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SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

Infrastructure of audiovisual services – Communication procedures

Gateway control protocol: MPLS support package

ITU-T Recommendation H.248.54

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ITU-T Recommendation H.248.54

Gateway control protocol: MPLS support package

Summary

An H.248 media gateway may be connected to multiprotocol label switching (MPLS) domains in various ways. ITU-T Recommendation H.248.54 defines an H.248 package that allows H.248 streams or terminations to bind to MPLS label switched paths.

Source

ITU-T Recommendation H.248.54 was approved on 29 August 2007 by ITU-T Study Group 16 (2005-2008) under the ITU-T Recommendation A.8 procedure.

FOREWORD

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ITU-T Recommendation H.248.54

Gateway control protocol: MPLS support package

1 Scope

An H.248 media gateway (MG) may be connected to multiprotocol label switching (MPLS) domains in various ways. The connection is typically realized via H.248 IP terminations, but there could also be other types of H.248 ephemeral terminations due to the nature of the MPLS protocol architecture. A basic MPLS building block is the so-called "Label Switched Path" (LSP), see [IETF RFC 3031]. The LSP binds MPLS domains and H.248 MGs because LSPs are associated with H.248 ephemeral terminations. This is the basic application of the H.248 *mpls* package.

The concept of LSP is very extensive, leading to a variety of scenarios involving LSP usage. Some examples are, most notably:

- LSP establishment and release:
  - signalled LSP establishment and release via a label distribution protocol (LDP);
  - provisioned LSP.

  NOTE 1 – The *mpls* package is applicable for provisioned LSPs. The support of signalled LSPs is for further study.
- Hierarchical LSPs:
  - relates to the MPLS label stack (see property *stack*; label stacking introduces hierarchy).

  NOTE 2 – The *mpls* package supports "any" legal MPLS label stack size.
- LSPs used for traffic engineering:
  - basic LSPs (according to [IETF RFC 3031]) are not "traffic engineered", e.g., transport characteristics are not explicitly assigned, however:
  - LSPs may be used for "traffic engineering" support (see [IETF RFC 2702]).

  NOTE 3 – The dimension of traffic engineering is not addressed by the *mpls* package version 1 as such, but the package permits traffic engineered LSPs. Traffic engineered LSPs are under the responsibility of MG provisioning. The support of signalled, traffic engineered LSPs is for further study and requires the handling of the LSP control protocol (e.g., CR-LDP, RSVP-TE; see [IETF RFC 2702] and [IETF RFC 3468]) by the MGC and/or MG.
- LSP mapping on H.248 streams and terminations:

  The following relations are applicable for LSP, H.248 stream and termination mapping:
  - 1:1:1 relation between a H.248 stream of an ephemeral termination and LSP;
  - N:1:1 relation between H.248 streams, ephemeral termination and LSP;
  - N:M:1 relation between H.248 streams, ephemeral terminations and LSP.

  NOTE 4 – The *mpls* package supports the above mapping schemes.
- LSP termination:
  - an H.248 MG could terminate an LSP, in which case the MG acts as an MPLS edge node (more details are outlined in Appendix I);
  - an H.248 MG could also provide a LSP traffic forwarding function. The LSP would then involve a single H.248 context with two ephemeral terminations.

  NOTE 5 – The first case is supported. The second case does not require the capabilities of the *mpls* package.

The *mpls* package may be used in various network environments. Several environments are described below. The function of the *mpls* package is further illustrated by examples in Appendix I.

1.1 General MPLS networks

[IETF RFC 3031] describes different MPLS node functions. Using this H.248 package, a H.248 MG could provide the *MPLS edge node* function. Further details are outlined in clause I.2.

