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Information technology — Telecommunications and information exchange between systems — Private Integrated Services Network — Mapping functions for the tunnelling of QSIG through H.323 networks

Technologies de l'information — Télécommunications et échange d'information entre systèmes — Réseau privé avec intégration de services — Fonctions d'application pour l'emploi de l'action tunnel de QSIG à travers les réseaux H.323

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. 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.

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ISO/IEC 23290 was prepared by ECMA (as ECMA-333) 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.

Introduction

This International Standard is one of a series of standards defining mapping functions in exchanges of Private Integrated Services Networks required for the utilization of intervening network scenarios. The series uses the ISDN concepts as developed by ITU-T (formerly CCITT) and is also within the framework of standards for open systems interconnection as defined by ISO.

This International Standard specifies mapping functions for the type of scenarios where two or more PINXs are interconnected via on-demand connections using an H.323 packet network as the IVN.

The 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.

Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Mapping functions for the tunnelling of QSIG through H.323 networks

1 Scope

This International Standard specifies functions for using an H.323 packet network in order to interconnect two Private Integrated services Network eXchanges (PINXs) forming part of a Private Integrated Services Network (PISN). Interconnection is achieved by carrying the inter-PINX signalling protocol over the H.323 call signalling channel, making use of the protocol tunnelling facilities of H.323, and inter-PINX user information (e.g., voice) over logical channels established through H.323. Each logical channel usually represents a unidirectional media stream conveyed by means of the Real-time Transport Protocol (RTP). The inter-PINX signalling protocol is assumed to be QSIG, as specified in ISO/IEC 11572, ISO/IEC 11582 and other International Standards.

The International Standard provides for an on-demand type of interconnection, where a separate H.323 call is established at the start of each PISN call and cleared down at the end of that call. A semi-permanent scenario where a single H.323 call with an indefinite lifetime carries QSIG on behalf of many PISN calls is described as an additional option.

In the scenarios covered in this International Standard, the PINXs participating in a call are not necessarily aware of the H.323 network providing the interconnection, and the features available are those of the QSIG network. This is different from a scenario where true interworking between QSIG and H.323 (i.e. QSIG–H.323–QSIG) is used to connect two PISNs or two parts of the same PISN. In this latter case all networks participate in a call on equal terms, and features are limited to those available in all networks and supported by the gateways. This latter scenario is outside the scope of this International Standard.

This International Standard is applicable to PINXs that can be interconnected to form a PISN using QSIG as the inter-PINX signalling protocol.

2 Conformance

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

3 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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 11582:2002, *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, *Call signalling protocols and media stream packetization for packet-based multimedia communication systems (2000 or later)*

ITU-T Rec. H.245, *Control protocol for multimedia communication (2000 or later)*

ITU-T Rec. H.323, *Packet-based multimedia communications systems (2000 or later)*

ITU-T H.323 annex M.1, *Tunnelling of signalling protocol (QSIG) in H.323*

4 Definitions

4.1 External definitions

For the purpose of this International Standard the following definitions apply:

- Call independent signalling connection (ISO/IEC 11582)
- C reference point (ISO/IEC 11579-1)
- Gatekeeper (ITU-T Rec. H.323)
- Gateway, Trunking Gateway (ITU-T Rec. H.323)
- Intervening network (ISO/IEC 11579-1)
- Logical channel (ITU-T Rec. H.323)
- Preceding PINX (ISO/IEC 11582)
- Private Integrated Services Network (ISO/IEC 11579-1)
- Private Integrated services Network eXchange (ISO/IEC 11579-1)
- Q reference point (ISO/IEC 11579-1)
- Subsequent PINX (ISO/IEC 11582)

4.2 Other definitions

4.2.1 Call

4.2.1.1 H.323 call

A call as defined in ITU-T Rec. H.323, i.e. a point-to-point communication between two H.323 endpoints. Here specifically a call in the H.323 network between two gateways.

4.2.1.2 PISN call

A call as defined in ISO/IEC 11572 and ISO/IEC 11582.

4.2.1.3 Call segment

A portion of a (PISN) call between two entities taking part in that call. The smallest segment is between adjacent entities, e.g. between two PINXs across one Inter-PINX link.

4.2.2 Channel

A means of bi-directional transmission of user or signalling information between two points.

4.2.2.1 D_Q-Channel

A channel used to convey call control information between the Q reference points of two peer PINXs.

4.2.2.2 U_Q-Channel

A channel used to convey user information between the Q reference points of two peer PINXs.

4.2.3 Inter-PINX Connection (IPC)

A connection provided by an IVN between two C reference points used to transport inter-PINX information from the PISN control plane and/or the PISN user plane.

4.2.4 Inter-PINX Link (IPL)

A link between the Q reference points of two PINXs, comprising the totality of signalling transfer and user information transfer means.

