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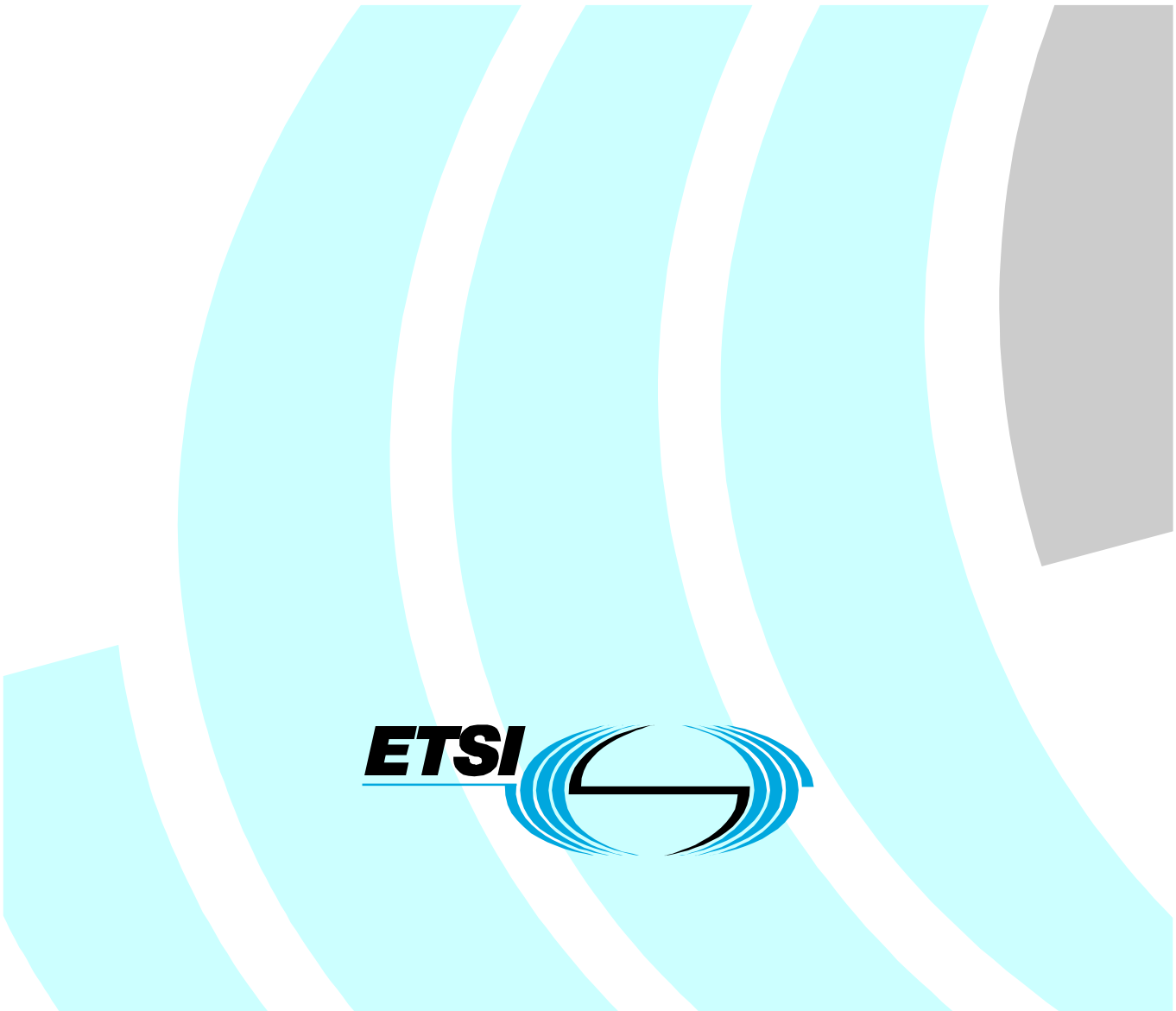
Technical Specification

Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Technology Mapping; Implementation of TIPHON architecture using H.323



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Foreword

This Technical Specification (TS) has been produced by ETSI Project Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON).

1 Scope

The present document describes how the H.323 [1] protocol suite can be used to implement the architecture, defined in TS 101 882 part 1 [8] to part 5 [12].

The present document defines the mapping of the following services:

- Registration and Service Attachment service;
- Simple Call service;
- Media Control Service; and
- Transport control service.

The present document is applicable to equipment performing the roles of terminal, gateway, gatekeeper, AuF, VLF, HLF, MT, BE and also to entities within the IP network that are necessary to support TIPHON Release 4.

The H.323 profile contained in the present document was derived by examination of:

- ITU-T Recommendation H.323 [1] and associated suite of protocols:
  - H.225.0 (RAS and Q.931);
  - H.245 (Media control channel-signalling protocol);
  - H.501 (Mobility and Collaboration procedures - Overview of Mobility and Collaboration, definitions, protocols and procedures);
  - H.510 (Mobility and Collaboration procedures - Mobility for H-Series multimedia systems and services);
  - H.235 (Security and encryption for H-series (H.323 and other H.245-based) multimedia terminals); and
  - H.530 (Mobility and Collaboration procedures - Security for mobile multimedia systems and services)
- the capabilities required by TS 101 878 [14] for the support of TIPHON;
- end-to-end Quality of Service in TS 102 024-3 [15];
- the TIPHON baseline architecture described in TS 101 314 [13]; and
- the primitives, parameters and procedures defined in ETSI TS 101 882-1 [8].

Figure 1 is derived from TS 101 314 [13] and illustrates the scope of the present document.

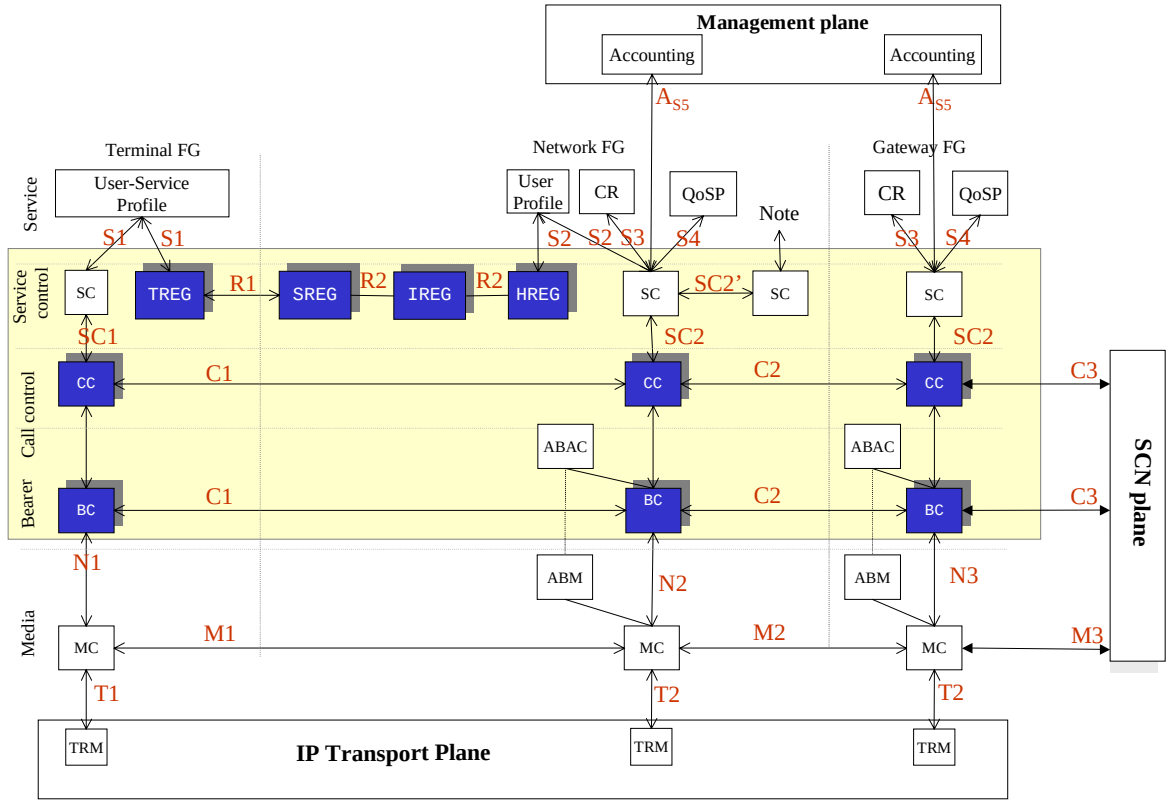

Figure 1: Scope of the present document

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
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[1] ITU-T Recommendation H.323: "Packet-based multimedia communications systems".

[2] ITU-T Recommendation H.225.0: "Call signalling protocols and media stream packetization for packet-based multimedia communication systems".

[3] ITU-T Recommendation H.245: "Control protocol for multimedia communication".

[4] ITU-T Recommendation H.501: "protocol for mobility management and intra/inter-domain communication in multimedia systems ".

[5] ITU-T Recommendation H.510: "Mobility for H.323 multimedia systems and services".

[6] ITU-T Recommendation H.530: "Symmetric security procedures for H.323 mobility in H.510".

[7] ITU-T Recommendation H.235: "Security and encryption for H-Series (H.323 and other H.245-based) multimedia terminals".

[8] ETSI TS 101 882-1: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Protocol Framework Definition; Part 1: Meta-protocol design rules, development method, and mapping guideline".

[9] ETSI TS 101 882-2: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Protocol Framework Definition; Part 2: Registration and Service Attachment service meta-protocol definition".

[10] ETSI TS 101 882-3: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Protocol Framework Definition; Part 3: TIPHON Simple Call service meta-protocol definition".

[11] ETSI TS 101 882-4: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Protocol Framework Definition; Part 4: Media control Service meta-protocol definition".

[12] ETSI TS 101 882-5: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Protocol Framework Definition; Part 5: Transport control service".

[13] ETSI TS 101 314: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Abstract Architecture and Reference Points Definition; Network Architecture and Reference Points".

[14] ETSI TS 101 878: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Service Capability Definition; Service Capabilities for TIPHON Release 4".

[15] ETSI TS 102 024-3: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; End-to-end Quality of Service in TIPHON Systems; Part 3: Signalling and Control of end-to-end Quality of Service".

[16] ETSI TS 101 315: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Information flow and reference point definitions; Implementation of service capabilities".

[17] ETSI TS 101 321: "Telecommunications and Internet Protocol Harmonization Over Networks (TIPHON) Release 4; Open Settlement Protocol (OSP) for Inter-Domain pricing, authorization and usage exchange".

[18] ECMA-332: "Corporate Telecommunication Networks - Signalling Interworking between QSIG and H.323 - Basic Services".

[19] ECMA-307: "Corporate Telecommunication Networks - Signalling Interworking between QSIG and H.323 - Generic Functional Protocol for the Support of Supplementary Services (ISO/IEC 21409)".

[20] ECMA-308: "Corporate Telecommunication Networks - Signalling Interworking between QSIG and H.323 - Call Transfer Supplementary Services (ISO/IEC 21410)".

[21] ECMA-309: "Corporate Telecommunication Networks - Signalling Interworking between QSIG and H.323 - Call Diverson Supplementary Services (ISO/IEC 21411)".

[22] ECMA-326: "Corporate Telecommunication Networks - Signalling Interworking between QSIG and H.323 - Call Completion Supplementary Services".

[23] ECMA-333: "Private Integrated Services Network (PISN) - Mapping Functions for the Tunnelling of QSIG through H.323 Networks".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TS 101 314 [13] and TS 101 878 [14] apply.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AD-BES	Administrative Domain Back End Service
ARQ	Admission ReQuest
AuF	Authentication Function
BE	Border Element
BES	Back End Service
CCA	Call Control Agent
CLC	Close Logical Channel
FE	Functional Entity
FG	Functional Group
GCF	Gatekeeper Confirm
GK	GateKeeper
GRJ	Gatekeeper ReJect
GRQ	Gatekeeper ReQuest
HLF	Home Location Function
IP	Internet Protocol
MC	Media Control
MCUs	Multipoint Control Units
MFE	Media control Functional Entity
MGC	Media Gateway Controller
MGW	Media GateWay
MT	Mobile Terminal
NAT	Network Address Translation
NFG	Network Functional Grouping
OLC	Open Logical Channel
PE	Protocol Entity
PSTN	Public Switched Telephony Network
QoS	Quality of Service
RAS	Registration Admission on Status
RCF	Register ConFirm
RIP	Request In Progress
RRJ	Register ReJect
RRQ	Register Request
SCN	Switched Circuit Networks
SG	Signalling Gateway
SPOA	Service Point Of Attachment
TCS	Terminal Capability Set
TE	TErminal
UCF	Unregister ConFirm
UDP	User Datagram Protocol
URJ	Unregister ReJect
URQ	Unregister ReQuest
VLF	Visitor Location Function
VoIP	Voice over IP

4 H.323 environment overview

4.1 Introduction

The purpose of the present document is to identify gaps in TIPHON to H.323 [1] direction between both protocols. To describe how to implement H.323 [1] protocol but how TIPHON protocol can be represented in H.323 environment and vice versa. For example to accentuate behaviour and mandatory parameter in H.323 but without equivalence in TIPHON information elements that are not documented. Extra behaviour can have to be implemented in H.323 without corresponding to any TIPHON information and are not described in the present document too.

4.2 H.323 protocol

Finalized and approved by the International Telecommunications Union (ITU) in 1996, the H.323 protocol suite is revolutionizing IP telephony and data and video teleconferencing.

H.323 serves as the "umbrella" set of recommendations defining real-time multimedia communications and conferencing over packet-based networks. These recommendations define how components that are built in compliance with H.323 set up calls, exchange compressed audio and video, participate in multiunit conferences, and operate with non-H.323 endpoints.

The H.323 Recommendation:

- Defines how audio and videoconferencing systems communicate over packet-switched networks that do not guarantee Quality of Service (QoS), such as the Internet and Intranets.
- Addresses call control and management for both point-to-point and multipoint conferences.
- Addresses QoS issues with a centralized gatekeeper component that LAN administrators to manage media traffic, bandwidth, and user participation.
- Addresses gateway functionality that allows calls to connect from the LAN to the Public Switched Telephone Network (PSTN), as well as to other H.32x recommendations-based terminals.

4.2.1 H.323 signalling, procedures and messages

4.2.1.1 H.323 signalling

H.323 is a protocol using binary data and, like most other similar protocols, it requires an abstract notation for defining its message structures so that programmers do not have to work at the binary layer. ASN.1 (Abstract Syntax Notation Number One) is the abstract notation used by ITU-T Recommendation H.323 [1].

4.2.1.2 TIPHON related H.323 procedures

Fast Connect	ITU-T Recommendation H.323 [1], clause 8.1.7	
Pre-Granted ARQ	ITU-T Recommendation H.225.0 [2],clause 7.9.2	Registration Confirm (RCF)
GatekeeperRouted callModel	ITU-T Recommendation H.323 [1], clause 8.1.7	
En-bloc Procedure	The H.323 terminal shall indicate that the en-bloc procedure is always used in at least one of the following ways: - include the **canOverlapSend** parameter in the SETUP message and set the value to **FALSE**; or	

NOTE: By not including the parameter, the value FALSE, will be assumed by the network.

- include the *Sending complete* information element in the SETUP message.

4.2.1.3 TIPHON relevant H.323 messages

H.225.0/Q.931

- Alerting;
- Call Proceeding;
- Connect;
- Progress;
- Release Complete;
- Setup;
- Setup Aknowledge.

H225/RAS

- GRQ/GCF/GRJ;
- RRQ/RCF/RRJ;
- URQ/UCF/URJ;
- ARQ/ACF/ARJ;
- DRQ/DCF/DRJ;
- RIP.

H.245

- Terminal Capability Set;
- Terminal Capability Set Acknowledge;
- Terminal Capability Set Reject;
- Terminal Capability Set Release;
- Open Logical Channel;
- Open Logical Channel Acknowledge;
- Open Logical Channel Reject;
- Open Logical Channel Confirm;
- Close Logical Channel;
- Close Logical Channel Acknowledge.

H.501

- DescriptorIDRequest;
- DescriptorIDConfirmation;
- DescriptorUpdate;
- DescriptorUpdateAck;
- AccessRequest;
- AccessConfirmation.

4.2.2 H.323 Protocol components

The H.323 components defined by the recommendation include:

- Terminals;
- Gateways;
- Gatekeepers;
- Multipoint Control Units (MCUs).

Terminals

Terminals provide real-time communications. They must support voice communications and can optionally support video or data communications

Gateways

H.323 gateways provide services to H.323 clients so that they can communicate with non-H.323 entities. The most common type of H.323 gateway allows communications between H.323 terminals and telephones on the circuit-switched network. The gateway must provide translations between different transmission formats, communications procedures, and audio codecs.

Gatekeepers

Gatekeepers provide call control services for H.323 endpoints, such as address translation and bandwidth management. Gatekeepers in H.323 networks are optional. If they are present in a network, however, endpoints *must* use their services. The H.323 recommendations define mandatory services that the gatekeeper must provide and specifies other optional functionality that it can provide.

Multipoint Control Units (MCUs)

Multipoint Control Units (MCUs) provide support for conferences of three or more endpoints.

An MCU manages conference resources, negotiations between endpoints for the purposes of determining the audio or video codec to use, and may or may not handle the media stream.

4.2.3 H.510 protocol components

A more detailed study of ITU-Recommendations H.501 [4] (Protocol for mobility management and intra/inter-domain communication in multimedia systems) and H.530 [6] (Symmetric security procedures for H.323 mobility in H.510 [5]) is needed.

AuF	**Authentication Function:** the AuF is responsible for authentication of a mobile user/terminal towards the serving domain (home or visited). It is always associated with the mobile user's/terminal's HLF, and thus with the home domain.
BE	**Border Element:** an H.323 mobile terminal is controlled by a home GK while roaming in the home domain, otherwise by a visited GK. In the latter case communication may further involve border elements in both administrative domains, home and visited. The GK also contains the information needed to handle the calls initiated or received by the H.323 MTs registered to it (e.g. supplementary service information received from the HLF, though for some supplementary services the GK may have to obtain additional information from the HLF).
HLF	**Home Location Function:** the HLF represents the home database that stores the permanent (subscription) data of a mobile user/terminal as well as the current location (by pointing to a VLF), if the user/terminal is online. This functional entity is always associated with the home domain.

MT **Mobile Terminal:** in addition to recommendation H.323 terminal functionality, an H.323 mobile terminal supports:

- the association with any authorized mobile user;
- the adoption of a mobile user's service profile;
- the dynamic change of network and/or H.323 point of attachment.

VLF **Visitor Location Function:** the HLF represents the home database that stores the permanent (subscription) data of a mobile user/terminal as well as the current location (by pointing to a VLF), if the user/terminal is online. This functional entity is always associated with the home domain.

5 Implementation of TIPHON functional architecture using H.323

ITU-T Recommendation H.323 [1] and associated suite of protocols identifies a number of entities. This section describes the behaviour of (and the communication between) the terminal, gatekeeper and the gateway.

TS 101 314 [13] defines a number of reference points and a number of functional groups. Those reference points and functional groups need to be mapped to the ITU-T Recommendation H.323 [1] architecture. Figure 1a shows the ITU-T Recommendation H.323 [1] entities and how they map to the functional layers defined in TS 101 314 [13] and the functional groups defined in TS 101 878 [14].

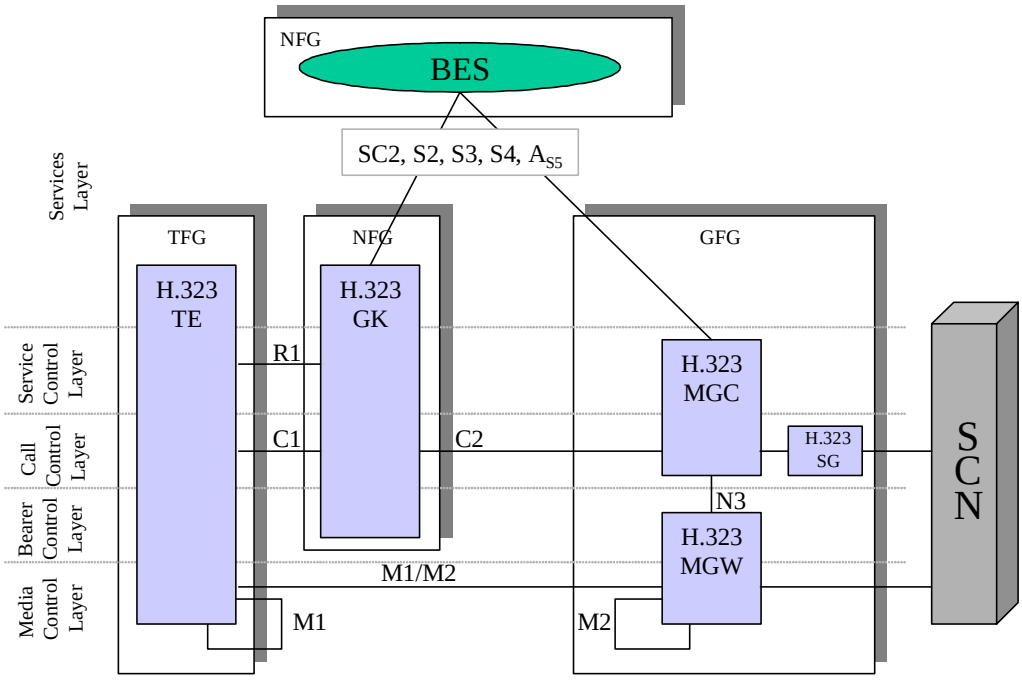


Figure 1a: The H.323 architecture mapped to the TIPHON functional layers and functional groups

The H.323 terminal (TE) shall provide the functionality of the terminal registration functional group, originating terminal functional group and the terminating terminal functional group.

