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Information technology — Telecommunications and information exchange between systems — Corporate telecommunication networks — Signalling interworking between QSIG and H.323 — Generic functional protocol for the support of supplementary services

Technologies de l'information — Télécommunications et échange d'information entre systèmes — Réseaux de télécommunications corporatifs — Signalisation de travail entre QSIG et H.323 — Protocole fonctionnel général pour le support des services supplémentaires

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 21409 was prepared by ECMA (as ECMA-307) and was adopted, under a special “fast-track procedure”, by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval by national bodies of ISO and IEC.

Annex A forms a normative part of this International Standard.

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Introduction

This International Standard is one of a series of Standards defining the interworking of services and signalling protocols deployed in Corporate telecommunication Networks (CNs). The series uses telecommunication concepts as developed by ITU-T and conforms to the framework of International Standards on Open Systems Interconnection as defined by ISO/IEC.

This International Standard defines the signalling protocol interworking for the generic functional procedures in support of Supplementary Services and/or Additional Network Features (ANFs) between a Private Integrated Services Network (PISN) and a private telecommunications network based on the Internet Protocol (IP). It is further assumed that the protocol for the PISN is that defined for the Q reference point (QSIG) and the protocols for the IP based network are based on ITU-T Recommendation H.323.

This International Standard is based upon the practical experience of ECMA member companies and the results of their active and continuous participation in the work of ISO/IEC JTC 1, ITU-T, ETSI and other international and national standardization bodies. It represents a pragmatic and widely based consensus.

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Information technology — Telecommunications and information exchange between systems — Corporate telecommunication networks — Signalling interworking between QSIG and H.323 — Generic functional protocol for the support of supplementary services

1 Scope

This International Standard specifies signalling interworking between "QSIG" and "H.323" in support of generic functional procedures for supplementary services within a Corporate telecommunication Network (CN).

"QSIG" is a signalling protocol that operates at the Q reference point between Private Integrated Services eXchanges (PINX) within a Private Integrated Services Network (PISN). The Q reference point is defined in ISO/IEC 11579-1. A PISN provides circuit-switched basic services and supplementary services to its users. QSIG is specified in other Standards, in particular ISO/IEC 11572 (call control in support of basic services), ISO/IEC 11582 (generic functional protocol for the support of supplementary services) and a number of standards specifying individual supplementary services.

"H.323" is a set of signalling protocols for the support of voice or multimedia communication within a packet network, in particular a packet network that uses the Internet Protocol (IP) as its network layer protocol (IP network). H.323 signalling protocols operate between endpoints in an IP network, either indirectly via one or more gatekeepers, or directly. An endpoint can be a terminal or a gateway to another network. H.323 is an "umbrella" recommendation, referring to various ITU-T recommendations, in particular Recommendations H.225.0 and H.245 (basic communication capabilities) and Recommendation H.450.1 (generic functional protocol for the support of supplementary services).

NOTE - H.450.1 applies to the 1998 version of H.323 (also known as H.323 version 2) and to later versions.

Interworking between QSIG and H.323 permits a call originating at a user of a PISN to terminate at a user of an IP network, or a call originating at a user of an IP network to terminate at a user of a PISN. In addition this International Standard enables the participants of a call to exchange supplementary service control information in a generic way. The more specific aspects of interworking particular supplementary services are specified in other Standards.

This International Standard is applicable to any interworking unit that can act as a gateway between a PISN employing QSIG and an IP network employing H.323.

2 Conformance

In order to conform to this International Standard, a gateway shall satisfy the requirements identified in the Implementation Conformance Statement (ICS) proforma in annex A.

3 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/IEC 11572:2000, *Information technology — Telecommunications and information exchange between systems — Private Integrated Services Network — Circuit mode bearer services — Inter-exchange signalling procedures and protocol*

ISO/IEC 11579-1:1994, *Information technology — Telecommunications and information exchange between systems — Private integrated services network — Part 1: Reference configuration for PISN Exchanges (PINX)*

ISO/IEC 11582:1995, *Information technology — Telecommunications and information exchange between systems — Private Integrated Services Network — Generic functional protocol for the support of supplementary services — Inter-exchange signalling procedures and protocol*

ITU-T Rec. H.225.0:1998 (or later edition), *Call signalling protocols and media stream packetization for packet-based multimedia communication systems*

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ITU-T Rec. H.245:1998 (or later edition), *Control protocol for multimedia communication*

ITU-T Rec. H.323:1998 (or later edition), *Packet-based multimedia communications systems*

ITU-T Rec. H.450.1:1998, *Generic functional protocol for the support of supplementary services in H.323*

4 Definitions

For the purposes of this International Standard, the following definitions apply.

4.1 External definitions

This International Standard uses the following terms defined in other documents:

- Endpoint (ITU-T Rec. H.323)
- Gatekeeper (ITU-T Rec. H.323)
- Private Integrated services Network eXchange (PINX) (ISO/IEC 11579-1)
- Switched Circuit Network (SCN) (ITU-T Rec. H.323)

Additionally the definitions of ISO/IEC 11582 and of ITU-T Rec. H.450.1 shall apply, as appropriate.

4.2 Other definitions

4.2.1 Call, Basic call : A call in the sense of QSIG (see ISO/IEC 11572), and a (point-to-point) conference in the sense of H.323 (see ITU-T Rec. H.323).

NOTE - A “call” in the sense of H.323 is that segment of a (point-to-point) conference which belongs to the H.323 domain. In a multipoint conference the H.323 segment of each conference leg is a separate call.

4.2.2 Corporate telecommunication Network (CN) : Sets of equipment [Customer Premises Equipment and/or Customer Premises Networks] which are located at geographically dispersed locations and are interconnected to provide telecommunication services to a defined group of users.

NOTE - A CN can comprise a PISN, a private IP network (intranet), or a combination of the two.

4.2.3 Gateway : A gateway as defined in H.323, here specifically for the purpose of interworking with a network employing QSIG.

4.2.4 IP network : A public or private network offering connectionless packet-mode services based on the Internet Protocol (IP) as the network layer protocol.