1.2 PSTN/ISDN evolution to NGN

[ITU-T Y.2261] describes, amongst other things, core network evolution scenarios towards NGN. In these scenarios, the packet-switched network infrastructure could be MPLS-based. In this particular network evolution scenario, many H.248 MGs are interconnected in the transport domain. This is especially so for the call server-based evolution scenarios to NGN (see clause I.1.1 of [ITU-T Y.2261], see also [ITU-T Y.2271]). Appendix I indicates how the *mpls* package could be used in such NGN use cases.

1.3 ITU-T NGN Release 1

MPLS is considered as one of the transport technologies by NGN Release 1 (see clause 5.2 of [ITU-T Y.2111]). The policy enforcement physical entity (PE-PE) may control an entire MPLS domain, or theoretically may also be an element within an MPLS domain. The PE functional entity (PE-FE) may be physically realized in an H.248 MG. In this case, the H.248 protocol may be profiled by the so-called "H.248 Rw profile" (according to [ITU-T Q.3303.2]). The *mpls* package could then be used dependent on specific MPLS deployment scenarios (see above).

1.4 Relation to "RACF for MPLS based (core) networks"

For further description of MPLS in the NGN RACF, see the ITU-T Y-series of Recommendations.

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.248.1] ITU-T Recommendation H.248.1 (2005), *Gateway control protocol: Version 3*.

[ITU-T Q.3303.2] ITU-T Recommendation 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 Y.2111] ITU-T Recommendation Y.2111 (2006), *Resource and admission control functions in Next Generation Networks*.

[ITU-T Y.2261] ITU-T Recommendation Y.2261 (2006), *PSTN/ISDN evolution to NGN*.

[ITU-T Y.2271] ITU-T Recommendation Y.2271 (2006), *Call server-based PSTN/ISDN emulation*.

[IETF RFC 2702] IETF RFC 2702 (1999), *Requirements for Traffic Engineering Over MPLS*.

[IETF RFC 3031] IETF RFC 3031 (2001), *Multiprotocol Label Switching Architecture*.

[IETF RFC 3468] IETF RFC 3468 (2003), *The Multiprotocol Label Switching (MPLS) Working Group decision on MPLS signaling protocols*.

3 Definitions

3.1 Terms defined elsewhere

None.

3.2 Terms defined in this Recommendation

None.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

AMG	Access MG
CR-LDP	Constraint-based Routing Label Distribution Protocol
FEC	Forwarding Equivalence Class
LDP	Label Distribution Protocol
LER	Label Edge Router
LSP	Label Switched Path
LSR	Label Switching Router
MG	Media Gateway
MGC	Media Gateway Controller
MPLS	MultiProtocol Label Switching
NGN	Next Generation Network
PE-FE	Policy Enforcement Functional Entity
PE-PE	Policy Enforcement Physical Entity
RACF	Resource Admission Control Function
RSVP-TE	Resource Reservation Protocol – Traffic Engineering
TMG	Trunking MG

5 Conventions

None.

6 MPLS package

Package Name:	MPLS package
PackageID:	mpls (0x0090) – value allocated by IANA.
Description:	This package enables a specific MPLS label stack to be passed to the MG to be applied to the given termination/stream. The first entry in the list is the top of the label stack and the last entry is the bottom of the label stack.
Version:	1
Extends:	None

6.1 Properties

6.1.1 MPLS Label Stack

Property Name:	MPLS Label Stack
PropertyID:	stack (0x0001)
Description:	This property corresponds to a stack of MPLS labels
Type:	Sub-list of integer
Possible values:	Any legal MPLS label
Default:	Provisioned
Defined in:	Local Control
Characteristics:	Read/Write

6.2 Events

None.

6.3 Signals

None.

6.4 Statistics

None.

6.5 Error codes

None.

6.6 Procedures

6.6.1 Label assignment

Label assignment relates to the binding of a particular label to a H.248 stream of an ephemeral termination. This property can be applied to ephemeral terminations, which use an MPLS encapsulation. The MG prepends the label stack onto the MPLS packets (so-called "labelled packet", see clause 3.3 of [IETF RFC 3031]) before sending them out of the context.

