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Technical Specification

Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); H.248 Non-Call Related Procedures and Management System Interaction

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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
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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).

This technical specification was previously published as a Technical Report.

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1 Scope

The purpose of the present document is to define guidelines with regard to the interaction of non-call related H.248 procedures and generic network management use cases and vice versa. More specifically, the interaction between the following is considered:

- **Control procedures** at the **H.248 interface**. These are the procedures between Media Gateway Controllers (primary and secondary) and their associated Media Gateways (primary, and secondary if available). These procedures primarily utilize the **H.248 ServiceChange** and **H.248 Audit** procedures.
- **Management procedures** at the management interface(s) of H.248 systems (i.e. both Media Gateway Controller and Media Gateway) to perform non call related tasks such as configuration management (start-up, capability change, maintenance locking) and fault management (failure handling).

It is intended that these guidelines are then subsequently used in corresponding H.248 profiles to produce detailed non-call related procedures. At the current time, the existing set of ETSI H.248 profiles ([i.1], [i.2], [i.3] and [i.4]) lack any such detailed procedures.

Specific management systems, architectures and protocols are outside the scope of the present document; only the general requirements and Use Cases related to the management system shall be discussed.

1.1 Applicability

The present document is applicable to any network element that exhibits a H.248 interface and a management interface (e.g. SNMP). The intent of the present document is to provide guidelines so as to facilitate a consistent set of behaviour for non-call related procedures in the related H.248 profile specifications. Due to the general nature of the present document, it is possible that some of the procedures herein will not be applicable to certain H.248 profiles - it is for a specific profile itself to define which procedures are mandatory/optional/not applicable.

The present document assumes an IP-based transport for H.248 signalling. The IP transport may be provided by either UDP or SCTP.

1.2 Relation to H.248 Standards

The present document is considered to be complementary to H.248 standards where there are discrepancies between the present document and the correspondent ITU-T Recommendation H.248 series Recommendations, the procedures of these ITU-T Recommendations (in particular ITU-T Recommendation H.248.1 [i.5] and its annex F on ServiceChange), take precedence over those described in the present document.

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 283 002 (V1.1.1): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); PSTN/ISDN Emulation Subsystem (PES); NGN Release 1 H.248 Profile for controlling Access and Residential Gateways".
- [i.2] ETSI ES 283 024 (V1.1.1): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); PSTN/ISDN Emulation: H.248 Profile for controlling Trunking Media Gateways in the PSTN/ISDN Emulation Subsystem (PES); Protocol specification".
- [i.3] ETSI ES 283 018 (V1.1.1): "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".
- [i.4] ETSI ES 283 031 (V1.1.1): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IP Multimedia: H.248 Profile for controlling Multimedia Resource Function Processors (MRFP) in the IP Multimedia System (IMS); Protocol specification".
- [i.5] ITU-T Recommendation H.248.1 (2005): "Gateway Control Protocol: Version 3".
- [i.6] ITU-T Recommendation H.248.10 (2001): "Gateway control protocol: Media Gateway Resource Congestion Handling package".
- [i.7] ITU-T Recommendation H.248.14 (2002): "Gateway control protocol: Inactivity timer package".

- [i.8] ITU-T Recommendation H.248.11 (2002): "Gateway control protocol: Media Gateway Overload Control package".
- [i.9] 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".
- [i.10] ITU-T Recommendation H.248.40 (2007): "Gateway control protocol: Application Data Inactivity Detection package".
- [i.11] IETF RFC 4268: "Entity State MIB".
- [i.12] ITU-T Recommendation X.731: "Information technology - Open Systems Interconnection - Systems management: State management function".
- [i.13] ITU-T Recommendation H.248.8: " Gateway control protocol: Error code and service change reason description ".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

control association: H.248 Control Association is defined in clause F.2/H.248.1 version 3 [i.5]

H.248 entity: any primary or secondary MGC or MG may be also denoted as H.248 entity

NOTE 1: An H.248 entity relates to a Functional Entity (FE), any implementation of an H.248 entity is mapping the functional entity on a Physical Entity (PE).

NOTE 2: E.g. a virtual MG (VMG) is a H.248 FE. Multiple VMGs are realized in a single physical MG, which relates to an H.248 PE.

NOTE 3: Physical entities are sometimes also denoted as "platform" or "processor".

primary Media Gateway (MG): no explicit definition in H.248

NOTE: The primary MG is rather implicitly defined. See mainly ITU-T Recommendation H.248.1 version 3 [i.5], clauses 7.2.8.1.11, 9, 11.2, 11.5, F.1, F.3.2, F3.5, F.3.11 or F.4.1.1. A primary MG is denoted by the facts that:

- 1) there is a single H.248 Control Association terminated in the MG; and that
- 2) there may be a secondary MG existing. The association between primary and secondary entity is given by support for redundancy on network level.

primary Media Gateway Controller (MGC): according to "Primary MG"

secondary Media Gateway (MG): according to "Primary MG"

secondary Media Gateway Controller (MGC): according to "Primary MGC"

NOTE: There can in general be a list of primary and secondary MGCs in each MG.