The H.323 [1] gatekeeper (GK) shall provide the Functional Entities required in a Network Functional Group (NFG) with the exception of functional entities in the Media Control layer. Reference points S2, S3, S4, A_{S5} and SC2 may be internal to the gatekeeper, however the gatekeeper may also utilize services provided by external Service Providers using those interfaces. The GK may play the roles of an originating network functional group, an intermediate network functional group or a terminating network functional group.

The combination a Media Gateway Controller (MGC), an H.323 Signalling Gateway (SG), an H.323 Media Gateway (MGW) provides the functionality of the originating gateway functional group and terminating functional group. Reference points S2, S3, S4, A_{S5} and SC2 may be internal to the gatekeeper, however the gatekeeper may use these interfaces to access external service providers.

6 Registration service

6.1 Introduction

This clause applies to H.323 terminals, gateways and gatekeepers and describes how ITU-T Recommendation H.323 [1] and the associated suite of protocols shall be used in order to implement the Registration Meta-protocol defined in TS 101 882-2 [9].

NOTE: The term "endpoint" or "H.323 endpoint" shall be used to indicate an H.323 terminal or an H.323 gateway.

6.1.1 Description

The registration service enables a user to seek and gain authority to invoke service in a domain for which access is strictly controlled. The service applications to be offered are determined, in part, by data held in the user profile.

The basic registration mechanisms can be described as follow:

1) User registration: The user registers for the service and shows entitlement for the service used.

2) Service preparation: The registrar selects a service node at which the user shall use the service and informs the service node that the user is entitled to use the service.

3) Service attachment: The user (terminal) attaches to the service node and the service can be delivered.

Two registration scenarios shall be supported:

- the "User at home" scenario;
- the "Roaming user" scenario using ITU-T Recommendation H.510 [5].

6.1.2 H.323 (De)Registration behaviour

6.1.2.1 User at home (de)registration scenario

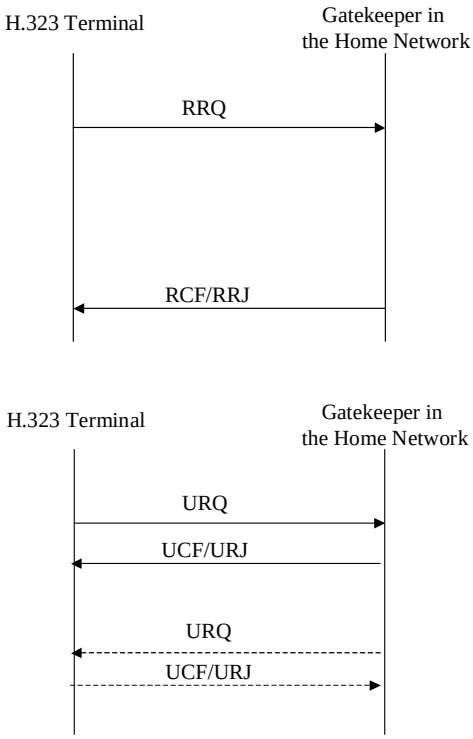


Figure 2: H.323 registration and unregistration behaviour in the "user at home" scenario

6.1.2.2 Roaming user (de)registration scenario

ITU-T Recommendation H.510

ITU-T Recommendation H.510 [5] deals with mobility aspects for H.323 systems above the transport layer.

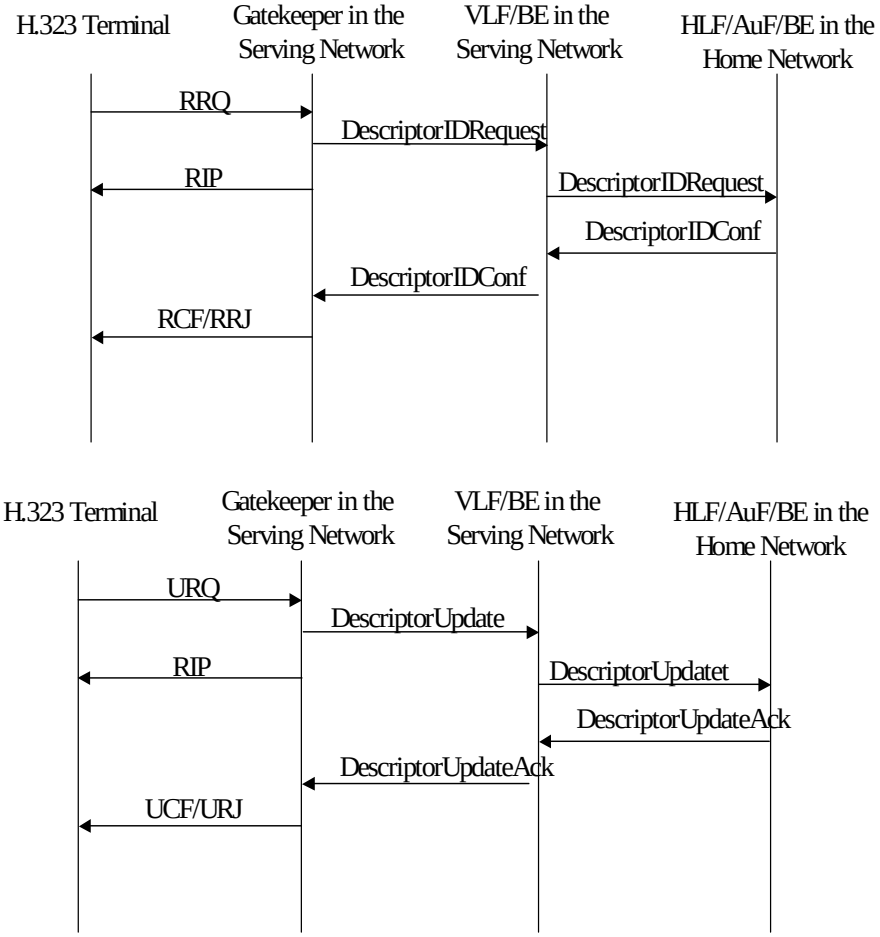


Figure 3: H.323 registration and unregistration behaviour in the "roaming user" scenario

6.2 Functional Entity model

6.2.1 Registration Functional Entity mapping

Table 1: Mapping of H.323 entities to TIPHON registration functional entities

TIPHON functional element		H.323 entity	
Identity	**TIPHON Description**	**User at Home**	**Roaming User**
RFE1	Registrant, the logical entity being registered	Endpoint	Endpoint(MT)
RFE2	Registrar, holder of user profile of the registrant	Gatekeeper in Home network	VLF/BE
RFE3	Serving Service Provider point of Attachment (SpoA)	Gatekeeper in Home network	HLF/AuF/BE
RFE4	Previous SpoA	Not Applicable	Old VLF/BE or HLF/AuF/BE

6.3 Registration messages mapping

Table 2: Mapping of H.323 messages to TIPHON registration MPMUs

TIPHON message	RelationShip ID	H.323 messages
Registrer	RFE1<->RFE2	RRQ/RCF/RRJ
DeRegister	RFE1<->RFE2	URQ/UCF/URJ
Authorize	RFE2<->RFE3	No H.323 signalling
Detach	RFE2<->RFE3	No H.323 signalling
Attach	RFE3<->RFE1	No H.323 signalling
Detach	RFE2<->RFE4	URQ/UCF/URJ
NOTE: The use and content of H.501 signalling is for further study.		

6.4 Registration information flow mapping

6.4.1 Relationship ra (RFE1/RFE2), Register and DeRegister

Table 3: Mapping of H.323 to Register request from RFE1 to RFE2

Register request/indication(RRQ)					
TIPHON				H.323	
Information element		Status	Value	Mapping	Notes
TIPHON-reg-id		M	Any	terminalAlias	The registration ID is initially not provided by the endpoint. TerminalAlias can be used for TIPHON-reg-id mapping.
RegistrationMode		M	Initial registration Location update	KeepAlive	If KeepAlive=.False. RRQ is an initial registration.
Location (of Registrant)		M			
	protocolID			protocolIdentifier	
	nameorAddress			rasAddress/callSignalAddress	
	port			rasAddress/callSignalAddress	
ServiceName		M	TIPHON Simple Call…	No equivalent	

Table 4: Mapping of H.323 to Register response from RFE2 to RFE1

Registerresponse/confirmation(RCF/RRJ)				
TIPHON			H.323	
Information element	**Status**	**Value**	**Mapping**	**Notes**
TIPHON-reg-id	M	Any	endpointIdentifier	endpointIdentifier is not present for RRJ. RequestSeqNum is used to identify previous RRQ.
ServiceName	O (see note 2)		No equivalent	
Result	M	Registration successful, Registration-Id invalid, Service unavailable	RRQ RRJ:RejectReason(Notes).	invalidRevision, invalidCallSignalAddress, invalidRASAddress, invalidTerminalType, invalidAlias,securityDenial , invalidTerminalAliases, discoveryRequired, duplicateAlias, undefinedReason, transportNotSupported, transportQoSNotSupported, additiveRegistrationNotSupported, resourceUnavailable, fullRegistrationRequired,.
ServiceProviderName	O (see note 1)	Any	No equivalent	GatekeeperIdentifier could be used to indicate the service provider
ClientAuhorizationToken	O (see note 1)	Any	No equivalent	This information could be carried in the tokens or cryptoTokens field
NOTE 1: Provided if Result = "Registration successful". NOTE 2: Provided if Result = "Service unavailable".				

Table 5: Mapping of H.323 to DeRegister request from RFE1 to RFE2

DeRegister request/indication(URQ)				
TIPHON			H.323	
Information element	**Status**	**Value**	**Mapping**	**Notes**
TIPHON-reg-id	M	Any	endpointIdentifier	
ServiceName	M	TIPHON Simple Call…	No equivalent	

Table 6: Mapping of H.323 to DeRegister response from RFE2 to RFE1

DeRegistration *response/confirmation*(UCF, URJ)				
TIPHON			H.323	
Information element	**Status**	**Value**	**Mapping**	**Notes**
TIPHON-reg-id	M	Any	No equivalent	RequestSeqNum is used to identify previous URQ.
Result	M	Deregistration successful, Registration-Id invalid	URQ URJ:reason	

6.4.2 Relationship rb (RFE2/RFE3), authorize and detach

No H.323 registration signalling is defined between RFE2 and RFE3.

6.4.3 Relationship rc (RFE1/RFE3), attach

No H.323 registration signalling is defined between RFE1 and RFE3.

6.4.4 Relationship rd (RFE2/RFE4), detach

Table 7: Mapping of H.323 to DeRegister request from RFE2 to RFE4

DeRegister request/indication(URQ)				
TIPHON			H.323	
Information element	Status	Value	Mapping	Notes
TIPHON-reg-id	M	Any	endpointIdentifier	
ServiceName	M	TIPHON Simple Call…	No equivalent	

Table 8: Mapping of H.323 to DeRegister response from RFE4 to RFE2

DeRegistration *response/confirmation*(UCF, URJ)				
TIPHON			H.323	
Information element	Status	Value	Mapping	Notes
TIPHON-reg-id	M	Any	No equivalent	RequestSeqNum is used to identify previous URQ.
Result	M	Deregistration successfull, Registration-Id invalid	URQ URJ:reason	

6.5 Information flow sequences

NOTE: <message>: = to stipulate TIPHON message not covered by H.323.

