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Korporativna telekomunikacijska omrežja (CN) - Signalizacijsko medsebojno delovanje QSIG in H.323 - Osnovne storitve

Corporate Telecommunication Networks (CN); Signalling interworking between QSIG and H.323; Basic Services

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Foreword

This Technical Specification (TS) has been produced by ECMA on behalf of its members and those of the European Telecommunications Standards Institute (ETSI).

Brief history

The present document is one of a series of ECMA 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. It has been produced under ETSI work item DTS/ECMA-00216.

The present document defines the signalling protocol interworking for basic services between a Private Integrated Services Network (PISN) and a packet-based private telecommunications network based on the Internet Protocol (IP). It is further assumed that the protocol for the PISN part is that defined for the Q reference point (QSIG) and that the protocols for the IP-based network are based on ITU-T Recommendation H.323 [9].

The present document 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 JTC1, ITU-T, ETSI and other international and national standardization bodies. It represents a pragmatic and widely based consensus.

The present document is contributed to ISO/IEC JTC1 under the terms of the fast-track procedure, for adoption as an ISO/IEC International Standard.

The present document has been adopted by the General Assembly of December 2001.

1 Scope

The present document specifies signalling interworking between "QSIG" and "H.323" in support of basic services within a Corporate telecommunication Network (CN).

"QSIG" is a signalling protocol that operates at the Q reference point between Private Integrated services Network eXchange (PINX) within a Private Integrated Services Network (PISN). The Q reference point is defined in ECMA-133 [1]. A PISN provides circuit-switched basic services and supplementary services to its users. QSIG is specified in other ECMA Standards, in particular ECMA-143 [2] (call control in support of basic 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 H.225.0 [6] and H.245 [8] (basic communication capabilities).

The present document specifies signalling interworking for basic services that provide a bidirectional transfer capability for speech, DTMF, facsimile and modem media between a PISN employing QSIG and a private IP network employing H.323. The present document specifies requirements for establishing user information (audio) connections between the PISN and the IP network, but protocols for transmitting audio in the IP network and for signalling in order to establish and close down audio transmission in the IP network are outside the scope of the present document. Supplementary services are outside the scope of the present document.

Interworking between QSIG and H.323 permits a call originating at a user of a PISN to terminate at a user of a private IP network, or a call originating at a user of a private IP network to terminate at a user of a PISN.

Interworking between a PISN employing QSIG and a public IP network employing H.323 is outside the scope of the present document. However, the functionality specified in the present document is in principle applicable to such a scenario when deployed in conjunction with other relevant functionality (e.g. number translation, security functions, etc.).

Although two such gateways can operate as peers on either side of an IP network (whereby the IP network provides interconnection between two PISNs), special support for this situation (e.g. tunnelling of QSIG information through the IP network) is outside the scope of the present document.

Although two such gateways can operate as peers on either side of a PISN (whereby the PISN provides interconnection between two IP networks), special support for this situation (e.g. tunnelling of H.323 information through the PISN) is outside the scope of the present document.

The present document is applicable to any interworking unit that can act as a gateway between a PISN employing QSIG and a private IP network employing H.323.

2 Conformance

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

3 References

The following standards contain provisions which, through reference in this text, constitute provisions of the present document. All standards are subject to revision, and parties to agreements based on the present document are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

In the case of references to ECMA Standards that are aligned with ISO/IEC International Standards, the number of the appropriate ISO/IEC International Standard is given in brackets after the ECMA reference.

[1] ECMA-133: "Private Integrated Services Network (PISN) - Reference Configuration for PISN Exchanges (PINX) (International Standard ISO/IEC 11579-1)".

[2] ECMA-143: "Private Integrated Services Network (PISN) - Circuit Mode Bearer Services - Inter-Exchange Signalling Procedures and Protocol (International Standard ISO/IEC 11572)".

[3] ECMA-155: "Private Integrated Services Networks - Addressing (International Standard ISO/IEC 11571)".

[4] ECMA-253: "Private Integrated Services Network (PISN) - Mapping Functions for the Employment of 64 kbit/s Circuit Mode Connections with 16 kbit/s Sub-multiplexing (International Standard ISO/IEC 17310)".

