

# ETSI TS 183 002 V3.3.1 (2009-08)

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*Technical Specification*

## **Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); H.248 Profile Version 3 for controlling Access and Residential Gateways**

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**Reference**

DTS/TISPAN-03187-NGN-R3

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**Keywords**

H.248, ISDN, PSTN, signalling

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## Foreword

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

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# 1 Scope

The present document defines a profile of the Gateway Control Protocol (H.248.1 [15]), for controlling access and residential gateways connecting analog lines and ISDN primary and basic accesses, in order to emulate PSTN/ISDN services over IP.

## 1.1 Differences between H.248 ARGW Profiles Version 1 and Version 2

The differences between both H.248 profile versions are detailed in annex A.

Summary list of differences:

- 1) Package usage details (see clause 5.14.2).
- 2) IUA/SCTP encapsulation for Q.921 p-/f-type frames in IP domain (see clause 7.3.2).
- 3) Additional V5 support (see clause 7.4).
- 4) Adaptive-rate based MGC overload control (see clause 8.1.2).
- 5) Real time statistics reporting (see clause 8.4).

## 1.2 Differences between H.248 ARGW Profiles Version 2 and Version 3

The differences between both H.248 profile versions are detailed in annex A.

Summary list of differences:

- 1) traffic volume related statistics on application data level (see clause 8.5);
- 2) V.152 compliant VBDoIP service (see clause 6.2);
- 3) addition of Digit Dialling Method Information for Extended Digit Maps Package; and
- 4) a keep pinhole open method for NAT traversal support (see clause 6.9).

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# 2 References

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## 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.

- [1] ETSI ES 282 001: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture Release 1".
- [2] ETSI ES 282 002: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); PSTN/ISDN Emulation Sub-system (PES); Functional architecture".
- [3] ETSI ES 201 970: "Access and Terminals (AT); Public Switched Telephone Network (PSTN); Harmonized specification of physical and electrical characteristics at a 2-wire analogue presented Network Termination Point (NTP)".
- [4] ETSI EN 300 659-1: "Access and Terminals (AT); Analogue access to the Public Switched Telephone Network (PSTN); Subscriber line protocol over the local loop for display (and related) services; Part 1: On-hook data transmission".
- [5] ETSI EN 300 659-2: "Access and Terminals (AT); Analogue access to the Public Switched Telephone Network (PSTN); Subscriber line protocol over the local loop for display (and related) services; Part 2: Off-hook data transmission".
- [6] ETSI ETS 300 099: "Integrated Services Digital Network (ISDN); Specification of the Packet Handler access point Interface (PHI)".
- [7] ETSI EN 301 141-1: "Integrated Services Digital Network (ISDN); Narrowband Multi-service Delivery System (NMDS); Part 1: NMDS interface specification".
- [8] ETSI ETS 300 402-2: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Data link layer; Part 2: General protocol specification [ITU-T Recommendation Q.921 (1993), modified]".
- [9] ETSI EN 300 367: "Integrated Services Digital Network (ISDN); Explicit Call Transfer (ECT) supplementary service; Service description".
- [10] ETSI TS 102 333: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Gate control protocol".
- [11] ITU-T Recommendation H.248.45: "Gateway control protocol: MGC information package".
- [12] IETF RFC 4233 (2006-01): "Integrated Services Digital Network (ISDN) Q.921-User Adaptation Layer".
- [13] ETSI TBR 003: "Integrated Services Digital Network (ISDN); Attachment requirements for terminal equipment to connect to an ISDN using ISDN basic access".
- [14] ETSI TBR 004: "Integrated Services Digital Network (ISDN); Attachment requirements for terminal equipment to connect to an ISDN using ISDN primary rate access".
- [15] ITU-T Recommendation H.248.1 + Corrigendum 1: "Gateway control protocol: Version 2".
- [16] ITU-T Recommendation H.248.2: "Gateway control protocol: Facsimile, text conversation and call discrimination packages".
- [17] ITU-T Recommendation H.248.4 + Corrigendum 1: "Gateway control protocol: Transport over Stream Control Transmission Protocol (SCTP)".
- [18] ITU-T Recommendation H.248.7: "Gateway control protocol: Generic Announcement package".
- [19] ITU-T Recommendation H.248.11: "Gateway control protocol: Media gateway overload control package".
- [20] ITU-T Recommendation H.248.13: "Gateway control protocol: Quality Alert Ceasing package".