4.2.5 Private Integrated Services Network (PISN) : A private switched circuit network (SCN).

4.2.6 Receiving side : Within the context of a single information exchange through a gateway, the side of the gateway where the information arrives.

4.2.7 Sending side : Within the context of a single information exchange through a gateway, the side of the gateway where the information is transmitted.

4.2.8 Side : A single protocol stack (QSIG or H.323) within a gateway.

5 Acronyms

APDU	Application Protocol Data Unit
ASE	Application Service Element
CN	Corporate telecommunication Network
GFT	Generic Functional Transport
GK	GateKeeper
ICS	Implementation Conformance Statement
IE	Information Element
IP	Internet Protocol
IPL	Inter-PINX Link
IWF	InterWorking Function

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LAN	Local Area Network
MCU	Multipoint Control Unit
PINX	Private Integrated services Network eXchange
PISN	Private Integrated Services Network
ROSE	Remote Operations Service Element
SCM	Signalling Carriage Mechanism
SCN	Switched Circuit Network
SS	Supplementary Service
TCP	Transmission Control Protocol
TE	Terminal Equipment
UDP	User Datagram Protocol

6 Service description

6.1 The architecture of the two networks

An H.323 arrangement consists of two or more H.323 endpoints connected to an IP network, e.g. a local area network (LAN). H.323 endpoints are terminals, gateways or multipoint control units (MCU). The arrangement may also contain one or more gatekeepers (GK). The underlying network's components (routers etc.), however, are of no concern with regard to H.323.

A gateway permits interworking with switched circuit networks (SCN), e.g. a PISN.

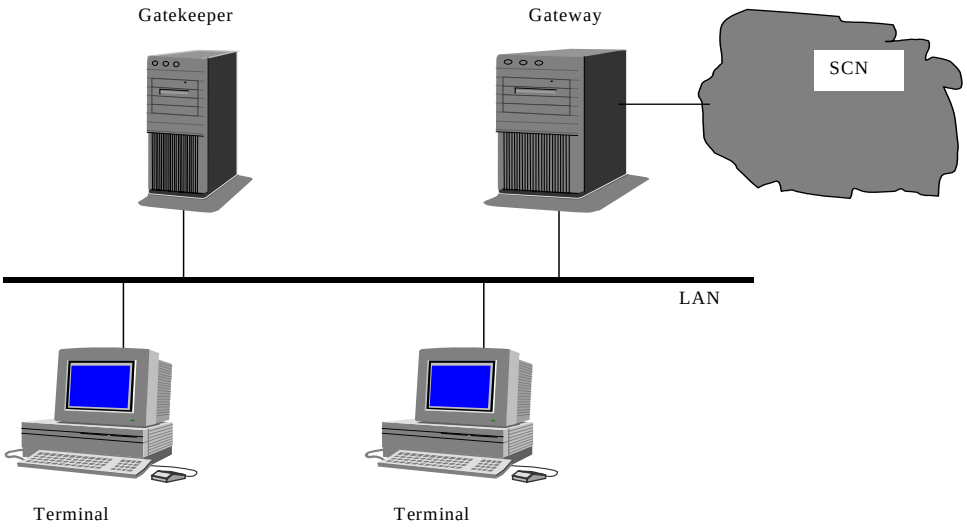

Figure 1 — Example of an H.323 arrangement

A Private Integrated Services Network (PISN) consists of one or more network exchanges (PINX) with attached terminals (TE). PINXs are inter-connected by inter-PINX links (IPLs). Communication requires a path to be set up between two TEs via PINXs and IPLs.

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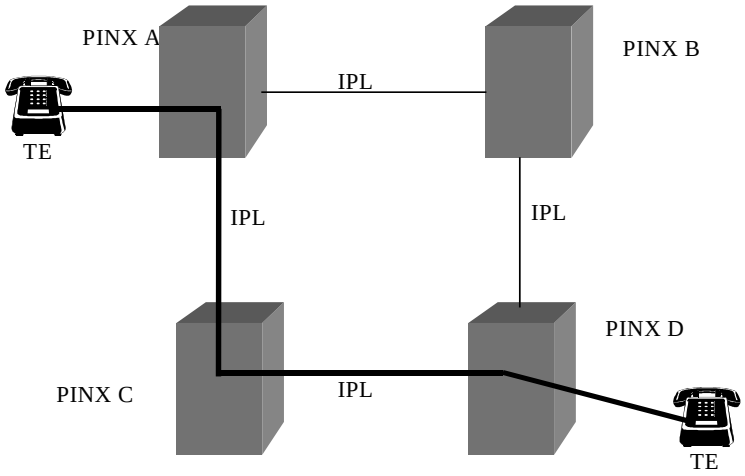

Figure 2 — Example of a PISN connection between two terminals

Comparing the two scenarios, the most significant difference is the absence of nodal entities in the H.323 case. Communication is an exchange of information packets directly between two or more endpoints: A gatekeeper, if present, has certain assisting tasks, but does not 'switch' any payload channels. It may, however, relay signalling information between endpoints or act upon it on behalf of endpoints.

In the PISN case, information channels are switched by PINXs between communicating terminals for the duration of the communication. The PINXs where the communicating terminals are attached are end PINXs, which act on user requests and are in control of the connection through the PISN. If more than 2 PINXs are present in a call path, the intermediate PINXs act as transit or relay nodes for both signalling and user information (payload). This role sharing – TE, end PINX, transit PINX - does not exist in a pure H.323 conversation.

These structural differences between H.323 and PISN will in many cases result in a different allocation of supplementary service functionality in the two environments. The possibly different function split must be taken into account when individual supplementary services are interworked.

6.2 Generic procedures: Capabilities

Generic procedures provide the transport protocol for supplementary service control information. Supplementary service control protocols are based on remote operations (ROSE) as defined in ITU-T Rec. X.219 / X.229 (blue book) and X.880 series.

Generic procedures for PISNs (QSIG-GF) are specified in ISO/IEC 11582. For the H.323 environment, generic procedures are specified in ITU-T Rec. H.450.1.

The following table 1 compares the capabilities of QSIG-GF and H.450.1.

