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Assignment of an Associated Channel Type for Packet Transport Network Applications
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Abstract

The Transport Profile of Multi-Protocol Label Switching (MPLS-TP) is a packet-based transport technology based on the MPLS Traffic Engineering (MPLS-TE) and Pseudowire (PW) data plane architectures applicable in various deployment environments.

This document describes the allocation of an Associated Channel Type to support ITU-T defined functions for packet transport network (PTN) applications, such as Operations, Administration and Maintenance (OAM), and applicable to MPLS-TP Pseudowires (PWs), Label Switched Paths (LSPs), Sub-path Maintenance Elements (SPMEs) and Sections.

This document is intended to become a product of a joint Internet Engineering Task Force (IETF) / International Telecommunications Union Telecommunication Standardization Sector (ITU-T) effort to include an MPLS Transport Profile within the IETF MPLS and PWE3 architectures to support the capabilities and functionalities of a packet transport network as defined by the ITU-T.

Status of this Memo

This Internet-Draft is submitted to IETF in full conformance with the provisions of BCP 78 and BCP 79.

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[RFC Editor, please remove this note before publication as an RFC and insert the correct Streams Boilerplate to indicate that the published RFC has IETF Consensus.]

1. Introduction

As noted in the multi-protocol label switching (MPLS-TP) Framework RFCs (RFC 5921 [5] and [6]), MPLS-TP is a packet-based transport technology based on the MPLS Traffic Engineering (MPLS-TE) and Pseudo Wire (PW) data plane architectures defined in RFC 3031 [1], RFC 3985 [2] and RFC 5659 [3] applicable in any packet network context.

A subset of MPLS-TP is also applicable to ITU-T-defined packet transport networks (PTN), where the transport network operational model is deemed attractive.

When MPLS-TP is deployed in PTN environment, application specific mechanisms (e.g., OAM) are required to allow service providers retaining the same operational experience in the MPLS-TP network as they had in their existing Synchronous Optical Network/Synchronous Digital Hierarchy (SONET/SDH) and Optical Transport Network (OTN) networks.

When MPLS-TP is deployed in other environments, e.g. in a Packet Switched Network (PSN), application specific mechanisms (e.g., OAM) are required to allow service providers retaining the same operational experience in the MPLS-TP network as they had in their existing IP and MPLS networks.

The standard MPLS-TP toolkit has to serve the interests of both communities of users.

The standardization of the OAM toolset has not met the market needs of some PTN operators. Recognizing that it is very important for ITU-T and IETF to provide timely solutions to maintain support for the MPLS-TP agreements, the development of PTN application specific functions within ITU-T will allow ITU-T to satisfy the urgent needs expressed at the June 2010 Study Group 15 meeting.

Allocation of one Associated Channel Type value will allow ITU-T to develop the tools required to address the unique needs of PTN application and will make more efficient use of the resources of both organizations while providing a mechanism to prevent the accidental interconnection between PTN and PSN application specific tools. The use of this code point fully complies with the framework and architecture for MPLS-TP.

This document describes the allocation of an Associated Channel Type to support ITU-T defined functions for packet transport network applications, such as Operations, Administration and Maintenance (OAM), and applicable to MPLS-TP Pseudowires (PWs), Label Switched Paths (LSPs), Sub-path Maintenance Elements (SPMEs) and Sections.

This document is intended to become a product of a joint Internet Engineering Task Force (IETF) / International Telecommunication Union Telecommunication Standardization Sector (ITU-T) effort to include an MPLS Transport Profile within the IETF MPLS and PWE3 architectures to support the capabilities and functionalities of a packet transport network as defined by the ITU-T.

1.1. PTN Application Description

In this application MPLS-TP will be used to add packet transport capability to an existing circuit switched (SDH/OTN) transport network. A Transport Network is a connection oriented network that support transport paths that provides connectivity between service switches. Currently only point to point co-routed bidirectional transport paths are supported. It is expected that support for uni-directional point to point and uni-directional point to multipoint transport paths will be added in the future.

A key characteristic for the transport network is the independence between services and transport i.e. the transport network is service agnostic. In the context of MPLS-TP the transport network provides a transport path for a PW or a LSP.

