**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.

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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.

o Three different label distribution protocols (LDP, RSVP-TE, BGP)

o Two different routing protocols (OSPF-TE and ISIS-TE)

o Three different VCCV types

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

o LDP is used for connectionless MPLS,

o RSVP-TE is used for connection-oriented MPLS

o 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.

```
        -----------        -----------        -----------
      /           \      /           \      /           \
     |    PTN A    |+++++|    PSN B    |+++++|    PTN C    |
      \           /      \           /      \           /
        -----------        -----------        -----------
                            PTN OAM
     |<------------.............................----------->|

        PTN OAM               PSN OAM               PTN OAM
     |<----------->|       |<----------->|       |<----------->|

              Section OAM         Section OAM
                |<--->|             |<--->|
```

        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.

```
   -----------         -----------         -----------
  /           \       /           \       /           \
 |    PSN A    |+++++|    PTN B    |+++++|    PSN C    |
  \           /       \           /       \           /
   -----------         -----------         -----------
                          PSN OAM
 |<--------------................................------------>|

     PSN OAM              PTN OAM              PSN OAM
 |<----------->|     |<------------>|      |<----------->|

            Section OAM          Section OAM
             |<--->|              |<--->|
```
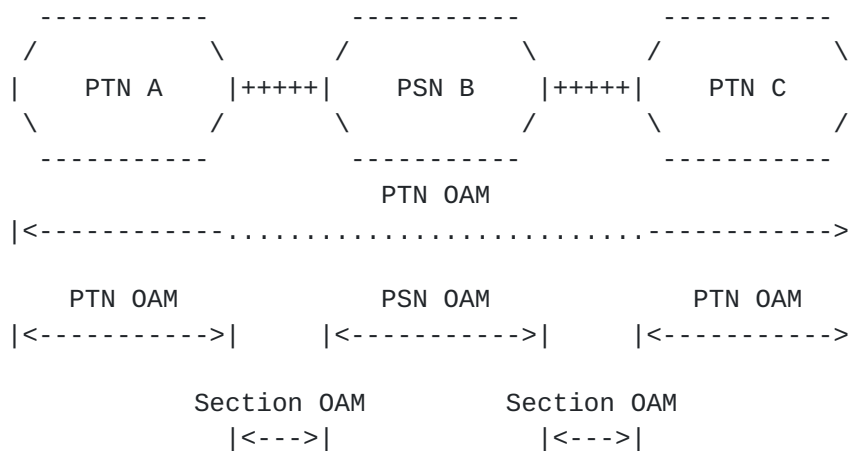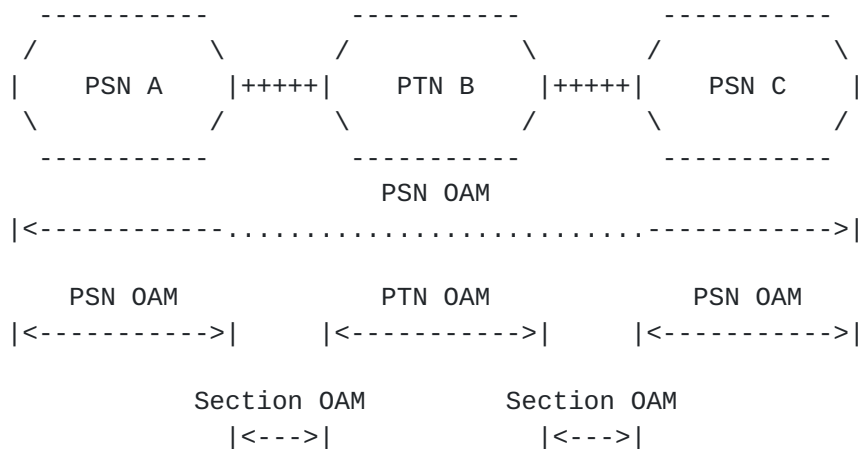
Figure 2 Interconnection case 2) PSN client over a PTN server

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.

```
          -----------         -----------
         /           \       /           \
        |    PTN A    |+++++|    PSN B     |
         \           /       \           /
          -----------         -----------
                    PSN OAM
        |<------------------------------->|

            PTN OAM              PSN OAM
        |<----------->|     |<----------->|

                 Section OAM
                  |<--->|
```
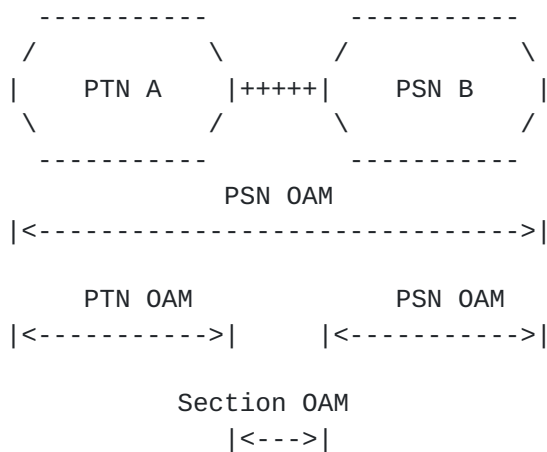
Figure 3 Interconnection case 3) PTN to PSN

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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