[5] ECMA-289: "Private Integrated Services Network (PISN) - Mapping Functions for the Employment of 64 kbit/s Circuit Mode Connections with 8 kbit/s Sub-Multiplexing (International Standard ISO/IEC 17311)".

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

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

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

[9] ITU-T Recommendation H.323: "Packet-based multimedia communications systems".

[10] ECMA-307: "Corporate Telecommunication Networks - Signalling Interworking between QSIG and H.323 - Generic Functional Protocol for the Support of Supplementary Services".

[11] ITU-T Recommendation E.164: "The international public telecommunication numbering plan".

[12] ITU-T Recommendation E.163: "Numbering plan for the international telephone service".

[13] ITU-T Recommendation G.711: "Pulse code modulation (PCM) of voice frequencies".

4 Definitions

For the purposes of the present document, the following terms and definitions apply:

4.1 External definitions

The present document uses the following terms defined in other documents:

- Call (ECMA-307 [10])
- Corporate telecommunication network (CN) (ECMA-307 [10])
- Endpoint (ITU-T Recommendation H.323 [9])
- Gatekeeper (ITU-T Recommendation H.323 [9])

- Private Integrated Services Network (PISN) (ECMA-307 [10])
- Private Integrated services Network eXchange (PINX) (ECMA-133 [1])

Additionally the definitions in ECMA-143 [2] and ITU-T Recommendation H.323 [9] apply as appropriate.

4.2 Other definitions

4.2.1 Gateway

A gateway as defined in ITU-T Recommendation H.323 [9] specifically for the purpose of interworking with a network employing QSIG.

4.2.2 IP network

A network, unless otherwise stated a CN, offering connectionless packet-mode services based on the Internet Protocol (IP) as the network layer protocol.

4.2.3 Ring-back tone

An in-band tone or announcement played to the calling user during the alerting of the called user.

5 Acronyms

CN	Corporate telecommunication Network
ICS	Implementation Conformance Statement
IP	Internet Protocol
NPI	Numbering Plan Identification
PINX	Private Integrated services Network eXchange
PISN	Private Integrated Services Network
PNP	Private Numbering Plan
TON	Type Of Number

6 Architecture

The present document specifies signalling protocol interworking aspects of a gateway between a PISN employing QSIG signalling and an IP network employing H.323 signalling. The gateway appears as a PINX to other PINXs in the PISN. The gateway appears as an H.323 endpoint to other H.323 entities in the IP network, these being:

- other endpoints (terminals, gateways or multipoint control units) that originate calls via the gateway to the PISN and terminate calls via the gateway from the PISN;
- gatekeepers, including the gatekeeper with which the gateway registers and other gatekeepers involved in call routing.

This environment is illustrated in figure 1.

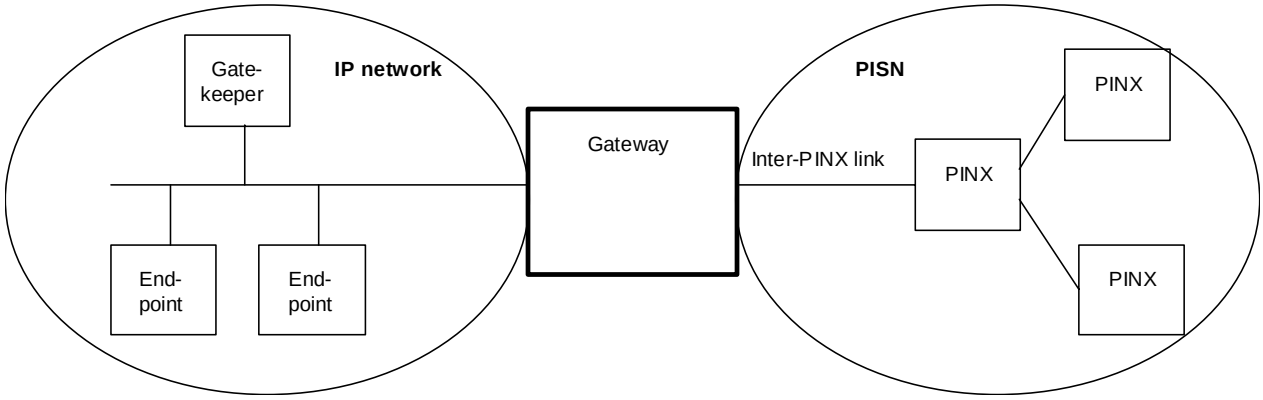

Figure 1: Environment

In addition to the signalling interworking functionality specified in the present document, it is assumed that the gateway also includes the following functionality:

- one or more physical interfaces on the PISN side supporting one or more inter-PINX links, each link providing one or more constant bit rate channels for media information and a reliable layer 2 connection for transporting QSIG signalling messages; and
- one or more physical interfaces on the IP network side supporting, through layer 1 and layer 2 protocols, IP as the network layer protocol and UDP and TCP as transport layer protocols, these being used for the transport of media information and H.323 signalling protocols;
- a means of transferring media information in each direction between the PISN and the IP network, including, as a minimum, packetization of media information sent to the IP network and de-packetization of media information received from the IP network.

NOTE: The gateway can be decomposed as described in clause 6.3.1 of H.323 [9]. In this case, the signalling interworking aspects of the gateway, as specified in the present document, can be expected to reside in the Media Gateway Controller (MGC).

The protocol model relevant to signalling interworking functionality of a gateway is shown in figure 2.

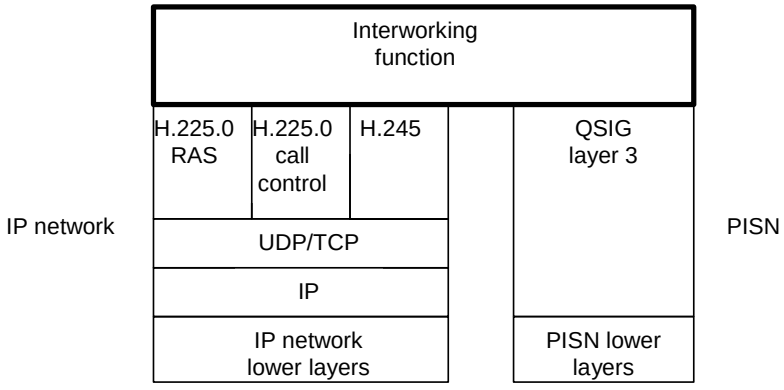

Figure 2: Protocol model

The relevant signalling protocols on the IP network side of the gateway are:

- H.225.0 Registration, Admission and Status (RAS);
- H.225.0 call control, for the purpose of establishing and clearing down sessions between endpoints; and
- H.245, for the purpose of supervising resources during a session.

The interworking function therefore provides interworking between QSIG on the PISN side and H.225.0 RAS, H.225.0 call control and H.245 on the IP network side.

7 General requirements

In order to conform to the present document, a gateway shall support QSIG in accordance with ECMA-143 [2] and shall support H.323 in accordance with H.323 [9] version 4 or later (including H.225.0 [6] version 4 or later and H.245 [8] version 7 or later). The gateway shall be able to interoperate with other H.323 entities in accordance with the provisions of H.323 [9] version 4.

The gateway shall support calls from QSIG to an H.323 endpoint and calls from an H.323 endpoint to QSIG.

The gateway shall be able to discover and register with a gatekeeper. The means of doing this is outside the scope of the present document, but should be in accordance with H.323 RAS procedures. The procedures specified in the present document for call establishment apply after successful registration.

The gateway may also be able to operate without registering with a gatekeeper. In this case the means by which the gateway maps QSIG numbers to IP addresses for routing calls from QSIG to an H.323 endpoint is outside the scope of the present document.

For operation with a gatekeeper, the gateway shall be able to employ admission and disengage procedures. The gateway may support pre-granted admission procedures.

For operation with a gatekeeper, the gateway shall be able to support both direct call signalling and gatekeeper-routed call signalling. Unless pre-granted admission procedures apply, choice of call signalling method shall be in accordance with instructions from the gatekeeper at the time of admission.

8 Message mapping requirements

8.1 Message validation and handling of protocol errors

The gateway shall validate received QSIG messages in accordance with the requirements of ECMA-143 [2] and shall act in accordance with ECMA-143 [2] on detection of a QSIG protocol error. The gateway shall validate received H.225.0 messages in accordance with the requirements of ITU-T Recommendations H.323 [9] and H.225.0 [6] and shall act in accordance with H.323 [9] and H.225.0 [6] on detection of an H.225.0 protocol error. Requirements of this clause for acting on a received QSIG or H.225.0 message apply only to a received message that has been successfully validated.