6.5.1 Normal operation

6.5.1.1 Initial registration

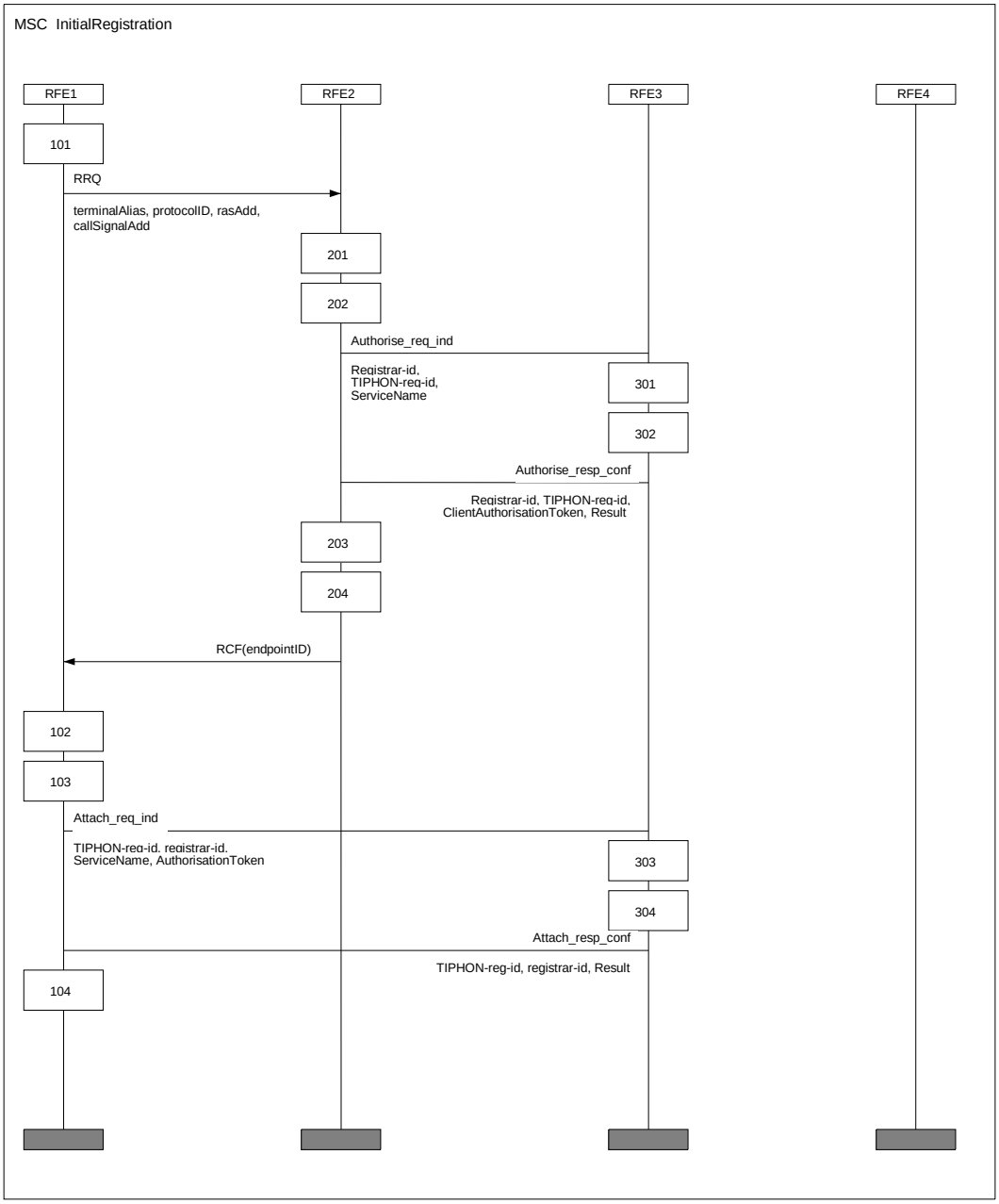


Figure 4: Initial registration

6.5.1.2 Change of SpoA (location update)

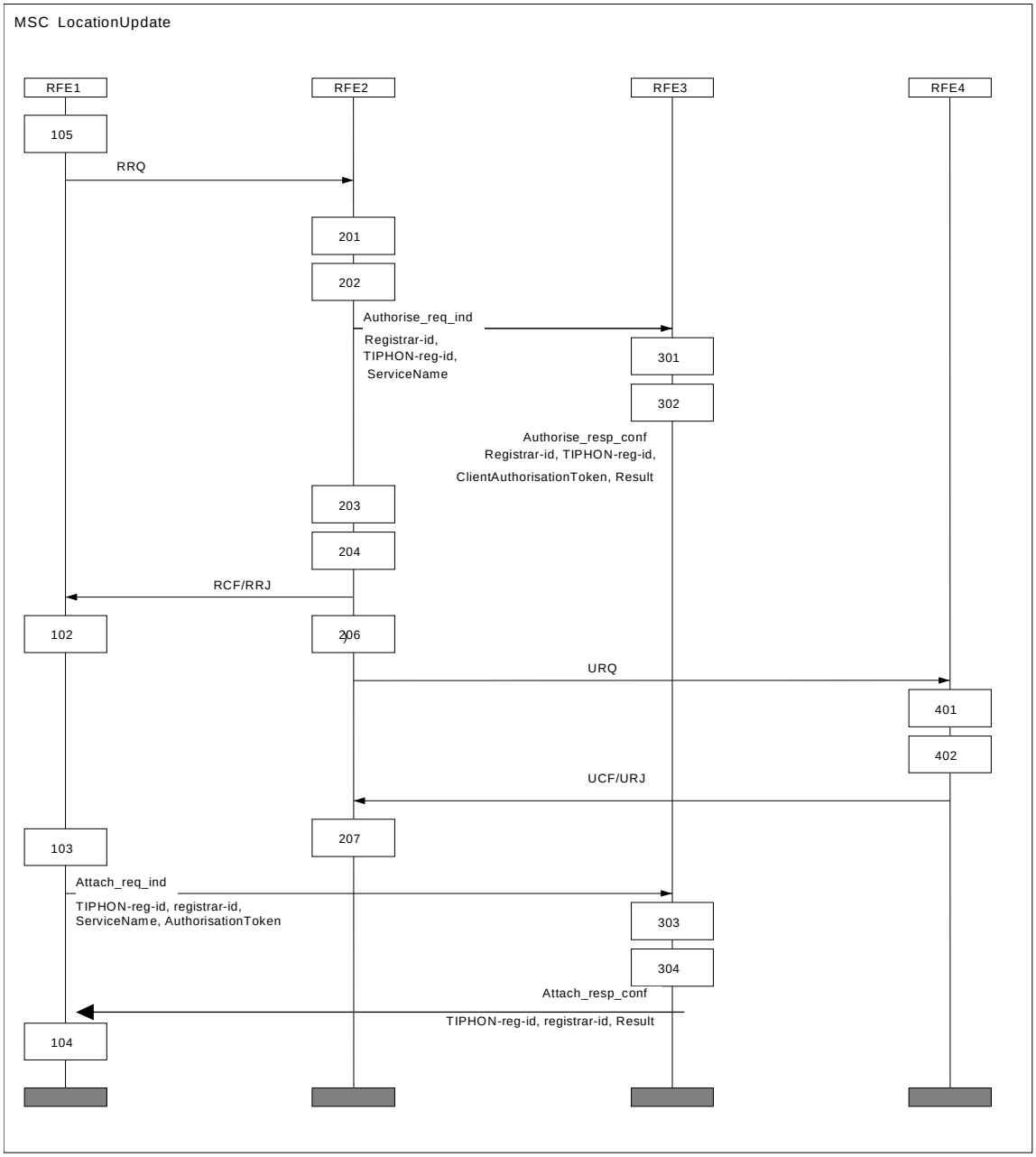


Figure 5: Change of SPoA

6.5.1.3 DeRegistration

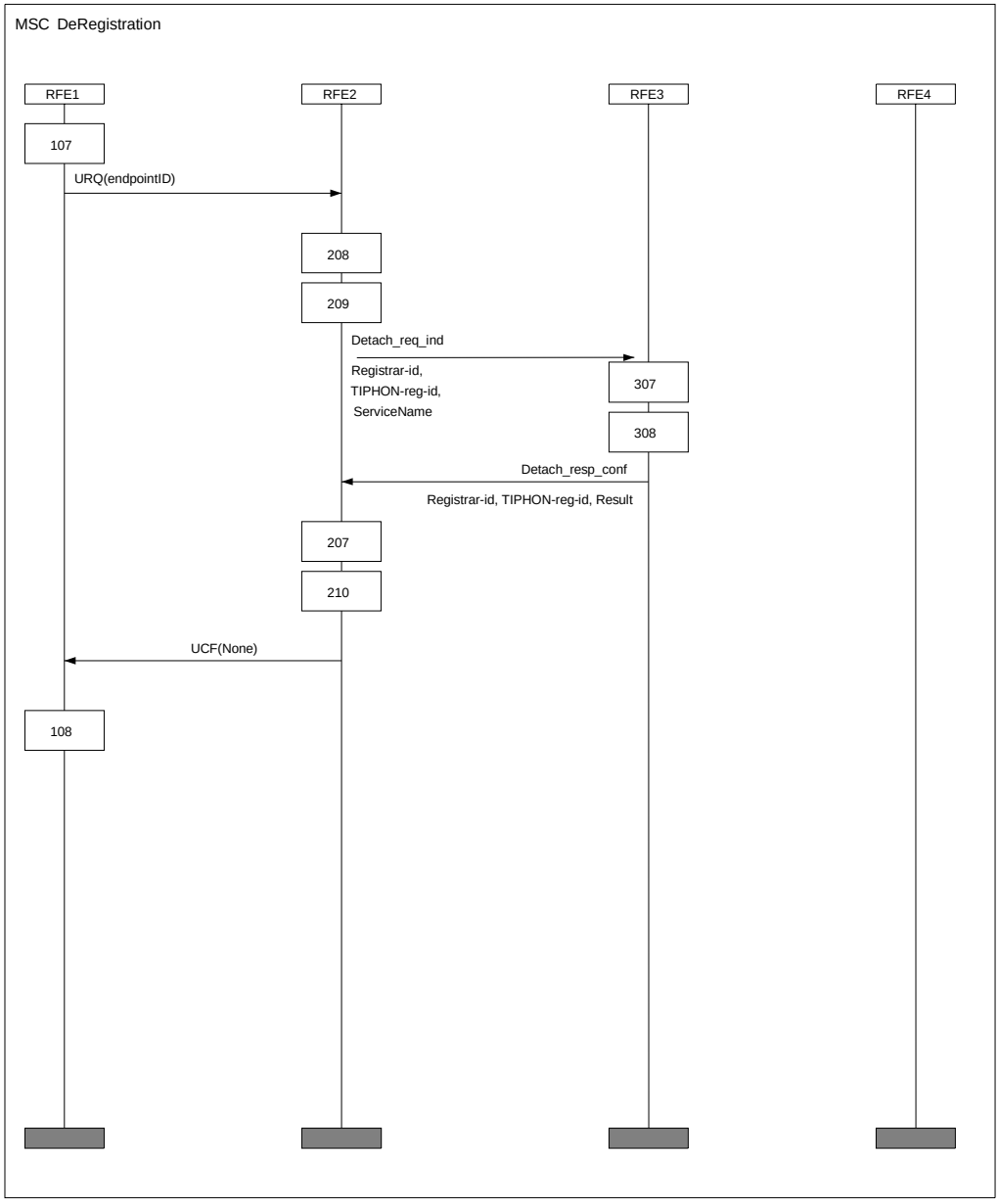


Figure 6: DeRegistration normal behaviour

6.5.2 Exceptional operation

6.5.2.1 Invalid identity

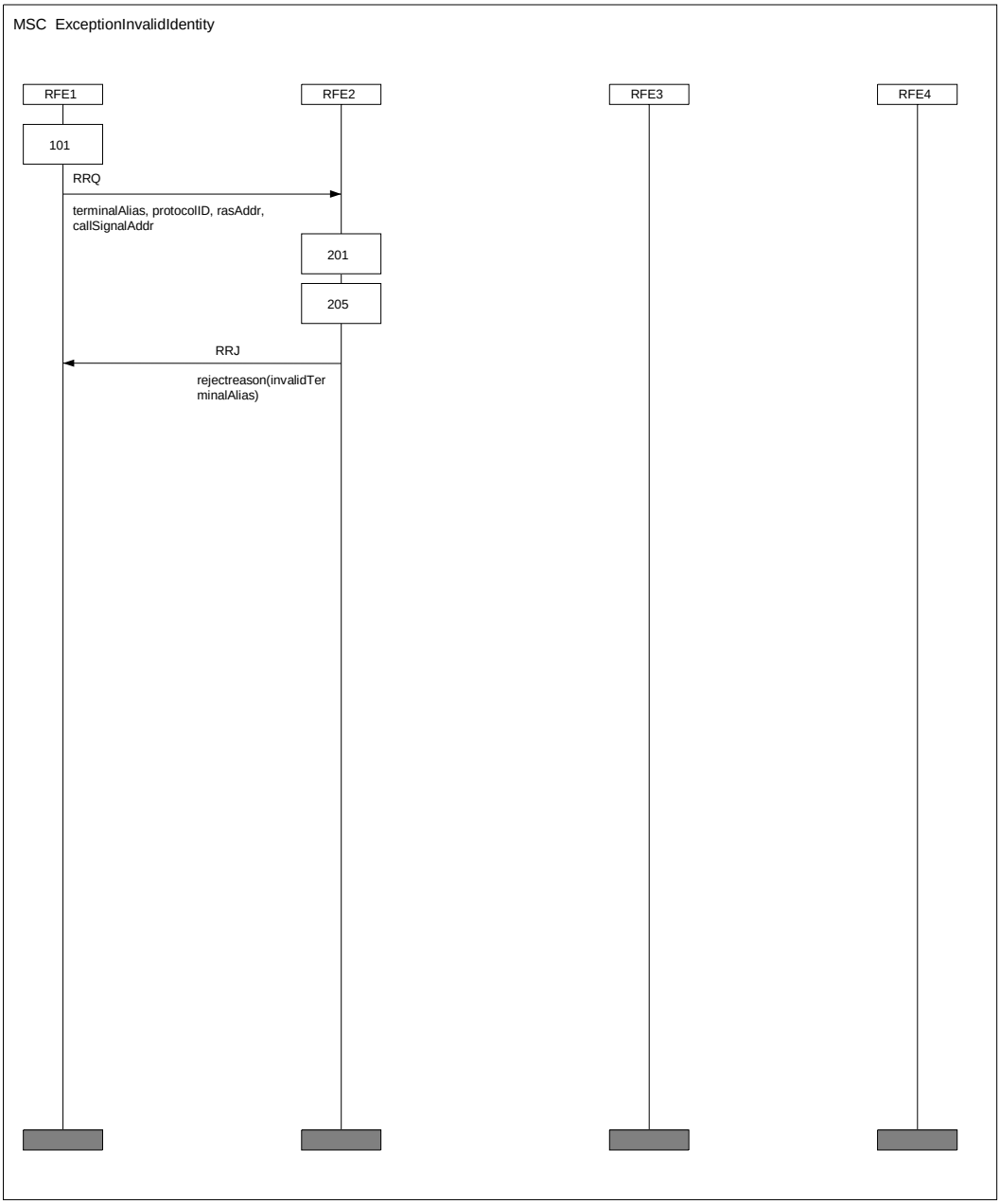


Figure 7: Invalid identity

6.5.2.2 Service not available

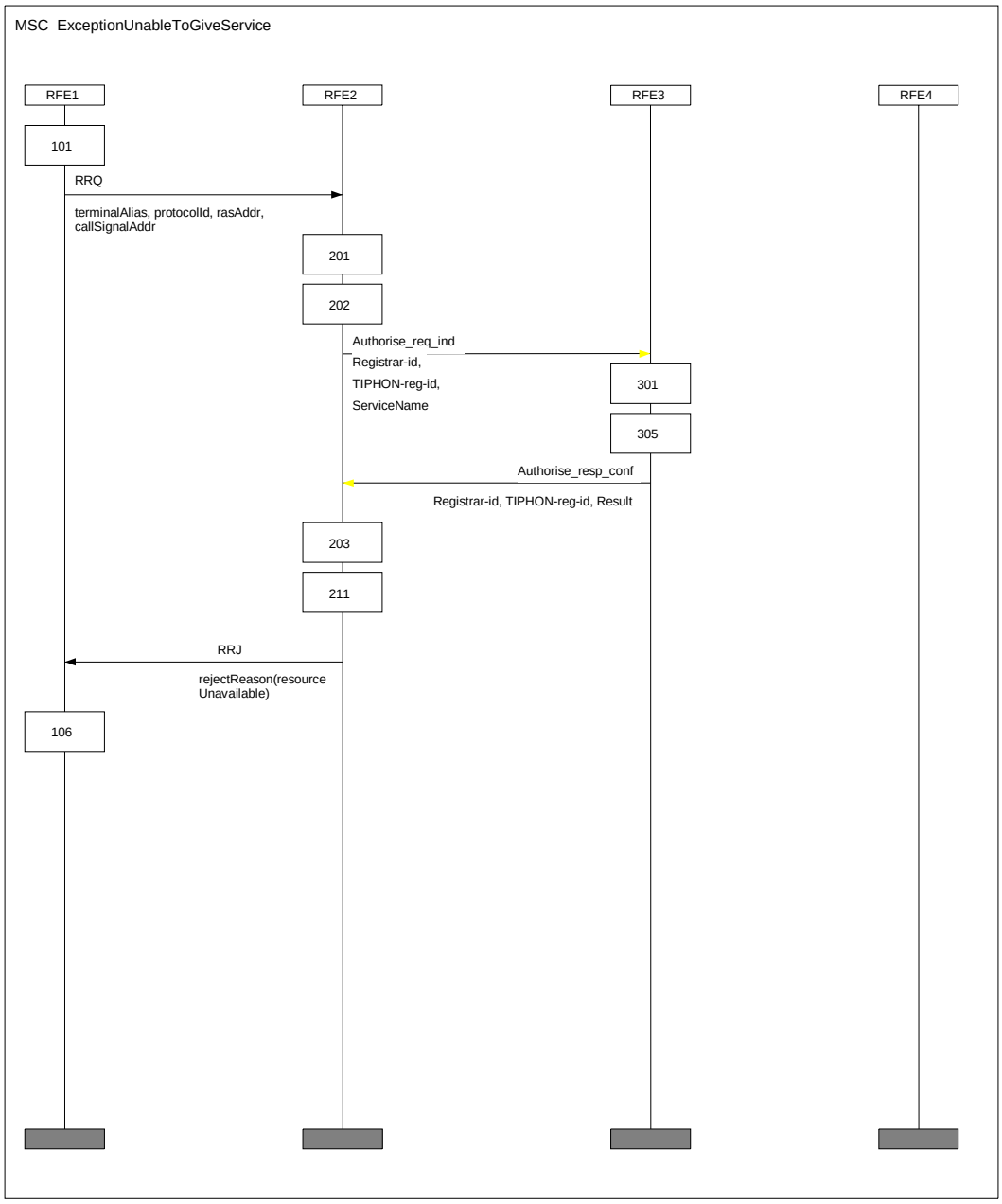


Figure 8: Service Not Available

6.6 Registration functional entity actions

Table 9: Mapping of H.323 to Registration action at RFE1

Actions at RFE1	
TIPHON action number	**H.323 action**
101	After GK discovery or manual GK-address provision, prepare and sending of RRQ message to RFE2
102	On receipt of a RCF message RFE1 shall extract endpointIdentifier and undertake action 103. On receipt of a RRJ message it shall extract the rejectReason. Depending of the result content, RFE1 shall undertake action accordingly(i.e. end registration or retry registration)
103	No H.323 signalling
104	No H.323 signalling
105	No H.323 signalling
106	No H.323 signalling
107	Prepare and send URQ message to RFE2
108	On receipt of UCF message, RFE1 shall end registration. On receipt of URJ message, RFE1 stays registerd with RFE2

Table 10: Mapping of H.323 to Registration action at RFE2

Actions at RFE2	
TIPHON action number	**H.323 action**
201	On receipt of RRQ message, RFE2 shall validate the terminalAlias. RFE2 shall also determine the type of registration request.
202	No H.323 signalling
203	No H.323 signalling
204	send RCF to RFE1
205	send RRJ to RFE1
206	send URQ to RFE4
207	No H.323 signalling
208	On receipt of URQ, RFE2 shall validate the endpointIdentifier
209	No H.323 signalling
210	send UCF to RFE1
211	No H.323 signalling

Table 11: Mapping of H.323 to Registration action at RFE3

Actions at RFE3	
TIPHON action number	**H.323 action**
	No H.323 signalling action

Table 12: Mapping of H.323 to Registration action at RFE4

Actions at RFE4	
TIPHON action number	**H.323 action**
401	No H.323 signalling action
402	Prepare and send UCF/URJ to RFE2

6.7 Conclusion

Gatekeeper discovery procedure should be covered. H.323 uses this procedure not only to discover a gatekeeper but also for failure, redundancy and security reasons ITU-T Recommendations H.323 [1] clause 7.2.1, H.235 [7] and H.530 [6].

H.323 does not register for service as such it may be worth considering a scenario of attachment leading to authorize (i.e. attach to RFE3 and then for RFE3 to do an authorize). H.323 "registers" for services (i.e. voice, video, data, conf, etc.) at call set-up time. At that point RFE2 will authorize with RFE3 and so on.

ITU-T Recommendation H.510 [5] covers the aspects of TIPHON roaming user. PEs were implemented and mapped but this recommendation and its implementation to TIPHON is for further study.

Missing: Deregistration triggered by RFE2.

7 Simple call service

7.1 Introduction

The intentions with this clause are to describe the simple call application defined with the Meta-protocol in TS 101 882-3 [10] using procedures defined in H.323 protocol suite and map those procedures to the architecture of TS 101 314 [13].

Two scenarios shall be supported:

- the "user at home" scenario; and
- the "roaming user" scenario.

NOTE: For details about the scenario (including some examples) see the TS 101 315 [16].

This clause describes some general behaviour during call establishment.

- only GatekeeperRouted callModel shall be used (i.e. all call related signalling shall be passed to the Gatekeeper);
- there is no bearer control negotiation in TIPHON, all resources are reserved in both directions while the set-up of the call (SETUP) is progressing and connect on a successful answer. Therefore only ITU-T Recommendation H.323 [1] FastConnect procedure shall be used;
- endpoints shall previously be registered with a gatekeeper (see clause 6 of the present document); and
- endpoints shall implement en-bloc procedure (see clause 4.2.1.2 of the present document).

7.1.1 Description

A TIPHON simple call is the means by which a temporary logical association is established (and subsequently cleared) between two or more users within a TIPHON system for the purpose of conveying information.

7.1.2 H.323 simple call behaviour

Figure 9 shows a H.323 call scenario that fits best with the TIPHON architectural approach.

Both endpoints registered with different gatekeepers;

GatekeeperRouted callModel (clause 4.2.1.2 of the present document);

No pregranted ARQ environment (for QoS purposes, clause 10 of the present document); and

Fast Connect procedure is implemented (clause 4.2.12 of the present document).

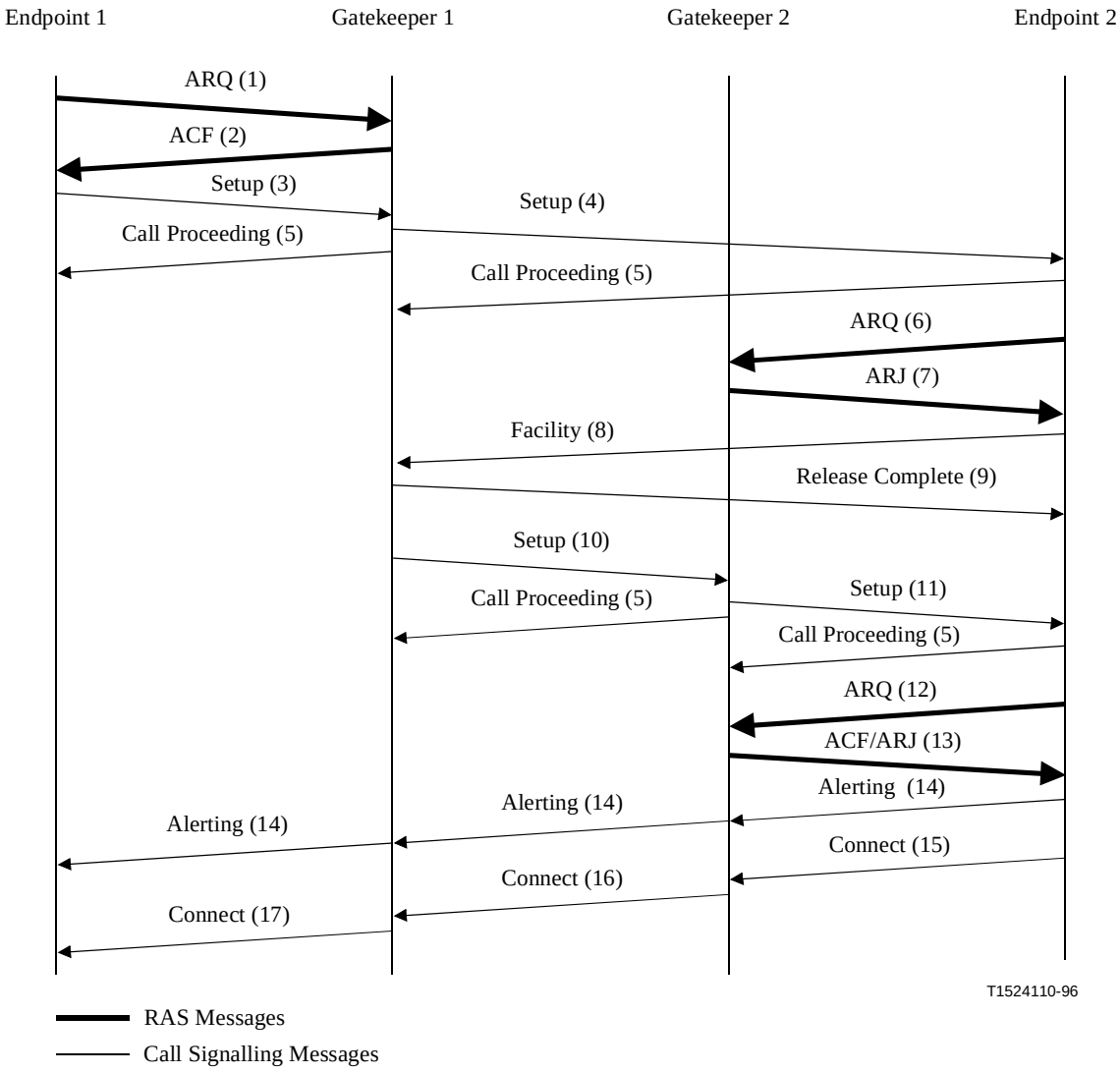
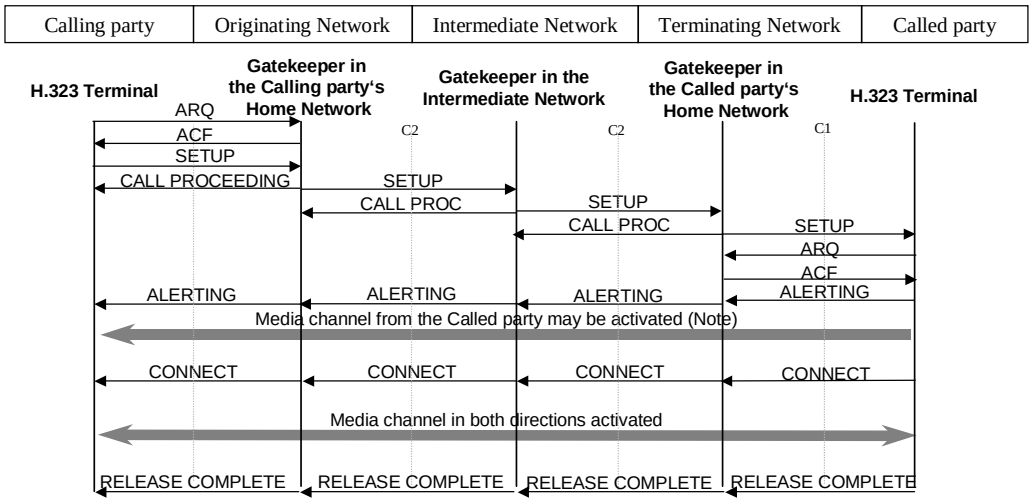


Figure 9: ITU-T Recommendation H.323 [1] Both EPs registered with different gatekeepers

7.1.2.1 User at home

Figure 10 shows the message flows related to call establishment and call release for a call where both users are at home.



NOTE: Called party may provide in-band information towards the calling party (e.g. the ringing tone) by means which re not in the scope of the present document.

Figure 10: Example of a call from a "User at home" connected to the IP network to a "User at home" connected to the IP network

7.1.2.2 Roaming user

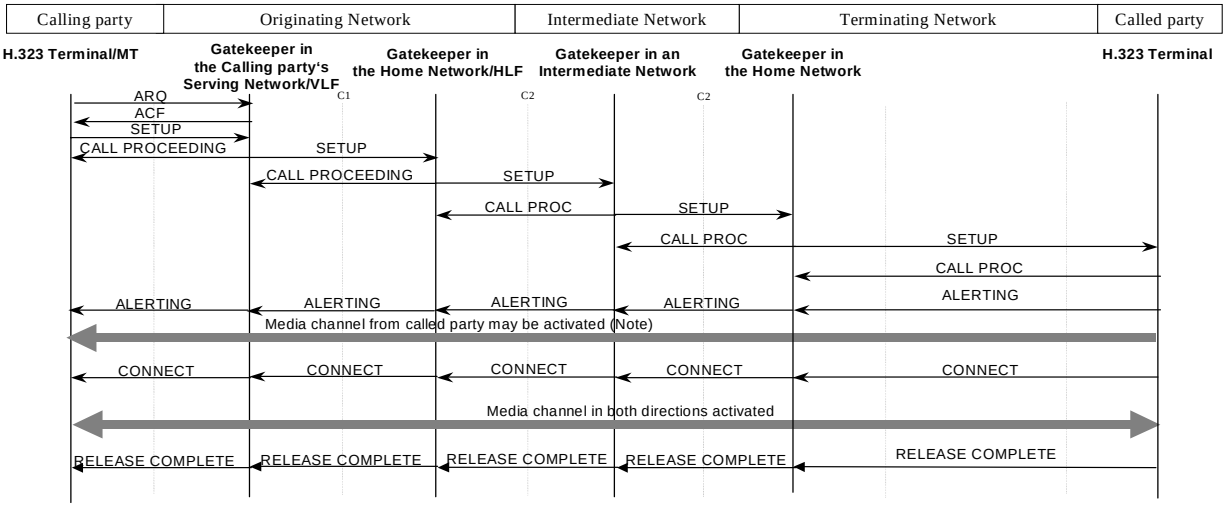
ITU-T Recommendation H.510 [5] 7.5 procedure describes 2 distinguished cases.

- outgoing call handling: calls originating by an H.323 MT;
- incoming call handling: calls terminating by an H.323 MT; and
- incoming and outgoing call is a combination of both cases.

7.1.2.2.1 Outgoing call handling

Figure 11 shows the message flows related to call establishment and release for a call where calling user is a roaming user.

The gatekeeper in the serving network uses information stored during the registration to locate the gatekeeper in the home network. For outgoing call handling, mobility can be supported by normal H.323 procedures. Any additional mobility specific requirements are for further study.



NOTE: Called party may provide in-band information towards the calling party (e.g. the ringing tone) by means which are not in the scope of the present document.

Figure 11: An example of a call from a "Roaming user" connected to the IP network to a "user at home" connected to the IP network

7.1.2.2.2 Incoming call handling

Figure 11 shows the message flows related to call establishment and release for a call where the called user is a roaming user.