- [21] ITU-T Recommendation H.248.14: "Gateway control protocol: Inactivity timer package".
- [22] ITU-T Recommendation H.248.16 + Corrigendum 1: "Gateway control protocol: Enhanced digit collection packages and procedures".
- [23] ITU-T Recommendation H.248.23: "Gateway control protocol: Enhanced Alerting packages".
- [24] ITU-T Recommendation H.248.26 + Amendment 1: "Gateway control protocol: Enhanced analog lines packages".
- [25] ITU-T Recommendation H.248.34: "Gateway control protocol: Stimulus analogue lines package".
- [26] ITU-T Recommendation Q.1950: "Bearer independent call bearer control protocol".
- [27] ITU-T Recommendation G.711: "Pulse code modulation (PCM) of voice frequencies".
- [28] ITU-T Recommendation G.711 Appendix I: "A high quality low-complexity algorithm for packet loss concealment with G.711".
- [29] ITU-T Recommendation G.711 Appendix II: "A comfort noise payload definition for ITU-T G.711 use in packet-based multimedia communication systems".
- [30] ITU-T Recommendation T.38: "Procedures for real-time Group 3 facsimile communication over IP networks".
- [31] ITU-T Recommendation V.150.1: "Modem-over-IP networks: Procedures for the end-to-end connection of V-series DCEs".
- [32] ITU-T Recommendation V.152 + Corrigendum 1 + Corrigendum 2: "Procedures for supporting voice-band data over IP networks".
- [33] ITU-T Recommendation E.180: "Technical characteristics of tones for the telephone service".
- [34] IETF RFC 2327: "SDP: Session Description Protocol".
- [35] IETF RFC 3551: "RTP Profile for Audio and Video Conferences with Minimal Control".
- [36] IETF RFC 4301: "Security Architecture for the Internet Protocol".
- [37] IETF RFC 4733: "RTP Payload for DTMF Digits, Telephony Tones and Telephony Signals".
- [38] IETF RFC 2784: "Generic Routing Encapsulation (GRE)".
- [39] IETF RFC 4040: "RTP Payload Format for a 64 kbit/s Transparent Call".
- [40] IETF RFC 4855: "Media Type Registration of RTP Payload Formats".
- [41] ITU-T Recommendation G.168: "Digital network echo cancellers".
- [42] IETF RFC 2733: "An RTP Payload Format for Generic Forward Error Correction".
- [43] IETF RFC 2198: "RTP Payload for Redundant Audio Data".
- [44] ITU-T Recommendation Q.115.0: "Protocols for the control of signal processing network elements and functions".
- [45] ITU-T Recommendation Q.115.1: "Logic for the control of echo control devices and functions".
- [46] ITU-T Recommendation Q.921: "ISDN user-network interface - Data link layer specification".
- [47] ETSI ETS 300 297: "Integrated Services Digital Network (ISDN); Access digital section for ISDN basic access".
- [48] ETSI ETS 300 233: "Integrated Services Digital Network (ISDN); Access digital section for ISDN primary rate".
- [49] ITU-T Recommendation H.248.17: "Gateway control protocol: Line test packages".

- [50] ETSI ES 201 235-3: "Access and Terminals (AT); Specification of Dual-Tone Multi-Frequency (DTMF) Transmitters and Receivers; Part 3: Receivers".
- [51] IETF RFC 3389: "Real-time Transport Protocol (RTP) Payload for Comfort Noise (CN)".
- [52] ETSI ES 283 002 (V1.1.3): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Release 1 H.248 Profile for controlling Access and Residential Gateways".
- [53] IETF RFC 3807 (2004): "V5.2-User Adaptation Layer (V5UA)".
- [54] ETSI EN 300 324-1: "V interfaces at the digital Local Exchange (LE); V5.1 interface for the support of Access Network (AN); Part 1: V5.1 interface specification".
- [55] ETSI EN 300 347-1: "V interfaces at the digital Local Exchange (LE); V5.2 interface for the support of Access Network (AN); Part 1: V5.2 interface specification".
- [56] ITU-T Recommendation H.248.47+Revision 1 (2008-07): "Gateway control protocol: Statistic conditional reporting package".
- [57] ETSI ES 283 039-4 (V2.1.1): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Overload Control Architecture; Part 4: Adaptive Control for the MGC".
- [58] IETF RFC 2960: "Stream Control Transmission Protocol".
- [59] ETSI TS 102 144: "Services and Protocols for Advanced Networks (SPAN); MTP/SCCP/SSCOP and SIGTRAN (Transport of SS7 over IP); Stream Control Transmission Protocol (SCTP) [Endorsement of RFC 2960 and RFC 3309, modified]".
- [60] ITU-T Recommendation H.248.58 (06/2008): "Gateway Control Protocol: Packages for application level H.248 Statistics".
- [61] ITU-T Recommendation H.248.52 (2008): "Gateway control protocol: QoS Support Packages".
- [62] ETSI ES 283 002 (V2.1.0): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); H.248 Profile for controlling Access and Residential Gateways".
- [63] Void.
- [64] ITU-T Recommendation H.248.70 (2009): "Gateway control protocol: Dialling method information packages".
- [65] IETF RFC 5109: "RTP Payload Format for Generic Forward Error Correction".
- [66] IETF RFC 4734: "Definition of Events for Modem, Fax, and Text Telephony Signals".