Appendix I

Some examples for MPLS network architectures

(This appendix does not form an integral part of this Recommendation)

I.1 Introduction

This appendix illustrates some examples of MG involvement in MPLS network architectures.

I.2 H.248 MG as a MPLS edge node

The H.248 MG may be connected to MPLS domains in various ways. In this case, the MG acts as a *MPLS edge node* (see [IETF RFC 3031]), see Figure I.1. Subsequent MPLS nodes within the MPLS domain could be, for instance, MPLS label switching routers (LSR), i.e., the H.248 MG would then peer with one or multiple LSRs. Another example is a peering configuration of the H.248 MG with a label switched hop.

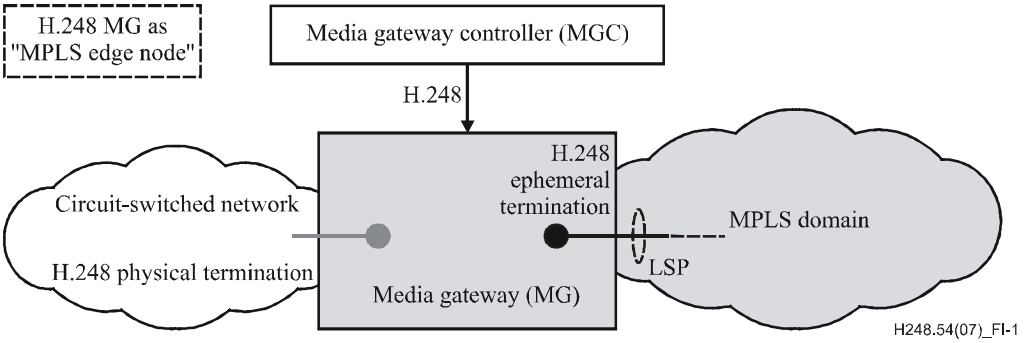


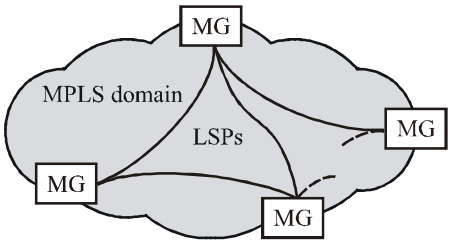
Figure I.1 – H.248 MG as MPLS edge node

The H.248 MG as *MPLS edge node* generally provides both the *MPLS ingress node* and the *MPLS egress node* functions in case of services with bidirectional communication. The LSPs of the MPLS domain, which are terminated at the H.248 MGs, may be provisioned. Other LSPs in the MPLS domain could be dynamically controlled (signalled).

The MGC binds a particular H.248 stream/termination to a LSP.

I.3 LSPs as aggregates for MG-to-MG traffic

Aggregation is a basic MPLS concept, see clause 3.20 of [IETF RFC 3031]. Such aggregates could be used for MG-to-MG traffic (Figure I.2, Note 1). The relation of a label to an aggregate is detailed in [IETF RFC 3031]. The MGC binds (Figure I.2, Note 2) a H.248 stream/termination to an aggregate via the *stack* property.



NOTE 1 – One example could be the interconnection of MGs by an MPLS infrastructure in NGN PSTN emulation subsystems (PES) core networks. [ITU-T Y.2261] depicts two PES scenarios based on (a) TMGs only and (b) TMGs and AMGs.
NOTE 2 – Label binding means the indication of dedicated forwarding equivalence class (FEC). The meaning of the FEC as such is transparent to the MG in this example, because of the "MPLS ingress role" of the MG. The "binding action" by the MGC is a result of the "route selection", see clause 3.21 of [IETF RFC 3031]. Typically "explicit routing" is then used.

Figure I.2 – LSPs used for aggregated MG-to-MG traffic

Bibliography

[b-ETSI TS 102 333] ETSI TS 102 333 v1.2.0 (2008), *Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Annex F, Gate control protocol: MPLS package*.

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