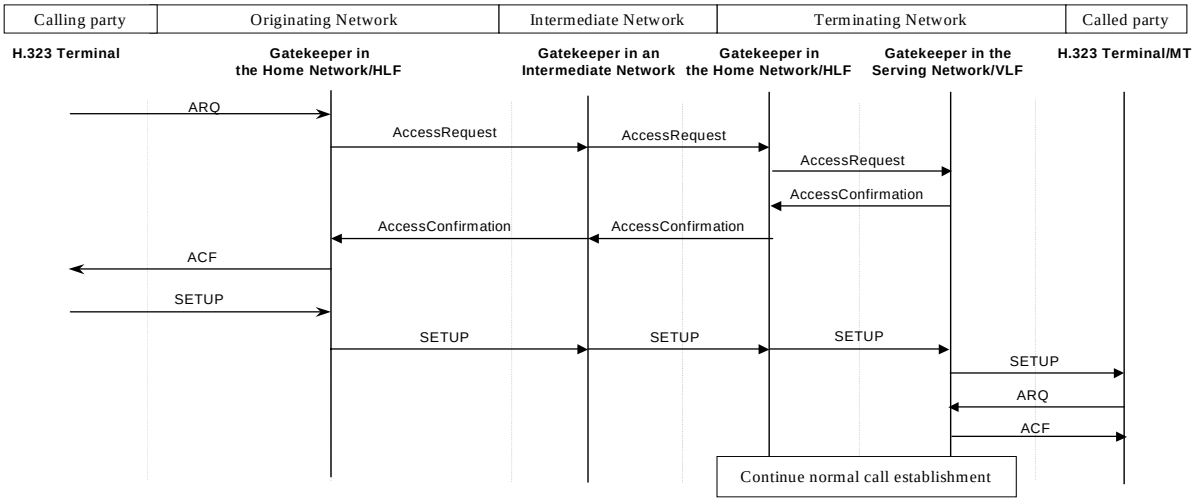


Figure 12: An example of a call from a "user at home" connected to the IP network to a "roaming user" connected to the IP network

7.1.2.2.3 Incoming and outgoing call

NOTE: Combination of pervious 2 roaming user call scenarios.

7.2 Simple call Functional Entities mapping

Table 13: Mapping of H.323 entities to TIPHON simple call functional entities

TIPHON functional element		H.323 entity	
Identity	**TIPHON Description**	**User at Home**	**Roaming User**
Calling User	The application at the calling user's terminal which instigates the service request;	Calling Endpoint	Calling Endpoint/MT
$CFE1_{OUA}$	The originating user service agent in the calling user's terminal that instigates the service request.	Calling Endpoint	Calling Endpoint/MT
$CFE2_{PE}$	The serving network policy control function associated with the calling user's service provider;	NA	NA
$CFE3_{OCC}$	The originating call coordination function that is responsible for establishing the call on behalf of the calling user;	Gatekeeper in the home network	Gatekeeper in the serving and home network VLF/HLF
$CFE4_{OR}$	The originating call routing function, providing routing information and number/address translations;	NA	NA
$CFE5_{OT}$	The originating transport coordination function serving the calling user;	Gatekeeper in the home network	Gatekeeper in the serving and home network VLF/HLF
$CFE6_{ICC}$	An intervening call control coordination function. This CFE is responsible for establishing the call via the intervening domain;	Gatekeeper in the intermediate network	Gatekeeper in the intermediate network
$CFE7_{IR}$	An intervening routing function;	NA	NA
$CFE8_{IT}$	An intervening transport coordination function;	Gatekeeper in the intermediate network	Gatekeeper in the intermediate network
$CFE9_{TCC}$	The destination call coordination function that is responsible for establishing the requested call on behalf of the called user;	Gatekeeper in the terminating network	Gatekeeper in the terminating network/VLF/HLF
$CFE10_{TT}$	The destination transport coordination function serving the called user;	Gatekeeper in the terminating network	Gatekeeper in the terminating network/VLF/HLF
$CFE11_{TUA}$	The service agent that processes an incoming call to the called user	Gatekeeper in the terminating network	Gatekeeper in the terminating network
Called User	The application in the called user's terminal at which the service request is terminated.	Called endpoint	Called endpoint/MT

7.3 Simple call messages mapping

Table 14: Mapping of H.323 messages to TIPHON simple call MPMUs

TIPHON message	RelationShip ID	H.323 messages
TCC_OrigCallSetup	Calling User<->CFE1	No H.323 signalling
TCC_CallRelease	Calling User<->CFE1	No H.323 signalling
ServingNwPolicy	CFE1<->CFE2	No H.323 signalling
CallSetup	CFE1<->CFE3	RAS: ARQ/ACF/ARJ H.225.0: SETUP/SETUP ACK/CALL PROCEEDING/PROGRESS/ALERTING/CONNECT
CallRelease	CFE1->CFE3	RAS: DRQ/DCF/DRJ H225.0: RELEASE COMPLETE
CallRoute	CFE3<->CFE4 CFE6<->CFE7	No H.323 signalling
TRMReserve	CFE3<->CFE5 CFE6<->CFE8 CFE9<->CFE10	RSVP Triggered by ARQ at CallSetup. NOTE(1)
TRMConnect	CFE3<->CFE5 CFE6<->CFE8 CFE9<->CFE10	RSVP
TRMRelease	CFE3<->CFE5 CFE6<->CFE8 CFE9<->CFE10	RSVP
NWCallSetup	CFE3<->CFE6 CFE6<->CFE9	SETUP/CALL PROCEEDING /PROGRESS/ ALERTING/CONNECT
NWCallRelease	CFE3<->CFE6 CFE6<->CFE9	RELEASE COMPLETE
DestCallSetup	CFE9<->CFE11	RAS: ARQ/ACF/ARJ H.225.0: SETUP/CALL PROCEEDING /PROGRESS /ALERTING/CONNECT
DestCallRelease	CFE9<->CFE11	RAS: DRQ/DCF/DRJ H225.0: RELEASE COMPLETE
TCC_DestCallSetup	CFE11<->Called User	No H.323 signalling
TCC_CallRelease	CFE11<->Called User	No H.323 signalling
NOTE: QoS support for H.323, clause 11 of the present document.		

7.4 Simple Call information flow Mapping

No mapping exists for relationships ra and rb.

7.4.1 Relationship rc (CFE1/CFE3)

Table 15: Mapping of H.323 to CallSetup request from CFE1 to CFE3

CallSetup *request/indication*(ARQ, SETUP)					
TIPHON			**H.323**		
Information element	**Status**	**Value**	**Mapping**		**Notes**
Call Identifier	M (see note 1)	Alphanumeric handle	callIdentifier		
Calling user ID restriction	M	Available/unavailable	presentationIndicator	presentationAllowed presentationRestricted or addressNotAvailable	
Calling user ID	O (see note 2)	TIPHON user name	Calling party number		
Called user ID	M	TIPHON user name	Called party number		
Service Offer Ticket	M	TicketType	No equivalent		
Transport QoSparameter	M	TransportParams	ARQ: transportQOS parameters		See note 6
maximumDelay	M	MicroSeconds	No equivalent		
maxDelayVariation	M	MicroSeconds	No equivalent		
maxMeanPacketLoss	M	PercentX1000	No equivalent		
Transport parameters qualifier	M	Enumerated : totalRemainingBudget, budgetAvailableForDomain	No equivalent		
TrafficDescriptior	M	TrafficDesc	Fast start parameters		
peakFrameRate	M	Integer	No equivalent		
maxFrameLength	M	Integer	No equivalent		
Codec	M	List of possible codecs	List of audioCapabilities in fast start IE		
Transcode count	M	Number of codec transcoding	Number of audioCapabilities		
Calling User Access Point	O (see note 3)	Network specific address	sourceAddress		
Destination Service domain	O (see note 4)	Domain address	No equivalent		
Routing number	O (see note 5)	Domain address	No equivalent		
Previous Domain Egress Point		Network specific address	No equivalent		
Next Domain Egress Point		Network specific address	No equivalent		

NOTE 1: A temporary Call Identifier value may be used in the call set-up request.
NOTE 2: Shall be present if "Calling User ID restriction" information element is set to value "available".
NOTE 3: This element is available only if by some means the next or destination network address can be determined initially. If so, this information may simplify route calculations in other functional groups.
NOTE 4 One at least has to be set.
NOTE 5: This element is available only if by some means the next or destination network address can be determined initially. If so, this information may simplify route calculations in other functional groups.
NOTE 6: An endpoint may use this to indicate its capability to reserve transport resources.
ITU-T Recommendation H.225.0 ARQ [2].

Table 16: Mapping of H.323 to CallSetup response from CFE3 to CFE1

CallSetup *response/confirmation*(ACF, ARJ,CALL PROCEEDING, PROGRESS, ALERTING, CONNECT)				
TIPHON			**H.323**	
Information element	**Status**	**Value**	**Mapping**	**Notes**
Call Identifier	M (see note 1)	Alphanumeric handle	callIdentifier	
Codec	O (see notes 2 and 3)	List of possible codecs	Selection of audioCapabilities in fast start IE	One or two codecs can be selected according to the use of symmetric or asymmetric codecs
Transcode count	O	Number of codec transcoding	Number of audioCapabilities	
Result	M	- Call established - Rejection cause Invalid ticket Insufficient resources Called user busy Transport not available Requested QoS not available Called user unknown - No compatible codec available	-CONNECT - neededFeatureNotSupported -noBandwidth -inConf -noBandwidth, newConnectionNeeded -QoSRelease element in ARJ -calledPartyNotRegistered, unreachableDestination, destinationRejection -empty audioCapability list	(see note 5)
Next Domain Egress Point	O (see note 6)			

NOTE 1: A temporary Call Identifier value may be used in the call setup request.
NOTE 2: The list of codecs shall be limited to a single entry in the response.
NOTE 3: This element shall be included if the result of the request is "Call established".
NOTE 4: ReleaseCompleteReasons table 8/H.225.0 [2].
NOTE 5: Fast connect procedure (see clause 4.2.1.2 of the present document).
NOTE 6: This element shall be included only if required to establish a dynamic address relationship between network funcional groups.

Table 17: Mapping of H.323 to CallRelease request from CFE1 to CFE3

CallRelease *request/indication*(RELEASE COMPLETE)				
TIPHON			**H.323**	
Information element	**Status**	**Value**	**Mapping**	**Notes**
Call Identifier	M	Alphanumeric handle	callIdentifier	
CauseCode	M	UserInitiated NetworkInitiated	Cause	

Table 18: Mapping of H.323 to CallRelease response from CFE3 to CFE1

CallRelease *response/confirmation*(RELEASE COMPLETE)				
TIPHON			**H.323**	
Information element	**Status**	**Value**	**Mapping**	**Notes**
Call Identifier	M	Alphanumeric handle	callIdentifier	
Result	M	- succesful - failed	No equivalent	

Table 19: Mapping of H.323 to CallAlerting from CFE3 to CFE1

CallRelease *response/confirmation*(RELEASE COMPLETE)				
TIPHON			H.323	
Information element	**Status**	**Value**	**Mapping**	**Notes**
Call Identifier	M	Alphanumeric handle	callIdentifier	

No mapping exists for relationships rd, rg, re, rh, rj.

7.4.2 Relationship rf,ri (CFE3/CFE6/CFE9)

Table 20: Mapping of H.323 to NwCallSetup request exchanged between CFE3/CFE6/CFE9

NwCallSetup *request/indication*(SETUP)					
TIPHON			H.323		
Information element	**Status**	**Value**	**Mapping**		**Notes**
Call Identifier	M	Alphanumeric handle	callIdentifier		
Calling user ID restriction	M	Available/unavailable	presentationIndicator	presentationAllowed presentationRestricted or addressNotAvailable	
Calling user ID	O (see note 1)	TIPHON user name	Calling party number		
Called user ID	M	TIPHON user name	Called party number		
PreviousDomainEgresspoint	M	Network specific address	No equivalent		
BearerIdentifier	M	Alphanumeric "handle"	sessionID		
Transport QoSparameter	M	TransportParams	ARQ: transportQOS parameters		(see note 4)
maximumDelay	M	MicroSeconds	No equivalent		
maxDelayVariation	M	MicroSeconds	No equivalent		
maxMeanPacketLoss	M	PercentX1000	No equivalent		
Transportparametersqualifier	M	Enumerated : totalRemainingBudget, budgetAvailableForDomain	No equivalent		
TrafficDescriptior	M	TrafficDesc	Fast start parameters		
peakFrameRate	M	Integer	No equivalent		
maxFrameLength	M	Integer	No equivalent		
Codec	M	List of possible codecs	List of audioCapabilities in fast start IE		
Transcode count	M	Number of codec transcoding	Number of audioCapabilities		
Destination Service domain	O (see note 2)	Domain address	No equivalent		
Calling User Access Point	O (see note 3)	Network specific address	sourceAddres		All proposed codecs use the same socket.
Routing number	O (see note 2)	Domain address	NA No equivalent		

NOTE 1: Shall be present if "Calling User ID restriction" information element is set to value "available".
NOTE 2: This element is available only if by some means routing information or destination network domain can be determined. If so, this information may simplify route calculations in other functional groups.
NOTE 3: The "Calling User Access Point" may be provided to support the routing decision.
NOTE 4: An endpoint may use this to indicate its capability to reserve transport resources. ITU-T Recommendation H.225.0 ARQ [2].

Table 21: Mapping of H.323 to NwCallSetup response exchanged between CFE3/CFE6/CFE9

NwCallSetup *response/confiramtion*(CALL PROCEEDING, PROGRESS, ALERTING, CONNECT)				
TIPHON			**H.323**	
Information element	**Status**	**Value**	**Mapping**	**Notes**
Call Identifier	M	Alphanumeric handle	callIdentifier	
Codec	O (see note 1)	List of possible codecs	Selection of audioCapabilities in fast start IE	One or two codecs can be selected according to the use of symmetric or asymmetric codecs. (see note 2)
Transcode count	O	Number of codec transcoding	number of audioCapabilities	(see note 2)
Next Domain Egress Point	O (see note 3)	Network Specific Address	No equivalent	
Result	M	- Call established - Rejection cause Invalid ticket Insufficient resources Called user busy Transport not available Requested QoS not available Called user unknown - No compatible codec available	- CONNECT - neededFeatureNotSupported - noBandwidth - inConf - noBandwidth, newConnectionNeeded - QoSRelease element in ARJ - calledPartyNotRegistered, unreachableDestination, destinationRejection - empty audioCapability list.	
NOTE 1: The list of codecs shall be limited to a single entry in the response. NOTE 2: This element shall be included if the result of the request is "Call established". NOTE 3: This element shall be included only if required to establish a dynamic address relationship between network funcional groups.				

Table 22: Mapping of H.323 to NwCallRelease request exchanged between CFE3/CFE6/CFE9

NwCallRelease *request/indication*(RELEASE COMPLETE)				
TIPHON			**H.323**	
Information element	**Status**	**Value**	**Mapping**	**Notes**
Call Identifier	M	Alphanumeric handle	callIdentifier	
CauseCode	M	UserInitiated NetworkInitiated	Cause	

Table 23: Mapping of H.323 to NwCallRelease response exchanged between CFE3/CFE6/CFE9

NwCallRelease *response/confirmation*(RELEASE COMPLETE)				
TIPHON			**H.323**	
Information element	**Status**	**Value**	**Mapping**	**Notes**
Call Identifier	M	Alphanumeric handle	callIdentifier	
Result	M	- succesful - failed	No equivalent	

Table 24: Mapping of H.323 to CallAlerting from CFE9 to CFE6 to CFE3

CallRelease *response/confirmation*(RELEASE COMPLETE)				
TIPHON			**H.323**	
Information element	**Status**	**Value**	**Mapping**	**Notes**
Call Identifier	M	Alphanumeric handle	callIdentifier	

7.4.3 Relationship rk (CFE9/CFE11)

Table 25: Mapping of H.323 to DestCallSetup request exchanged from CFE9 to CFE11

DestCallSetup *request/indication*(SETUP)				
TIPHON			**H.323**	
Information element	**Status**	**Value**	**Mapping**	**Notes**
Call Identifier	M	Alphanumeric handle	callIdentifier	
Calling user ID	M (see note)	TIPHON user name	Calling party number	
Called user ID	O	TIPHON user name	Called party number	
Codec	M	List of possible codecs	List of audioCapabilities in fast start IE	
Transcode count	M	Number of codec transcoding	Number of audioCapabilities	
Pervious Domain Egress Point	M	Network Specific Address	No equivalent	
NOTE: Shall be present if "Calling User ID restriction" information element is set to value "available".				

Table 26: Mapping of H.323 to DestCallSetup response exchanged from CFE11 to CFE9

DestCallSetup *response/confirmation*(CALL PROCEEDING, PROGRESS, ALERTING, CONNECT)				
TIPHON			**H.323**	
Information element	**Status**	**Value**	**Mapping**	**Notes**
Call Identifier	M	Alphanumeric handle	callIdentifier	
Codec	O (see note 1)	List of possible codecs	Selection of audioCapabilities in fast start IE	One or two codecs can be selected according to the use of symmetric or asymmetric codecs.
Transcode count	O	Number of codec transcoding	Number of audioCapabilities	See note 2
Next Domain Egress Point	O	Network Specific Address	No equivalent	
Result	M	- Call established - Rejection cause Invalid ticket Insufficient resources Called user busy Transport not available Requested QoS not available Called user unknown - No compatible codec available	- CONNECT - neededFeatureNotSupported - noBandwidth - inConf - noBandwidth, newConnectionNeeded - QoSRelease element in ARJ - calledPartyNotRegistered, unreachableDestination, destinationRejection - empty audioCapability list.	
NOTE 1: The list of codecs shall be limited to a single entry in the response. NOTE 2: This element shall be included if the result of the request is "Call established".				

Table 27: Mapping of H.323 to CallRelease request exchanged between CFE9/CFE11

CallRelease *request/indication*(RELEASE COMPLETE)				
TIPHON			**H.323**	
Information element	**Status**	**Value**	**Mapping**	**Notes**
Call Identifier	M	Alphanumeric handle	callIdentifier	

Table 28: Mapping of H.323 to CallRelease response exchanged between CFE9/CFE11

NwCallRelease *response/confirmation*(RELEASE COMPLETE)				
TIPHON			H.323	
Information element	**Status**	**Value**	**Mapping**	**Notes**
Call Identifier	M	Alphanumeric handle	callIdentifier	

No mapping exists for relationship rl.

7.4.4 Timers

All entities in a TIPHON compliant network shall implement the timers defined in ITU-T Recommendation H.323 [1] with the following additions/clarifications:

- Timer T301 shall be implemented to supervise the reception of a CONNECT message. The timer is started/restarted at the reception of the messages: CALL PROCEEDING, FACILITY, PROGRESS and ALERTING. The timer is stopped when the CONNECT message is received.

The recommended value for this timer is 3 minutes.

- Timer T302 shall be implemented to supervise the reception of a complete E.164 number. The timer is started when an incomplete E.164 (type) number is received. The timer is restarted when additional information is received and stopped when a complete number is received.

The recommended value for this timer is between 5 and 15 seconds and is inmplementation dependant based on the number of digits expected to be received.

- Timer T303 shall be implemented to supervise the first response to the SETUP message. The timer is started when the SETUP message is sent and stopped at the receipt of the first response message.

Recommended value for this timer is 4 seconds.

7.5 Information flow sequences

NOTE: <message> := to stipulate TIPHON message not covered by H.323.