NOTE 1: These rules mean that an error detected in a received message will not be propagated to the other side of the gateway. However, there can be an indirect impact on the other side of the gateway, e.g. the initiation of call clearing procedures.

The gateway shall handle the QSIG RESTART, RESTART ACKNOWLEDGE, STATUS and STATUS ENQUIRY messages and the QSIG Restart indicator and Call state information elements in accordance with ECMA-143 [2] and shall not propagate these items to the H.323 side of the gateway.

NOTE 2: There can, however, be an indirect impact on the H.323 side of the gateway, e.g. the initiation of call clearing procedures.

The gateway shall handle the QSIG Channel identification information element in accordance with ECMA-143 [2] and shall not propagate this information element to the H.323 side of the gateway.

The gateway shall handle locally any QSIG information elements from codesets other than codeset 0 and shall not propagate these information elements to the H.323 side of the gateway.

The QSIG Facility and Notification indicator information elements are outside the scope of ECMA-143 [2] and are therefore outside the scope of the present document.

The gateway shall handle the H.225.0 STATUS and STATUS INQUIRY messages and the H.225.0 Call state information element in accordance with H.323 and H.225.0 and shall not propagate these items to the QSIG side of the gateway.

NOTE 3: There can, however, be an indirect impact on the QSIG side of the gateway, e.g. the initiation of call clearing procedures.

The gateway shall handle locally any H.225.0 messages and information elements that do not have QSIG equivalents specified in ECMA-143 [2] (e.g. USER INFORMATION message, Display information element) and shall not propagate these items to the QSIG side of the gateway.

Interworking requirements for other messages and information elements are specified in the remainder of the present document.

8.2 Call establishment from QSIG to H.323

The gateway shall support call establishment using admission procedures as specified in clause 8.2.1. The gateway may also support call establishment without admission procedures as specified in clause 8.2.2 for use in the following circumstances:

- if the gateway has not registered with a gatekeeper; or
- if the gateway has registered with a gatekeeper and pre-granted admission applies for H.323 calls established by the gateway.

8.2.1 Call establishment from QSIG to H.323 using admission procedures

The gateway shall support call establishment using en bloc sending as specified in clause 8.2.1.1. The gateway shall support call establishment using QSIG overlap sending either:

- by digit collection and the use of H.323 en bloc sending, as specified in clause 8.2.1.2; and/or
- by using H.323 overlap sending, as specified in clause 8.2.1.3.

Examples of message sequences are shown in clause B.2.

8.2.1.1 Call establishment from QSIG to H.323 using admission procedures and en bloc sending

The following procedures apply when the gateway receives a QSIG SETUP message containing a Sending complete information element or the gateway receives a QSIG SETUP message and is able to determine that the number in the Called party number information element is complete.

NOTE: The means by which the gateway determines the number to be complete is an implementation matter. It can involve knowledge of the numbering plan and/or the use of inter-digit timer expiry.

8.2.1.1.1 Receipt of QSIG SETUP message

On receipt of a QSIG SETUP message containing a number that the gateway determines to be complete in the Called party number information element, or containing a Sending complete information element if the gateway is unable to determine whether the number is complete, the gateway shall transmit an H.225.0 ARQ message to the gatekeeper. The gateway shall include the contents of the QSIG SETUP message Called party number information element in the destinationInfo element of the ARQ message using choice partyNumber. The gateway shall also transmit a QSIG CALL PROCEEDING message.

On receipt of a QSIG SETUP message containing a Sending complete information element and a number that the gateway determines to be incomplete in the Called party number information element, the gateway shall initiate QSIG call clearing procedures using cause number 28 "invalid number format (address incomplete)".

8.2.1.1.2 Receipt of H.225.0 ACF message

If in response to an H.225.0 ARQ message for a call from QSIG the gateway receives an H.225.0 ACF message, the gateway shall transmit an H.225.0 SETUP message to the transport address contained in the destCallSignallingAddress element of the ACF message.

For the Called party number information element and/or the destinationAddress element in the H.225.0 SETUP (see clause 9.2), the gateway shall use the contents of the destinationInfo element, if present in the ACF message.