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Table 1 — Capabilities

Capability	QSIG-GF	H.450.1	Remarks
Call related transport	✓	✓	
Call independent connection oriented transport	✓	✓	
Call independent connectionless transport	✓	-	Currently not used by standardized QSIG supplementary services
Network Facility Extension (NFE)	✓	✓	Extended addressing capabilities in H.450.1
Interpretation APDU	✓	✓	
ROSE APDUs and procedures	X.219 / 229	X.880 series	In practice no relevant difference.
Other APDUs and procedures: DSE (dialogue procedures), ACSE	✓	-	Currently not used by standardized QSIG supplementary services
Manufacturer specific information	✓	✓	2 alternative containers in H.450.1
Notifications	✓	-	
Messages	ALERTING, CONNECT, DISCONNECT, PROGRESS, RELEASE, REL. COMP., SETUP; FACILITY, NOTIFY	ALERTING, CALL PROC., CONNECT, PROGRESS, REL. COMP., SETUP; FACILITY	These QSIG messages are defined in ISO/IEC 11572. All messages for H.450.1 transport are defined in H.225.0. These QSIG messages are defined in ISO/IEC 11582.
Information elements	Facility; Notification indicator	User-user information	Element H 450.1 Supplementary Service APDU within User-user information is the equivalent of information element Facility
ASN.1 encoding rules	X.208 X.209 BER	X.680 series X.691 PER (BAV)	BER – Basic Encoding Rules PER – Packed Encoding Rules BAV – basic aligned variant

Table 1 shows that the capabilities currently used by standardized supplementary services are supported in both environments (exception: Notifications are currently not used in H.450. However, in many cases an equivalent operation exists in an H.450 supplementary service). An interworking or mapping is therefore generally possible although details may be different.

NOTE - The NOTIFY message is optional in H.225.0 and may be passed on by a gateway to the H.323 side, but its processing is unspecified – it may be meaningless. In the other direction, current H.450.x services do not generate notifications.

6.3 Protocol model

QSIG-GF defines a protocol model which can be applied to H.450.1, too (see figure 3).

The shaded areas in figure 3 are specific to GF and are defined in ISO/IEC 11582. Call control and the non-shaded part of protocol control represent the basic call protocol as defined in ISO/IEC 11572. SS-control parts are defined in individual supplementary service standards. SCM is any suitable layer 2 protocol, dependent on the scenario in which QSIG is used.

NOTE - Some parts of the QSIG-GF protocol model, e.g. the DSE element, are omitted from figure 3 for clarity.

In the H.450.1 case call control and protocol control include H.225.0 and possibly H.245 signalling (the latter is not required by H.450.1 per se) . The signalling carriage mechanism is an IP protocol stack, usually TCP (and/or UDP) on top of IP. The shaded areas are GF specific and are implicitly contained in H.450.1 (and partly in H.225.0).

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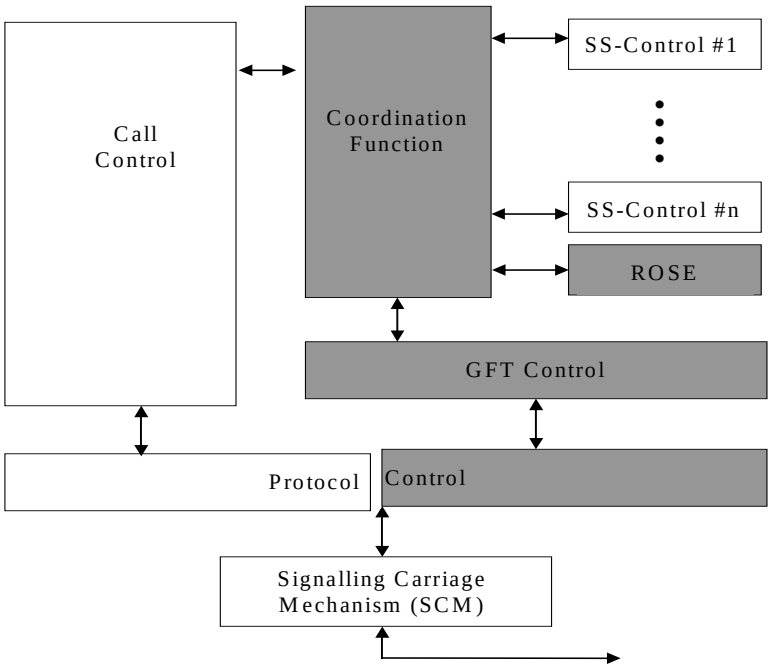

Figure 3 — Protocol model

6.4 Interworking of supplementary services

The interworking function (IWF) sits above the application service elements (ASE), which comprise the coordination function, ROSE and SS Control. The gateway has to support both protocol versions of the supplementary service syntactically and semantically. It represents on each side one of the functional roles specified for the supplementary service (usually a different one on each side – for example, the gateway may look like the terminating PINX on its PISN side and like the originating endpoint on its H.323 side). Depending on the individual supplementary service, the gateway may have to provide functions that are interworking specific, in addition to the procedures specified by the supplementary service itself.

This International Standard specifies generic requirements for the IWF. For a given supplementary service additional requirements of the IWF can be specified separately, e.g., in another standard.