## 2.2 Informative references

- [i.1] ETSI TR 183 025 (Release 2): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); H.248 Non-call related procedures and management system interaction".
- [i.2] ETSI TR 183 040 (V1.1.1): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); H.248 POTS Message Flows based on the H.248 Profile for controlling Access and Residential Gateways".
- [i.3] ITU-T Recommendation H.248.1 (Version 3) Amendment 1: "Gateway control protocol".
- [i.4] Draft ITU-T Recommendation H.248.50: "Gateway control protocol: NAT Traversal Toolkit Packages".

## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document the terms and definitions given in ITU-T Recommendation H.248.1 [15] and the following apply:

**Access GateWay (AGW):** Media GateWay (MGW) that interworks a significant number of analogue lines to a packet network and is located at the operator's premises

NOTE: See also clause 3.1 of ITU-T Recommendation H.248.1 [15].

**IP Port:** source and destination port numbers for UDP, SCTP and TCP traffic

**Media GateWay (MGW):** refers both to Access Media GateWays (AMGs) and to Residential Media Gateways (RMGs)

NOTE: See ITU-T Recommendation H.248.1 [15].

**MG Port:** single physical access interface at a Media GateWay. This is always a circuit oriented interface in the scope of this H.248 Profile

NOTE: There are therefore three port types: analog port, ISDN Basic Rate Access port and Primary Rate Access Port.

**originating Media GateWay (MGW):** Media GateWay (MGW) to which the calling party's physical termination is connected

**Residential GateWay (RGW):** Media GateWay (MGW) that interworks a small number of analogue lines

NOTE: A Residential Media Gateway (RMG) typically contains one or two analogue lines and is located at the customer premises. See also clause 3.6 of ITU-T Recommendation H.248.1 [15].

**terminating Media GateWay (MGW):** Media GateWay (MGW) to which the called party's physical termination is connected

### 3.2 Abbreviations

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

ACO	Address Complete message
AGCF	Access Gateway Control Function
AGW	Access GateWay
ALN	Analog Line
AMG	Access Media Gateway
A-MGF	Access-MGF
AN	Access Network
AOC	Advice of Charge
ARGW	Access Residential media GateWay
BA	Basic Access
BGF	Border Gateway Function
CDR	Call Detail Record
CN	Comfort Noise
CRC	Cyclic Redundancy Check
DLCI	Data Link Connection endpoint Identifier
DNS	Domain Name System
DTMF	Dual Tone Multi Frequency
ECD	Echo Control Device
FEC	Forward Error Correction
FECD	Full ECD
FH	Frame Handler

