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Information technology — Telecommunications and information exchange between systems — Corporate telecommunication networks — Tunnelling of QSIG over SIP

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO/IEC 22535 was prepared by Ecma International (as ECMA-355) 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 the interworking of services and signalling protocols deployed in corporate telecommunication networks (CNs) (also known as enterprise networks). 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 specifies tunnelling of QSIG over the Session Initiation Protocol (SIP). This enables calls between "islands" of circuit switched networks that use QSIG signalling to be interconnected by an IP network that uses SIP signalling without loss of QSIG functionality.

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, IETF, ETSI and other international and national standardization bodies. It represents a pragmatic and widely based consensus.

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1 Scope

This International Standard specifies tunnelling of "QSIG" over the Session Initiation Protocol (SIP) within a corporate telecommunication network (CN).

"QSIG" is a signalling protocol that operates between Private Integrated services Network eXchanges (PINX) within a Private Integrated Services Network (PISN). A PISN provides circuit-switched basic services and supplementary services to its users. QSIG is specified in Standards, in particular [1] (call control in support of basic services), [2] (generic functional protocol for the support of supplementary services) and a number of Standards specifying individual supplementary services.

NOTE The name QSIG was derived from the fact that it is used for signalling at the Q reference point. The Q reference point is a point of demarcation between two PINXs.

SIP is an application layer protocol for establishing, terminating and modifying multimedia sessions. It is typically carried over IP [4], [6]. Telephone calls are considered as a type of multimedia session where just audio is exchanged. SIP is defined in [9].

Often a CN comprises both PISNs employing QSIG and IP networks employing SIP. A call can originate at a user connected to a PISN and terminate at a user connected to an IP network or vice versa. In either case, a gateway provides interworking between QSIG and SIP at the boundary between the PISN and the IP network. Basic call interworking at a gateway is specified in [3]. Another case is where a call originates at a user connected to a PISN, traverses an IP network using SIP, and terminates at a user connected to another (or another part of the same) PISN. This document addresses this last case in a way that preserves all QSIG capabilities across the IP network. It achieves this by tunnelling QSIG messages within SIP requests and responses in the context of a SIP dialog.

The tunnelling of QSIG through a public IP network employing SIP is outside the scope of this specification. However, the functionality specified in this specification is in principle applicable to such a scenario when deployed in conjunction with other relevant functionality (e.g., address translation, security functions, etc.).

This specification is applicable to any interworking unit that can act as a gateway between a PISN employing QSIG and a corporate IP network employing SIP, with QSIG tunnelled within SIP requests and responses.

2 Normative references

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

[1] International Standard ISO/IEC 11572 *Information technology — Telecommunications and information exchange between systems — Private Integrated Services Network — Circuit mode bearer services — Inter-exchange signalling procedures and protocol* (also published by Ecma as Standard ECMA-143).

[2] International Standard ISO/IEC 11582 *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* (also published by Ecma as Standard ECMA-165).

[3] International Standard ISO/IEC 17343 *Information technology — Telecommunications and information exchange between systems — Corporate telecommunication networks — Signalling interworking between QSIG and SIP — Basic services* (also published by Ecma as Standard ECMA-339).

[4] Postel, J., "Internet Protocol", RFC 791.

[5] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119.

[6] Deering, S., Hinden, R., "Internet Protocol, Version 6 (IPv6)", RFC 2460.

[7] Donovan, S., "The SIP INFO Method", RFC 2976.

[8] Zimmerer, E., Peterson, J., Vemuri, A., Ong, L., Audet, F., Watson, M. and Zonoun, M., "MIME media types for ISUP and QSIG objects", RFC 3204.

[9] Rosenberg, J., Schulzrinne, H. et al., "SIP: Session initiation protocol", RFC 3261.

[10] Rosenberg, J., Schulzrinne, H. et al., "An Offer/Answer Model with the Session Description Protocol (SDP)", RFC 3264.

[11] Rosenberg, J., "The Session Initiation Protocol (SIP) UPDATE message", RFC 3311.

3 Terms and definitions

In this document, the key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" are to be interpreted as described in [5] and indicate requirement levels for compliant SIP implementations.

For the purposes of this document, the following definitions apply.

3.1 External definitions

The definitions in [1] and [9] apply as appropriate.

3.2 Other definitions

3.2.1
Corporate telecommunication Network (CN)
Sets of privately-owned or carrier-provided equipment that 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.

3.2.2
Egress gateway
A gateway handling a QSIG call or call-independent signalling connection established in the direction IP network to PISN.

3.2.3
Gateway
An entity that behaves as a QSIG Transit PINX with QSIG carried over a circuit-switched link within a PISN on one side and QSIG tunnelled over SIP within an IP network on the other side.

3.2.4
Ingress gateway
A gateway handling a QSIG call or call-independent signalling connection established in the direction PISN to IP network.

3.2.5
IP network
A network, unless otherwise stated a corporate network, offering connectionless packet-mode services based on the Internet Protocol (IP) as the network layer protocol.

3.2.6
Media stream
Audio or other user information transmitted in UDP packets, typically containing RTP, in a single direction between the gateway and a peer entity participating in a session established using SIP.

NOTE Normally a SIP session establishes a pair of media streams, one in each direction.

3.2.7
Private Integrated Services Network (PISN)
A CN or part of a CN that employs circuit-switched technology and QSIG signalling.

3.2.8
Private Integrated services Network eXchange (PINX)
A PISN nodal entity comprising switching and call handling functions and supporting QSIG signalling in accordance with [1].

4 Abbreviations and acronyms

CN	corporate telecommunication network
IP	Internet Protocol
PINX	Private Integrated services Network eXchange
PISN	Private Integrated Services Network
QSIG	Signalling system for the Q reference point
RTP	Real-time Transport Protocol
SDP	Session Description Protocol
SIP	Session Initiation Protocol
TCP	Transmission Control Protocol
TLS	Transport Layer Security
UA	User Agent
UAC	User Agent Client
UAS	User Agent Server
UDP	User Datagram Protocol
URI	Universal Resource Identifier

5 Background and architecture

This document concerns the case of a call that originates at a user connected to a PISN employing QSIG, traverses an IP network employing SIP, and terminates at a user connected to another (or another part of the same) PISN. This can be achieved by employing a gateway at each boundary between a PISN employing QSIG and an IP network employing SIP, as shown in Figure 1.