

## Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Guidelines on using Ia H.248 profile for control of Border Gateway Functions (BGF); Border Gateway Guidelines

---

**iTeh STANDARD PREVIEW**  
(standards.iteh.ai)

Full standard:  
<https://standards.iteh.ai/catalog/standards/sist/4d259bb7-1bc5-472b-b0f4-104bbb07d429/etsi-tr-183-068-v3.1.1-2009-08>



## Reference

DTR/TISPAN-03202-NGN-R3

## Keywords

gateway, H.248, SIP

**ETSI**

650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° 7803/88

**Important notice**

Individual copies of the present document can be downloaded from:

<http://www.etsi.org>

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the PDF version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at

<http://portal.etsi.org/tb/status/status.asp>

If you find errors in the present document, please send your comment to one of the following services:

[http://portal.etsi.org/chaicor/ETSI\\_support.asp](http://portal.etsi.org/chaicor/ETSI_support.asp)

**Copyright Notification**

No part may be reproduced except as authorized by written permission.  
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2009.  
All rights reserved.

**DECT**<sup>TM</sup>, **PLUGTESTS**<sup>TM</sup>, **UMTS**<sup>TM</sup>, **TIPHON**<sup>TM</sup>, the TIPHON logo and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members.

**3GPP**<sup>TM</sup> is a Trade Mark of ETSI registered for the benefit of its Members and of the 3GPP Organizational Partners.

**LTE**<sup>TM</sup> is a Trade Mark of ETSI currently being registered

for the benefit of its Members and of the 3GPP Organizational Partners.

**GSM**<sup>®</sup> and the GSM logo are Trade Marks registered and owned by the GSM Association.

# Contents

Intellectual Property Rights .....	6
Foreword.....	6
1 Scope .....	7
2 References .....	7
2.1 Normative references .....	7
2.2 Informative references.....	8
3 Abbreviations .....	9
4 Structure of this Technical Report.....	9
<b>Annex A: Illustration of Gate/Pinhole Concept.....</b>	<b>10</b>
A.1 General .....	10
A.2 Relationships between gates and H.248 Streams .....	10
<b>Annex B: Void .....</b>	<b>11</b>
<b>Annex C: Void .....</b>	<b>12</b>
<b>Annex D: Illustration of an IP processing model for an H.248 (IP, IP) Context.....</b>	<b>13</b>
D.1 Example model.....	13
D.2 Aspects of filter interaction .....	15
D.2.1 Interaction between address latching and address policing .....	15
<b>Annex E: Guidelines for Ia-to-Gq' mapping .....</b>	<b>17</b>
E.1 Guidelines for Ia-to-Gq' mapping with regards to session-independent procedures.....	17
E.1.1 Introduction .....	17
E.1.2 Mapping guidelines .....	17
E.1.2.1 Session-dependent procedures.....	17
E.1.2.2 Session-independent procedures.....	18
E.2 Guidelines for Ia-to-Gq' mapping with regards to bearer-specific events.....	18
E.2.1 Introduction .....	18
E.2.2 Mapping guidelines .....	19
E.2.2.1 Guidelines for <i>Specific Action</i> AVPs.....	19
E.2.2.2 Other AVPs.....	19
<b>Annex F: Bandwidth Reservation - Examples for Bandwidth Estimations .....</b>	<b>20</b>
F.1 Introduction .....	20
F.1.1 Bitrate B in general.....	21
F.1.1.1 Before service admission .....	21
F.1.1.1a After service completion.....	21
F.1.1.2 Transport efficiency .....	21
F.1.2 Some important RACS principles .....	22
F.1.2.1 Independence of layer 2 and layer 1 .....	22
F.1.2.2 Awareness of IP version .....	22
F.1.3 VPN Identifiers .....	22
F.1.4 SDP "b=" line semantic in H.248 Ia profile versions .....	22
F.1.5 Conclusion: ideal resource management model for resource "bitrate".....	22
F.2 Traffic aspects .....	23
F.2.1 Quality of bitrate reservation.....	23
F.3 Examples .....	23

