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Label Switched Path (LSP) Ping for Pseudowire FECs Advertised over IPv6  
[draft-ietf-mpls-ipv6-pw-lsp-ping-04](#)

## Abstract

Multi-Protocol Label Switching (MPLS) Label Switched Path (LSP) Ping and traceroute mechanisms are commonly used to detect and isolate data plane failures in all MPLS LSPs including LSPs used for each direction of an MPLS Pseudowire (PW). The LSP Ping and traceroute elements used for PWs, however, are not specified for IPv6 address usage.

This document extends the PW LSP Ping and traceroute mechanisms so they can be used with PWs that are setup and maintained using IPv6 LDP sessions, and updates [RFC 4379](#).

## Requirements Language

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 [RFC 2119](#) [[RFC2119](#)].

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## 1. Introduction

Multi-Protocol Label Switching (MPLS) Label Switched Path (LSP) Ping and traceroute are defined in [[RFC4379](#)]. These mechanisms can be used to detect data plane failures in all MPLS Label Switched Paths (LSPs) including Pseudowires (PWs). The PW LSP Ping and traceroute elements, however, are not specified for IPv6 address usage.

Specifically, the PW FEC sub-TLVs for the Target FEC Stack in the LSP Ping and traceroute mechanism are defined only for IPv4 Provider Edge (PEs) routers, and are not applicable for the case where PEs use IPv6 addresses. Three PW related Target Forwarding Equivalence Class (FEC) sub-TLVs are currently defined (FEC 128 Pseudowire-Deprecated, FEC 128 Pseudowire-Current, and FEC 129 Pseudowire, see Sections 3.2.8 through 3.2.10 of [[RFC4379](#)]). These sub-TLVs contain the source and destination addresses of the LDP session, and currently only an IPv4 LDP session is covered. Despite the fact that the PE IP address family is not explicit in the sub-TLV definition, this can be inferred indirectly by examining the lengths of the Sender's/Remote PE Address fields, or calculating the Length of the sub-TLVs (see [Section 3.2 of \[RFC4379\]](#)). When an IPv6 LDP session is used, therefore these existing sub-TLVs can not be used since the addresses will not fit. Additionally, all other sub-TLVs are defined in pairs, one for IPv4 and another for IPv6, but not the PW sub-TLVs.

This document updates [[RFC4379](#)] to explicitly constrain the existing PW FEC sub-TLVs for IPv4 LDP sessions, and extends the PW LSP Ping to IPv6 LDP sessions (i.e., when IPv6 LDP sessions are used to signal the PW, the Sender's and Receiver's IP addresses are IPv6 addresses). This is done by renaming the existing PW sub-TLVs to say "IPv4", and also by defining two new Target FEC sub-TLVs (FEC 128 Pseudowire IPv6 sub-TLV and FEC 129 Pseudowire IPv6 sub-TLV) to extend the application of PW LSP Ping and traceroute to the IPv6 usage when an IPv6 LDP session [[I-D.ietf-mpls-ldp-ipv6](#)] is used to signal the Pseudowire. Note that FEC 128 Pseudowire (Deprecated) is not defined for IPv6 in this document.

## 2. Pseudowire IPv4 Target FEC Stack Sub-TLVs

This document updates [Section 3.2](#) and Sections [3.2.8](#) through [3.2.10](#) of [[RFC4379](#)] as follows and as indicated in [Section 4](#) and [Section 6](#). This is done to avoid any potential ambiguity and confusion, and to clarify that these TLVs carry only IPv4 addresses. Note that the changes are limited to the names of fields; there are no semantic changes.

Sections [3.2.8](#) through [3.2.10](#) of [[RFC4379](#)] list the PW sub-TLVs and



state:

"FEC 128" Pseudowire (Deprecated)

"FEC 128" Pseudowire

"FEC 129" Pseudowire

These names and titles are now changed to:

"FEC 128" Pseudowire - IPv4 (Deprecated)

"FEC 128" Pseudowire - IPv4

"FEC 129" Pseudowire - IPv4

Additionally, when referring to the PE addresses, these three sections state:

Sender's PE Address

Remote PE Address

These are now updated to say:

Sender's PE IPv4 Address

Remote PE IPv4 Address

### **[3.](#) Pseudowire IPv6 Target FEC Stack Sub-TLVs**

#### **[3.1.](#) FEC 128 Pseudowire**

FEC 128 Pseudowire IPv6 sub-TLV has the consistent structure with FEC 128 Pseudowire sub-TLV as described in [Section 3.2.9 of \[RFC4379\]](#). The encoding of FEC 128 Pseudowire IPv6 sub-TLV is as follows:



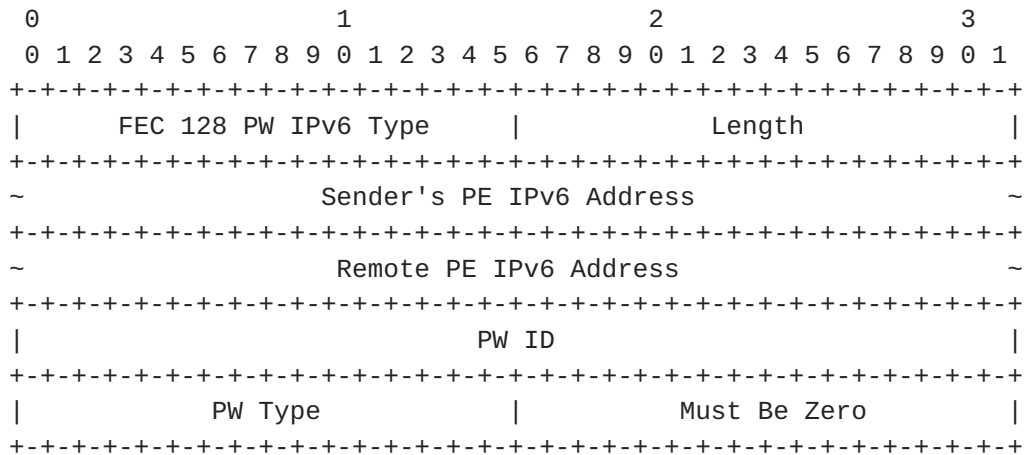


Figure 1: FEC 128 Pseudowire - IPv6

FEC 128 PW IPv6 Type: TBD1. 2 octets.

Length: Defines the length in octets of the value field of the sub-TLV and its value is 38. 2 octets.

Sender's PE IPv6 Address: The source IP address of the target IPv6 LDP session. 16 octets.

Remote PE IPv6 Address: The destination IP address of the target IPv6 LDP session. 16 octets.

PW ID: Same as FEC 128 Pseudowire IPv4 [[RFC4379](#)].

PW Type: Same as FEC 128 Pseudowire IPv4 [[RFC4379](#)].

**3.2. FEC 129 Pseudowire**

FEC 129 Pseudowire IPv6 sub-TLV has the consistent structure with FEC 129 Pseudowire sub-TLV as described in [Section 3.2.10 of \[RFC4379\]](#). The encoding of FEC 129 Pseudowire IPv6 is as follows:





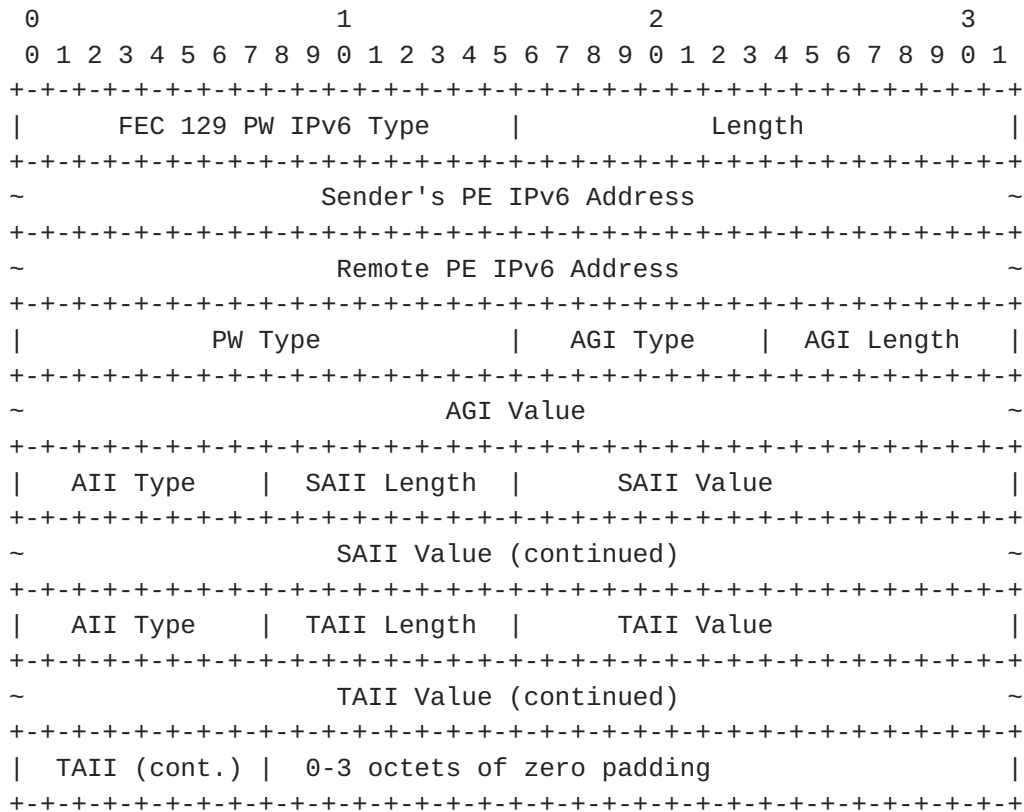


Figure 2: FEC 129 Pseudowire - IPv6

FEC 129 PW IPv6 Type: TBD2. 2 octets.

Length: Defines the length in octets of the value field of the sub-TLV. 2 octets

The length of this TLV is 40 + AGI length + SAII length + TAII length. Padding is used to make the total length a multiple of 4; the length of the padding is not included in the Length field.

Sender's PE IPv6 Address: The source IP address of the target IPv6 LDP session. 16 octets.

Remote PE IPv6 Address: The destination IP address of the target IPv6 LDP session. 16 octets.

The other fields are same as FEC 129 Pseudowire IPv4 [[RFC4379](#)].

#### 4. Summary of Changes

[Section 3.2 of \[RFC4379\]](#) tabulates all the sub-TLVs for the Target FEC Stack. Per the change described in [Section 2](#) and [Section 3](#), the



table would show the following:

Sub-Type	Length	Value Field
-----	-----	-----
...		
9	10	"FEC 128" Pseudowire - IPv4 (deprecated)
10	14	"FEC 128" Pseudowire - IPv4
11	16+	"FEC 129" Pseudowire - IPv4
...		
TBD1	38	"FEC 128" Pseudowire - IPv6
TBD2	40+	"FEC 129" Pseudowire - IPv6

5. Operation

This document does not define any new procedures. The process described in [RFC4379] MUST be used.

6. IANA Considerations

IANA is requested to perform the following assignments in the "Multi-Protocol Label Switching (MPLS) Label Switched Paths (LSPs) Ping Parameters" registry, "TLVs and sub-TLVs" sub-registry.

[RFC Editor: To be REMOVED prior to publication. This registration should take place at <<http://www.iana.org/assignments/mpls-lsp-ping-parameters/mpls-lsp-ping-parameters.xml#mpls-lsp-ping-parameters-7>>]

The following Sub-TLV changes, which comprise three updates and two additions, are made for the TLV Type 1 "Target FEC Stack" in the aforementioned sub-registry.

Update the names of the Value fields of these three Sub-TLVs, adding the "IPv4" qualifier (see Section 2), and update the Reference to also point to this document:

Type	Sub-Type	Value Field
----	-----	-----
1	9	"FEC 128" Pseudowire - IPv4 (Deprecated)
1	10	"FEC 128" Pseudowire - IPv4
1	11	"FEC 129" Pseudowire - IPv4

Create two new entries for the Sub-Type field of Target FEC TLV (see Section 3):



Type	Sub-Type	Value Field
----	-----	-----
1	TBD1	"FEC 128" Pseudowire - IPv6
1	TBD2	"FEC 129" Pseudowire - IPv6

## **7. Security Considerations**

This draft does not introduce any new security issues, the security mechanisms defined in [[RFC4379](#)] apply here.

## **8. Acknowledgements**

The authors gratefully acknowledge review and comments of Vanson Lim, Tom Petch, Spike Curtis, Loa Andersson, and Kireeti Kompella.

## **9. References**

### **9.1. Normative References**

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [RFC4379] Kompella, K. and G. Swallow, "Detecting Multi-Protocol Label Switched (MPLS) Data Plane Failures", [RFC 4379](#), February 2006.

### **9.2. Informative References**

- [I-D.ietf-mpls-ldp-ipv6] Asati, R., Manral, V., Papneja, R., and C. Pignataro, "Updates to LDP for IPv6", [draft-ietf-mpls-ldp-ipv6-07](#) (work in progress), June 2012.

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