
**Information technology —
Telecommunications and information
exchange between systems —
Interoperation of PISNs with IP networks**

*Technologies de l'information — Télécommunications et échange
d'information entre systèmes — Interopération de PISN avec des
réseaux IP*

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

© ISO/IEC 2001

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

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.ch
Web www.iso.ch

Printed in Switzerland

Contents

Foreword	vi
Introduction	vii
1 Scope	1
2 Normative references	1
3 Definitions	3
3.1 Corporate telecommunication Network (CN)	3
3.2 Internet	3
3.3 Intranet	3
3.4 Internet Protocol (IP)	3
3.5 IP network	3
3.6 Private Integrated Services Network (PISN)	3
3.7 Private Integrated services Network eXchange (PINX)	3
3.8 Switched Circuit Network (SCN)	3
3.9 Tunnelling	3
4 Acronyms	3
5 Introduction	5
5.1 Background	5
5.2 Types of network	6
5.3 Arrangements for interworking of SCNs and IP networks	7
5.4 Arrangements for interconnection of SCN components over IP networks	8
6 General principles of multimedia communication over an IP network	8
6.1 Architecture	9
6.1.1 Media processing and packetization (MPP) functional entity	9
6.1.2 Resource control (RC) functional entity	9
6.1.3 Session control (SC) functional entity	10
6.1.4 SC-redirect (SC-R), SC-proxy (SC-P) and RC-proxy (RC-P) functional entities	10
6.1.5 Admission control (AC) functional entities	11
6.1.6 Identity resolution (IR) functional entity	11
6.1.7 Registrar (RGR) and registrant (RGT) functional entities	11
6.1.8 Generic functional architecture (non-interworking)	11
6.1.9 Physical realizations of generic functional architecture for multimedia communication over an IP network (non-interworking)	12
6.1.10 Generic functional architecture for interworking with an SCN	13
6.1.11 Physical realizations of generic functional architecture for interworking with an SCN	13
6.1.12 Simple terminals	15
6.2 Naming and addressing	16
6.3 Security	16
6.4 Quality of service (QoS)	17
6.5 Mobility	18
7 Standards for multimedia communication over an IP network	18
7.1 Overview	18
7.2 The ITU-T H.323 family of recommendations	19
7.2.1 Functional architecture	19
7.2.2 Naming and addressing	20
7.2.3 Supplementary services	20

7.2.4	Security	21
7.2.5	Quality of service	22
7.2.6	Mobility	22
7.3	Other ITU-T standards	22
7.3.1	H.248	22
7.3.2	BICC	23
7.4	IETF specifications for IP telephony	23
7.4.1	Functional architecture	23
7.4.2	Main protocols	24
7.4.3	Naming and addressing	24
7.4.4	Supplementary services	25
7.4.5	Security	25
7.4.6	Quality of service	26
7.4.7	Mobility	26
7.5	ETSI TIPHON specifications	26
7.6	Terminal specifications from TIA TR-41.3.4	26
8	Interworking of PISNs and IP networks via a gateway	26
8.1	Architecture	27
8.2	Signalling	28
8.3	Naming and addressing	28
8.3.1	Naming and addressing in PISNs	28
8.3.2	Naming and addressing in IP networks	28
8.3.3	Naming and addressing interworking when H.323 used in the IP network	28
8.3.4	Naming and addressing interworking when SIP used in the IP network	29
8.4	Supplementary services	29
8.4.1	H.323 supplementary services	29
8.4.2	SIP supplementary services	29
8.5	Security	29
8.6	Quality of service	29
8.7	Mobility	29
8.8	Network management	29
8.9	Aspects requiring further study or standardization work	30
9	Interconnection of remote PISNs via an IP network	30
9.1	Classification of scenarios for the interconnection of PISNs	30
9.2	Solutions for the interconnection of remote PISNs via an IP network	31
9.3	Solution 1 – QSIG tunnelling over IP network transport layer protocol	32
9.3.1	Architecture	32
9.3.2	Aspects requiring further study or standardization work	33
9.4	Solution 2 – QSIG tunnelling over IP network session control protocol	33
9.4.1	Architecture	33
9.4.2	Aspects requiring further study or standardization work	34
9.5	Solution 3 – enhanced QSIG in the IP network	34
9.5.1	Architecture	34
9.5.2	Aspects requiring further study or standardization work	34
10	Connection of telephones to a PINX via an IP network	35
10.1	Architecture	35

10.2	Aspect requiring standardization work	37
11	Summary	37
Annexes		
A	Overview and status of H.323	39
B	Overview and status of SIP	42
C	Overview of H.248 / MEGACO protocol	45
D	Architecture for Signalling Transport over IP-networks (SIGTRAN)	46

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.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

The main task of technical committees is to prepare International Standards, but in exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

- type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;
- type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;
- type 3, when a technical committee has collected data of a different kind from that which is normally published as an International Standard (“state of the art”, for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

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

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

ISO/IEC TR 21890, which is Technical Report of type 3, was prepared by ECMA (as Technical Report ECMA TR/81) 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 Technical Report investigates the interoperability of Private Integrated Services Networks (PISNs) and Internet Protocol (IP) networks within the context of Corporate Telecommunication Networks. The purpose is to identify possible scenarios for interoperation, problems that will have to be solved if particular scenarios are to be pursued further, and possible future standardization activities in this area. It forms the foundation for further work in ECMA on this subject, including the production of Standards where found to be required.