F.3.1	Examples for media-aware streams .....	23
F.3.1.1	Example for G.711 .....	23
F.3.2	Examples for media-agnostic streams .....	24
<b>Annex G:</b>	<b>Illustration of BGF modes of operation .....</b>	<b>26</b>
G.1	Major SDP Information Elements for Media/Bearer/Resource Control in the BGF.....	26
G.1.1	Example.....	27
G.2	BGF modes driven by particular SDP lines .....	27
G.2.1	SDP "c=" line .....	27
G.2.2	SDP "m=" line .....	28
G.3	BGF modes driven by configuration management.....	28
G.3.1	Media-related modes .....	28
G.3.2	Transport-related modes .....	28
<b>Annex H:</b>	<b>Illustration of NAPT modes of operation .....</b>	<b>29</b>
H.1	NAPT types .....	29
H.1.1	Remote NA(P)T devices .....	29
H.1.2	MG-local NA(P)T function .....	30
H.2	NAPT-full modes .....	30
H.2.1	General case: non-symmetrical remote network addresses .....	30
H.2.1.1	"Double" NAPT mode <i>without</i> explicit Local Source settings .....	30
H.2.1.2	"Double" NAPT mode <i>with</i> explicit Local Source settings .....	32
H.2.2	Special case: symmetrical remote network addresses .....	32
H.2.2.1	"Double" NAPT mode <i>without</i> explicit Local Source settings .....	33
H.2.2.2	"Double" NAPT mode <i>with</i> explicit Local Source settings .....	34
H.3	NAPT-less .....	34
H.3.1	Definition .....	34
H.3.2	BGF (MG) behaviour for NAPT-less.....	34
H.3.2.1	Handling of <i>source</i> transport address values {SA, SP} .....	35
H.3.2.2	Handling of <i>destination</i> transport address values {DA, DP} .....	35
H.3.3	Control methods of NAPT-less mode .....	35
H.3.3.1	Method 1: mirrored H.248 LD and RD between the two H.248 IP terminations (stream endpoints).....	35
H.3.3.2	Method 2: omitted address information in H.248 LD and RD.....	35
H.3.3.3	Method 3: explicit indication via H.248 Context Attribute .....	35
H.3.4	NAPT-less examples .....	36
H.3.4.1	"Double" NAPT-less mode, controlled via method 1 .....	36
H.4	Mixed NA(P)T-full/NA(P)T-less modes.....	36
H.4.1	Example of combination of Double-NAPT and NAPT-less .....	36
H.4.2	Profile limitations .....	37
<b>Annex I:</b>	<b>Illustration of "Protocol Layer Lx"-based Packet Processing BGF modes .....</b>	<b>38</b>
I.1	BGF modes - Technological Framework .....	39
I.2	BGF modes - Control Framework.....	40
I.3	Example BGF modes - RTP-based Applications .....	43
I.3.1	Example application .....	43
I.3.2	Transport-agnostic modes .....	44
I.3.3	L4-port aware and transport-protocol agnostic modes .....	46
I.3.4	Transport aware (= L4-port aware and transport-protocol aware) modes .....	49
I.3.5	Media framing aware (= media-type aware, media-format agnostic, L4-port aware and transport-protocol aware) modes .....	52
I.3.5.1	Open items .....	55
I.3.6	Media aware "RTP Transport Translator" (= media-type aware, media-format aware) modes .....	55
I.3.7	Media aware "RTP Media Translator" (= media-type aware, media-format aware) modes.....	58
I.4	Example BGF modes - TCP-based Applications .....	61
I.4.1	Example application .....	61

I.4.1.1	Mode discrimination .....	62
I.4.2	TCP relay modes .....	62
I.4.2.1	Unencrypted transport layer .....	62
I.4.2.2	Encrypted transport layer using TLS .....	64
I.4.3	TCP proxy modes .....	65
I.5	Summary .....	67
<b>Annex J:</b>	<b>Illustration of BGF Reporting of Protocol Layer Lx based Performance</b>	
	<b>Measurements .....</b>	<b>68</b>
History .....		70

**ITeH STANDARD PREVIEW**  
(standards.iteh.ai)

Full standard:  
<https://standards.iteh.ai/catalog/standards/sist/4d259bb7-1bc5-472b-b0f4-104bbb07d429/etsi-tr-183-068-v3.1.1-2009-08>

---

## Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<http://webapp.etsi.org/IPR/home.asp>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

---

## Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN).

