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Static pseudowire configuration checking using Generic Associated Channel (G-ACh) Advertisement Protocol

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Abstract

This draft defines a method to verify the configuration parameters of static pseudowires (PW). Since a static PW can be independently provisioned at each end of the PW there is a potential for a configuration parameter mismatch and this can result in the PW not being operational. The procedures in this draft intend to solve this problem and simplify the provisioning.

Status of this Memo

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1. Introduction

The manual configuration of static PW in MPLS and MPLS-TP network requires configuring different PW parameters at the two terminating PEs (Provider Edge). The PW parameters include PW-id, PW-Type, Control word setting, interface and VCCV parameters settings.

The PW provisioned parameters MUST be aligned, so as to make the PW operational. For dynamically signaled PW, the PW parameters are negotiated using the signaling protocol, and only when the PW parameters match at the terminating PE end points, the P2P (Point-to-Point) PW is made operational and can be used to forward data traffic.

In the absence of a signaling protocol, this draft defines a method to do static PW configuration verification, so as to ease the troubleshooting of end to end static PW provisioning in both MPLS and MPLS-TP networks. The mechanism to exchange the PW configuration parameters uses the Generic Associated Channel (G-ACh) Advertisement Protocol (GAP) defined in [I-D.ietf-mpls-gach-adv]. In this draft, the GAP functionality assumes that the PW's underlying PSN Tunnel with GAP enabled is operational.

In the following sections we will describe the extension to the GAP mechanism to do the PW configuration verification at the two terminating PEs for P2P PW. The P2MP (Point-to-Multipoint) PW configuration verification is for further study.

2. Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].

This document uses some terms and acronyms as follows:

MPLS: Multi Protocol Label Switching.

OAM: MPLS Operations, Administration and Maintenance.

PE: Provide Edge Node.

PW: PseudoWire.

TLV: Type, Length, and Value.

VPLS: Virtual Private LAN Services.

MS-PW: Multi-segment PseudoWire

3. GAP Extensions

3.1. Static PW Application Message

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|          Static PW            |             Length            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|          Lifetime             |             Reserve           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                               |
+                    Static PW FEC Element TLV                  +
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Figure 1

A new GAP application "Static PW" is defined in this draft. The Static PW Application ID is to be assigned by IANA, and suggested value is 0x0002.

Length: as per [I-D.ietf-mpls-gach-adv].

Lifetime: as per [I-D.ietf-mpls-gach-adv], and the default value is suggested to be 120 seconds.