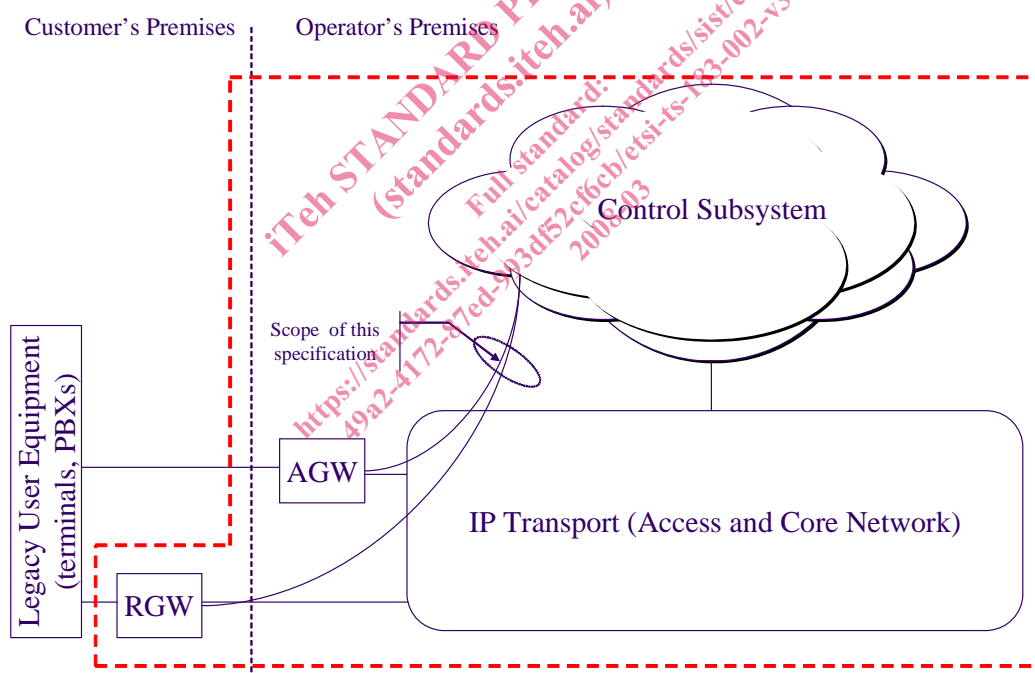
GRE	Generic Routing Encapsulation
HECD	Half-way ECD
IECD	Incoming ECD
IID	IUA Interface Identifier
IP	Internet Protocol
IPsec	IP security
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
IUA	ISDN Q.921-User Adaptation
LD	Local Descriptor
MGC	Media Gateway Controller
MGF	Media Gateway Function
MGW	Media GateWay
MID	Message Identifier
MRFP	Media Resource Function Processor
NAT	Network Address Translation
NMDS	Narrowband Multi-service Delivery System
NT1	Network Termination (type 1)
NTN	Network Terminating Node
NTP	Network Termination Point
OAM	Operation, Administration and Maintenance
OECD	Outgoing ECD
PBX	Private Branch eXchange
PES	PSTN/ISDN Emulation Subsystem
PH	Packet Handler
PLC	Packet Loss Concealment
PLP	Packet Layer Procedures
PRA	Primary Rate Access
PT	Payload Type
QoS	Quality of Service
RD	Remote Descriptor
RFC	Request For Comments (IETF)
RGW	Residential GateWay
RMG	Residential Media Gateway
RMGC	Residential Media Gateway Controller
R-MGF	Residential-MGF
RTP	Real-time Transport Protocol
SAPI	Service Access Point Identifier
SCTP	Stream Control Transmission Protocol
SDP	Session Description Protocol
SPNE	Signal Processing Network Equipment
SRV	SeRVer
SSRC	Synchronization SouRCe
TAS	Terminal Alerting Signal
TCP	Transmission Control Protocol
TDW	Time Division Multiplexing
TE	Terminal Equipment
TEI	TE Identifier
TLS	Transport Layer Security
TMGW	Trunking Media GateWay
TTL	Time To Live
UDP	User Datagram Protocol
V5UA	V5.2 - User Adaptation Layer
VBD	VoiceBand Data
VoIP	Voice over IP

## 4 Applicability

### 4.1 Architecture

Figure 1 illustrates the architecture assumed in the present document. The Media Gateway Controller (MGC) resides in a control subsystem and may be implemented as a stand-alone piece of equipment or as a component of a call server. Access to the IP network is provided to analog terminals, ISDN terminals, analog and ISDN Private Branch Exchanges (PBX), V5.1 and V5.2 Access Networks (AN) through Residential GateWays (RGWs) or Access GateWays (AGWs), which support one or more of the following reference points:

- The Z reference point for analogue terminations.
- The T reference point for Primary Rate Access.
- The S/T reference point for Basic Rate Access.
- The T\* reference point for NMDS Access, as defined in EN 301 141-1 [7].
- The V5.1 reference point for V5.1 Access, as defined in EN 300 324-1 [54].
- The V5.2 reference point for V5.2 Access, as defined in EN 300 347-1 [55].



NOTE: V5 interfaces are supported by this profile, but not indicated in this drawing. The V5 access networks would be located in the operator's premises, in front of the AGW.

**Figure 1: Reference architecture**

The present document does not make any assumption on the structure of the control subsystem hosting the MGC functionality. In the context of the TISPAN NGN Architecture (see ES 282 001 [1]), the control subsystem is the PSTN/ISDN Emulation Subsystem (PES) (see ES 282 002 [2]). Within this subsystem, the AGCF plays the MGC role. The RGW and the AGW implement the R-MGF and A-MGF functional entities (respectively).

The area shown within the dashed lines, including part of the equipment placed on customer premises as a RGW, is considered to be under the control of a single operator. The use of IPSec (see RFC 4301 [36]) or other security measures to create such a control area is outside the scope of the present document.