**iTeh STANDARD PREVIEW**  
(standards.iteh.ai)  
Full standard:  
<https://standards.iteh.ai/catalog/standards/sist/4d259bb7-1bc5-472b-b0f4-104bbb07d429/etsi-tr-183-068-v3.1.1-2009-08>

# 1 Scope

The present document defines guidelines for usage and implementation of border gateways (BGW), based on H.248 profile definitions for controlling such IP-to-IP gateways like ETSI TISPAN "H.248 Ia profile" specifications [i.1], [i.2] and [i.3].

Figure 1 illustrates the architecture assumed in the present document.

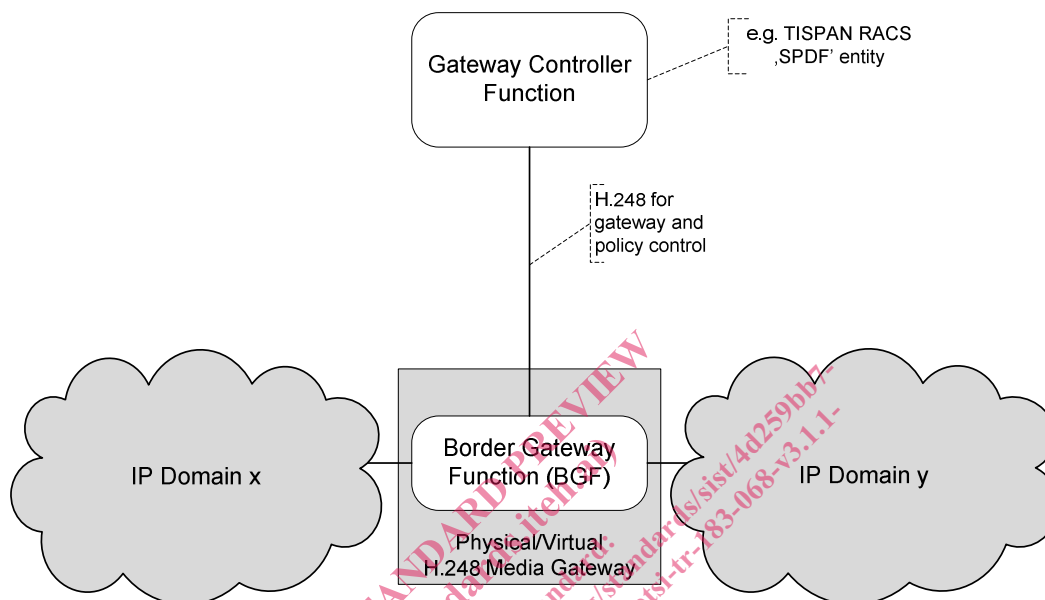


Figure 1: Scope

# 2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
  - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
  - for informative references.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

## 2.1 Normative references

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

Not applicable.