4.2.5 PINX roles

4.2.5.1 Initiating PINX

The PINX that initiates an IPL establishment request.

4.2.5.2 Accepting PINX

The PINX that accepts an IPL establishment request.

5 List of acronyms

GK	Gatekeeper
ICS	Implementation Conformance Statement
IP	Internet Protocol
IPC	Inter-PINX Connection
IPL	Inter-PINX Link
IVN	Intervening Network
PINX	Private Integrated services Network eXchange
PISN	Private Integrated Services Network
QSIG	Signalling system for the Q reference point
RAS	Registration, Admission and Status
RTP / RTCP	Real Time Protocol / Real Time Control Protocol
TCP	Transmission Control Protocol
UDP	User Datagram Protocol

6 Introduction

6.1 Reference configuration

ISO/IEC 11579-1 defines a reference configuration for a PINX. Logically the switching and call control functions of a PINX communicate over an instance of the Q reference point with a peer PINX. This communication is known as an Inter-PINX Link (IPL) and comprises a signalling channel, known as a D_Q-channel, and one or more user information channels, each known as a U_Q-channel; see figure 1. One or more IPLs can be established between the same pair of PINXs.

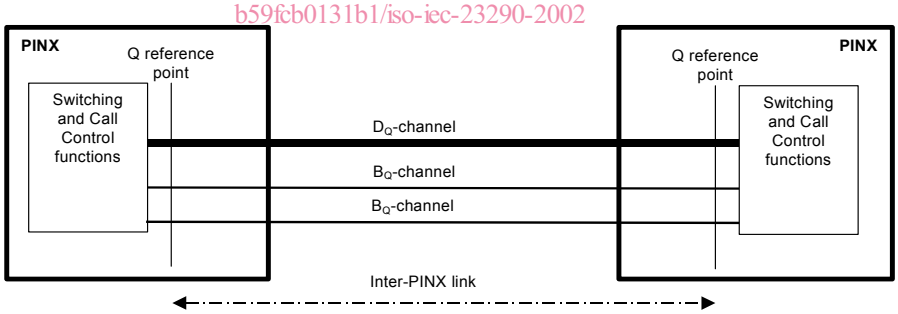

Figure 1 – IPL concept

There are many ways of implementing an IPL. In general, the IPL uses services of another network, known as an Intervening Network (IVN). A PINX interfaces to the IVN at the C reference point. The IVN provides connections, known as Inter-PINX Connections (IPCs) between the C reference points of the peer PINXs. Mapping functions within each PINX map the D_Q-channel and the U_Q-channels at the Q reference point onto one or more IPCs at the C reference point.

6.2 Specific scenarios

This International Standard specifies mapping functions for use when the IVN is an H.323 packet network that is used to provide the following types of IPC:

– a signalling connection for carrying signalling information; and

– a pair of UDP streams, one stream in each direction, for carrying user information over RTP.

NOTE - Other means of transporting user information can be used, e.g. T.38 fax without RTP, an ATM virtual channel, or a bi-directional TCP connection instead of UDP streams. See H.323 for more details. These cases are outside the scope of this International Standard.

A single IPL requires a single signalling connection, for support of the D_Q-channel, and one pair of UDP streams per U_Q-channel.

The main inter-PINX connection scenario described in this International Standard is an on-demand connection scenario. This means that an IPL is established whenever a PISN call segment is to be set up between two PINXs and released when the PISN call ends. An optional semi-permanent scenario is also described, where multiple concurrent or consecutive PISN calls can use the same IPL.

In both scenarios the signalling connection is established by means of an H.323 call, using the protocol tunnelling facilities provided by H.225.0 and H.323 annex M.1. The H.225.0 call signalling connection in conjunction with the tunnelling of the QSIG signalling is used to provide the D_Q-channel. The pair of UDP streams used to provide an inter-PINX user connection (U_Q-channel) is established as H.323 logical channel(s). An IPL may have multiple U_Q-channels.

Figure 2 illustrates these concepts.

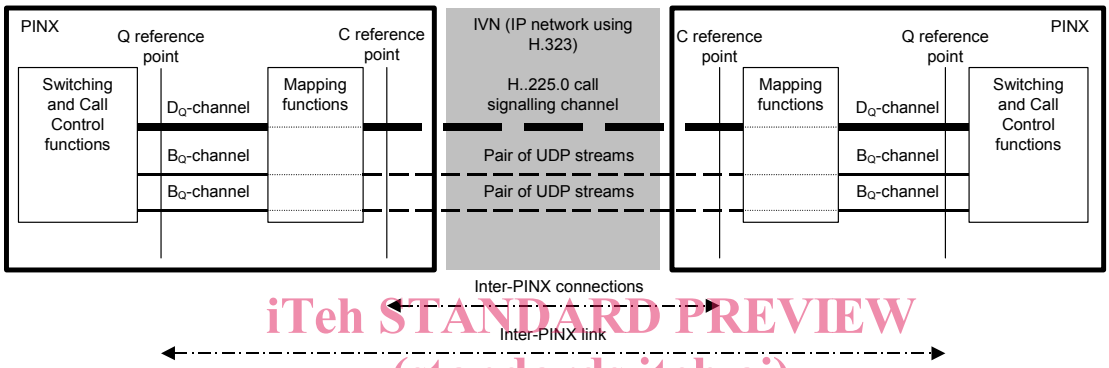

Figure 2 – H.323 as intervening network (IVN)

IPCs in support of these scenarios can be established and released at any time under the control of either PINX. In case of IPC failure, the H.323 network may reject a call establishment request or release an already established call.