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

Information technology - Telecommunications and information exchange between systems - Interoperation of PISNs with IP Networks

1 Scope

The purpose of this Technical Report is to investigate the interoperability of Private Integrated Services Networks (PISNs) and Internet Protocol (IP) networks, with a view to identifying possible scenarios for interoperation, problems that will have to be solved if particular scenarios are to be pursued further, and possible future standardization activities in this area. In particular, the following aspects of interoperability are investigated:

- the interworking of PISNs and IP networks via a gateway;
- the connection of PISN components via IP networks.

For each of the above, aspects considered include architecture, addressing (including use of IP addressing), services, protocols, security, quality of service and mobility. This is conducted within the context of leading standards for voice and multimedia communication over IP networks, including ITU-T recommendation H.323, IETF Session Initiation Protocol (SIP) and ITU-T recommendation H.248.

Possible future standardization activities resulting from this Technical Report can include work items relating to IP networks and work items relating to PISNs, as well as work items concerned specifically with interoperability.

The dominant traffic in PISNs is voice, and therefore this Technical Report focuses on interoperability considerations for voice traffic. However, many of the standards that support voice in an IP network are also applicable to multi-media traffic (e.g., voice, video and data). Although in many respects similar to voice, fax traffic has slightly different requirements and is not explicitly considered in this Technical Report. It could be the subject of further study.

2 References

ISO/IEC 11571, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Networks - Addressing*

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*

ISO/IEC 11579-1, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Part 1: Reference configuration for PISN exchanges (PINX)*

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*

ISO/IEC 13864, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Specification, functional model and information flows - Name identification supplementary services*

ISO/IEC 13868, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Name identification supplementary services*

ISO/IEC 13869, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Call transfer supplementary service*

ISO/IEC 13870, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Call completion supplementary services*

ISO/IEC 13873, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Call diversion supplementary services*

ISO/IEC TR 14475, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Architecture and scenarios for Private Integrated Services Networking*

ISO/IEC 15506, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network (PISN) - Inter-Exchange Signalling Protocol - Message Waiting Indication Supplementary Service*

ISO/IEC 19460, *Information technology - Telecommunications and information exchange between systems - Private Integrated Services Network - Inter-exchange signalling protocol - Single Step Call Transfer Supplementary Service*

ECMA TR/57, *Private Integrated Services Networks*

ETSI TS 101 313, *Telecommunications and Internet Protocol Harmonization over Networks (TIPHON); Network architecture and reference configurations; Phase II: Scenario 1 + Scenario 2*

ITU-T Rec. G.107, *The E-Model, a computational model for use in transmission planning*

ITU-T Rec. G.711, *Pulse Code Modulation (PCM) of voice frequencies*

ITU-T Rec. G.723.1, *Dual rate speech coder for multimedia communications transmitting at 5.3 and 6.3 kbit/s*

ITU-T Rec. H.225.0, *Call signalling protocols and media stream packetization for packet-based multimedia communication systems*

ITU-T Rec. H.235, *Security and encryption for H-Series (H.323 and other H.245-based) multimedia terminals*

ITU-T Rec. H.245, *Control protocol for multimedia communication*

ITU-T Rec. H.248, *Gateway control protocol*

ITU-T Rec. H.261, *Video codec for audiovisual services at $p \times 64$ kbits*

ITU-T Rec. H.320, *Narrow-band visual telephone systems and terminal equipment*

ITU-T Rec. H.323, *Packet-based multimedia communications systems*

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

ITU-T Rec. H.450.2, *Call transfer supplementary service for H.323*

ITU-T Rec. H.450.3, *Call diversion supplementary service for H.323*

ITU-T Rec. H.450.4, *Call hold supplementary service for H.323*

ITU-T Rec. H.450.5, *Call park and call pickup supplementary services for H.323*

ITU-T Rec. H.450.6, *Call waiting supplementary service for H.323*

ITU-T Rec. H.450.7, *Message waiting indication supplementary service for H.323*

ITU-T Rec. H.450.8, *Name identification supplementary service for H.323*

ITU-T Rec. H.450.9, *(draft) Call completion supplementary services for H.323*

ITU-T Rec. Q.921, *ISDN user-network interface - Data link layer specification*

ITU-T Rec. Q.931, *ISDN user-network interface layer 3 specification for basic call control*

IETF RFC 791, *Internet Protocol (IP), version 4*

IETF RFC 1034, *Domain names - Concepts and facilities*

IETF RFC 1035, *Domain names - Implementation and specification*

IETF RFC 1889, *RTP: a transport protocol for real-time applications*

IETF RFC 2205, *Resource ReSerVation Protocol (RSVP) - Version 1 functional specification*

IETF RFC 2246, *The TLS Protocol Version 1.0*

IETF RFC 2251, *Lightweight Directory Access Protocol (version 3)*

IETF RFC 2326, *Real-time streaming protocol (RTSP)*

IETF RFC 2327, *SDP: Session Description Protocol*

IETF RFC 2401, *Security Architecture for the Internet Protocol*

IETF RFC 2402, *IP Authentication Header*

IETF RFC 2406, *IP Encapsulating Security Payload (ESP)*

IETF RFC 2407, *The Internet IP Security Domain of Interpretation for ISAKMP*

IETF RFC 2408, *Internet Security Association and Key Management Protocol (ISAKMP)*

IETF RFC 2460, *Internet Protocol, Version 6 (IPv6) Specification*

IETF RFC 2475, *An architecture for differentiated services*

IETF RFC 2543, *SIP: Session Initiation Protocol*

IETF RFC 2719, *Framework architecture for signaling transport*

TIA/EIA/IS-811, *Telephone Terminal Equipment - Performance and Interoperability Requirements for Voice-over-IP (VoIP) Feature Telephones*

TIA/EIA/TSB-116, *Voice Quality Recommendations for IP Telephony*