7.5.1 Normal operation

7.5.1.1 Call set-up

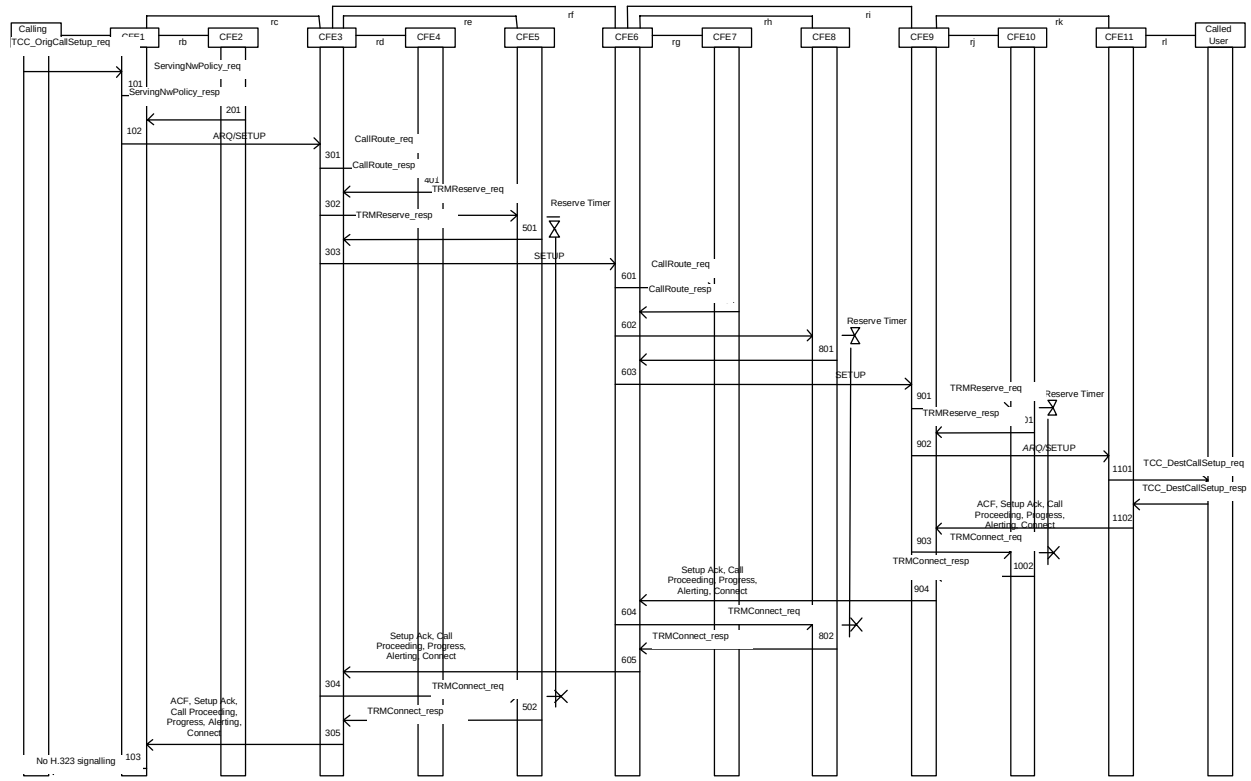


Figure 13: Call set-up

7.5.1.2 Call clear-down

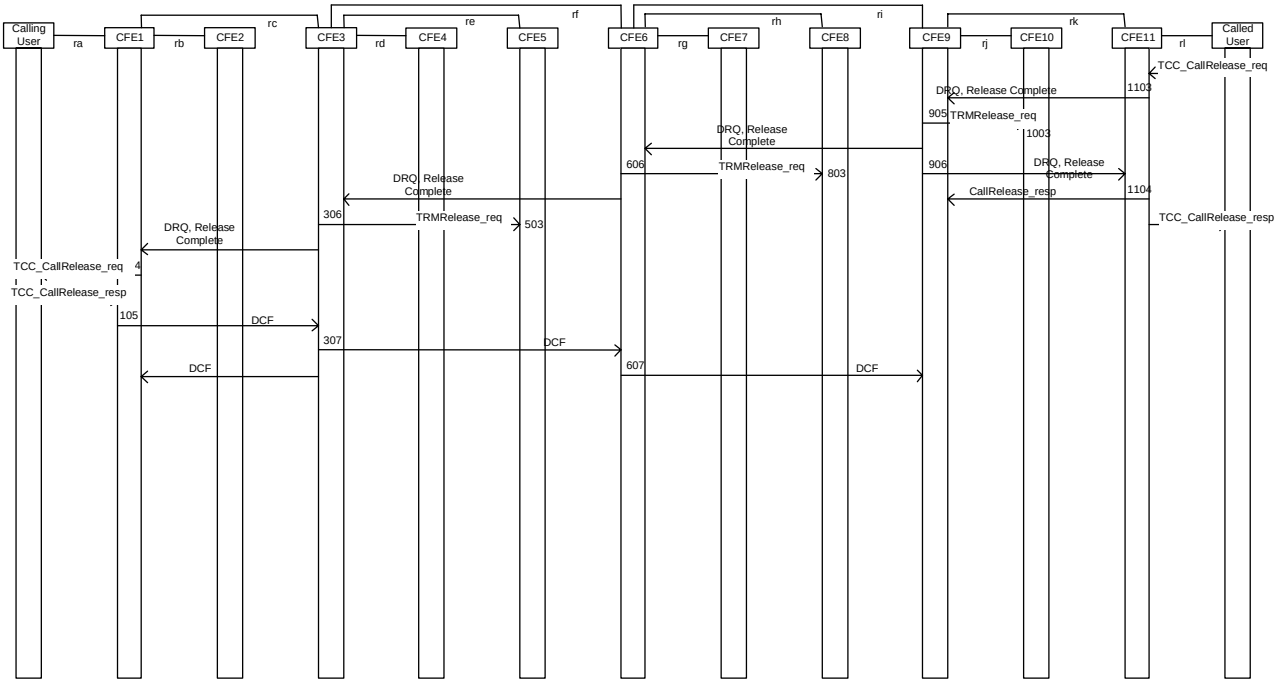


Figure 14: Call clear-down

7.5.2 Exceptional behaviour

7.5.2.1 Unsuccessful call set-up due to called party unknown

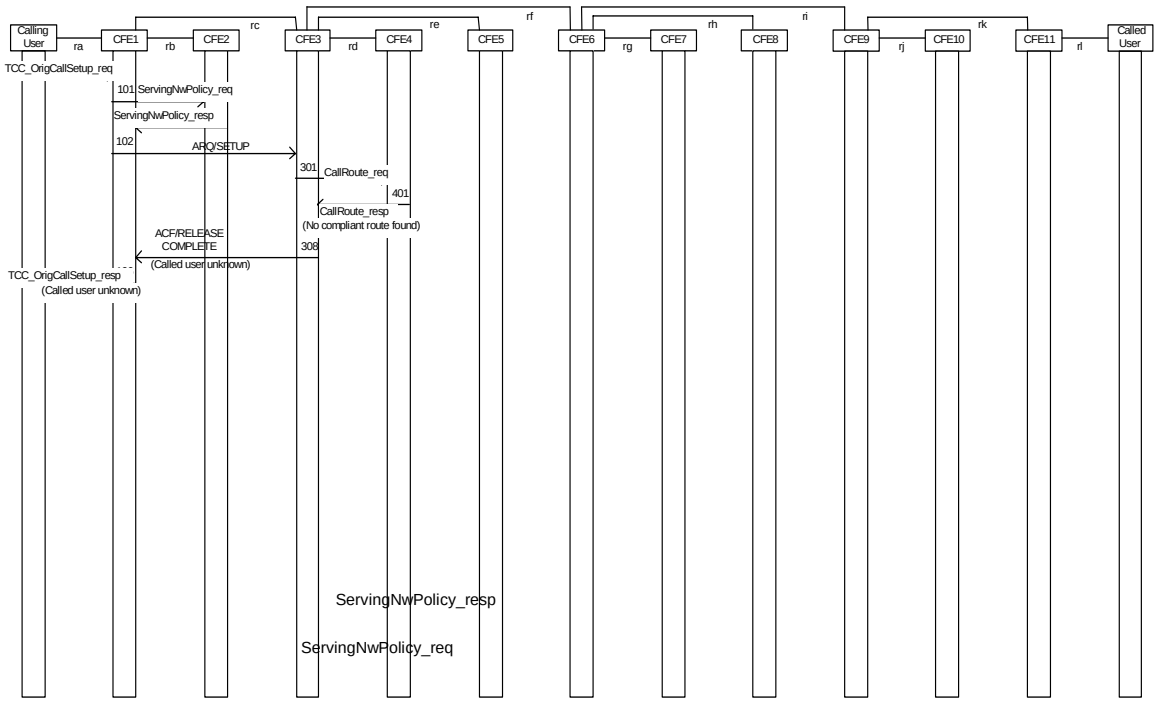


Figure 15: Unsuccessful call set-up due to called party unknown

7.5.2.2 Requested QoS not supported for calling party

No H.323 signalling.

7.5.2.3 Unsuccessful call set-up due to transport recources unavailable

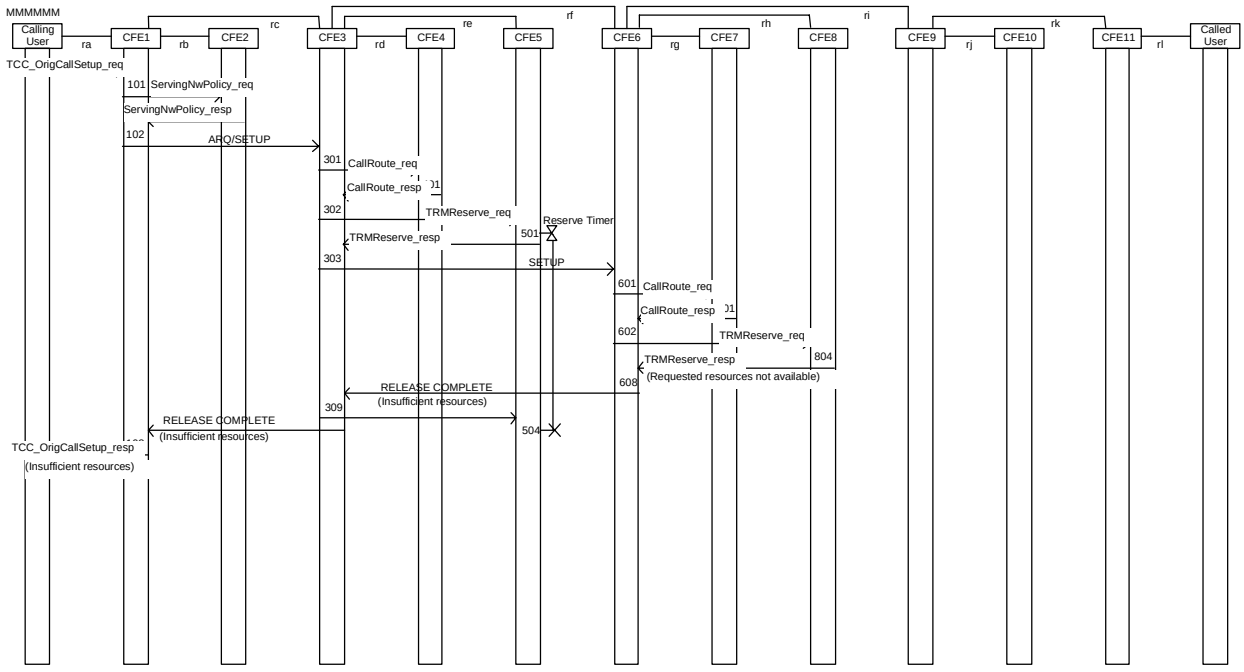


Figure 16: Unsuccessful call set-up due to transport recources unavailable

7.5.2.4 Rejection of call establishment due to transport reservation time out

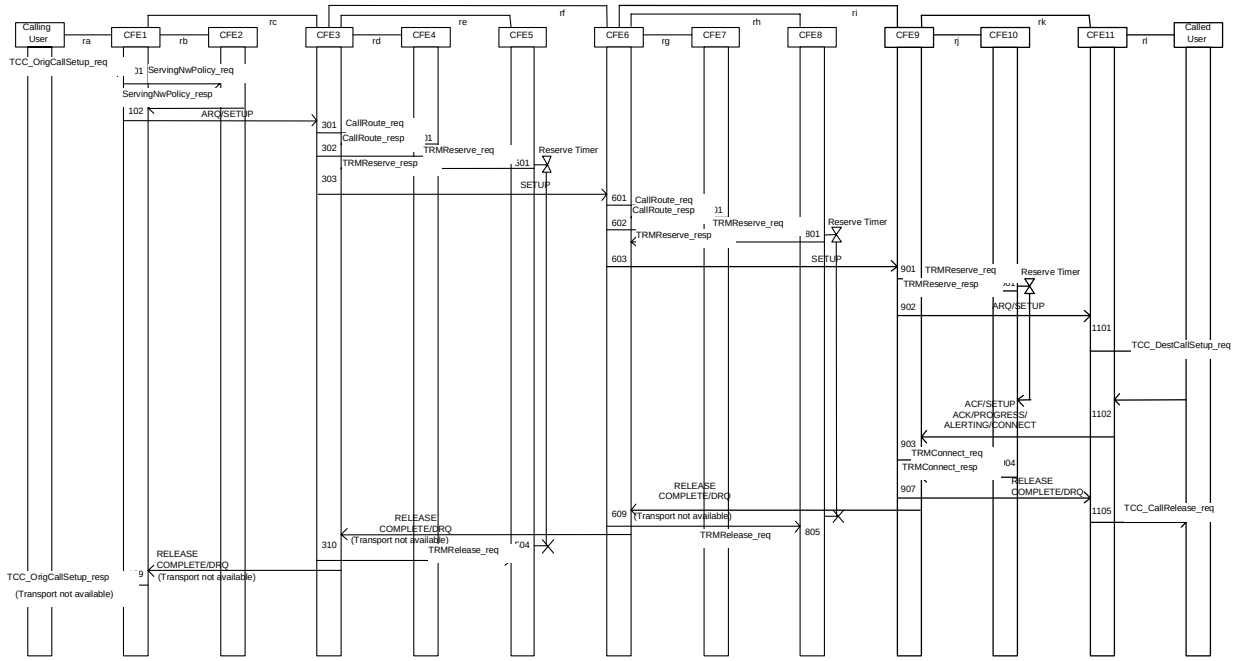


Figure 17: Rejection of call establishment due to transport reservation time out

7.5.2.5 Rejection of call establishment due to no compatible codec being available at the called party

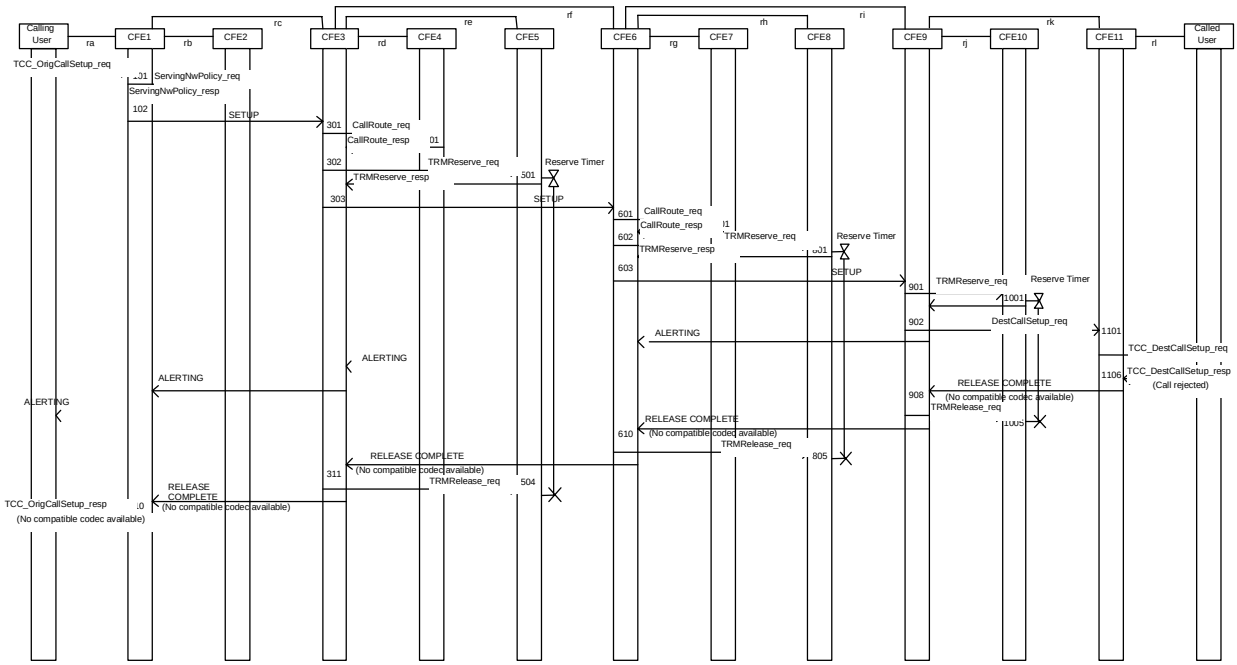


Figure 18: Rejection of call establishment due to no compatible codec being available at the called party

7.6 Simple call functional entity actions

Table 29: Mapping of H.323 to Simple call at $CFE1_{OUA}$

TIPHON Action number	H.323 action
101	No H.323 signalling
102	send ARQ/SETUP to CFE3 (note 1)
103, 104	No H.323 signalling
105	On receipt of a release message, send Release Complete to CFE3
106, 107, 108, 109, 110	No H.323 signalling
NOTE: H.323 behaviour for simple call, clause 7.1.2 of the present document.	

No Action mapping at $CFE2_{PE}$

Table 30: Mapping of H.323 to Simple Call at $CFE3_{OCC}$

Actions at CFE3	
TIPHON Action number	**H.323 action**
301, 302	No H.323 signalling
303	Prepare and send SETUP to CFE6
304	No H.323 signalling
305	On receipt of a TRMConnect send a CONNECT to CFE1
306	No H.323 signalling
307	On receipt of a Release Complete, send Release Complete to CFE6. No response shall be send on receipt of a Release Complete
308	send a Release Complete with release code "unreachable destination" to CFE1
309	send a Release Complete with release code "noBandwidth" to CFE1
310	send a Release Complete with release code "noBandwidth" to CFE1
311	send a callSetup response message with empty audioCapability list (NOTE 1) to CFE1
NOTE: H.323 Fast Connect procedure (see clause 4.2.1.2 of the present document).	

No Action mapping at $CFE4_{OR}$

No Action mapping at $CFE5_{OT}$

Table 31: Mapping of H.323 to Simple call at $CFE6_{ICC}$

Actions at CFE6	
TIPHON Action number	**H.323 action**
601, 602	No H.323 signalling
603	send SETUP to CFE9
604	No H.323 signalling
605	On receipt of a TRMConnect send a CONNECT to CFE3
606	send a Release Complete to CFE3
607	send a Release Complete to CFE9
608	send a Release Complete with release code "unreachable destination" to CFE3
608	send a Release Complete with release code "noBandwidth" to CFE3
609	send a Release Complete with release code "noBandwidth" to CFE3
610	send a callSetup response message with empty audioCapability list (see note) to CFE3
NOTE: H.323 Fast Connect procedure, see clause 4.2.1.2 of the present document.	

No Action mapping at $CFE7_{IR}$

No Action mapping at $CFE8_{IT}$

Table 32: Mapping of H.323 to Simple call at $CFE9_{TCC}$

Actions at CFE9	
TIPHON Action number	**H.323 action**
901	No H.323 signalling
902	send SETUP to CFE11
903	No H.323 signalling
904	On receipt of a TRMConnect send a CONNECT to CFE6
905	No H.323 signalling
906	send a Release Complete to CFE11, no answer will be expected
907	send a Release Complete with release code "noBandwidth" to CFE11
908	send a callSetup response message with empty audioCapability list (see note) to CFE6
NOTE: H.323 Fast Connect procedure (see clause 4.2.1.2 of the present document).	

No Action mapping at $CFE10_{TT}$

Table 33: Mapping of H.323 to Simple call at $CFE11_{TUA}$

Actions at CFE11	
TIPHON Action number	**H.323 action**
1101	No H.323 signalling
1102	On receipt of a positive TCC_destCallSetup send a CONNECT to CFE9
1103	send Release Complete to CFE9
1104, 1105	No H.323 signalling
1106	send a callSetup response message with empty audioCapability list (see note) to CFE9
NOTE: H.323 Fast Connect procedure (see clause 4.2.1.2 of the present document).	

7.7 Conclusion

ITU-T Recommendation H.510 [5] covers the aspects of TIPHON roaming user. PEs were implemented and mapped but this recommendation and its implementation to TIPHON is for further study.

H.323 normal call set-up (see clause 7.1.2 of the present document) behaviour indicates the need for CFE3 CFE11 Relationship. This is not defined in TS 101 882-3 [10].

H.323 does not define an intermidiate NFG as shown in TS 101 314 [13].

QoS support in H.323, is handled by RSVP (see clause 11 of the present document).

The first NwCallAlerting_req should always be issued by the last intelligent element is a call (GK or GW).

8 Media Control Service

8.1 Introduction

The intentions with this clause are to describe the media control service defined with the Meta-protocol in TS 101 882-4 [11] using procedures defined in H.323 [1] and map those procedures to the architecture of TS 101 314 [13].

8.1.1 Description

Media Control service (MC) establishes the media elements required to support both call and bearer. It is used to establish a QoS controlled transport capability in accordance with the QoS class identified by the call control meta-protocol.

MC does the following:

- maintains the media state;
- establishes and releases media elements.

8.1.2 H.323 media control behaviour

TIPHON describes the use of the H.323 Fast Connect procedure (clause 4.2.1.2 of present document). Therefore the use of separate H.245 call set-up signalling is out of scope during call set-up e.g. media resource reservation. This does not mean that H.245 signalling is invalid. For many mid-call signalling procedures, separate H.245 signalling is necessary:

- capability exchange H.245 [3], clause B.2;
- change of codec H.245 [3], clause B.6;
- change of media channels H.245 [3], clause B.3;
- change of bandwidth usage(RAS:BRQ) H.323 [1], clause 8.4.1;
- change of callMode (audio, video, data, T.38(fax)…) H.245 [3], clause B.6;
- transport of outband DTMF H.245 [3] userInputIndicator( );
- ITU-T Recommendations H.235 [7] and H.530 [6] security aspects;
- Etc.

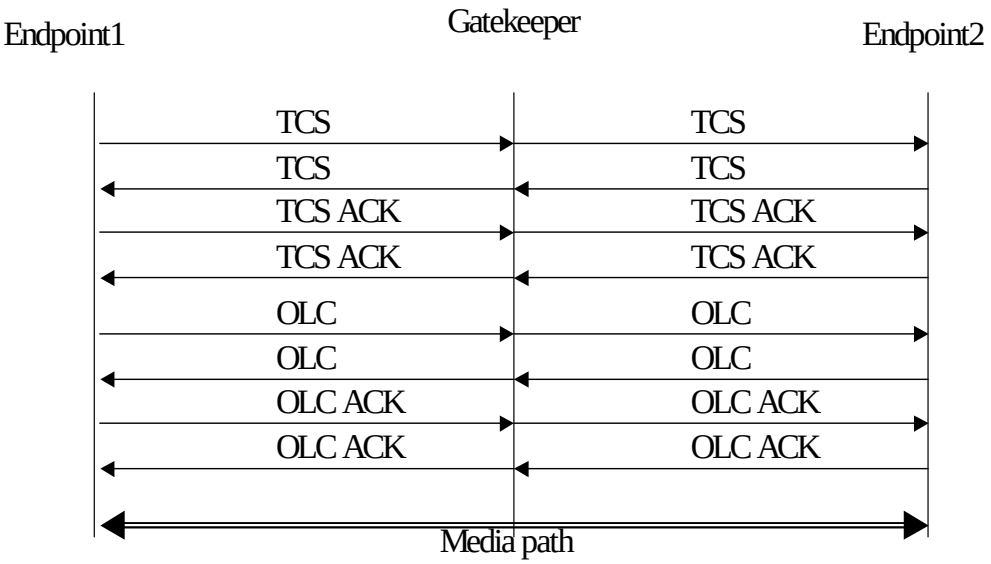


Figure 19: H.245 normal media channel establishment

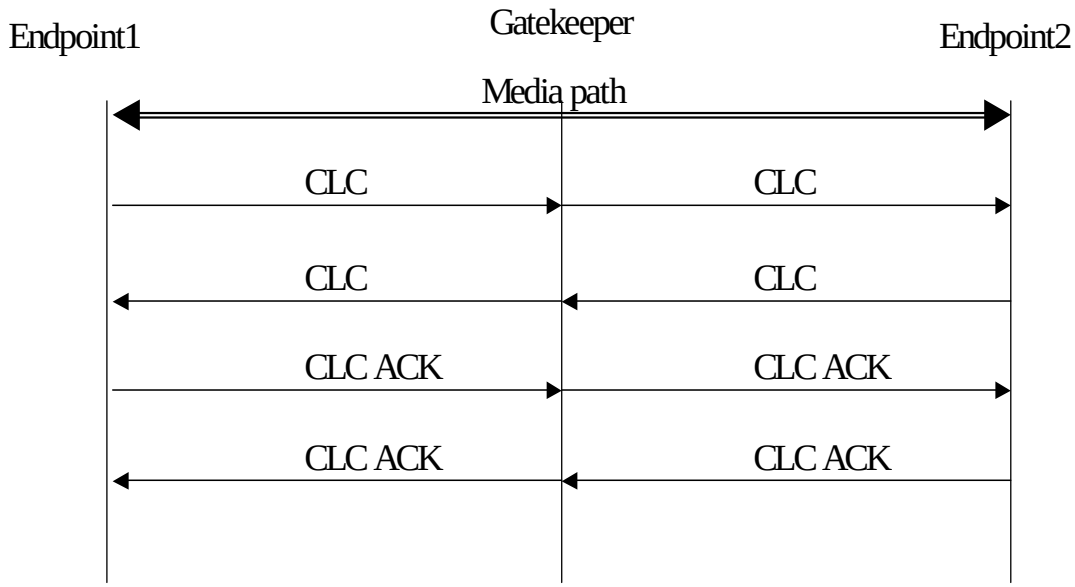


Figure 20: H.245 normal media channel release

NOTE 1: It is not necessary to set-up a separate H.245 signalling path. H.245 signalling can be tunnelled through H.225.0 messages H.323 [1] clause 8.2.4. In this way H.245 signalling uses the same gatekeeperRouted callModel path.

