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Layer Two Tunneling Protocol - Setup of TDM Pseudowires

Status of this Memo

Abstract

This document defines extensions to the Layer Two Tunneling Protocol (L2TP) for support of structure-agnostic [PWE3-SATOP] and structure-aware [PWE3-CESoPSN], [PWE3-TDMoIP] pseudowires.

Conventions used in this document

In this document we refer to control plane as the packets that contain control information (via AVP) and the mechanism that handle these packets.
In this document we refer to the data plane as the packets that contain transported user data.

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

This document defines extensions to the Layer Two Tunneling Protocol (L2TP) for support of structure-agnostic [PWE3-SATOP] and structure-aware [PWE3-CESoPSN], [PWE3-TDMoIP] pseudowires.

2. L2TP Extension

The L2TP Control Connection is responsible for 3 main operations:
1. Establishment and validation of session.
2. Ending (tearing down) of session.
3. Transferring of End Point status.

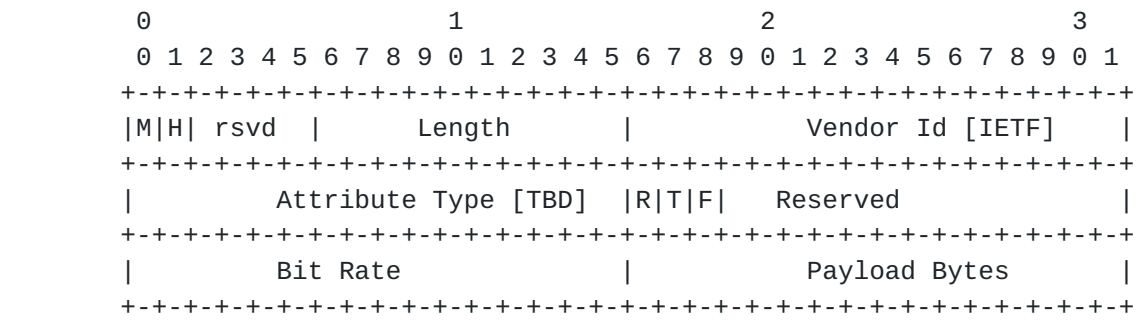
Tearing down of session is identical to [L2TP].

[PWE3-CESoPSN] and [PWE3-SATOP] describe how to transfer the END Point status via the Data Plane. This is therefore RECOMMENDED to not use the Set-Link-Info (SLI) described in [L2TP].

The next sections describe the extensions to the L2TP for establishment and validation of TDM Pseudowire sessions.

There are 2 new AVPs for the Session Connection Messages. One AVP describe the TDM Pseudowire attributes. The second AVP describe the RTP attributes for this TDM Pseudowire.

2.1 TDM PW AVP [ICRQ, OCRQ]



This AVP MAY be hidden (the H bit MAY be 0 or 1). The M bit for this AVP SHOULD be set to 0. The Length (before hiding) of this AVP is 12.

Bit Rate is defined in [PWE3-IANA]. Its usage for all types of TDM PWs assumes the following semantics:

1. This interface parameter MAY be omitted, if the attachment circuit bit-rate is unambiguously derived from the PW Type.
2. Only the following values MUST be specified for structure-agnostic emulation (see [PWE3-SATOP]:
   a. Structure-agnostic E1 emulation - 32
   b. Structure-agnostic T1 emulation:
      1. MUST be set to 24 for the basic emulation mode
      2. MUST be set to 25 for the "Octet-aligned T1" emulation mode
   c. Structure-agnostic E3 emulation - 535
   d. Structure-agnostic T3 emulation - 699
3. For all kinds of structure-aware emulation, this parameter MUST be set to the number of DS0 channels in the corresponding attachment circuit.

Note: for Structure-agnostic T1 emulation the value 24 does not indicate the exact bit rate, and is used for convenience only.

