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SERIES V: DATA COMMUNICATION OVER THE
TELEPHONE NETWORK

Interworking with other networks

Interworking between ITU-T T.38 and ITU-T V.152 using IP peering for real-time facsimile services

Recommendation ITU-T V.153



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Recommendation ITU-T V.153

Interworking between ITU-T T.38 and ITU-T V.152 using IP peering for real-time facsimile services

Summary

Recommendation ITU-T V.153 defines service interworking between two IP domains, whereby one IP domain is using voiceband data over IP (VBDoIP) transport according to Recommendation ITU-T V.152 and the other IP domain is using facsimile relay over IP (FoIP) transport according to Recommendation ITU-T T.38. Two modes of operation are specified for the T.38-to-V.152 interworking function: native versus emulated interworking.

The T.38-to-V.152 interworking technology is subject of the user plane and typically located in IP-to-IP gateway equipment, like border routers or border gateways.

History

Edition	Recommendation	Approval	Study Group
1.0	ITU-T V.153	2009-12-14	16

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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As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at <http://www.itu.int/ITU-T/ipr/>.

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Recommendation ITU-T V.153

Interworking between ITU-T T.38 and ITU-T V.152 using IP peering for real-time facsimile services

1 Scope

[ITU-T V.152] describes the voiceband data (VBD) operation of voice-over-Internet protocol (VoIP) gateways, which may be abbreviated as VBDoIP. [ITU-T T.38] describes the facsimile packet relay operation of voice-over-Internet protocol (VoIP) gateways, which may be abbreviated as FoIP. Both these gateway models consider explicitly interworking between an IP-based packet-switched network on one side and a circuit-switched network on the other side.

This Recommendation describes procedures for direct service interworking (according to the definition in clause 3.2 of [ITU-T Y.1251]) of two IP domains, whereby one IP domain uses V.152-based VBDoIP transport and the other IP domain uses T.38-based FoIP transport.

The term voiceband data is an umbrella term for all kinds of teleservices that use a "data-oriented transport" in the frequency band of the narrow-band voice spectrum (which is a 3.1-kHz-band). The data-oriented transport is realized by modem protocols (the definition for modem can be found in clause 3.13 of [ITU-T V.152]), as defined, e.g., within the ITU-T V-series Recommendations. Teleservices may be categorized into three major applications areas: facsimile, text-based communication and general data services. The three VBD application areas may be summarized as (by using notation "application/transport"):

- **Facsimile/modem:** Gateway technologies for PSTN-to-IP interworking, see, e.g., [ITU-T V.152] for pass-through mode and [ITU-T T.38] for packet relay mode.
- **Text/modem:** Gateway technologies for PSTN-to-IP interworking, see, e.g., [ITU-T V.152] for pass-through mode and [b-ITU-T V.151] for packet relay mode.
- **Data/modem:** Gateway technologies for PSTN-to-IP interworking, see, e.g., [ITU-T V.152] for pass-through mode and [b-ITU-T V.150.1] for packet relay mode.

This Recommendation only considers facsimile/modem.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [ITU-T H.245] Recommendation ITU-T H.245 (2008), *Control protocol for multimedia communication*.
- [ITU-T H.248.1] Recommendation ITU-T H.248.1 (2005), *Gateway Control Protocol: Version 3, including its Amendment 2* (2009).
- [ITU-T H.323] Recommendation ITU-T H.323 (2006), *Packet-based multimedia communications systems*.

- [ITU-T Q.3303.2] Recommendation ITU-T Q.3303.2 (2007), *Resource control protocol No. 3 – Protocol at the interface between a Policy Decision Physical Entity (PD-PE) and a Policy Enforcement Physical Entity (PE-PE) (Rw interface): H.248 alternative*.
- [ITU-T T.30] Recommendation ITU-T T.30 (2005), *Procedures for document facsimile transmission in the general switched telephone network*.
- [ITU-T T.38] Recommendation ITU-T T.38 (2007), *Procedures for real-time Group 3 facsimile communication over IP networks*.
- [ITU-T V.152] Recommendation ITU-T V.152 (2005), *Procedures for supporting voice-band data over IP networks*, and its Corrigenda 1 (2005) and 2 (2006).
- [ITU-T Y.1251] Recommendation ITU-T Y.1251 (2002), *General architectural model for interworking*.
- [IETF RFC 2198] IETF RFC 2198 (1997), *RTP Payload for Redundant Audio Data*.
- [IETF RFC 2733] IETF RFC 2733 (1999), *An RTP Payload Format for Generic Forward Error Correction*.
- [IETF RFC 3261] IETF RFC 3261 (2002), *SIP: Session Initiation Protocol*.
- [IETF RFC 3550] IETF RFC 3550 (2003), *RTP: A Transport Protocol for Real-Time Applications*.
- [IETF RFC 3551] IETF RFC 3551 (2003), *RTP Profile for Audio and Video Conferences with Minimal Control*.
- [IETF RFC 4566] IETF RFC 4566 (2006), *SDP: Session Description Protocol*.
- [IETF RFC 4733] IETF RFC 4733 (2006), *RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals*.

3 Definitions

3.1 Terms defined elsewhere

The terms defined in clause 3 of [ITU-T V.152] and clause 3 of [ITU-T T.38] are applicable, as far as relevant, in this Recommendation. In addition:

3.1.1 voiceband data [b-ITU-T V.150.0]: The transport of modem signals over a voice channel of a packet network with the encoding appropriate for modem signals.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 emulated VBDtoIP-to-FoIP mode: This is an internal mode of operation of the VBDtoIP-to-FoIP gateway with an indirect interworking between both IP connection endpoints. This is done using a gateway that embeds internal TDM-based, 64-kbit/s bearer channels. The two (gateway local) IP connection endpoints do thus represent emulated ITU-T V.152 and ITU-T T.38 gateway functions.