## 2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

- [i.1] ETSI ES 283 018 (Release 1): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control: H.248 Profile for controlling Border Gateway Functions (BGF) in the Resource and Admission Control Subsystem (RACS); Protocol specification". - also known as "H.248 Ia Profile Version 1".
- [i.2] ETSI ES 283 018 (Release 2): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control: H.248 Profile for controlling Border Gateway Functions (BGF) in the Resource and Admission Control Subsystem (RACS); Protocol specification". - also known as "H.248 Ia Profile Version 2".
- [i.3] ETSI TS 183 018 (Release 3): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control: H.248 Profile Version 3 for controlling Border Gateway Functions (BGF) in the Resource and Admission Control Subsystem (RACS); Protocol specification". - also known as "H.248 Ia Profile Version 3".
- [i.4] ITU-T Recommendation H.248.1 (2005): "Gateway control protocol: Version 3" including its Amendment 1 (05/2008).
- [i.5] ETSI TS 183 048: "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control System (RACS); Protocol Signalling flows specification; RACS Stage 3".
- [i.6] ETSI TS 183 017: "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control: DIAMETER protocol for session based policy set-up information exchange between the Application Function (AF) and the Service Policy Decision Function (SPDF); Protocol specification".
- [i.7] ETSI TS 181 018 (Release 2): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Requirements for QoS in a NGN".
- [i.8] ETSI TR 182 022 (Release 2): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Architectures for QoS handling".
- [i.9] IEEE 802.3: "Ethernet Working Group".
- [i.10] ETSI TR 187 008 (Release 1): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NAT traversal feasibility study report".
- [i.11] IETF RFC 5117 (2008-01): "RTP Topologies".
- [i.12] draft-hunt-avt-rtcptrans-00.txt (2007-11): "RTCP Reporting by Translators".
- [i.13] ITU-T Recommendation Y.1251 (08/2002): "General architectural model for interworking".
- [i.14] Draft ITU-T Recommendation G.IP2IP: "Functionality and Performance of an IP-to-IP Voice Gateway, optimised for the transport of voice and voiceband data".
- [i.15] ITU-T Recommendation Y.1560 (09/2003): "Parameters for TCP connection performance in the presence of middleboxes".
- [i.16] IEEE 802.1: "Local Area Networks: Architecture & Overview".
- [i.17] IETF RFC 1812: "Requirements for IP Version 4 Routers".
- [i.18] IETF RFC 768: "User Datagram Protocol".
- [i.19] IETF RFC 3550: "RTP: A Transport Protocol for Real-Time Applications".
- [i.20] IETF RFC 3551: "RTP Profile for Audio and Video Conferences with Minimal Control".



- [i.21] IETF RFC 4733: "RTP Payload for DTMF Digits, Telephony Tones, and Telephony Signals".
- [i.22] IETF RFC 3142: "An IPv6-to-IPv4 Transport Relay Translator".
- [i.23] IETF RFC 4734: "Definition of Events for Modem, Fax, and Text Telephony Signals".
- [i.24] ITU-T Recommendation Draft H.248.64.

---

## 3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AC	Admission Control
B2BIH	Back-to-Back IP Host (mode)
B2BRE	Back-to-Back RTP Endsystem (mode)
B2BTE	Back-to-Back TCP Endpoint (mode)
BGF	Border Gateway Function
CBR	Constant Bit Rate
IP	Internet Protocol
IPR	IP router (mode)
LCD	Local Control Descriptor
LD	Local Descriptor (H.248)
LS	Local Source
MALG	Media Application ILevel Gateway
MG, MGW	Media GateWay
MGC	Media Gateway Controller
MP	Measurement Point
MSRP	Message Session Relay Protocol
NA(P)T	Network Address (and Port) Translation
NAPT	Network Address and Port Translation
NTE	Network Telephone Events
PCI	Protocol Control Information
PDU	Protocol Data Unit
RD	Remote Descriptor (H.248)
RFC	Request For Comments (IETF)
RP	Reporting Point
RS	Remote Source
RTCP	RTP Control Protocol
RTP	Real-time Transport Protocol
RTPMTm	RTP Media Translator mode
RTPTTm	RTP Transport Translator mode
SDP	Session Description Protocol
SDU	Service Data Unit
SIP	Session Initiation Protocol
SPDF	Service Policy Decision Function
StAC	Stream Admission Control
TCP	Transmission Control Protocol
TLS	Transport Layer Security
TRT	Transport Relay Translator
UDP	User Datagram Protocol
VBR	Variable Bit Rate

---

## 4 Structure of this Technical Report

The present document inherits a structure based on annexes from the H.248 Ia profile specifications [i.1], [i.2] and [i.3]. The annex numbering was kept in order to be consistent with the old document versions of these specifications.

Any references from the annexes are related to H.248 Ia profile version 3 specification [i.3].

## Annex A: Illustration of Gate/Pinhole Concept

The purpose of this annex is the illustration of the H.248 Stream/Termination model by showing exemplary realizations of gates for uni- versus bidirectional media flows.