NOTE 2: Only the fast connect procedure will be used for this mapping excercise.

8.2 Media control functional entities mapping

Media control service functional entities

Table 34: Mapping of H.323 entities to TIPHON media control functional entities

TIPHON functional element		H.323 entity
Identity	**TIPHON Description**	
CCAgent	The application that instigates the service request.	Endpoint or gatekeeper
MFE1	The media control coordination function.	Endpoint or gatekeeper

8.3 Media control message mapping

Table 35: Mapping of H.323 messages to TIPHON Media control MPMUs

TIPHON message	RelationShip ID	H.323 messages
MedaiReservation	CCA <-> MFE1	SETUP(FastStart)/OLC
MediaEstablishment	CCA <-> MFE1	FastStart IE in H.225.0/OLC ACK
MediaRelease	CCA <-> MFE1	RELEASE COMPLETE/CLC/CLC ACK
MediaCapability	CCA <-> MFE1	FastStart IE in H.225.0/TCS/TCS ACK

8.4 Media control information flow mapping

8.4.1 Relationship ra (CCA/MFE1)

Table 36: Mapping of H.323 to MediaReservation From CCA to MFE1

MediaReservation *requeste/indication*(FastStart IE in SETUP)				
TIPHON			**H.323**	
Information element	**Status**	**Value**	**Mapping**	**Notes**
Session handle	M	Alphanumeric "handle"	CallIdentifier	
Media resource	M	resource handle Rx flow descriptor Tx flow descriptor priority	Capability entry Reverse logical channel Forward logical channel Capability in preferred audioCapability list.	 preferred codec list description in H.323 [1], clause 8.1.7.1

Table 37: Mapping of H.323 to MediaReservation From MFE1 to CCA

MediaReservation *response/confirmation*(FastStart IE in H.225.0)				
TIPHON			**H.323**	
Information element	**Status**	**Value**	**Mapping**	**Notes**
Session handle	M	Alphanumeric "handle"	CallIdentifier	
Media resource handle	O (see note)	Alphanumeric "handle"	Capability entry	
Result	M	- Resource reserved - Rejection cause - Unable to complete connection	Reverse logical channel Forward logical channel Release complete No equivalent	Only 1 codec/channel will be selected
NOTE: Media resource handle shall be included if information element "Result" is "Resource reserved".				

NOTE: The media path is established at the point of MediaReservation response/confirmation. Once a selection in the proposed audiocapability list is made, the media path between calling and called party is created.

Table 38: Mapping of H.323 to MediaRelease From CCA to MFE1

MediaRelease *requeste/indication* (Release Complete)				
TIPHON			**H.323**	
Information element	**Status**	**Value**	**Mapping**	**Notes**
Session handle	M	Alphanumeric "handle"	CallIdentifier	

Table 39: Mapping of H.323 to MediaRelease From MFE1 to CCA

MediaRelease *requeste/indication* (Release Complete)				
TIPHON			**H.323**	
Information element	**Status**	**Value**	**Mapping**	**Notes**
Session handle	M	Alphanumeric "handle"	CallIdentifier	

Table 40: Mapping of H.323 to MediaCapability From CCA to MFE1

MediaCapability *requeste/indication*(H.245 TerminalCapabilitySet)				
TIPHON			**H.323**	
Information element	**Status**	**Value**	**Mapping**	**Notes**
Session handle	O (see note 1)	Alphanumeric "handle"	SequenceNumber	
Information category	M (see note 2)	capabilities supported media resource state information	Capability Set	
Flow handle	O	Alphanumeric "handle"	No equivalent	
Transport resource handle	O	Alphanumeric "handle"	No equivalent	
Media resource handle	O	Alphanumeric "handle"	No equivalent	
NOTE 1: May be optional only if element "Information category" is "capabilities supported". NOTE 2: At least one of the information elements "Media resource handle", "Flow handle" and "Transport resource handle" shall be present if the value of "Information category" is "media resource state information".				

Table 41: Mapping of H.323 to MediaCapability From MFE1 to CCA

MediaCapability *response/confirmation*(H.245 TCS Ack)				
TIPHON			**H.323**	
Information element	**Status**	**Value**	**Mapping**	**Notes**
Session handle	M	Alphanumeric "handle"	SequenceNumber	
Media resource descriptor	O (see note 1)	Alphanumeric "handle"	No equivalent	
Result	O (see note 2)	Media resource handle Rx flow Tx flow Priority	No equivalent	
Flow descriptor	O (see note 2)	Flow descriptor handle Priority Codec descriptor Transport descriptors	No equivalent	
Transport resource	O (see note 2)	Transport resource handle Transport resource state: - available - reserved - established Traffic descriptor Ingress address Destination transport domain	No equivalent	
Result	M	- Information available - Information unavailable	No equivalent	
NOTE 1: Media resource handle shall be included if information element "Result" is "Resource reserved". NOTE 2: Information element "Media resource descriptor", "Flow descriptor" and "Transport resource" shall be present in the response if respectively "Media resource handle", "Flow handle" or "Transport resource handle" is present in the request.				

8.4.2 Timers

The same timers for the Simple call service apply.

8.5 Information flows

NOTE: <message>:= to stipulate TIPHON message not covered by H.323.

8.5.1 Normal operation

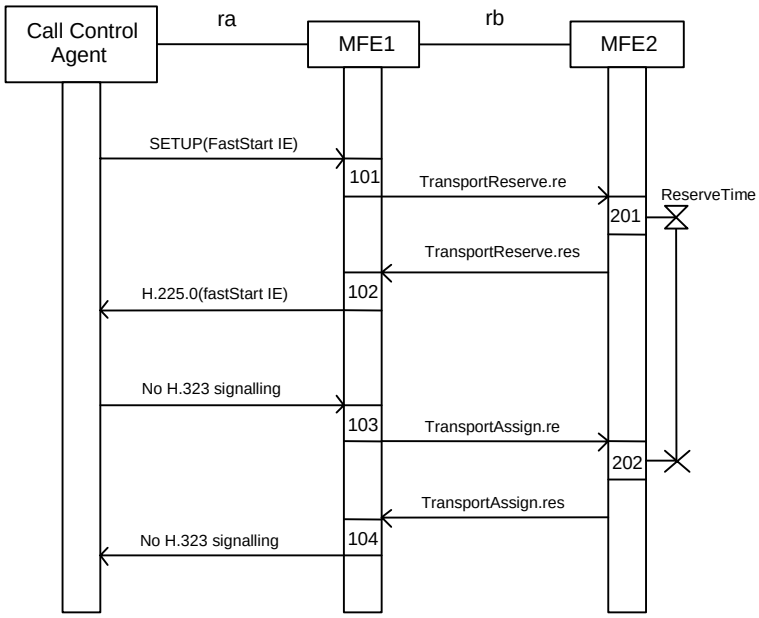


Figure 21: Information flows for successful media reservation and establishment

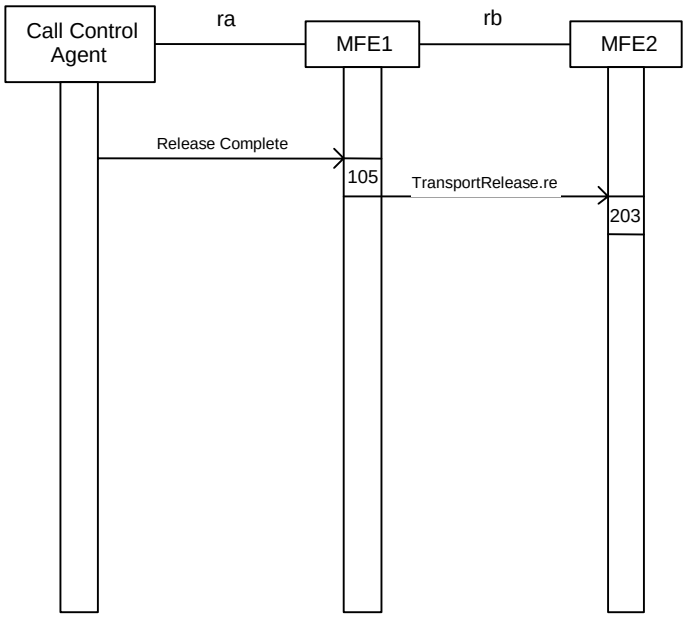


Figure 22: Information flows for release of media resources

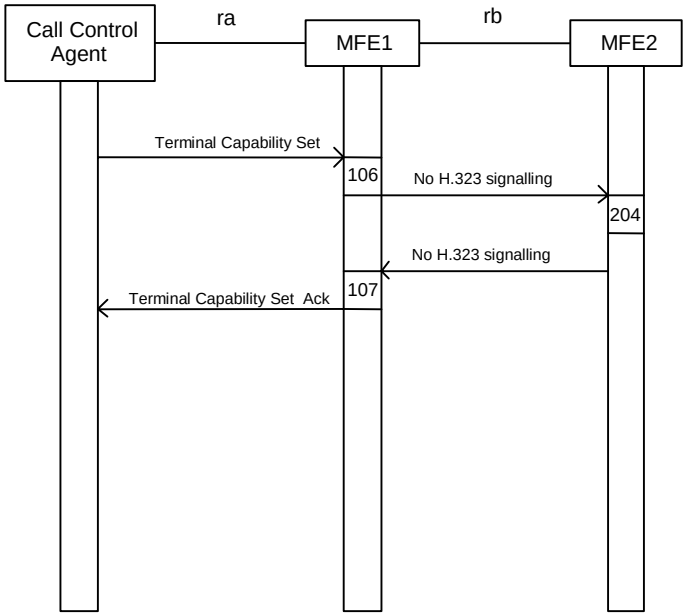


Figure 22a: Information flows for capability information request

8.5.2 Exeptional behaviour

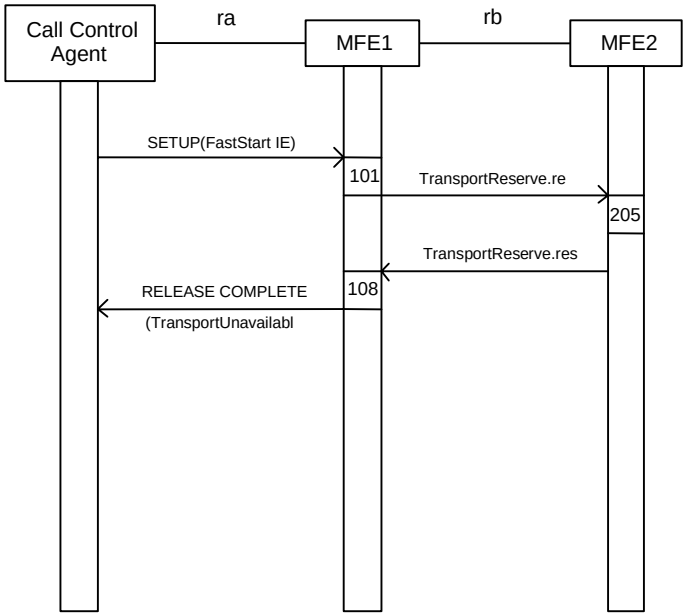


Figure 23: Unsuccessful media establishment due to insufficient transport resource available

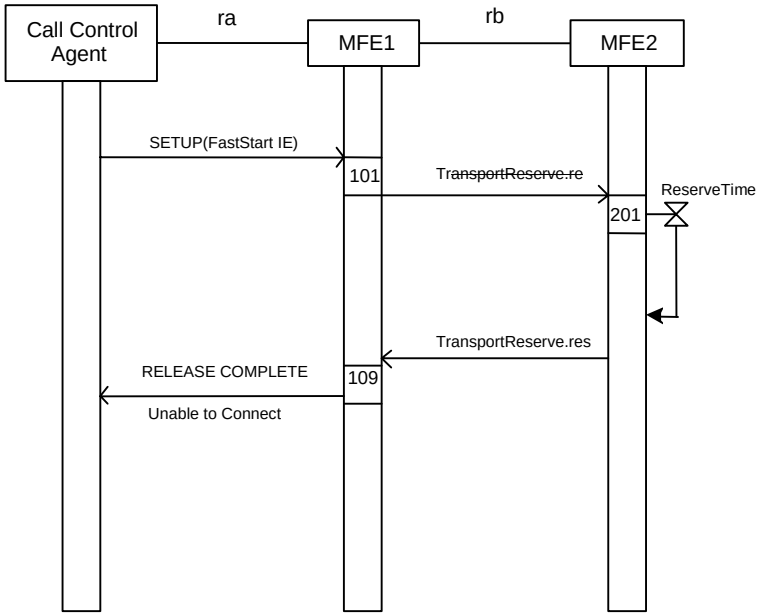


Figure 24: Unsuccessful media establishment due to reservation timeout

8.6 Media control functional entity action

NOTE: No CCA media control functional entity actions are defined in TS 101 882-4 [11].

Table 42: Mapping of H.323 to Media Control at MFE1

Actions at MFE1	
TIPHON Action number	**H.323 action**
101	No H.323 signalling
102	Send H.225.0(fastStart IE) to CCA
103,104,105,106	No H.323 signalling
107	Send H.245 TerminalCapabilitySet to CCA
108	Send Release Complete(transport Unavailable) to CCA
109	Send Release Complete(UnableToConnect) to CCA

8.7 Conclusion

Only fast connect used at this point in the mapping excercise.

For future mid-call signalling H.245 will be added.

9 Transport control service

No H.323 signalling mapping to TS 101 882-5 [12].

Annex A (informative): ITU-T Recommendation H.323 annexes, supplemetary services and interworking recommendations

Table A.1: Supplemetary services and interworking recommendations

H.323	Packet-based multimedia communications systems	
	Annex A	H.245 messages used "by H.323 endpoints
	Annex B	Procedures for layered video codecs
	Annex C	H.323 on ATM
	Annex D	Real-time fax over H.323
	Annex E	Multiplexed Call Signaling over UDP
	Annex F	Audio Simple Endpoint Type
	Annex G	Text Simple Endpoint Type
	Annex J	Secure Simple Endpoint Type
	Annex K	HTTP-based Service Control
	Annex L	Stimulus Control Protocol
	Annex M.1	Tunnelling of signalling protocols (QSIG) in H.323
	Annex M.2	Tunnelling of signalling protocols (ISUP) in H.323
	Annex M.3	Tunneling of DSS1 through H.323
	Annex P	Transfer of Modem Signals over H.323
	Annex Q	Far End Camera Control and H.281 / H.224
	Annex R	Robustness Methods for H.323 Entities
H.225.0	Call signalling protocols and media stream packetization for packet-based multimedia communication systems	
	Annex A	RTP/RTCP
	Annex B	RTP Profile
	Annex C	RTP Payload Format for H.261 video streams
	Annex D	RTP Payload Format for H.261A video streams
	Annex E	Video packetization
	Annex F	Audio and multiplexed packetization

	Annex G	Communication Between Administrative Domains
	Annex H	H.225.0 Message Syntax (ASN.1)
	Annex I	H.263+ Video Packetization
H.245	Control Protocol for multimedia communication	
	Annex A	Messages: Syntax
	Annex B	Messages: Semantic Definition
	Annex C	Procedures
	Annex D	Object Identifier Assignments
	Annex E	ISO/IEC 14496-2 Capability Definitions
	Annex F	Logical Channel Bit Rate Management Capability Definitions
	Annex G	ISO/IEC 14496-1 Capability Definitions
	Annex H	ISO/IEC 14496-3 Capability Definitions
	Annex I	GSM Adaptive Multi Rate Capability Definitions
H.246	Interworking of H-Series multimedia terminals with H-Series multimedia terminals and voice/voiceband terminals on GSTN and ISDN	
	Annex A	H.323-H.320 Interworking
	Annex C	ISUP/H.225.0 Interworking
	Annex E.1	MAP/H.225.0 Interworking
	Annex E.2	ANSI-41 MAP/H.225.0 Interworking
	Annex F	H.323-H.324 Interworking
H.235	Security and encryption for H-Series (H.323 and other H.245-based) multimedia terminals	
	Annex A	H.235 ASN.1
	Annex B	H.323 specific topics
	Annex C	H.324 specific topics
	Annex D	Baseline Security Profile
	Annex E	Signature Profile
	Annex F	Hybrid Security Profile
H.450.1	Generic functional protocol for the support of supplementary services in H.323	
H.450.2	Call transfer supplementary service for H.323	
H.450.3	Call diversion supplementary service for H.323	

H.450.4 Call hold supplementary service for H.323

H.450.5 Call park and call pickup supplementary services for H.323

H.450.6 Call waiting supplementary service for H.323

H.450.7 Message waiting indication supplementary service for H.323

H.450.8 Name identification supplementary service for H.323

H.450.9 Call Completion Supplementary Services for H.323

H.450.10 Call offering supplementary services for H.323

H.450.11 Call intrusion supplementary services

H.450.12 Common Information Additional Network Feature for H.323

H.460.1 Guidelines for the use of the generic extensible framework

H.460.2 Number Portability interworking between H.323 and SCN networks

H.460.3 Circuit Status Map

H.460.4 Call Priority Designation

H.460.5 Transport of Multiple Q.931 IEs

H.460.6 Extended Fast Connect

H.460.7 Digit Maps

H.460.8 Querying for Alternate Routes

H.460.9 QoS Monitoring Reporting

H.501 Protocol for mobility management and intra/inter-domain communication in multimedia systems

H.510 Mobility for H.323 multimedia systems

H.530 Symmetric Security Procedures for H.510

- **ECMA-332** [18].
- **ECMA-307** [19].
- **ECMA-308** [20].
- **ECMA-309** [21].
- **ECMA-326** [22].
- **ECMA-333** [23].

Annex B (informative): H.323 protocol PDUs

The profile is based on ITU-T Recommendation H.323 [1] versions 2, 3 and 4.

This annex describes the usage of the messages and their parameters required to fulfil the requirements defined in TS 101 882 [8] to [12] and the main body of the present document.

The main body is created using ITU-T Recommendation H.323 [1] recommendation suite as base, adding requirements from TS 101 882 [8] to [12] but also using experiences from interoperability tests (arranged within the scope of TIPHON or other external organizations).

- "Q.931 information elements" column indicates a Q.931 information element.
- "UUIE Fields" indicates an ITU-T Recommendation H.225.0 [2] parameter.
- The "H.323v2 Status" column indicates the status in ITU-T Recommendation H.225.0 [2] version 2 for a specific parameter/information element.
- The "H.323v3 Status" column indicates the status in ITU-T Recommendation H.225.0 [2] version 3 for a specific parameter/information element.
- The "H.323v4 Status" column indicates the status in ITU-T Recommendation H.225.0 [2] version 4 for a specific parameter/information element.
- "R1 status" column, "R2 status" column, "C1 status" column and "C2 Status2" column.
  In order to distinguish between requirements from TS 101 882 [8] to [12] and other requirements the following syntax is used in the Status fields in tables shown in the following clauses:

  M: Indicates a mandatory requirement in TS 101 882 [8] to [12].

  O: Indicates an optional requirement in the TS 101 882 [8] to [12]. However, only sending of the parameter/message is optional. When the parameter/message is received a TIPHON compliant entity shall act upon the parameter/message in accordance with the procedures as described in the main body of the present document.

  " An empty status field indicates that the ITU-T Recommendation H.323 shall be followed in regards to optionally.

NOTE: ITU-T Recommendation H.323 [1] version 3 has introduced parameters listed hereafter with a yellow background; ITU-T Recommendation H.323 [1] version 4 has introduced those with a blue background. All the other parameters are already available in ITU-T Recommendation H.323 [1] version 2.

B.1 H.225.0

This clause and the following clauses specify the usage of the ITU-T Recommendation H.225.0 [2] protocol messages and parameters.