Within a transport network multi technology transport nodes that support a combination of MPLS-TP, Ethernet, OTN and SDH transport technologies are typically deployed. Multiple transport layer networks may be supported by a common node. Note that in many existing transport networks, Ethernet technology has been already deployed to address some of the needs for packet transport capability. Ethernet is also a primary packet transport service for

PTN. In this application, the primary requirements are driven by a desire for compatibility and consistency with the existing transport network operational behaviour, operational functionality and operational processes. In particular compatibility with the existing OAM and protection switching paradigm for SDH, OTN, Ethernet (i.e., provide the same controls and indications).

Compatibility (consistency) means that the same management information model is used. This enables upgrades of the OSS infra structure in which it is only necessary to recognize the new type of layer network technology.

It is also important to minimize the impact on the workforce that operates the existing transport network (e.g., the retraining required to add MPLS-TP to a network should be about the same as the retraining required when OTN is added to an SDH network).

1.2. Support for multiple applications

Multiple applications are commonly supported from a single toolkit within the MPLS suite of protocols, with extensions that are applied to specific applications.

As a consequence, the MPLS architecture allows multiple protocols to perform the same function for different network applications; e.g.

- Three different label distribution protocols (LDP, RSVP-TE, BGP)
- Two different routing protocols (OSPF-TE and ISIS-TE)
- Three different VCCV types

For any given application, a subset of protocols are implemented; e.g.,

- LDP is used for connectionless MPLS,
- RSVP-TE is used for connection-oriented MPLS
- BGP is used with L2 and L3 VPNs

There are no MPLS architecture barriers to allowing different protocols for network operations in "PTN" and "PSN" applications while the operational requirement in these two applications domains are sufficiently distinct to justify such an approach.

2. Conventions used in this document

2.1. Terminology

G-ACh Generalized Associate Channel

LSP Label Switched Path

OAM Operations, Administration and Maintenance

OTN Optical Transport Network

PSN Packet Switched Network

PTN Packet Transport Network

PW Pseudowire

SDH Synchronous Digital Hierarchy

SONET Synchronous Optical Network

SPME Sub-path Maintenance Element

2.2. Definitions

This document uses the term LSP to indicate either a service LSP or a transport LSP (as defined in RFC 5921 [5]).

This document uses the terms Section and Sub Path Maintenance Element (SPME) as defined in RFC 5921 [5].

3. Usage of the Associated Channel Type allocated for PTN

The usage of the associated channel type allocated for PTN applications will fully comply with the MPLS-TP data plane architecture and framework as described in RFC 5960 [7], RFC 5586 [4], RFC 5921 [5] and RFC 6215 [6].

4. Compatibility Considerations

As described in section 5 of RFC 5586 [4], an LER, LSR or PE that are not capable to processing packets on the Associated Channel Type allocated for PTN applications discards such packets when all the MPLS or PW labels have been popped.

5. Interconnection of PTN and PSN networks

PTN and PSN networks can be interconnected together. Three scenarios for interconnection are described in this section.

5.1. PTN client over a PSN server

In this case a LSP originates and terminates in a PTN network and crosses a PSN network. The end to end PTN LSP runs as a client over the PSN network. In this case the PSN network must provide an appropriate class of service for the PTN LSP, e.g. it should use MPLS-TP or MPLS-TE. This is illustrated in Figure 1 below.

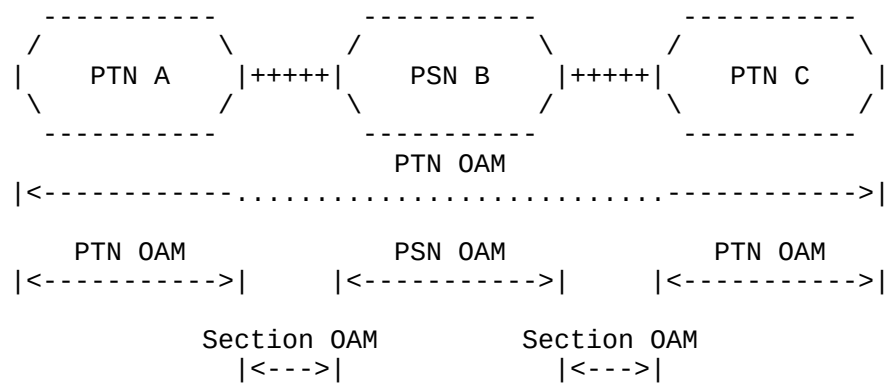

Figure 1 Interconnection case 1) PTN client over a PSN server

Support of a PTN MIP within the PSN network is optional. Support of PTN alarm and lock reporting within the PSN network is optional.

