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Signalling requirements to support IP telephony

ITU-T Q-series Recommendations – Supplement 49

ITU-T

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Supplement 49 to ITU-T Q-series Recommendations

Signalling requirements to support IP telephony

Summary

Supplement 49 to the Q series of ITU-T Recommendations consists of a technical report that specifies the signalling requirements to support IP telephony. IP telephony is defined as a service enabling the exchange of voice information primarily in the form of packets using Internet protocols (IP), while Internet telephony is defined as a particular application of the Internet, such that Internet telephony falls outside the scope of this Supplement. Network configurations are classified into four types (phone-to-phone, IP phone-to-phone, phone-to-IP phone and IP phone-to-IP phone) and the characteristics of each configuration are described using a general example. The network capabilities needed to support IP telephony and interworking with legacy telephone networks are identified in this Supplement. Finally, the signalling requirements and control protocols needed to support IP telephony services in public networks are identified.

History

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FOREWORD

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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Supplement 49 to ITU-T Q-series Recommendations

Signalling requirements to support IP telephony

1 Scope

This Supplement identifies the network capabilities that must be satisfied to enable the support of IP telephony as well as interworking with legacy telephony networks. It identifies the relevant network configurations, the network functions required to support the IP telephony feature and the protocol stacks.

2 Introduction

The traffic characteristics of IP-based applications and of voiceband data communications generally, are significantly different from those of traditional speech communications upon which the engineering of the public switched telephone network (PSTN) has historically been based. Transaction-oriented traffic is handled inefficiently by the traditional PSTN, with the "call" establishment time being at least of the same, and often of a greater, order of magnitude than the duration of the transactions themselves. This has particularly significance for "e-commerce" applications. WTSA-2000 (World Telecommunication Standardization Assembly, 2000) created a working group, (Question 7/11), to investigate approaches to signalling that efficiently directs these new traffic demands to (an) appropriately engineered network(s), while minimizing the potential for service degradation experienced by PSTN users.

Furthermore, at WTPF-2001 (World Telecommunication Policy Forum, 2001), four opinions were adopted regarding the global introduction of IP telephony services. One of these opinions expressed a need to study the technical issues associated with interworking and the coexistence of the PSTN and IP-based networks to provide telephony services.

This Supplement completes the study instigated by WTPF-2001 and explains the signalling needed to support IP telephony, provides example network configurations and identifies the capabilities that a network must have to support IP telephony.

3 References

- [ITU-T E.106] Recommendation ITU-T E.106 (2003), *International Emergency Preference Scheme (IEPS) for disaster relief operations.*
- [ITU-T E.107] Recommendation ITU-T E.107 (2007), *Emergency Telecommunications Service (ETS) and interconnection framework for national implementations of ETS.*
- [ITU-T E.164] Recommendation ITU-T E.164 (1997), *The international public telecommunication numbering plan.*
- [ITU-T E.370] Recommendation ITU-T E.370 (2001), *Service principles when public circuit-switched international telecommunication networks interwork with IP-based networks.*
- [ITU-T G.107] Recommendation ITU-T G.107 (2003), *The E-Model, a computational model for use in transmission planning.*
- [ITU-T H.235] Recommendation ITU-T H.235 (2003), *Security and encryption for H-series (H.323 and other H.245-based) multimedia terminals.*
- [ITU-T H.248] Recommendation ITU-T H.248 (2000), *Gateway control protocol.*