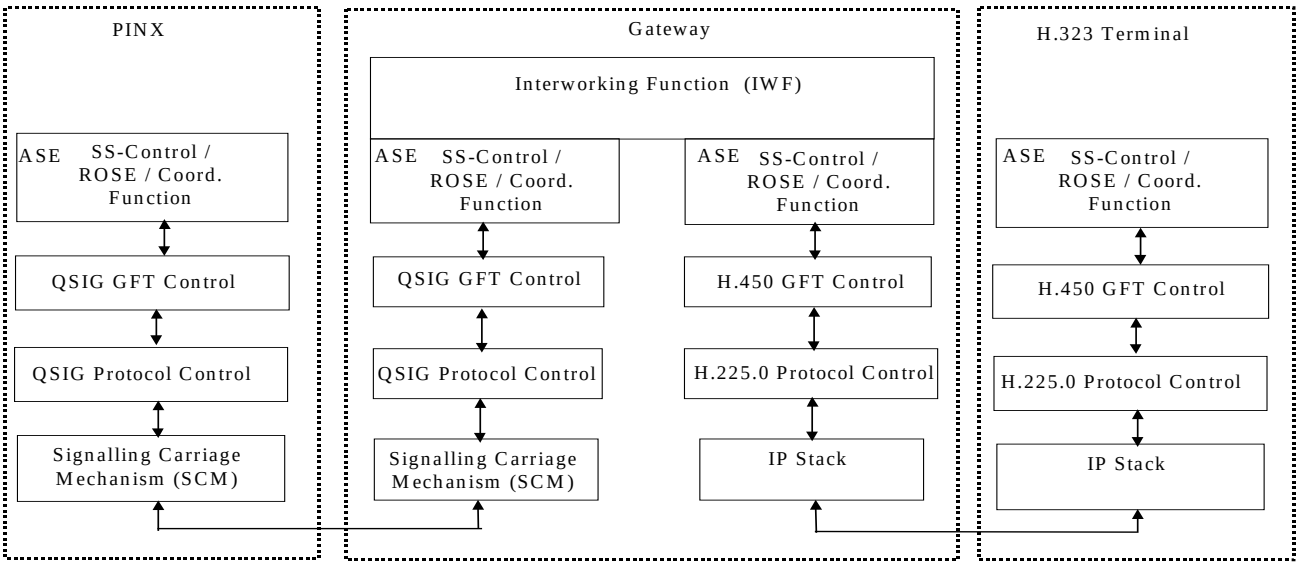

Figure 4 — Interworking

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7 Protocol interworking – Messages and information elements

When providing interworking for a specific supplementary service, each side of a gateway shall act according to the requirements of the supplementary service protocol in force on that side. In addition, the gateway shall provide the interworking function that controls and co-ordinates the two sides of the gateway.

NOTE - This means the gateway will act as source PINX or as destination PINX on its QSIG side, and as source endpoint or as destination endpoint on its H.323 side.

In the absence of more specific rules mandated by a supplementary service specific interworking specification, a gateway shall:

— if the content - e.g. APDU(s) of supplementary service operation(s) - of a received message is understood and can be passed on (in the form of equivalent information), behave in accordance with the rules of table 2, by carrying out the — required action when a given condition occurs. Each condition applies to either the receipt of an H.323 message from an entity in the IP network or the receipt of a QSIG message from a PINX;

— if the content is understood but cannot be passed on, discard the information and act in accordance with the rules of the supplementary service concerned;

— if an invoke APDU of an unrecognised operation is encountered, act according to the interpretation APDU; in the absence of an interpretation APDU, send back a reject APDU 'unrecognisedOperation'.

NOTE 1 - The rules below cover both call related and call independent signalling.

NOTE 2 - It is recommended that supplementary service specific interworking standards take these rules as a basis and modify them or add to them only when necessary.

NOTE 3 - It is not precluded that an implementation handles additional cases by refining these rules, e.g. sending a FACILITY message if the intended basic call control message is not appropriate at the time. Such behaviour is outside the scope of this International Standard.

Table 2 — Generic Message and APDU handling requirements

Rule	Condition	Required action
1	Receipt of an H.323 ALERTING, CONNECT, or PROGRESS message containing one or more H4501SupplementaryService APDU(s) within the User-user information element	If a QSIG ALERTING, CONNECT, or PROGRESS message is to be transmitted, include in this QSIG message one or more Facility information element(s) with content equivalent to that of the H4501SupplementaryService APDU(s)
2	Receipt of an H.323 SETUP message containing one or more H4501SupplementaryService APDU(s) within the User-user information element	If a QSIG SETUP message is to be transmitted, include in this QSIG message one or more Facility information element(s) with content equivalent to that of the H4501SupplementaryService APDU(s)
3	Receipt of an H.323 CALL PROCEEDING message containing one or more H4501SupplementaryService APDU(s) within the User-user information element	Transmit a QSIG FACILITY message containing one or more Facility information element(s) with content equivalent to that of the H4501SupplementaryService APDU(s) if the QSIG call state permits
4	Receipt of an H.323 RELEASE COMPLETE message containing one or more H4501SupplementaryService APDU(s) within the User-user information element	If clearing is not already in progress on the QSIG side, transmit a QSIG DISCONNECT, RELEASE or RELEASE COMPLETE message, whichever is appropriate for the QSIG call state, containing one or more Facility information element(s) with content equivalent to that of the H4501SupplementaryService APDU(s)
5	Receipt of an H.323 FACILITY message containing one or more H4501SupplementaryService APDU(s) within the User-user information element	Transmit a QSIG FACILITY message containing one or more Facility information element(s) with content equivalent to that of the H4501SupplementaryService APDU(s) if the QSIG call state permits

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6	Receipt of a QSIG ALERTING, CONNECT, or PROGRESS message containing one or more Facility information element(s)	If an H.323 ALERTING, CONNECT, or PROGRESS message is to be transmitted, include within the User-user information element in this message one or more H4501SupplementaryService APDU(s) with content equivalent to that of the Facility information element(s)
7	Receipt of a QSIG SETUP message containing one or more Facility information element(s)	If an H.323 SETUP message is to be transmitted, include within the User-user information element in this message one or more H4501SupplementaryService APDU(s) with content equivalent to that of the Facility information element(s)
8	Receipt of a QSIG DISCONNECT, RELEASE or RELEASE COMPLETE message containing one or more Facility information element(s), as the first call clearing message	If clearing has not already taken place on the H.323 side, transmit an H.323 RELEASE COMPLETE message containing within the User-user information element one or more H4501SupplementaryService APDU(s) with content equivalent to that of the Facility information element(s)
9	Receipt of a QSIG RELEASE or RELEASE COMPLETE message containing one or more Facility information element(s), as a subsequent call clearing message	Ignore
10	Receipt of a QSIG FACILITY message containing a call reference other than the dummy call reference and one or more Facility information element(s)	Transmit an H.323 FACILITY message containing within the User-user information element one or more H4501SupplementaryService APDU(s) with content equivalent to that of the Facility information element(s) if the H.323 call state permits
11	Receipt of a QSIG FACILITY message containing the dummy call reference	Ignore
12	Receipt of a QSIG NOTIFY message	Ignore
13	Receipt of a QSIG message, other than NOTIFY, containing a Notification indicator information element	Ignore the Notification indicator information element (further actions to be taken are those required by basic call interworking rules or by rules 1 through 10 above)
14	Receipt of an H.323 SETUP message for a call independent signalling connection	Transmit a QSIG SETUP message for a call independent signalling connection if possible (rule 2 applies if supplementary service information is present)
15	Receipt of a QSIG SETUP message for a call independent signalling connection	Transmit an H.323 SETUP message for a call independent signalling connection if possible (rule 7 applies if supplementary service information is present)