Static PW FEC Element TLV for "Static PW" GAP application:


```
     0                   1                   2                   3
     0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |      Type     |    Reserved   |            Length             |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |                        Source Global ID                       |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |                         Source Node ID                        |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |                          Source AC-ID                         |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |                     Destination Global ID                     |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |                      Destination Node ID                      |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |                       Destination AC-ID                       |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |          PW Type            |C|            Reserved           |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |                       TX Sequence Number                      |
    +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
    |                       RX Sequence Number                      |
```

```
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|0|0|  Label Sub-TLV(0x0200)  |              Length           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                          Incoming Label                       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|0|0|  Label Sub-TLV(0x0200)  |              Length           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                          Outgoing Label                       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                               |
+             Optional Interface Parameters Sub-TLV             +
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Figure 2

The Static PW FEC Element TLV type is to be assigned by IANA. The Length field specifies the length in octets of the Static PW FEC Element and all Optional Interface Parameters Sub-TLVs.

The Static PW FEC element TLV value MUST include the following:

- The Global ID and Node ID fields MUST be set as per [RFC6370].

- The AC-ID fields MUST be set as per [RFC5003].

- PW-Type and control word bit (C) MUST be set as per [RFC4447].

- TX Sequence Number: The transmitted message sequence number for the associated Static PW FEC Element TLV.

- RX Sequence Number: The last received sequence number for the associated Static PW FEC Element TLV.

- Two Generic Label TLVs as defined in [RFC5036] to encode static PW incoming and outgoing labels in the order shown above.

- Optional Interface parameters Sub-TLV as defined in [RFC4447].

The GAP Suppress message defined in [I-D.ietf-mpls-gach-adv] only applies all TLVs for a given application. We define a new TLV, static PW suppress TLV, to suppress static PW FEC element transmission. Multiple static PW FEC element TLVs could be included in this TLV. The format would be as follows:

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|PW Suppress TLV|    Reserved   |             Length            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                               |
+                      Static PW FEC Element                    +
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
~               Multiple Static PW FEC Element TLVs             ~
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Figure 3

The type of static PW suppress TLV is to be assigned by IANA.

The static PW suppress TLV could be sent by a receiving PE to request a transmitting PE to stop sending GAP messages for the static PW FEC Element TLVs in the static PW suppress TLV.

The static PW application MUST follow all procedures defined in [I-D.ietf-mpls-gach-adv].

3.2. PE Procedure

The mechanism defined in this draft provides a verification tool for the P2P PW configuration information between two PEs. Upon the provisioning or re-provisioning of a PW at an endpoint PE, GAP messages carrying the static PW application TLV will be sent over the PW's corresponding PSN tunnel which the endpoints PEs of the P2P PW selects by local policy.

3.2.1. Sending PW application Element TLV

When a PW is configured at one endpoint PE, and the PW corresponding PSN Tunnel is operational and UP, the PE MUST send its local PW configuration information using the GAP over the PSN tunnel.

The transmitting PE MUST set the TX sequence number to a non-zero value in Static PW FEC Element TLV, and MUST increment the TX sequence number each time any local PW parameters change.

If the transmitting PE has previously received a GAP message with the static PW FEC Element, the transmitting PE MUST verify local PW parameters with the remote PE parameters as specified in section 4.2.3. The RX sequence number MUST be set to the previously received TX sequence number, otherwise set to zero.

3.2.2. Receiving PW application Element TLV

The receiving PE MUST update the remote PW parameters associated with a static PW FEC Element TLV, when the received TX sequence number in the GAP message is different from the last one received.

If the receiving PE has been provisioned locally with the PW parameters and has previously sent GAP message for the PW parameters, it MUST check if the RX sequence number in the received GAP message is equal to the TX sequence number it previously sent.

If the RX sequence number is equal, the receiving PE MUST send GAP message with static PW suppress TLV as a response to remote PE, and then verify local static PW parameters with the remote static PW FEC parameters as specified in section 3.2.3.

Otherwise, if the RX sequence number is not equal, the receiving PE MUST continue sending GAP message with static PW FEC element TLV, with the RX sequence number set to the last received TX sequence number from the remote PE.

If there is no local PW configuration associated with the static PW FEC Element TLV, the receiving PE MUST retain the remote static PW

FEC Element information.

Whenever PE receives the GAP message with static PW suppress TLV, it MUST stop sending GAP messages with the specified static PW FEC element TLVs included in the static suppress TLV.

The GAP message of static PW application SHOULD be sent at least three times within lifetime.

The mechanism described above applies as well for MS-PW.

3.2.3. PW Configuration Verification Process

Using source/destination Global-IDs, and source/destination node-ID and AC-IDs, to identify a locally provisioned static PW, once found, perform the following parameter verification checks:

1. Check the control word bit (C), and MUST do logical operation "AND". Only when both ends have the use of control word enabled, the result would be with control word presented on this PW.

2. Check PW type mismatch as defined in [RFC4447].

3. Check and negotiate interface parameters as defined in [RFC4447].

4. Check incoming and outgoing static PW labels. The local incoming label should be equal to remote outgoing label, and the local outgoing label should be equal to remote incoming label, otherwise checking failed.

3.2.4. Remote Label Advertisement

The mechanism described in this draft MAY also be used to communicate local static PW labels to allow for single side provisioning of labels. As such, only incoming label will be included in the GAP message and this label will be used by the remote PE as the output label for the PW.

4. Security Considerations

The mechanisms defined in this draft do not introduce any new threats more than what's described in [I-D.ietf-mpls-gach-adv].

5. IANA Considerations

IANA is requested to allocate a new "Static PW" Application ID in the

"G-Ach Advertisement Protocol Applications" registry.

Application ID	Description	Reference
(TBD)	Static PW Application	(this draft)

This document requests that IANA create a new registry, "GAP Static PW Application: TLV objects", with fields and initial value as follows:

Type Name	Type ID	Reference
Static PW FEC Element	0	(this draft)
Static PW suppress TLV	1	(this draft)

The range of the Type ID field is 0 - 255.

The allocation policy for this registry is IETF Review.

6. Acknowledgements

The authors would like to thank Stewart Bryant, Dan Frost for their review and contributions.

7. References

7.1. Normative references

[I-D.ietf-mpls-gach-adv]
Frost, D., Bryant, S., and M. Bocci, "MPLS Generic Associated Channel (G-ACh) Advertisement Protocol", draft-ietf-mpls-gach-adv-02 (work in progress), May 2012.

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

7.2. Informative References

[RFC4447] Martini, L., Rosen, E., El-Aawar, N., Smith, T., and G. Heron, "Pseudowire Setup and Maintenance Using the Label Distribution Protocol (LDP)", RFC 4447, April 2006.

[RFC5003] Metz, C., Martini, L., Balus, F., and J. Sugimoto, "Attachment Individual Identifier (AII) Types for

Aggregation", RFC 5003, September 2007.

[RFC5036] Andersson, L., Minei, I., and B. Thomas, "LDP

Specification", RFC 5036, October 2007.

[RFC6370] Bocci, M., Swallow, G., and E. Gray, "MPLS Transport Profile (MPLS-TP) Identifiers", RFC 6370, September 2011.

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