3.2 Abbreviations

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

AGW	Access GateWay
DSP	Digital Signal Processor
FE	Functional Entity
IP	Internet Protocol
IS	In Service
MG	Media Gateway
MGC	Media Gateway Controller
MGW	Media GateWay
NGN	Next Generation Network
OOS	Out-Of-Service
PE	Physical Entity
RTP	Real-time Transport Protocol
SC	ServiceChange (H.248)
SCTP	Stream Control Transmission Protocol
SDO	Standardization Development Organizations
SNMP	Simple Network Management Protocol
TISPAN	Telecommunications and Internet converged Services and Protocols for Advanced Networking
TR	Technical Report
UDP	User Datagram Protocol
VMG	Virtual Media Gateway

4 Reference Architecture

Figure 1 illustrates the reference architecture assumed in the present document.

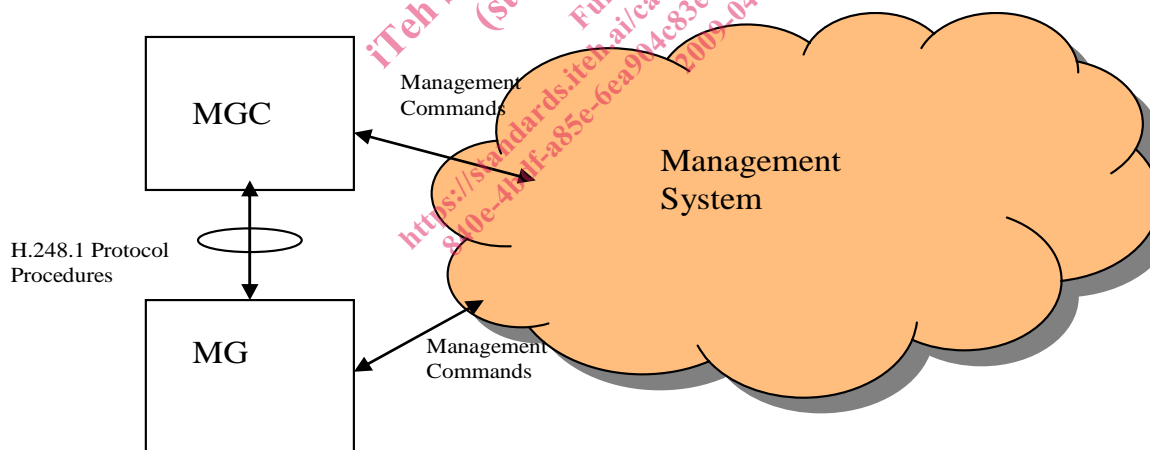


Figure 1: Reference architecture

The present document discusses the message primitives that may be passed over the Management Command interface and any related mappings into the H.248 control procedures and vice versa.

5 H.248 Concepts And Logical Entities

5.1 H.248 Entities

H.248 commands and procedures are acting on H.248 logical entities. These are the different types:

- **Context:** This is the entity that associates terminations together in a call or session. See also clause 6.1 of [i.5].
- **NULL Context:** This is a special Context which contains all Physical Terminations that are not associated with any other Termination. However, commands may still be initiated to and from these terminations. See also clause 6.1 of [i.5].
- **Root Termination:** This defines the MGW as an individual entity as a whole. See also clause 6.2.5 of [i.5].
- **Physical Termination:** This is an entity which has fixed physical characteristics (e.g. an analogue line) and requires pre-configuration via the management system prior to use within H.248 protocol. For such terminations, the MGC and MG are pre-provisioned to have a common view of the existing physical terminations. See also clause 6.2 of [i.5].
- **Ephemeral Termination:** This is a logical entity representing a dynamically created termination within the MGW (e.g. IP/RTP). No pre-configured characteristics are required for this type of entity, although in some profiles the MGC may have a dependency on the MG via the termination naming principles. See also clause 6.2 of [i.5].

Terminations may be individually addressed or as group (except Root Termination). Group addressing is performed via H.248 wildcarding.