8 Protocol interworking – Content of information elements

8.1 Content mapping from QSIG to H.323

Unless a specific supplementary service interworking standard mandates a different mapping, a gateway, when transmitting an H4501SupplementaryService APDU within the User-user information element as a result of receiving a QSIG Facility information element, shall map elements in accordance with table 3 by carrying out the required action when a given condition occurs.

In the table, "(M)" denotes a mandatory element, and "(C)" denotes a conditionally mandatory element, meaning that the element is part of another optional element of type SEQUENCE or SET and shall be included if the enclosing element is included.

NOTE - The QSIG Facility information element adheres to the Q.931 coding rules of separate octet groups, with some octet groups being ASN.1 encoded, whereas the H.450.1SupplementaryService APDU is a single structure fully defined in ASN.1.

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Table 3 — Mapping from QSIG Facility information element to H.323 H4501SupplementaryService APDU

QSIG element name	H.323 element name	Mapping requirement
Network Facility Extension	networkFacilityExtension	(Note)
sourceEntity (C): endPINX anyTypeOfPINX	sourceEntity (C): endpoint anyEntity	Generate as required, or map without change (type ENUMERATED vs. type CHOICE with alternatives of type NULL).
sourceEntityAddress	sourceEntityAddress	Generate as required, or map from type PartyNumber to type AliasAddress.partyNumber according to table 5.
destinationEntity (C): endPINX anyTypeOfPINX	destinationEntity (C): endpoint anyEntity	Generate as required, or map without change (type ENUMERATED vs. type CHOICE with alternatives of type NULL).
destinationEntityAddress	destinationEntityAddress	Generate as required, or map from type PartyNumber to type AliasAddress.partyNumber according to table 5.
Network Protocol Profile	-	No mapping required. Discard whole Facility IE.
Interpretation APDU	interpretationApdu	Generate as required, or map without change (type ENUMERATED vs. type CHOICE with alternatives of type NULL).
Service APDU(s) (M)	serviceApdu (M)	Map every ROSE APDU separately according to the respective interworking standard. Discard APDUs for which no mapping rules are available. Discard whole Facility IE if no APDUs are mappable (i.e. if serviceApdu would become an empty SEQUENCE).
NOTE - The NFE shall be processed on the receiving side as specified in ISO/IEC 11582. An NFE shall be inserted on the sending side according to the requirements of the respective supplementary service protocol. Usually no mapping will occur.		

8.2 Content mapping from H.323 to QSIG

Unless a specific supplementary service interworking standard mandates a different mapping, a gateway, when transmitting a QSIG Facility information element as a result of receiving an H4501SupplementaryService APDU within the User-user information element, shall map elements in accordance with table 4 by carrying out the required action when a given condition occurs.

In the table, “(M)” denotes a mandatory element, and “(C)” denotes a conditionally mandatory element, meaning that the element is part of another optional element of type SEQUENCE or SET and shall be included if the enclosing element is included.

NOTE - The H.450.1SupplementaryService APDU is a single structure fully defined in ASN.1, whereas the QSIG Facility information element adheres to the Q.931 coding rules of separate octet groups, with some octet groups being ASN.1 encoded.

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Table 4 - Mapping from H.323 H4501SupplementaryService APDU to QSIG Facility information element

H.323 element name	QSIG element name	Mapping requirement
networkFacilityExtension	Network Facility Extension	(Note)
sourceEntity (C): endpoint anyEntity	sourceEntity (C): endPINX anyTypeOfPINX	Generate as required, or map without change (type CHOICE with alternatives of type NULL vs. type ENUMERATED).
sourceEntityAddress	sourceEntityAddress	Generate as required, or map from type AliasAddress**.**partyNumber or AliasAddress**.**e164 to type PartyNumber according to table 6. Do not map other alternatives of CHOICE type AliasAddress.
destinationEntity (C): endpoint anyEntity	destinationEntity (C): endPINX anyTypeOfPINX	Generate as required, or map without change (type CHOICE with alternatives of type NULL vs. type ENUMERATED).
destinationEntityAddress	destinationEntityAddress	Generate as required, or map from type AliasAddress**.**partyNumber or AliasAddress**.**e164 to type PartyNumber according to table 6. Do not map other alternatives of CHOICE type AliasAddress.
interpretationApdu	Interpretation APDU	Generate as required, or map without change (type CHOICE with alternatives of type NULL vs. type ENUMERATED).
serviceApdu (M)	Service APDU(s) (M)	Map every ROSE APDU separately according to the respective interworking standard. Discard APDUs for which no mapping rules are available. Discard whole H4501SupplementaryService APDU if no APDUs are mappable.
NOTE - The NFE shall be processed on the receiving side as specified in ITU-T Rec. H.450.1. An NFE shall be inserted on the sending side according to the requirements of the respective supplementary service protocol. Usually no mapping will occur.		

8.3 Mapping of generic elements

8.3.1 Mapping of addressing elements from QSIG to H.323

A gateway shall map an addressing element received within an APDU of a QSIG operation to an addressing element of the APDU of the equivalent H.323 operation, if such an element is available in this APDU, by choosing one of the alternatives given in table 5. Which alternative is to be chosen depends on the specific H.323 operation.

NOTE - At the time of publication of this International Standard, not all alternatives listed in table 5 are used by standardized operations.