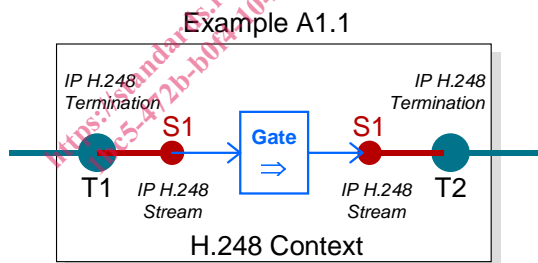
### A.1 General

Only point-to-point sessions are in scope of this H.248 Profile (see clause 5.4, TS 183 018 [i.3]). Interconnection of individual H.248 Streams is based on the basic principle described in clause 7.1.6/H.248.1 [i.4]. The H.248 Multiplex Descriptor is therefore not necessary (see clause 5.6.2, TS 183 018 [i.3]). The H.248 Topology Descriptor definition includes individual H.248 Streams, but is also not necessary (see clause 5.7.8, TS 183 018 [i.3]).

It has to be noted that all sessions have unicast media flows. Potential multicast applications are transparent for MG point of view.

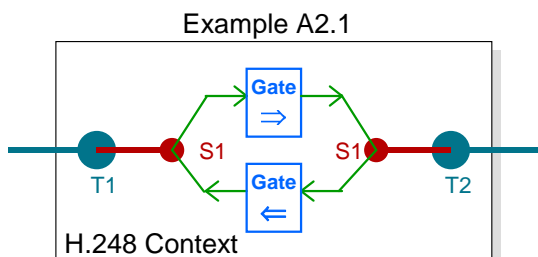
### A.2 Relationships between gates and H.248 Streams

The realization of a gate is illustrated in figure A.1. There is a unidirectional media flow in that example, and there is a single H.248 Stream per Termination. A **H.248 Stream** covers per definition a single **bidirectional** media flow (clause 7.1.6/ITU-T Recommendation H.248.1 [i.4]). In this profile when RTP is used with RTCP, a single H.248 stream represents both RTP media and the corresponding RTCP flow. Media flows are interconnected by using the same **StreamID** (here: StreamID equals to S1 for T1 and T2).



**Figure A.1: H.248 Context - Illustration of Gate, Stream and Terminations**

The uni- or bidirectional application of an H.248 Streams is controlled via usage of Local Descriptor (LD) and Remote Descriptor (RD). Figure A.2 shows a bidirectional session. There is again a single H.248 Stream per Termination. Gates are direction-dependent, there are consequently two gates in this example.



**Figure A.2: H.248 Context Bidirectional Session using single H.248 Streams**

---

## Annex B: Void

NOTE: This clause is present to be backwards compatible with the H.248 profile specifications in [i.2] and [i.3].

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**  
Full standard:  
<https://standards.iteh.ai/catalog/standards/sist/4d259bb7-1bc5-472b-b0f4-104bbb07d429/etsi-tr-183-068-v3.1.1-2009-08>

---

## Annex C: Void

NOTE: This clause is present to be backwards compatible with the H.248 profile specifications in [i.2] and [i.3].

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**  
Full standard:  
<https://standards.iteh.ai/catalog/standards/sist/4d259bb7-1bc5-472b-b0f4-104bbb07d429/etsi-tr-183-068-v3.1.1-2009-08>

---

## Annex D: Illustration of an IP processing model for an H.248 (IP, IP) Context

The purpose of this annex is the illustration of a possible IP flow processing model. Such a model is helpful when considering aspects concerning:

- location of a particular function within the (BGF) processing pipeline; or
- possible interactions between functions (see e.g. clause D.2).

It has to be noted that the model is just an example, not exhaustive concerning all possible functions with regards to supported capabilities by this profile, and not related to any particular implementation.

---

### D.1 Example model

Figure D.1 provides an example pipeline model, which is only indicating a single H.248 Stream of the (IP, IP) Context. A H.248 Stream is fundamentally bidirectional, i.e. relates to two unicast IP flows, one per traffic direction. This example is not considering aspects of RTP/RTCP mapping on a H.248 Stream.

The example model is considering optional and mandatory functions by this profile specification. The example is using modelling components for *filter* (F), *detector* (D), *address processing* (A) and *statistic* (S) entities. There might be further modelling components, e.g. for media-aware specific processing functions. The example model is assuming a pure serial processing pipeline, real implementations could of course benefit from parallelization.