5.2 H.248 Non-Call Related Commands

The H.248.1 commands relevant to the present document are:

- **AuditValue:** This command enables a MGC to request the supported packages and current state of properties, events, signals and statistics of terminations. For further details, see also clause 7.2.5 of [i.5].
- **AuditCapability:** This command enables a MGC to request all supported values for termination properties, events and signals allowed by the Media Gateway (i.e. the ROOT Termination). This command is not used in any of the TISPAN profiles and is thus considered to be out of scope in the present document. For further details, see also clause 7.2.6 of [i.5].
- **ServiceChange:** This command enables a MG to notify the MGC that a termination or group of terminations is about to be taken out of service or has just been returned to service. It also used by the MG to announce its availability to a MGC (registration), and to notify the MGC of impending or completed restart of the MG. The MGC may announce a handover to the MG by sending it a ServiceChange command. The MGC may also use ServiceChange to instruct the MG to take a termination or group of terminations in or out of service. For further details, see also clause 7.2.8 of [i.5].
- **Notify:** This command enables a MG to notify the MGC of any event occurring in the MG (that has been requested by the MGC). The Notify command is applicable to both call and non-call related procedures. Only the latter is in scope of the present document. For further details, see also clause 7.2.7 of [i.5].

5.3 H.248 Service State

One of the key descriptors of Terminations in the present document is the ServiceStates property within the Termination State Descriptor:

Possible values:

InService	The termination is in-service and functioning normally.
OutOfService	The termination is out-of-service and not available for traffic.
Test	The termination is undergoing testing.

The MG/MGC may report changes to the service state via the Service Change Command to its peer. Changes to the service state can occur due to faults (MG only) or interaction with management commands (MG/MGC). In the latter case, the H248 Service State is assumed to reflect the overall/resulting availability status of the termination based on the administrative (i.e. the state of the resource as required by the management interface) and operational (i.e. the state of the resource based whether it is working correctly or not) states.

Note that the transition into the TEST state has no impact on Service Change procedures. Service change procedures are impacted only in the transition from TEST to OUT OF SERVICE states (see table F2/H248.1 of [i.5]).

6 Management Primitives

As stated previously, specific management systems, architectures and protocols are outside the scope of the present document. Rather, the present document considers only a high level set of primitives which directly result in the triggering of H.248 signalling.

The following management primitives are defined in the present document:

- **Create Resource:** This command creates a resource. A resource is typically created prior to it being enabled. This command has no impact on H.248 signalling and is included only for completeness.
- **Enable Resource:** The resource moves from an OOS to an IS state (assuming that there is no problem with any related physical state) and is now available for traffic.
- **Disable Resource (Graceful):** The resource is no longer available to new calls/connections. However, all existing calls are permitted to terminate naturally at which point the resource moves into the OOS state. If there are still remaining calls on the resource after a period of time, the operator may invoke the Disable Resource (Immediate) primitive.
- **Disable Resource (Immediate):** Any existing calls/connections are force released, at which point the resource moves into the OOS state.
- **Delete Resource:** This command deletes a resource. A resource would be disabled prior to it being deleted. This command has no impact on H.248 signalling and is included only for completeness.

These management primitives (in general) are applicable at both the MG and MGC.

7 Failure/Recovery Scenarios

Certain failure scenarios also result in the triggering of H.248 signalling. The present document defines the following set of such scenarios:

- **Nodal failure and recovery of a MG/MGC.** This can be due to hardware or software faults.
- **Termination failure and recovery.** Examples of this are termination failure/recovery on the MG (e.g. DSP failure, interface failure such as loss of synchronization on an E1, etc.).
- **User plane failure.** Examples of this would be detection of loss of RTP media. The MG would inform the MGC of such failure and the MGC may force release the call.

- MG-MGC signalling link (control association) failure/recovery. The detection of a signalling link failure results in H.248 signalling to restore the link. On restoring the link, the MG and MGC may have become out of step and thus additional H.248 audits are necessary to ensure the re-synchronization of each end.

8 Redundancy Scenarios

The H.248 non call related procedures are also impacted by the redundancy architectures chosen at a MG/MGC. Examples of such scenarios are:

- MGC Hand-Off. This functionality enables a MGC to terminate an existing control association and establish a new control association to an alternative MGC. This procedure can be applied to load share or due to maintenance action.
- MGC Triggered MG Re-direct. This functionality enables a MGC to redirect an attempted registration to an alternative MGC.
- MG Failover. This functionality enables a MG to inform a MGC that a secondary MG is taking over an existing control association.

It should be noted that processor redundancy can be achieved within a functional node thus being invisible to the H.248 protocol peer or additionally within the functional node but between logical entities within that node and thus using H.248 procedures but using the same nodal address. The scope of the present document does not extend to inter-nodal protocol solutions to support other such redundancy scenarios.

9 General Use Cases

The following use cases and their interaction with the H.248 non-call related procedures are considered in the present document.

Configuration Management:

- Enable MG.
- Enable MGC.
- Disable MG (Graceful).
- Disable MG (Immediate).
- Disable MGC.
- Enable Termination.
- Disable Termination (Graceful).
- Disable Termination (Immediate).
- Change of MG Resources.

Fault Management - Failure and recovery:

- MG failure and recovery.
- MG termination failure and recovery.
- MGC failure and recovery.
- User plane failure.
- MGC-MG signalling link failure and recovery.