- [ITU-T H.323] Recommendation ITU-T H.323 (2003), *Packet-based multimedia communications systems*.
- [ITU-T H.450.1] Recommendation ITU-T H.450.1(2011), *Generic functional protocol for the support of supplementary services in ITU-T H.323 systems*.
- [ITU-T H.450.2] Recommendation ITU-T H.450.2 (2011), *Call transfer supplementary service for ITU-T H.323 systems*.
- [ITU-T H.450.3] Recommendation ITU-T H.450.3 (2011), *Call diversion supplementary service for ITU-T H.323 systems*.
- [ITU-T H.450.4] Recommendation ITU-T H.450.4 (2013), *Call hold supplementary service for ITU-T H.323 systems*.
- [ITU-T H.450.5] Recommendation ITU-T H.450.5 (2013), *Call park and call pickup supplementary services for ITU-T H.323 systems*.
- [ITU-T H.450.6] Recommendation ITU-T H.450.6 (1999), *Call waiting supplementary service for H.323*.
- [ITU-T H.450.7] Recommendation ITU-T H.450.7 (2013), *Message waiting indication supplementary service for ITU-T H.323 systems*.
- [ITU-T H.450.8] Recommendation ITU-T H.450.8 (2013), *Name identification supplementary service for ITU-T H.323 systems*.
- [ITU-T H.450.9] Recommendation ITU-T H.450.9 (2000), *Call completion supplementary services for H.323*.
- [ITU-T H.450.10] Recommendation ITU-T H.450.10 (2001), *Call offering supplementary services for H.323*.
- [ITU-T H.450.11] Recommendation ITU-T H.450.11 (2001), *Call intrusion supplementary service for H.323*.
- [ITU-T H.450.12] Recommendation ITU-T H.450.12 (2001), *Common Information Additional Network Feature for H.323*.
- [ITU-T H.450.x] Recommendations ITU-T H.450.1 to ITU-T H.450.12 on supplementary services.
- [ITU-T I.250] Recommendation ITU-T I.250 (1988), *Definition of supplementary services*.
- [ITU-T I.251.1] Recommendation ITU-T I.251.1 (1992), *Number Identification supplementary services: Direct dialling in*.
- [ITU-T I.251.2] Recommendation ITU-T I.251.2 (1992), *Multiple Subscriber Number*.
- [ITU-T I.251.3] Recommendation ITU-T I.251.3 (1992), *Calling Line Identification Presentation*.
- [ITU-T I.251.4] Recommendation ITU-T I.251.4 (1992), *Calling Line Identification Restriction*.
- [ITU-T I.251.5] Recommendation ITU-T I.251.5 (1995), *Connected Line Identification Presentation (COLP)*.
- [ITU-T I.251.6] Recommendation ITU-T I.251.6 (1995), *Connected Line Identification Restriction (COLR)*.
- [ITU-T I.251.7] Recommendation ITU-T I.251.7 (1992), *Malicious call identification*.
- [ITU-T I.251.8] Recommendation ITU-T I.251.8 (1992), *Sub-addressing supplementary service*.

[ITU-T I.252.1]	Recommendation ITU-T I.252.1 (1988), <i>Call Offering supplementary services: Call Transfer</i>
[ITU-T I.252.2]	Recommendation ITU-T I.252.2 (1992), <i>Call Offering supplementary services: Call Forwarding Busy.</i>
[ITU-T I.252.3]	Recommendation ITU-T I.252.3 (1992), <i>Call Offering supplementary services: Call Forwarding No Reply.</i>
[ITU-T I.252.4]	Recommendation ITU-T I.252.4 (1992), <i>Call Offering supplementary services: Call Forwarding Unconditional.</i>
[ITU-T I.252.5]	Recommendation ITU-T I.252.5 (1992), <i>Call Offering supplementary services: Call Deflection.</i>
[ITU-T I.252.6]	Recommendation ITU-T I.252.6 (1988), <i>Call Offering supplementary services: Line Hunting (LH).</i>
[ITU-T I.253.1]	Recommendation ITU-T I.253.1 (1990), <i>Call completion supplementary services: Call Waiting (CW) supplementary service.</i>
[ITU-T I.253.2]	Recommendation ITU-T I.253.2 (1992), <i>Call completion supplementary services: Call Hold.</i>
[ITU-T I.253.3]	Recommendation ITU-T I.253.3 (1996), <i>Call completion supplementary services: Completion of calls to busy subscribers.</i>
[ITU-T I.254.1]	Recommendation ITU-T I.254.1 (1988), <i>Multiparty supplementary services, Conference calling (CONF).</i>
[ITU-T I.254.2]	Recommendation ITU-T I.254.2 (1992), <i>Multiparty supplementary services, Three-Party Supplementary Service.</i>
[ITU-T I.255.1]	Recommendation ITU-T I.255.1 (1992), <i>Community of Interest supplementary services: Closed User Group.</i>
[ITU-T I.255.2]	Recommendation ITU-T I.255.2 (1996), <i>Community of Interest supplementary services: Support of Private Numbering Plans.</i>
[ITU-T I.256.1]	Recommendation ITU-T I.256.1 (1988), <i>Charging supplementary services: Credit card calling (CRED).</i>
[ITU-T I.256.2]	Recommendation ITU-T I.256.2 (1993), <i>Charging supplementary services: Advice of charge (AOC).</i>
[ITU-T I.256.3]	Recommendation ITU-T I.256.3 (1992), <i>Charging supplementary services: Reverse charging.</i>
[ITU-T I.257.1]	Recommendation ITU-T I.257.1 (1995), <i>Additional Information Transfer supplementary services: User-to-User Signalling (UUS).</i>
[ITU-T J.160]	Recommendation ITU-T J.160 (2005), <i>Architectural framework for the delivery of time-critical services over cable television networks using cable modems.</i>
[ITU-T J.161]	Recommendation ITU-T J.161 (2007), <i>Audio codec requirements for the provision of bidirectional audio service over cable television networks using cable modems.</i>
[ITU-T J.162]	Recommendation ITU-T J.162 (2007), <i>Network call signalling protocol for the delivery of time-critical services over cable television networks using cable modems.</i>