5.2. PSN client over a PTN server

In this case a LSP originates and terminates in a PSN network and crosses a PTN network. The end to end PSN LSP runs as a client over the PTN network. This is illustrated in Figure 2 below.

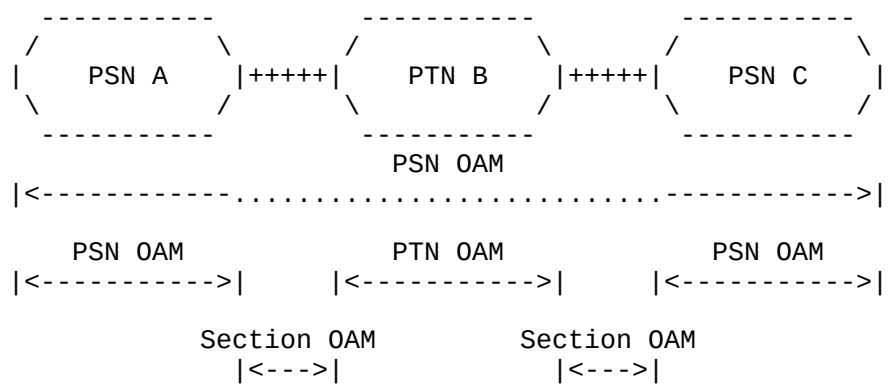

Figure 2 Interconnection case 2) PSN client over a PTN server

Support of a PSN MIP within the PTN network is optional. Support of PSN alarm and lock reporting within the PTN network is optional.

5.3. LSP or PW originating in a PTN network and terminating in a PSN network

In this case the PW (or LSP) originates (or terminates) in a PTN and terminates (or originates) in a PSN. The default OAM for the end to end LSP or PW is PSN. PTN OAM may be used if the network operators mutually agree to select this option. The default option is illustrated in Figure 3 below.

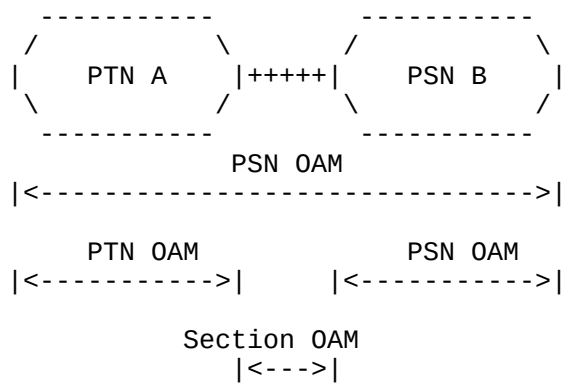

Figure 3 Interconnection case 3) PTN to PSN

In this case the PTN network is required to support PSN OAM for the termination or origination of an end to end LSP or PW. Support of the PSN MIP function in the PTN network is optional.

6. Security Considerations

The security considerations for the generalized associate channel (G-ACh) are describes in RFC 5586 [4].

7. IANA Considerations

This document requires a unique Associated Channel Type which are assigned by IANA from the Pseudowire Associated Channel Types Registry.

Registry:

Value	Description	TLV Follows	Reference
0xXXXX	PTN Applications (ITU-T)	No	(This Document)

8. Acknowledgments

This document was prepared using 2-Word-v2.0.template.dot.

9. References

9.1. Normative References

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[2] Bryant, S., Pate, P., "Pseudo Wire Emulation Edge-to-Edge (PWE3) Architecture", RFC 3985, March 2005

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[4] Vigoureux, M., Bocci, M., Swallow, G., Ward, D., Aggarwal, R., "MPLS Generic Associated Channel", RFC 5586, June 2009

[5] Bocci, M., Bryant, S., Frost, D., Levrau, L., Berger, L., "A Framework for MPLS in Transport Networks", RFC 5921, July 2010

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