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Table 5 — Mapping (within ROSE APDUs) from QSIG address element to H.323 address element

QSIG element (ASN.1 type)	H.323 element (ASN.1 type)	Mapping requirement
Address	Address	Map without change.
PartyNumber	AliasAddress.partyNumber	Map without change to alternative partyNumber of CHOICE type AliasAddress.
	EndpointAddress. destinationAddress	Map without change to alternative partyNumber of CHOICE type AliasAddress in component destinationAddress of EndpointAddress. This mapping shall be the default alternative. (Note 1)
	EndpointAddress. remoteExtensionAddress	Map without change to alternative partyNumber of CHOICE type AliasAddress in component remoteExtensionAddress of EndpointAddress. (Note 1)
PartySubaddress	PartySubaddress	Map without change.
PresentationAllowedIndicator	PresentationAllowedIndicator	Map without change.
PresentedAddressScreened	PresentedAddressScreened	Map without change.
	EndpointAddress	Map PartyNumber, if present, to destinationAddress or remoteExtensionAddress as specified above. Map ScreeningIndicator without change. Discard PartySubaddress if present. Optionally include PresentationIndicator (mandatory if number is restricted or not available). (Note 2)
PresentedAddressUnscreened	PresentedAddressUnscreened	Map without change.
	EndpointAddress	Map PartyNumber, if present, to destinationAddress or remoteExtensionAddress as specified above. Discard PartySubaddress if present. Optionally include PresentationIndicator (mandatory if number is restricted or not available). (Note 2)
PresentedNumberScreened	PresentedNumberScreened	Map without change.
	EndpointAddress	Map PartyNumber, if present, to destinationAddress or remoteExtensionAddress as specified above. Map ScreeningIndicator without change. Optionally include PresentationIndicator (mandatory if number is restricted or not available). (Note 2)
PresentedNumberUnscreened	PresentedNumberUnscreened	Map without change.
	EndpointAddress	Map PartyNumber, if present, to destinationAddress or remoteExtensionAddress as specified above. Optionally include PresentationIndicator (mandatory if number is restricted or not available). (Note 2)

NOTE 1 - If the gateway wants to include an additional address (e.g. its own) then this address shall be included in destinationAddress, and PartyNumber shall be mapped to remoteExtensionAddress. Otherwise PartyNumber shall be mapped to destinationAddress.

NOTE 2 - The additional elements required for this mapping are specified in the “Implementers Guide for H.323, H.225.0, H.245, H.246, H.235, H.450 Series, and H.341 Recommendations” published by ITU-T (2000). These elements will be included in the next edition of Recommendation H.450.1.

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8.3.2 Mapping of addressing elements from H.323 to QSIG

A gateway shall map an addressing element received within an APDU of an H.323 operation to an addressing element of the APDU of the equivalent QSIG operation, if such an element is available in this APDU, by choosing one of the alternatives given in table 6. Which alternative is to be chosen depends on the specific QSIG operation.

NOTE - At the time of publication of this International Standard, not all alternatives listed in table 6 are used by standardized operations.

Table 6 — Mapping (within ROSE APDUs) from H.323 address element to QSIG address element

H.323 element (ASN.1 type)	QSIG element (ASN.1 type)	Mapping requirement
Address	Address	Map without change.
AliasAddress.e164	PartyNumber	Map as an explicit number (type of number = E164 or PNP) if possible, else as an implicit number (type of number = unknown) if possible (i.e. numeric string whose length does not exceed the QSIG limit), otherwise discard.
AliasAddress.partyNumber	PartyNumber	Map without change.
AliasAddress.*	-	Other alternatives of AliasAddress are not mappable.
EndpointAddress	PartyNumber	Map destinationAddress or remoteExtensionAddress (Note 1) as specified for AliasAddress above.
	PresentedAddressScreened	Map destinationAddress or remoteExtensionAddress (Note 1) to PartyNumber as specified for AliasAddress above, taking into account the PresentationIndicator if available (Note 2). Map to numberNotAvailableDueToInterworking if none of the AliasAddress elements is a number. Set ScreeningIndicator to userProvidedNotScreened if not contained in EndpointAddress (Note 2), otherwise map without change.
	PresentedAddressUnscreened	Map destinationAddress or remoteExtensionAddress (Note 1) to PartyNumber as specified for AliasAddress above, taking into account the PresentationIndicator if available (Note 2). Map to numberNotAvailableDueToInterworking if none of the AliasAddress elements is a number.
	PresentedNumberScreened	Map destinationAddress or remoteExtensionAddress (Note 1) to PartyNumber as specified for AliasAddress above, taking into account the PresentationIndicator if available (Note 2). Map to numberNotAvailableDueToInterworking if none of the AliasAddress elements is a number. Set ScreeningIndicator to userProvidedNotScreened if not contained in EndpointAddress (Note 2), otherwise map without change.
	PresentedNumberUnscreened	Map destinationAddress or remoteExtensionAddress (Note 1) to PartyNumber as specified for AliasAddress above, taking into account the PresentationIndicator if available (Note 2). Map to numberNotAvailableDueToInterworking if none of the AliasAddress elements is a number.
PartySubaddress	PartySubaddress	Map without change.
PresentationAllowedIndicator	PresentationAllowedIndicator	Map without change.
PresentedAddressScreened	PresentedAddressScreened	Map without change.

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PresentedAddressUnscreened	PresentedAddressUnscreened	Map without change.
PresentedNumberScreened	PresentedNumberScreened	Map without change.
PresentedNumberUnscreened	PresentedNumberUnscreened	Map without change.
NOTE 1 - If present, remoteExtensionAddress shall be chosen for mapping. In this case destinationAddress contains the address of a network entity, e.g. a gateway, that "represents" this remote extension in the H.323 domain. NOTE 2 - These additional elements are specified in the "Implementers Guide for H.323, H.225.0, H.245, H.246, H.235, H.450 Series, and H.341 Recommendations" published by ITU-T (2000). They will be included in the next edition of Recommendation H.450.1.		

8.3.3 Mapping of embedded information elements

A gateway shall map those QSIG information elements embedded within PSS1InformationElement in the APDU of a QSIG operation, which are also valid information elements in H.323, to the equivalent H.323 information elements embedded within H225InformationElement, if the APDU of the respective H.323 operation allows so.