3.2.2 facsimile packet relay mode ("fax relay" for short): The transport of facsimile/modem data across an IP-based packet network using [ITU-T T.38].

3.2.3 IP peering: IP peering denotes the interconnection of two IP domains (at the network protocol layer).

3.2.4 native VBDotIP-to-FoIP mode: This is an internal mode of operation of the VBDotIP-to-FoIP gateway with a direct interworking between both (gateway local) IP connection endpoints where no circuit-switched bearer technology is used internally in the gateway.

3.2.5 VBDotIP-to-FoIP gateway: A media gateway that is compliant with this Recommendation.

3.2.6 voiceband data mode [adapted from ITU-T V.152]: VBDotIP is the transport of voiceband data over a voice channel of an IP-based packet network with the encoding appropriate for modem signals as defined in [ITU-T V.152], clause 6.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

B2BUA	(SIP) Back-to-Back User Agent
BICC	Bearer Independent Call Control
CSN	Circuit-Switched Network
DS0	Digital Signal level 0
FoIP	Facsimile-over-IP
FoTDM	Facsimile-over-TDM
G3FE	Group 3 Facsimile Equipment
GSTN	General Switched Telephone Network
IMS	IP Multimedia System
IP	Internet Protocol
IPDV	IP Packet Delay Variation
IPLR	IP Packet Loss Ratio
IPTD	IP Packet Transfer Delay
ISDN	Integrated Services Digital Network
IWF	Interworking Function
MG	Media Gateway
MGC	Media Gateway Controller
NGN	Next Generation Network
NTE	Network Telephone Event
O/A	(SDP) Offer/Answer
PE-PE	Policy Enforcement Physical Entity
PES	PSTN Emulation Subsystem
PSTN	Public Switched Telephone Network
PT	(RTP) Payload Type/Packet Type
RTCP	RTP Control Protocol
RTP	Real-time Transport Protocol
SDP	Session Description Protocol
SIP	Session Initiation Protocol

SLA	Service Level Agreement
(S)TDM	(Synchronous) Time Division Multiplexing
TPKT	Transport Protocol Data Unit Packet
UA	(SIP) User Agent
UDP	User Datagram Protocol
UDPTL	Facsimile UDP Transport Layer (protocol)
VBD	Voiceband Data
VBDolP	Voiceband Data-over-IP
VBDolTDM	Voiceband Data-over-TDM

5 Conventions

None.

6 Overview

This Recommendation considers real-time facsimile services in case of IP peering. The understanding of IP peering is here simplified to the peer model of an ITU-T T.38 domain ("FoIP" for fax-over-IP) with an ITU-T V.152 domain ("VBDolP" for voiceband data-over-IP).

Figure 1 recalls again the two interworking models of [ITU-T T.38] and [ITU-T V.152].

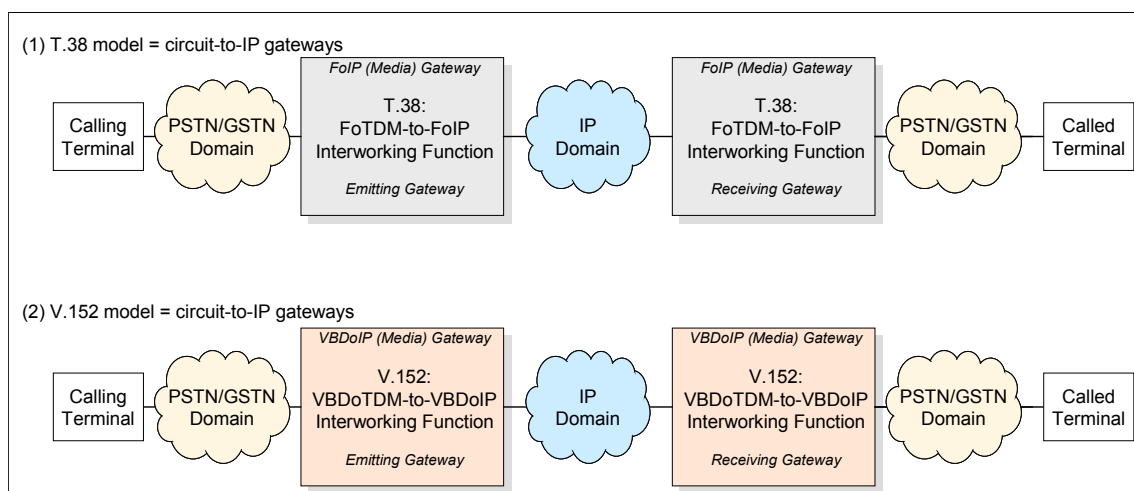


Figure 1 – Interworking between CSN and IP networks using T.38-to-T.38 and V.152-to-V.152 topologies

Both models consider explicitly interworking between an IP network on one side and a circuit-switched network (CSN) on the other side:

- ITU-T V.152: VBDolP for PSTN-to-IP interworking.
- ITU-T T.38: FoIP for GSTN-to-IP interworking.

That means that an ITU-T V.152 gateway and an ITU-T T.38 gateway always have an IP interface and either an analogue line interface, or a digital 1 x 64 kbit/s synchronous TDM (STDM) interface.

In this Recommendation, "IP peering" denotes the interconnection of two IP domains (at the network protocol layer).