B.1.1 H323-UU-PDU

UUIE Fields	H.323v2 Status	H.323v3 Status	H.323v4 Status	TIPHON Status
h323-message-body	M	M	M	M
h245Tunneling	M	M	M	M
nonStandardControl	O	O	O	
h4501SupplementaryService	O	O	O	NA
H245Control	O	O	O	O
callLinkage	-	-	O	
tunnelledSignallingMessage	-	-	O	NA
provisionalResponseToH245Tunneling	-	-	O	
stimulusControl	-	-	O	NA
genericData	-	-	O	NA
NOTE: All the parameters marked with "-" in the columns of "H.323 v2 Status" and "H.323v3 Status" are not defined in H.323 v2 and H.323 v3 respectively. If the protocolIdentifier parameter is set to 2, parameters defined in H.323 v3 and H.323 v4 shall not be present. If the protocolIdentifier parameter is set to 3 parameters defined in ITU-T Recommendation H.323 [1] v4 shall not be present.				

B.1.2 RAS messages and parameters

B.1.2.1 Gatekeeper discovery procedures

This clause shows the coding details of messages used during the procedures described in clause 5.

B.1.2.1.1 Gatekeeper ReQuest (GRQ)

UUIE Fields	H.323v2 Status	H.323v3 Status	H.323v4 Status	R1 Status	R2 Status
RequestSeqNum	M	M	M		
protocolIdentifier (see note 1)	M	M	M		
NonStandardData	O	O	O		
RasAddress	M	M	M	M	M
EndpointType	M	M	M	(see note 2)	(see note 3)
GatekeeperIdentifier	O	O	O		
CallServices	O	O	O	NA	NA
endpointAlias (see note 4)	O	O	O	M	M
AlternateEndpoints	O	O	O	NA	NA
Tokens	O	O	O		
cryptoTokens	O	O	O		
authenticationCapability	O	O	O	O (see note 5)	O (see note 5)
algorithmOID	O	O	O	O (see note 5)	O (see note 5)
integrity	O	O	O		
integrityCheckValue	O	O	O		
supportsAltGK	-	-	O		
featureSet	-	-	O	NA	NA
genericData	-	-	O	NA	NA

NOTE 1: The protocolIdentifier parameter shall be set to set to v2, v3 or v4. If the **protocolIdentifier** parameter is set to 2, parameters defined in H.323 v3 and H.323 v4 shall not be present. If the **protocolIdentifier** parameter is set to 3 parameters defined in H.323 v4 shall not be present.

NOTE 2: Between the H.323 terminal and the gatekeeper the **endpointType** parameter shall always be set to **terminal**.

NOTE 3: Between gatekeepers the **endpointType** shall always be set to **terminal** and **gatekeeper**.

NOTE 4: The **endpointAlias** shall include one part identifying the User and one part identifying the IP Telephony service provider.

NOTE 5: The parameters **authenticationCapability** and **algorithmOID** are only mandatory when an explicit authentication is required.

B.1.2.1.2 Gatekeeper ConFirm (GCF)

UUIE Fields	H.323v2 Status	H.323v3 Status	H.323v4 Status	R1 Status	R2 Status
requestSeqNum	M	M	M		
protocolIdentifier (see note 1)	M	M	M		
nonStandardData	O	O	O		
gatekeeperIdentifier	O	O	O		
rasAddress	M	M	M	M	M
alternateGatekeeper	O	O	O		
authenticationMode	O	O	O	O	O
tokens	O	O	O	(see note 2)	(see note 2)
cryptoTokens	O	O	O	(see note 2)	(see note 2)
algorithmOIDs	O	O	O	(see note 2)	(see note 2)
integrity	O	O	O		
integrityCheckValue	O	O	O		
featureSet	-	-	O	NA	NA
genericData	-	-	O	NA	NA

NOTE 1: The protocolIdentifier parameter shall be set to set to v2, v3 or v4. If the **protocolIdentifier** parameter is set to 2, parameters defined in H.323 v3 and H.323v4 shall not be present. If the **protocolIdentifier** parameter is set to 3 parameters defined in H.323 v4 shall not be present.

NOTE 2: Parameters: **tokens**, **crypTokens** and **algorithmOIDs** are mandatory when explicit authentication is required.

B.1.2.1.3 Gatekeeper ReJect (GRJ)

UUIE Fields	H.323v2 Status	H.323v3 Status	H.323v4 Status	R1 Status	R2 Status
requestSeqNum	M	M	M		
protocolIdentifier (see note)	M	M	M		
nonStandardData	O	O	O		
gatekeeperIdentifier	O	O	O		
rejectReason	M	M	M		
altGKInfo	O	O	O		
tokens	O	O	O		
cryptoTokens	O	O	O		
integrityCheckValue	O	O	O		
featureSet	-	-	O	NA	NA
genericData	-	-	O	NA	NA

NOTE: The **protocolIdentifier** parameter shall be set to set to v2, v3 or v4. If the **protocolIdentifier** parameter is set to 2, parameters defined in H.323 v3 and H.323 v4 shall not be present. If the **protocolIdentifier** parameter is set to 3 parameters defined in H.323 v4 shall not be present.

B.1.2.2 Registration request procedure

This clause shows the coding details of messages used during the procedures described in clause 5.2.

B.1.2.2.1 Register ReQuest (RRQ)

UUIE Fields	H.323v2 Status	H.323v3 Status	H.323v4 Status	R1 Status	R2 Status
requestSeqNum	M	M	M		
protocolIdentifier (see note 1)	M	M	M		
nonStandardData	O	O	O		
discoveryComplete	M	M	M		
callSignalAddress	M	M	M	(see note 6)	
rasAddress	M	M	M	(see note 6)	
terminalType	M	M	M	(see note 2)	(see note 3)
terminalAlias (see note 8)	O	O	O	M	M
gatekeeperIdentifier	O	O	O		
endpointVendor	M	M	M		
alternateEndpoints	O	O	O		
timeToLive	O	O	O	M	NA
tokens	O	O	O	O	O
cryptoTokens	O	O	O	O	O
integrityCheckValue	O	O	O		
keepAlive	M	M	M		NA
endpointIdentifier	O	O	O	(see note 7)	(see note 7)
willSupplyUUIEs	M	M	M		
maintainConnection	-	M	M		
supportAnnexECallSignalling	-	M	?		
alternateTransportAddresses	-	-	O		
additiveRegistration		-	O	NA (see note 4)	NA (see note 4)
terminalAliasPattern		-	O	NA (see note 4)	NA (see note 4)
supportsAltGK		-	O		
usageReportingCapability		-	O	NA (see note 5)	NA (see note 5)
supportsRubustnessProcedures		-	M		
multipleCalls	-	-	O		
supportedH248Packages	-	-	O		
callCreditCapability	-	-	O		
capacityReportingCapability	-	-	O		
capacity	-	-	O		
featureSet	-	-	O		
genericData	-	-	O		

NOTE 1: The protocolIdentifier parameter shall be set to set to v2, v3 or v4. If the **protocolIdentifier*r*** parameter is set to 2, parameters defined in H.323 v3 and H.323 v4 shall not be present. If the **protocolIdentifier** parameter is set to 3 parameters defined in H.323 v4 shall not be present.
NOTE 2: The terminal shall set **terminalType** to **terminal**.
NOTE 3: The gatekeeper/H.323 proxy shall set (add) the **terminalType gatekeeper**.
NOTE 4: Registration of gateways not supported by this profile.
NOTE 5: Gatekeeper routed call model mandated in the present document thus no usage information is required in RAS messages.
NOTE 6: The H.323 terminal shall generate only one **rasAddress** and only one **callSignalAddress**.
NOTE 7: The **endpointIdentifier** identifies an active registration. Consequently the **endpointIdentifier** is not applicable when the H.323 terminal registers the first time but mandatory during the keep-alive procedure.
NOTE 8: The **terminalAlias** parameter shall include at least one valid user identity. In case more than one user identity is included, the first valid user identity shall be used as the identity for gatekeepers H.323 proxies in the serving network and H.323 proxies gatekeepers in the intermediate networks to identify a users service provider. A gatekeeper in the home network shall search for the first valid user identity that at the same time corresponds to one of its users. As a consequence of this the serving network, the intermediate network and the home network may identify different users as a valid **terminalAlias**. The gatekeeper in the home network returns the final set of valid **terminalAlias** in the RCF.

B.1.2.2.2 Register ConFirm (RCF)

UUIE Fields	H.323v2 Status	H.323v3 Status	H.323v4 Status	R1 Status	R2 Status
requestSeqNum	M	M	M		
protocolIdentifier (see note 1)	M	M	M		
nonStandardData	O	O	O		
callSignalAddress	M	M	M		
terminalAlias	O	O	O	M (see note 6)	M (see note 6)
gatekeeperIdentifier	O	O	O		
endpointIdentifier	M	M	M		
alternateGatekeeper	O	O	O	NA	NA
timeToLive	O	O	O		
tokens	O	O	O	O	O
cryptoTokens	O	O	O	O	O
integrityCheckValue	O	O	O		
willRespondToIRR	-	M	M		(see note 2)
preGrantedARQ (see note 3)	-	O	O	M	M
maintainConnection	-	M	M		
serviceControl	-	-	O		
additiveRegistrationSupport	-	-	M	NA	NA
terminalAliasPattern	-	-	O	NA	NA
supportedPrefixes	-	-	O	NA	NA
usageSpec	-	-	O	NA	NA
featureServerAlias	-	-	O		
capacityReportingSpec	-	-	O		
genericData	-	-	O		

NOTE 1: The protocolIdentifier parameter shall be set to set to v2, v3 or v4. If the **protocolIdentifier** parameter is set to 2, parameters defined in H.323 v3 and H.323 v4 shall not be present. If the **protocolIdentifier** parameter is set to 3 parameters defined in H.323 v4 shall not be present.

NOTE 2: The sending of IRR messages between the serving network and the home network shall not apply.

NOTE 3: The **makeCall** parameter shall be set to **TRUE**. The **useGKCallSignalAddressToMakeCall** parameter shall be set to **TRUE**. The **answerCall** parameter shall be set to **TRUE**. The **useGLCallSignalAddressToAnswer** parameter shall be set to **TRUE**.

NOTE 4: Registration of gateways not supported by this profile.

NOTE 5: Gatekeeper routed call model mandated in the present document thus no usage information is required in RAS messages.

NOTE 6: The **terminalAlias** parameter includes the resulting list of **terminalAlias**, i.e. all user identities that the home network has successfully validated. Any authentication procedure or any call-setup procedure requiring only one user identity shall use the first **terminalAlias** as the user identity.

B.1.2.2.3 Register ReJect (RRJ)

Mandatory UUIE Fields	H.323v2 Status	H.323v3 Status	H.323v4 Status	R1 Status	R2 Status
requestSeqNum	M	M	M		
protocolIdentifier (see note)	M	M	M		
nonStandardData	O	O	O		
rejectReason	M	M	M		
gatekeeperIdentifier	O	O	O		
altGKInfo	O	O	O		
tokens	O	O	O	O	O
cryptoTokens	O	O	O	O	O
integrityCheckValue	O	O	O		
featureSet	-	-	O		
genericData	-	-	O		

NOTE: The protocolIdentifier parameter shall be set to set to v2, v3 or v4. If the **protocolIdentifier** parameter is set to 2, parameters defined in H.323 v3 and H.323 v4 shall not be present. If the **protocolIdentifier** parameter is set to 3 parameters defined in H.323 v4 shall not be present.

B.1.2.3 Unregistration Registration request procedure

This clause shows the coding details of messages used during the procedures described in clause 5.3.

B.1.2.3.1 UnregisterReQuest (URQ)

UUIE Fields	H.323v2 Status	H.323v3 Status	H.323v4 Status	R1 Status	R2 Status
requestSeqNum	M	M	M		
callSignalAddress	M	M	-		
endpointAlias	O	O	O		
nonStandardData	O	O	O		
endpointIdentifier	O	O	O		
alternateEndpoints	O	O	O		
gatekeeperIdentifier	O	O	O		
tokens	O	O	O		O
cryptoTokens	O	O	O		O
integrityCheckValue	O	O	O		
reason	O	O	O		
endpointAliasPattern	-	-	O		NA
supportedPrefixes	-	-	O		NA
alternateGatekeeper	-	-	O		
genericData	-	-	O		

B.1.2.3.2 UnregisterConfirm (UCF)

UUIE Fields	H.323v2 Status	H.323v3 Status	H.323v4 Status	R1 Status	R2 Status
requestSeqNum (see note)	M	M	M		
nonStandardData	O	O	O		
tokens	O	O	O		
cryptoTokens	O	O	O		
integrityCheckValue	O	O	O		
genericData	-	O	O		

B.1.2.3.3 UnregisterReject (URJ)

UUIE Fields	H.323v2 Status	H.323v3 Status	H.323v4 Status	R1 Status	R2 Status
requestSeqNum	M	M	M		
rejectReason	M	M	M		
nonStandardData	O	O	O		
altGKInfo	O	O	O		
tokens	O	O	O		
cryptoTokens	O	O	O		
integrityCheckValue	O	O	O		
genericData	-	-	O		

B.1.2.4 Request In Progress (RIP)

The Request In Progress (RIP) message shall be used as described in clause 5. The coding of the message shall be according to the ITU-T Recommendation H.225.0 [2].

B.1.2.5 Admission ReQuest procedures (ARQ)

Gatekeepers/H323 proxies are recommended to allow endpoints not to use this procedure but use the pre-granted ARQ option instead. However, when used the Admission Request procedure shall only apply between the endpoint and the serving network in case of a roaming user.

B.1.2.6 Information Request procedures

The information request procedure is not mandated within the context of the TIPHON profile. However, when used the Information Request procedure shall only apply between Endpoint and the serving network in case of a roaming user.

B.1.2.7 Location request procedures

This procedure is for further study and not included in this version of the present document.

B.1.3 Q.931/Q.932 messages and parameters

TIPHON compliant equipment, implementing the call control and bearer control functional layer, shall support Q.931 messages according to the "*table 4/H.225.0 – H.225.0 usage of Q.931/Q.932 Messages*" with the modifications and clarifications that follow:

The entries in the table B.1 replaces the corresponding entries in table "*table 4/H.225.0 – H.225.0 usage of Q.931/Q.932 Messages*".

Table B.1: Q.931/Q.932 supported messages

Call establishment messages	Transmit (M, F, O, CM)	Receive and act on (M, F, O, CM)
Alerting	The ALERTING message is mandatory (to transmit and to receive and act on) for all gatekeepers/H.323 proxies and gateways. The ALERTING message is mandatory to transmit for H.323 terminals that want to indicate that a user is alerted about the reception of a call. The ALERTING message is mandatory to receive and act on for all H.323 terminals that implements the originating terminal functional group.	
Call Proceeding	The CALL PROCEEDING message is mandatory (to transmit and to receive and act on) for all gatekeepers/H.323 proxies and gateways. The CALL PROCEEDING message is mandatory for H.323 terminals that want to indicate that complete call information is received. The CALL PROCEEDING message is mandatory to receive and act on for all H.323 terminals that implements the originating terminal functional group.	
Connect	The CONNECT message is mandatory (to transmit and to receive and act on) for all gatekeepers/H.323 proxies and gateways. The CONNECT message is mandatory to transmit for all H.323 terminals that implements the terminating functional group. The CONNECT message is mandatory to receive and act on for all H.323 terminals that implements the originating terminal functional group.	
Progress	The PROGRESS message is mandatory (to transmit and to receive and act on) for all gatekeepers/H.323 proxies and gateways. The PROGRESS message is mandatory to receive and act on for all H.323 terminals that implements the originating terminal functional group.	
Setup	The SETUP message is mandatory (to transmit and to receive and act on) for all gatekeepers/H.323 proxies and gateways. The SETUP message is mandatory to receive and act on for all H.323 terminals that implements the terminating functional group. The SETUP message is mandatory to transmit for all H.323 terminals that implements the originating terminal functional group.	
Setup Acknowledge	The SETUP ACKNOVLEDGE message is mandatory (to transmit and to receive and act on) for all gatekeepers/H.323 proxies and gateways. The SETUP ACKNOVLEDGE message is mandatory to receive and act on for all H.323 terminals that implements the originating terminal functional group.	
Information	The INFORMATION message is mandatory (to receive and transmit) for all gatekeepers/H.323 proxies and gateways. The INFORMATION message is mandatory for all H.323 terminals implementing the overlap procedure.	

B.1.3.1 Alerting message

Q.931 information elements	H.323v2 Status	H.323v3 Status	H.323v4 Status	C1 Status	C2 Status
Protocol discriminator	M	M	M		
Call reference	M	M	M		
Message type	M	M	M		
Bearer capability	O	O	O		
Extended Facility	O	O	O		
Channel identification	FFS	FFS	FFS		
Facility	O	O	O		
Progress indicator	O	O	O	O	O
Notification Indicator	O	O	O		
Display	O	O	O		
Signal	O	O	O		
High layer compatibility	FFS	FFS	FFS		
User-to-User	M	M	M		
UUIE parameters					
protocolIdentifier	M	M	M		
destinationInfo	M	M	M		
h245Address	O	O	O		
callIdentifier	M	M	M		
h245SecurityMode	O	O	O		
tokens (see note 2)	O	O	O	O	O
cryptoTokens (see note 2)	O	O	O	O	O
fastStart	O	O	O	O	O
multipleCalls	-	M	M		
maintainConnection	-	M	M		
alertingAddress	-	O	O		
presentationIndicator	-	O	O		
screeningIndicator	-	O	O		
fastConnectRefused	-	-	O		
serviceControl	-	-	O		
capacity	-	-	O		

NOTE 1: The **protocolIdentifier** parameter shall be set to set to v2, v3 or v4. If the **protocolIdentifier** parameter is set to 2, parameters defined in H.323 v3 and H.323 v4 shall not be present. If the **protocolIdentifier** parameter is set to 3 parameters defined in H.323 v4 shall not be present.

NOTE 2: Call related and/or bearer related **tokens**/**cryptoTokens** may be present.

B.1.3.2 Call Proceeding

Q.931 information elements	H.323v2 Status	H.323v3 Status	H.323v4 Status	C1 Status	C2 Status
Protocol discriminator	M	M	M		
Call reference	M	M	M		
Message type	M	M	M		
Bearer capability	O	O	O		
Extended Facility	O	O	O		
Channel identification	FFS	FFS	FFS		
Facility	O	O	O		
Progress indicator	O	O	O	O	O
Notification Indicator	O	O	O		
Display	O	O	O		
High layer compatibility	FFS				
User-to-User	M	M	M		
UUIE Fields					
protocolIdentifier (see note 1)	M	M	M		
destinationInfo	M	M	M		
h245Address	O	O	O		
callIdentifier	M	M	M		
h245SecurityMode	O	O	O		
tokens (see note 1)	O	O	O	O	O
cryptoTokens (see note 2)	O	O	O	O	O
fastStart	O	O	O	O	O
multipleCalls	-	M	M		
maintainConnection	-	M	M		
fastConnectRefused	-	-	O		
featureSet	-	-	O		

NOTE 1: The **protocolIdentifier** parameter shall be set to set to v2, v3 or v4. If the **protocolIdentifier** parameter is set to 2, parameters defined in H.323 v3 and H.323 v4 shall not be present. If the **protocolIdentifier** parameter is set to 3 parameters defined in H.323 v4 shall not be present.

NOTE 2: Call related and/or Bearer related **tokens**/**cryptoTokens** may be present.

B.1.3.3 Connect message

Q.931 information elements	H.323v2 Status	H.323v3 Status	H.323v4 Status	C1 Status	C2 Status
Protocol discriminator	M	M	M		
Call reference	M	M	M		
Message type	M	M	M		
Bearer capability	O	O	O		
Extended Facility	O	O	O		
Channel identification	FFS	FFS	FFS		
Facility	O	O	O		
Progress indicator	O	O	O		
Notification Indicator	O	O	O		
Display	O	O	O		
Date/Time	O	O	O	NA	NA
Connected Number	O	O	O		
Connected Sub Address	O	O	O		
Low layer compatibility	FFS	FFS	FFS		
High layer compatibility	FFS	FFS	FFS		
User-to-User	M	M	M		
UUIE Fields					
protocolIdentifier (see note 1)	M	M	M		
h245Address	O	O	O		
destinationInfo	M	M	M		
conferenceID	M	M	M		
callIdentifier	M	M	M		
h245SecurityMode	O	O	O		
tokens (see note 2)	O	O	O	O	O
cryptoTokens (see note 2)	O	O	O	O	O
fastStart	O	O	O	O	O
multipleCalls	-	M	M		
maintainConnection	-	M	M		
language					
connectedAddress	-	O	O		
presentationIndicator	-	O	O		
screeningIndicator	-	O	O		
fastConnectRefused	-	-	O		
serviceControl	-	-	O		
capacity	-	-	O		
featureSet	-	-	O		

NOTE 1: The **protocolIdentifier** parameter shall be set to set to v2, v3 or v4. If the **protocolIdentifier** parameter is set to 2, parameters defined in H.323 v3 and H.323 v4 shall not be present. If the **protocolIdentifier** parameter is set to 3 parameters defined in H.323 v4 shall not be present.

NOTE 2: Call related and/or Bearer related **tokens**/**cryptoTokens** may be present.

B.1.3.4 Facility

In the context of the present document this message shall be used to tunnel the H.245 protocol messages.