A single PINX can terminate a multiplicity of IPLs leading to the same and/or different peer PINXs. Each IPL comprises a single H.323 call.

6.3 Relationship with H.323 gateways

Each PINX connected to another PINX via an H.323 network represents a trunking gateway in H.323 terms. The H.323 gateway functionality is part of the mapping functions of the PINX. No specific implementation is implied by this International Standard. The gateway function may be fully integrated or decomposed into several components (e.g. media gateway controller and media gateway), as explained in H.323.

The tasks of the gateway include the handling of user data or media, e.g. packetization / de-packetization, and signalling interworking. The latter mainly enables QSIG to be tunnelled over an H.323 call, as specified in more detail in subsequent clauses.

Figure 3 shows an example of the relationship between a PISN call and the underlying H.323 call which provides the inter-PINX link for one segment of the PISN call.

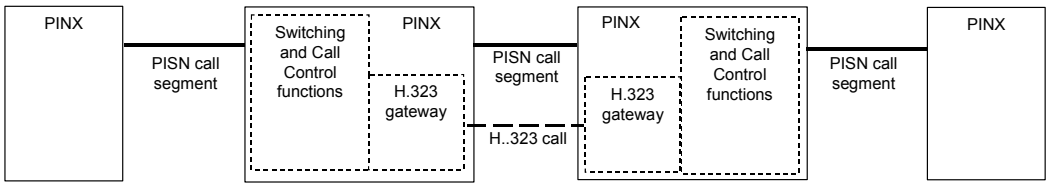

Figure 3 – Example of the relationship between PISN call and H.323 call

7 Capabilities at the Q reference point

For each instance of the Q reference point:

– one signalling channel (D_Q) for carrying the inter-PINX Layer 3 signalling protocol, and

– zero, one or more user channels (U_Q)

are provided.

NOTE - If the D_Q-channel is used only to support QSIG call-independent signalling connections, no U_Q-channels are required.

For a U_Q-channel the following bearer capability shall be provided:

– transfer mode: circuit mode;

– information transfer rate: 64 kbit/s;

– information transfer capability: speech or 3,1 kHz audio;

– user information layer 1 protocol: G.711 A or μ law.

Other bearer capabilities may also be provided (e.g. 64 kbit/s unrestricted digital information, or transfer rates other than 64 kbit/s).

For a D_Q-channel the following bearer capability shall be provided:

– transfer mode: packet mode;

– information transfer rate: implementation-dependent;

– information transfer capability: unrestricted digital information.

The functions to map D_Q- and U_Q-channels to an inter-PINX connection (IPC) at the C reference point are described in clause 9.

8 Capabilities at the C reference point

A PINX shall support a packet network interface suitable for multimedia communication according to ITU-T recommendation H.323. The protocol stack shall conform to ITU-T recommendations H.323, H.225.0 and H.245 and shall support protocol tunnelling according to H.323 annex M.1.

NOTE - This means that the following protocols are used:
- H.225.0 RAS, if a gatekeeper is present, over UDP/IP;
- H.225.0 call control signalling, with embedded QSIG tunnel, over TCP/IP;
- H.245 within fastStart elements and/or embedded in H.225.0 call control or explicit over TCP/IP;
- RTP/RTCP over UDP/IP.

The protocol tunnelling capability of the H.323 call signalling channel serves as the IPC for the D_Q-channel. A pair of H.323 logical channels for media transport serves as the IPC for a U_Q-channel.

For the on-demand scenario a new H.323 call is established every time a PISN call occurs and cleared when the PISN call finishes.

For the optional semi-permanent scenario the same H.323 call serves multiple concurrent or consecutive PISN calls. In this case logical channels are dynamically opened and closed according to the number of U_Q-channels required at the time.

9 Mapping functions

9.1 General requirements

For each IPL terminating at a PINX, the PINX shall provide mapping functions for:

– mapping of the D_Q-channel onto a packet mode IPC as provided by the H.323 call signalling channel with embedded QSIG tunnel;

– mapping of the U_Q-channel(s) onto the corresponding IPC(s) with an information transfer rate of 64 kbit/s as provided by H.323 logical channels (pair(s) of UDP streams).