A gateway shall map those H.323 information elements embedded within H225InformationElement in the APDU of an H.323 operation, which are also valid information elements in QSIG, to the equivalent QSIG information elements, embedded in PSS1InformationElement, if the APDU of the respective QSIG operation allows so.

8.3.4 Mapping of manufacturer specific information from QSIG to H.323

A gateway shall include any manufacturer specific information (MSI) received within an APDU of a QSIG operation in the APDU of the equivalent H.323 operation according to table 7.

Table 7 — Mapping of extensions from QSIG to H.323

QSIG MSI (ASN.1 type)	H.323 MSI (ASN.1 type)	Mapping requirement
Extension	Extension	Map without change.

8.3.5 Mapping of manufacturer specific information from H.323 to QSIG

A gateway shall include any manufacturer specific information (MSI) received within an APDU of an H.323 operation in the APDU of the equivalent QSIG operation according to table 8.

Table 8 — Mapping of extensions from H.323 to QSIG

H.323 MSI (ASN.1 type)	QSIG MSI (ASN.1 type)	Mapping requirement
Extension	Extension	Map without change.
NonStandardParameter	-	Discard

8.3.6 Mapping of names from QSIG to H.323

A gateway shall map a name element received within an APDU of a QSIG operation to a character string element of the APDU of the equivalent H.323 operation, if such an element is available in this APDU, according to table 9.

Table 9 — Mapping of names from QSIG to H.323

QSIG element (type)	H.323 element (type)	Mapping requirement
Name	BMPString	Map content of NameData, if present and not presentation-restricted, interpreted according to the applicable character set, to the equivalent BMP (i.e. unicode) string.

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8.3.7 Mapping of names from H.323 to QSIG

A gateway shall map a character string element received within an APDU of an H.323 operation to a name element of the APDU of the equivalent QSIG operation, if such an element is available in this APDU, according to table 10.

Table 10 — Mapping of names from H.323 to QSIG

H.323 element (type)	QSIG element (type)	Mapping requirement
BMPString	Name	Map content to element NameSet.nameData of type NamePresentationAllowed, according to one of the supported character sets, and indicate the chosen character set in element NameSet.characterSet. Alternatively, if character set ISO 8859-1 is used, map to alternative NameData (of type NamePresentationAllowed). Truncate if the H.323 element is longer than 50 characters.

8.4 Handling of ROSE APDUs

The generation and mapping of invoke, return result and return error APDUs shall be in accordance with the procedures of the individual supplementary service on each side of the gateway and with the requirements of a specific mapping standard if such a standard exists.

In the absence of more specific requirements, a reject APDU containing a non-empty invoke identifier shall be mapped to a reject APDU with the same problem code. A QSIG reject APDU with an empty invoke identifier (i.e. type NULL) shall be discarded when received.

When sending an invoke APDU the gateway shall allocate a new invoke identifier from the range of identifiers available on the sending side, and map it to the invoke identifier received on the receiving side if the invoke APDU is sent as a result of receiving an equivalent invoke APDU on the other side.

When sending a return result or return error APDU, the gateway shall follow normal ROSE procedures, i.e. include the same invoke identifier as received in the invoke APDU to which this response relates. This rule shall also apply to reject APDUs with a non-empty invoke identifier.

NOTE - Generation of a reject APDU with empty invoke identifier on the QSIG side of the gateway is outside the scope of this International Standard.

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Annex A
(normative)

ICS Proforma

A.1 Introduction

The supplier of an implementation which is claimed to conform to this International Standard shall complete the following Implementation Conformance Statement (ICS) proforma.

A completed ICS proforma is the ICS for the implementation in question. The ICS is a statement of which capabilities and options have been implemented for a given specification.

The ICS can have a number of uses, including use:

— by the implementor, as a check list for implementations to reduce the risk of unintended non-conformance, e.g. through oversight;

— by the supplier and acquirer, or potential acquirer, of the implementation, as a detailed indication of the capabilities of the implementation, stated relative to the common basis for understanding provided by the Standard's ICS proforma;

— by the user or potential user of the implementation, as a basis for initially checking the possibility of interworking with another implementation - while interworking can never be guaranteed, failure to interwork can often be predicted from incompatible ICS;

— by a tester, as the basis for selecting appropriate tests against which to assess the claim for conformance of the implementation.

A.2 Instructions for completing the ICS proforma

A.2.1 General structure of the ICS proforma

The ICS proforma is a fixed format questionnaire divided into sub-clauses each containing a group of individual items. Each item is identified by an item reference, the description of the item (question to be answered), and the reference(s) to the clause(s) that specifies (specify) the item in the main body of this International Standard.

The "Conditions for Status" column contains a specification, if appropriate, of the predicate upon which a conditional status is based. The indication of an item reference in this column indicates a simple-predicate condition (support of this item is dependent on the support marked for the referenced item).

The “Status” column indicates whether an item is applicable and if so whether support is mandatory or optional. The following terms are used:

I — irrelevant or out-of-scope - this capability is outside the scope of the standard to which this ICS proforma applies and is not subject to conformance testing in this context;

M — mandatory (the capability is required for conformance to the standard);

N/A — not applicable - in the given context, it is impossible to use the capability; no answer in the support column is required;

O — optional (the capability is not required for conformance to the standard, but if the capability is implemented it is required to conform to the specification in this International Standard);

O.<n> — qualified optional - in this case, <n> is an integer that identifies a unique group of related optional items; if no additional qualification is indicated, the support of at least one of the optional items is required for conformance to this International Standard; otherwise, the qualification and logic of the selection among the optional items is defined below the table explicitly;

X — excluded or prohibited - there is a requirement not to use this capability in a given context.

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Answers to the questionnaire items are to be provided in the “Support” column, by simply marking an answer to indicate a restricted choice (Yes, No or N/A). In specific cases, the indication of explicit values may be requested. Where a support column box is left blank, no answer is required.