Mandatory Fields	H.323v2 Status	H.323v3 Status	H.323v4 Status	C1 Status	C2 Status
Protocol discriminator	M	M	M		
Call reference	M	M	M		
Message type	M	M	M		
Extended facility	O	O	O		
Facility	O	M	M		
Notification indicator	O	O	O		
Display	O	O	O		
Calling Party Number	F	F	F		
Called Party Number	F	F	F		
User-to-User	M	M	M		
UUIE Fields					
protocolIdentifier (see note 1)	M	M	M		
alternativeAddress	O	O	O		
alternativeAliasAddress	O	O	O		
conferceID	O	O	O		
reason	M	M	M		
callIdentifier	M	M	M		
destExtraCallInfo	O	O	O	NA	NA
remoteExtensionAddress	O	O	O	NA	NA
tokens (see note 3)	O	O	O	O	O
cryptoTokens (see note 3)	O	O	O	O	O
conferences	O	O	O		
h245Address	O	O	O		
fastStart	O (see note 2)	O	O	O	O
multipleCalls	-	M	M		
maintainConnection	-	M	M		
fastConnectRefused	-	-	O		
serviceControl	-	-	O		
circuitInfo	-	-	O		
destinationInfo	-	-	O		
h245SecurityMode	-	-	O		

NOTE 1: The protocolIdentifier parameter shall be set to set to v2, v3 or v4. If the **protocolIdentifier** parameter is set to 2, parameters defined in H.323 v3 and H.323 v4 shall not be present. If the **protocolIdentifier** parameter is set to 3 parameters defined in H.323 v4 shall not be present.

NOTE 2: Originally the Facility-UUIE does not include in the **fastStart** parameter. The ITU-T Recommendation H.225.0 is modified by the Implementers guide (for version 2) to also include the **fastStart** parameter.

NOTE 3: Call related and/or Bearer related **tokens**/**cryptoTokens** may be present.

B.1.3.5 Information

Q.931 information elements	H.323v2 Status	H.323v3 Status	H.323v4 Status	C1 Status	C2 Status
Protocol discriminator	M	M	M		
Call reference	M	M	M		
Message type	M	M	M		
Sending complete	O	O	O	O (see note 1)	O (see note 1)
Display	O	O	O		
Keypad facility	O	O	O		
Signal	O	O	O		
Called party number	O	O	O	O (see note 1)	O (see note 1)
User-to-User	M	M	M		
UUIE Fields					
protocolIdentifier (see note 2)	M	M	M		
callIdentifier	M	M	M		
tokens	-	O	O	O	O
cryptoTokens	-	O	O	O	O
fastStart	-	O	O	NA	NA
fastConnectRefused	-	-	O		
circuitInfo	-	-	O	NA	?

NOTE 1: At least one of the information elements *Sending complete* or *called party number* shall be present.

NOTE 2: The **protocolIdentifier** parameter shall be set to set to v2, v3 or v4. If the **protocolIdentifier** parameter is set to 2, parameters defined in H.323 v3 and H.323 v4 shall not be present. If the **protocolIdentifier** parameter is set to 3 parameters defined in H.323 v4 shall not be present.

B.1.3.6 Progress

Q.931 information elements	H.323v2 Status	H.323v3 Status	H.323v4 Status	C1 Status	C2 Status
Protocol discriminator	M	M	M		
Call reference	M	M	M		
Message type	M	M	M		
Bearer capability	O	O	O		
Cause	O	O	O	O	O
Extended Facility	O	O	O		
Channel identification	FFS	FFS	FFS		
Facility	O	O	O		
Progress indicator	O	O	O	M	M
Notification Indicator	O	O	O		
Display	O	O	O		
High layer compatibility	FFS	FFS	FFS		
User-to-User	M	M	M		
UUIE Fields					
protocolIdentifier (see note 1)	M	M	M		
destinationInfo	M	M	M		
h245Address	O	O	O		
callIdentifier	M	M	M		
h245SecurityMode	O	O	O		
tokens (see note 2)	O	O	O	O	O
cryptoTokens(see note 2)	O	O	O	O	O
fastStart	O	O	O	O	O
multipleCalls	-	M	M		
maintainConnection	-	M	M		
fastConnectRefused	-	-	O		

NOTE 1: The **protocolIdentifier** parameter shall be set to set to v2, v3 or v4. If the **protocolIdentifier** parameter is set to 2, parameters defined in H.323 v3 and H.323 v4 shall not be present. If the **protocolIdentifier** parameter is set to 3 parameters defined in H.323 v4 shall not be present.

NOTE 2: Call related and/or Bearer related **tokens**/**cryptoTokens** may be present.

B.1.3.7 Release Complete

Q.931 information elements	H.323v2 Status	H.323v3 Status	H.323v4 Status	C1 Status	C2 Status
Protocol discriminator	M	M	M		
Call reference	M	M	M		
Message type	M	M	M		
Cause	CM	CM	CM	O (see note 1)	O (see note 1)
Facility	O	O	O		
Notification Indicator	O	O	O		
Display	O	O	O		
Signal	O	O	O		
User-to-User	M	M	M		
UUIE Fields					
protocol Identifier (see note 2)	M	M	M		
reason	O	O	O	O (see note 1)	O (see note 1)
callIdentifier	M	M	M		
tokens	-	O	O		
cryptoTokens	-	O	O		
busyAddress	-	O	O		
presentationIdentificatior	-	M	O		
screeningIndicator	-	M	O		
capacity	-	-	O		
serviceControl	-	-	O		
featureSet	-	-	O		

NOTE 1: The information element "*Cause"* and the parameter "**reason**" is mutual exclusive, however the sending of one of them is mandatory.

NOTE 2: The **protocolIdentifier** parameter shall be set to set to v2, v3 or v4. If the **protocolIdentifier** parameter is set to 2, parameters defined in H.323 v3 and H.323 v4 shall not be present. If the **protocolIdentifier** parameter is set to 3 parameters defined in H.323 v4 shall not be present.

B.1.3.8 Setup

Q.931 information elements	H.323v2 Status	H.323v3 Status	H.323v4 Status	C1 Status	C2 Status
Protocol discriminator	M	M	M		
Call reference	M	M	M		
Message type	M	M	M		
Sending complete	O	O	O	O	M
Repeat indicator	F	F	F		
Bearer capability	M	M	M		
Extended facility	O	O	O		
Channel indication	FFS	FFS	FFS		
Facility	O	O	O		
Progress indicator	F	F	F		
Network specific facilities	F	F	F		
Notification indicator	O	O	O		
Display	O	O	O		
Keypad facility	O	O	O		
Signal	O	O	O		
Calling party number	O	O	O		O (see note 1)
Calling party subaddress	O	O	O		
Called party number	O	O	O	O (see note 2)	O (see note 2)
Called party subaddress	O	O	O		
Transit network selection	F	F	F		
Repeat indicator	F	F	F		
Low layer compatibility	FFS	FFS	FFS		
High layer compatibility	FFS	FFS	FFS		
User-to-User	M	M	M		
UUIE Fields					
protocol Identifier (see note 4)	M	M	M		
h245Address	O	O	O		x
sourceAddress	O	O	O	O	O (see note 1)
sourceInfo	M	M	M	?	?
destinationAddress	O	O	O	O (see note 2)	O (see note 2)
destCallSignalAddress	O	O	O		
destExtraCallInfo	O	O	O	NA	NA
destExtraCRV	O	O	O	NA	NA
activeMC	M	M	M		
conference ID	M	M	M		
conference Goal	M	M	M		
callServices	O	O	O		
callType (see note 5)	M	M	M		
sourceCallSignalAddress	O	O	O		
remoteExtensionAddress	O	O	O	NA	NA
callIdentifier	M	M	M		
h245SecurityCapability	O	O	O		
tokens (see note 8)	O	O	O	O	O
cryptoTokens (see note 8)	O	O	O	O	O
fastStart	O	O	O	M	M
mediaWaitForConnect	M	M	M		
canOverlapSend	M	M	M		
endpointIdentifier	-	O	O	M (see note 3)	
multipleCalls	-	M	M		
maintainConnection	-	M	M		
ConnectionParameters	-	O	O		
language	-	O	O		
presentationIndicator (see note 9)	-	O	O	O	O
screeningIndicator (see note 9)	-	O	O	O	O
serviceControl	-	-	O		

Q.931 information elements	H.323v2 Status	H.323v3 Status	H.323v4 Status	C1 Status	C2 Status
symmetricOperationRequired	-	-	O		
capacity	-	-	O		
circuited	-	-	O		
desiredProtocols	-	-	O		
neededFeatures	-	-	O		
desiredFeatures	-	-	O		
supportedFeatures	-	-	O		
parallelH245Control	-	-	O		
additionalSourceAddresses	-	-	O		

NOTE 1: At least one of the parameters **sourceAddress** or calling party number information element is shall be present.
NOTE 2: At least one of the parameter **destinationAddress** or the called party number information element shall be present.
NOTE 3: Since the gatekeeper routed call model is mandatory, between the H.323 terminal and the Gatekeeper in the home network H.323 proxy in the serving network i.e. C1 reference point, the **endpointIdentifier** parameter shall always be present.
NOTE 4: The protocolIdentifier parameter shall be set to set to v2, v3 or v4. If the **protocolIdentifier** parameter is set to 2, parameters defined in H.323 v3 and H.323 v4 shall not be present. If the **protocolIdentifier** parameter is set to 3 parameters defined in H.323 v4 shall not be present.
NOTE 5: The **callType** parameter shall always be set to **pointToPoint**.
NOTE 6: The **presentationRestriction** and screeningIndicator is valid only for email and URL **callingPartyID**. The screening and restriction information for the E.164 number is included in the *calling party number* information element.
NOTE 7: E.164 **calledPartyID** shall be included in the *called party number* information element.
NOTE 8: Call related and/or Bearer related **tokens**/**cryptoTokens** may be present.
NOTE 9: If the **protocolIdentifier** is set either to 3 or 4 then this parameter shall be present since it is required for CLIR. If the **protocolIdentifier** is set to 2 then this parameter shall not be present since it is not defined in H.323 v2.

B.1.3.9 Setup acknowledge

Q.931 information elements	H.323v2 Status	H.323v3 Status	H.323v4 Status	C1 Status	C2 Status
Protocol discriminator	M	M	M		
Call reference	M	M	M		
Message type	M	M	M		
Channel identification	O	O	O	NA	NA
Progress indicator	O	O	O	NA	NA
Display	O	O	O		
Signal	O	O	O		
UUIE Fields					
protocolIdentifier	-	-	M		
callIdentifier	-	-	M		
tokens	-	-	O		
cryptoTokens	-	-	O		

B.2 H.245

B.2.1 Terminal Capability set message

B.2.1.1 Terminal Capability set

Fields	H.323 Status	C1 Status	C2 Status
sequenceNumber	M		
protocolIdentifier	M		
multiplexCapability	O	M	M
capabilityTable	O		
capabilityDescriptors	O		

B.2.1.2 Terminal Capability Set acknowledge

Fields	H.323 Status	C1 Status	C2 Status
sequenceNumber	M		

B.2.1.3 Terminal Capability Set reject

Fields	H.323S Status	C1 Status	C2 Status
sequenceNumber	M		
cause	M		

B.2.3 Logical Channel signalling messages

B.2.3.1 Open Logical Channel

Fields	H.323 Status	C1 Status	C2 Status
forwardLogicalChannelNumber	M		
forwardLogicalChannelParameters	M		
reverseLogicalChannelParameters	O		
separateStack	O		
encryptionSync	O		

B.2.3.2 Open Logical Channel acknowledge

Fields	H.323S Status	C1 Status	C2 Status
forwardLogicalChannelNumber	M		
reverseLogicalChannelParameters	O		
separateStack	O		
encryptionSync	O		

B.2.3.3 Open Logical Channel reject

Fields	H.323S Status	C1 Status	C2 Status
forwardLogicalChannelNumber	M		
cause	M		

B.2.3.4 Open Logical Channel confirm

Fields	H.323S Status	C1 Status	C2 Status
forwardLogicalChannelNumber	M		

B.2.3.5 Close Logical Channel

Fields	H.323S Status	C1 Status	C2 Status
forwardLogicalChannelNumber	M		
source	M		
reason	M		

B.2.3.6 Close Logical Channel acknowledge

Fields	H.323S Status	C1 Status	C2 Status
forwardLogicalChannelNumber	M		

B.2.4 Request mode messages

B.2.4.1 Request mode

Fields	H.323S Status	C1 Status	C2 Status
sequenceNumber	M		
requestedModes	M		

B.2.4.2 Request mode ack

Fields	H.323S Status	C1 Status	C2 Status
sequenceNumber	M		
response	M		

B.2.4.3 Request mode reject

Mandatory Fields	H.323 Status	C1 Status	C2 Status
sequenceNumber	M		
cause	M		
Optional Fields			

Annex C (informative): Control of end-to-end Quality of service

C.1 Introduction

For each element in each of the QoS Signalling information flows, the tables in this annex identify where and how the information can be obtained or sent in the H.323 [1] series of protocols (H.225.0 [2] and H.245 [3]). The underlying architectural model of H.323 is simpler than the TIPHON model as there is no provision for guaranteed QoS in H.323. This means that some of the mappings in this annex are tentative, speculative or non-existent. In each case, notes in the tables identify the status of the mappings.

C.1.1 H.323 overall behaviour

When an endpoint requests admission with a Gatekeeper, it should indicate in the ARQ message whether or not it is capable of reserving resources. The Gatekeeper should then decide, based on the information it receives from the endpoint and on information it has about the state of the network, either:

- to permit the endpoint to apply its own reservation mechanism for its H.323 session; or
- to perform resource reservation on behalf of the endpoint; or
- that no resource reservation is needed at all. Best-effort is sufficient.

C.2 Qos information flow mapping

C.2.1 OrigQoSEstab

Table C.1: Mapping of OrigQoSEstab request

OrigQoSEstab *request*		**H.225.0** (ARQ/SETUP(fastStart IE))	
Information element	**Value**	**Mapping**	**Notes**
QoS Service Class	- Predefined - TIPHON QoS class - 3 Best - 2H High - 2M Medium - 2A Acceptable - 1 Best effort - Non-standardized QoS class	No equivalent	There is no relationship between Q.931 BC and the proposed and selected codecs.
Called user ID	TIPHON user name	ARQ *destinationInfo* - a single entry as an E.164 number	TS 102 024-3 [15] specifies an E.164 number as a 1 to 15 digit numeric string. H.225.0 specifies it as a 1 to 128 character IA5 string
Codec	- List of possible codecs - Codec type - Frames per packet	audioCapability (see note 2)	BC=speech or 3,1 kHz audio does not map exclusively to G.711. If this were the case no compression would be achived. Codecs G.723.x and G.729.x are the most used codecs in an H.323 environment
NOTE1: The value of 20 G.711 samples per packet is not entirely arbitrary but is based on the common use of 20 or 30 in existing devices which packetize G.711 sample streams. However, there appears to be no published research on determining the optimum value. NOTE2: TIPHON uses the fast connect procedure. In the SETUP message there is a preferred list of supported audioCapabilities where codecType and fpp are present. H.245 is only an end-to-end signal if Direct H.245 is used.			

Table C.2: Mapping of OrigQoSEstab response

OrigQoSEstab *response*		**H.225.0** (ACF/H.225.0(fastStart IE)	
Information element	**Value**	**Mapping**	**Notes**
Codec	- List of possible codecs - Codec type - Frames per packet	audioCapability	A selection of codecs made out of the proposed codecs in the SETUP(fastStart IE)
Result	- End-to-End QoS Established - with requested QoS - Rejection cause - Requested QoS not available - Called user unknown - No compatible codec available - Policy Rejection	ACF ARJ *rejectReason* - resourceUnavailable - calledPartyNotRegistered - no direct mapping - invalidPermission	

The transportQOS information element in the H.225.0 ARQ message should be set to the value *gatekeeperControlled*.

C.2.2 QoSEstab

Table C.3: Mapping of QoSEstab request

QoSEstab request		H.225.0 (SETUP)	
Information element	**Value**	**Mapping**	**Notes**
Calling user ID	TIPHON user name	Calling party number	TS 102 024-3 [15] specifies an E.164 number as a 1 to 15 digit numeric string. H.225.0 specifies it as a 1 to 128 character IA5 string
Called user ID	TIPHON user name	Called party number	TS 102 024-3 [15] specifies an E.164 number as a 1 to 15 digit numeric string. H.225.0 specifies it as a 1 to 128 character IA5 string
Transport QoS parameters	Maximum delay, Maximum packet delay variation, Maximum mean packet loss	No equivalent	No ARQ in the network FG Information can be substracted from RTCP information
Transport parameters qualifier	- Transport QoS parameters indicate total remaining budget - Transport QoS parameters indicate budget available per domain	No equivalent	No ARQ in the network FG Information can be substracted from RTCP information
Traffic descriptor	Media peak rate, Maximum media frame size,	No equivalent	No ARQ in the network FG
Codec	List of possible codecs - Codec type - Frames per packet	audioCapabiltiy	
Destination service domain	Network specific address	signallingAddress	For both IPv4 and IPv6 addresses, there is an exact mapping of the address portion itself. However, TS 102 024-3 [15] specifies the port as a 16 octet string while H.225.0 specifies it as a 16-bit integer

Table C.4: Mapping of QoSEstab response

QoSEstab response		H.225.0	
Information element	**Value**	**Mapping**	**Notes**
Codec	List of possible codecs - Codec type - Frames per packet	audioCapability	This information could be carried in the ACF *genericData* IE. The codec type can use the type "text" and the frames per packet can use the type "number8"
Result	- Requested QoS available - Rejection cause - Requested QoS not available - Called user unknown - No compatible codec available		

C.2.2.1 Additional H.225.0 ARQ settings

transportQOS should be set to ***gatekeeperControlled***

C.2.3 DestQoSEstab

Table C.5: Mapping of DestQoSEstab request

DestQoSEstab *request*		H.225.0 (SETUP)	
Information element	**Value**	**Mapping**	**Notes**
Calling user ID	TIPHON user name	Calling party number	TS 102 024-3 [15] specifies an E.164 number as a 1 to 15 digit numeric string. H225.0 specifies it as a 1 to 128 character IA5 string
Transport QoS parameters	Maximum delay, Maximum packet delay variation, Maximum mean packet loss	No equivalent	
Codec	List of possible codecs - Codec type - Frames per packet	audioCapability	

Table C.6: Mapping of DestQoSEstab response

DestQoSEstab *response*		H.225.0	
Information element	**Value**	**Mapping**	**Notes**
Codec	List of possible codecs - Codec type - Frames per packet	No equivalent audioCapability	This information could be carried in the ACF *genericData* IE. The codec type can use the type "text" and the frames per packet can use the type "number8"
Result	- Indicated codec selected - Rejection cause: - Codecs not supported	audioCapability ARJ *rejectReason* no direct mapping empty audioCapability listS	

C.3 QoSPolicy

The H.323 model does not include a policy entity and so there is no equivalent to the QoSPolicy protocol messages. Consequently, it is not possible to make any definite mapping between the TIPHON meta-protocol and H.323 in this area. However, it may be useful to consider the Clearing House Border Element (BE_{CH}) described in annex G of H.225.0 as performing this function.

Table C.7: Mapping of QoSPolicy request

QoSPolicy *request*		**H.225.0**	
Information element	**Value**	**Mapping**	**Notes**
Calling user ID	TIPHON user name	ARQ *srcInfo* - a single entry as an E.164 number	TS 102 024-3 [15] specifies an E.164 number as a 1 to 15 digit numeric string. H.225.0 specifies it as a 1 to 128 character IA5 string
Called user ID	TIPHON user name	ARQ *destinationInfo* - a single entry as an E.164 number	TS 102 024-3 [15] specifies an E.164 number as a 1 to 15 digit numeric string. H.225.0 specifies it as a 1 to 128 character IA5 string
Transport QoS parameters	Maximum delay, Maximum packet delay variation, Maximum mean packet loss	No equivalent	This information could be carried in the ARQ *genericData* IE. Delay and delay variation can use the type "number16" and packet loss can use the type "number32"
QoS Service Class	- Predefined - TIPHON QoS class - 3 Best - 2H High - 2M Medium - 2A Acceptable - 1 Best effort - Non-standardized QoS class	No equivalent	This information could be carried in the ARQ *genericData* IE using the type "number8"

Table C.8: Mapping of QoSPolicy response

QoSPolicy response		**H.225.0**	
Information element	**Value**	**Mapping**	**Notes**
Result	- Call permitted - Rejection cause - Service not subscribed to - Service currently not available	ACF ARJ *rejectReason* invalidPermission neededFeatureNotSupported	

C.4 TRMReserve, TRMConnect, TRMRelease

The H.323 series of recommendations are explicitly intended for providing communications without a guarantee of QoS. As a consequence, the underlying model is different from the TIPHON model. H.323 assumes a direct, but uncontrolled media path to the destination whereas TIPHON assumes linked transport domains carefully controlled by service domains to ensure that sufficient resources are available that the desired QoS can be achieved. There is, therefore, no functional equivalence in H.323 to the messages that pass between a TIPHON service domain and the corresponding transport domain (TRMReserve, TRMConnect and TRMRelease) and, thus, no mapping of meta-protocol information elements to H.323 signals is possible.

C.5 Summary of mapping QoS meta-protocol to H.323 series

Although, with some assumptions, it is possible to show how H.225.0 can be mapped to the TIPHON QoS meta-protocol between users and service domains and between service domains and service domains, there is no provision in the current version of the H.323 series of recommendations for any signalling between service domains and transport domains. Since this signalling is fundamental to the provision of guaranteed QoS in the TIPHON model, there is a significant gap in the mappings. To achieve full mapping, there needs to be a revision of the H.323 architecture as well as considerable modifications to the protocols themselves.

This should include:

- the clear recognition that there are entities which can at least act as service domains between the calling user and the called user;
- the modification of H.225.0 to provide communication between user and service domain as well as between service domain and service domain;
- the addition within the H.323 architecture of transport domains distinct from the current administrative domains and a specific Policy Entity;
- the addition of specific protocol within H.225.0 for making enquiries to the Policy Entity (possibly based on TS 101 321 [17];
- the addition of a completely new protocol recommendation for signalling between service domains and transport domains;
- the addition within the H.225.0 ARQ message of information elements to carry QoS class, Transport QoS Parameters, the Transport Parameters Qualifier, the Traffic descriptor and Codec lists;
- the addition within the H.225.0 ACF message of an information element to carry a Codec descriptor.

History

Document history		
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