If a "prerequisite line" (see 0 below) is used after a subclause heading or table title, and its predicate is false, no answer is required for the whole subclause or table, respectively.

A.2.2 Additional Information

Items of Additional Information allow a supplier to provide further information intended to assist the interpretation of the ICS. It is not intended or expected that a large quantity will be supplied, and an ICS can be considered complete without any such information. Examples might be an outline of the ways in which a (single) implementation can be set up to operate in a variety of environments and configurations.

References to items of Additional Information may be entered next to any answer in the questionnaire, and may be included in items of Exception Information.

A.2.3 Exception Information

It may occasionally happen that a supplier will wish to answer an item with mandatory or prohibited status (after any conditions have been applied) in a way that conflicts with the indicated requirement. No pre-printed answer will be found in the Support column for this. Instead, the supplier is required to write into the support column an x.<i> reference to an item of Exception Information, and to provide the appropriate rationale in the Exception item itself.

An implementation for which an Exception item is required in this way does not conform to this International Standard. A possible reason for the situation described above is that a defect in the standard has been reported, a correction for which is expected to change the requirement not met by the implementation.

A.2.4 Further indications of the ICS proforma tables

In addition to the columns of a table, the following information may be indicated:

Prerequisite line

A prerequisite line after a subclause heading or table title indicates that the whole subclause or the whole table is not required to be completed if the predicate is false.

Qualification

At the end of a table, a detailed qualification for a group of optional items may be indicated, as specified in the description of the status "qualified optional" in subclause A.2.1.

Comments

This box at the end of a table allows a supplier to enter any comments to that table. Comments may also be provided separately (without using this box).

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A.3 Identification of the Implementation

A.3.1 Implementation Identification

Supplier (Note 1)	
Contact point for queries about the ICS (Note 1)	
Implementation Name(s) and Version(s) (Note 1, Note 2)	
Other information necessary for full identification - e.g., name(s) and version(s) for machines and/or operating systems; System name(s)	

NOTE 1 - Only the first three items are required for all implementations; other information may be completed as appropriate in meeting the requirement for full identification.

NOTE 2 - The terms Name and Version should be interpreted appropriately to correspond with a suppliers terminology (e.g. Type, Series, Model).

A.3.2 Specification for which this ICS applies

Title	Corporate telecommunication networks - Signalling interworking between QSIG and H.323 - Generic functional protocol for the support of supplementary services
Version	1.0
Corrigenda Implemented (if applicable)	
Addenda Implemented (if applicable)	
Amendments Implemented (if applicable)	
Have any exception items been required ?	No[ ]Yes[ ] (The answer Yes means that the implementation does not conform to this International Standard) (Note)
Date of Statement	
NOTE: In this case, an explanation shall be given of the nature of non-conformance either below or on a separate sheet of paper. Nature of non-conformance (if applicable):	

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A.4 Major capabilities

Table A.1 — Major capabilities

Item	Question: Does the implementation...	Conditions for status	Status	Reference	Support
MC 1	support QSIG call related generic procedures		O.1	ISO/IEC 11582	[ ]Yes [ ]No
MC 2	support QSIG call independent connection oriented generic procedures		O.1	ISO/IEC 11582	[ ]Yes [ ]No
MC 3	support QSIG call independent connectionless generic procedures		O	ISO/IEC 11582	[ ]Yes [ ]No
MC 4	support QSIG notification procedures		O	ISO/IEC 11582	[ ]Yes [ ]No
MC 5	support H.450.1 generic procedures		M	H.450.1	[ ]Yes
MC 6	support protocol interworking		M	7	[ ]Yes
O.1: Support of at least one of these capabilities is required.					
Comments:					

A.5 Message and information element handling

Table A.2 — Message and information element handling

Item	Question: Does the implementation...	Conditions for status	Status	Reference	Support
MI 1	behave in accordance with rules 1 to 10		M	7	[ ]Yes
MI 2	behave in accordance with rule 11	MC 3 NOT MC 3	M N/A	7	[ ]Yes [ ]N/A
MI 3	behave in accordance with rules 12 and 13	MC 4 NOT MC 4	M N/A	7	[ ]Yes [ ]N/A
MI 4	behave according to the interpretation APDU when an unrecognised invoke APDU is encountered		M	7	[ ]Yes
MI 5	discard information that cannot be passed on		M	7	[ ]Yes
MI 6	behave in accordance with rules 14 and 15	MC 2 NOT MC 2	M N/A	7	[ ]Yes [ ]N/A
Comments:					

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A.6 Mapping content of information elements

A.6.1 Mapping content of elements from QSIG to H.323

Table A.3 — Content mapping from QSIG to H.323

Item	Question: Does the implementation...	Conditions for status	Status	Reference	Support
CMQ 1	map Facility information elements to H4501SupplementaryServiceAPDUs		M	8.1	[ ]Yes
CMQ 2	map addressing elements from QSIG to H.323		M	8.3.1	[ ]Yes
CMQ 3	map embedded information elements from QSIG to H.323		M	8.3.3	[ ]Yes
CMQ 4	map extensions from QSIG to H.323		M	8.3.4	[ ]Yes
CMQ 5	map embedded names from QSIG to H.323 strings		M	8.3.6	[ ]Yes
CMQ 6	map ROSE APDUs from QSIG to H.323		M	8.4	[ ]Yes
Comments:					

A.6.2 Mapping content of elements from H.323 to QSIG

Table A.4 — Content mapping from H.323 to QSIG

Item	Question: Does the implementation...	Conditions for status	Status	Reference	Support
CMH 1	map H4501SupplementaryServiceAPDUs to Facility information elements		M	8.2	[ ]Yes
CMH 2	map addressing elements from H.323 to QSIG		M	8.3.2	[ ]Yes
CMH 3	map embedded information elements from H.323 to QSIG		M	8.3.3	[ ]Yes
CMH 4	map extensions from H.323 to QSIG		M	8.3.5	[ ]Yes
CMH 5	map embedded strings from H.323 to QSIG names		M	8.3.7	[ ]Yes
CMH 6	map ROSE APDUs from H.323 to QSIG		M	8.4	[ ]Yes
Comments:					

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ICS 33.040.35

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