Payload Bytes has been initially defined for CEP [PWE3-SONET] PWs. It can be used for setup of all types of TDM PWs without any changes in its encoding (see [PWE3-IANA]) with the following semantics:

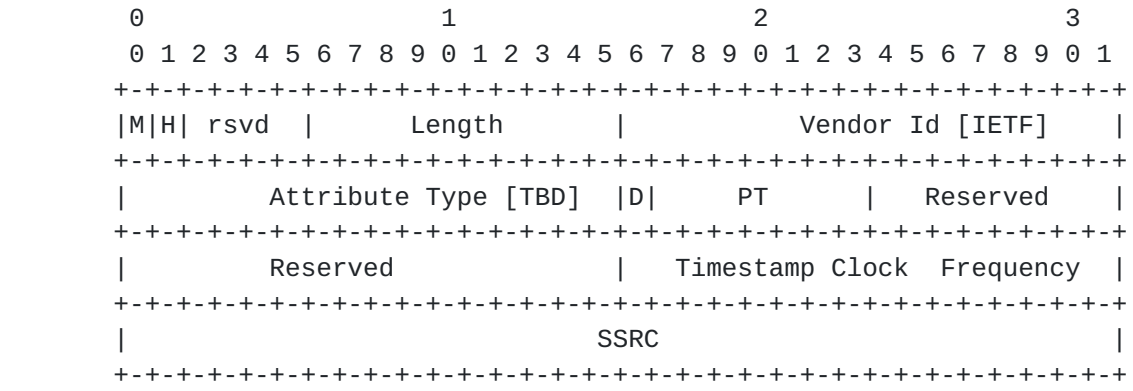
1. For Structure-agnostic emulation the payload type can be any value.
2. For CESoPSN PWs:
   a. The specified value MUST be an integer multiple of number of DS0 channels in the corresponding attachment circuit.
   b. For trunk-specific NxDS0 with CAS, (Payload Bytes/number of DS0 channels) must be an integer factor of the number of frames per corresponding trunk multiframe
3. For TDMoIP the Payload Bytes must be an integer multiple of 48

The R bit defines the present of the RTP header. If the R bit is 1 then the RTP header is present and the RTP AVP MUST appear. If the R bit is zero then the RTP header is not used.

The T bit is ignored and MUST be set to zero.

The F bit indicates fragmentation when sending multiframe. The F bit MUST be zero for all TDM PWs Types excluding trunk-specific NxDS0 services with CAS using the CESoPSN encapsulation. In case of these services, the F bit MUST be set if the payload size specified value differs from the number of frames per trunk multiframe.

2.2 RTP AVP [ICRQ, OCRQ, ICRP, OCRP]



This AVP MUST appear only if the RTP header is used.
This AVP MAY be hidden (the H bit MAY be 0 or 1). The M bit for this AVP SHOULD be set to 0. The Length (before hiding) of this AVP is 16.

The D bit indicates differential time stamping in the RTP header. If the D bit is set to 1 then the time stamping is differential. Otherwise absolute time stamping is used. Differential mode can be used only if both sides use RTP and use differential time stamping.

PT is the payload type expected in the RTP header. Value of zero indicates that the payload type is ignored and will not be used to detect malformed packets.
Timestamp Clock Frequency is the clock frequency used for the time stamping in 8 KHz.

SSRC indicates the expected value of SSRC ID in the RTP header. A zero in this field means that SSRC ID will not be used for detecting misconnections. Since L2TP provides an alternative security mechanism via the cookies, if the cookie length is larger then zero the SSRC SHOULD be zero.

2.3 Changes in the Control Connection AVPs

Control Connection that support TDM MUST add the appropriate PW Type value to the list in the Pseudowire Capabilities List AVP. The exact value is TBD by IANA and is listed in the next section.

2.4 Changes in the Session Connection AVPs

PW Type AVP should be set to one of the following values:

1. Structure-agnostic emulation [PWE3-SATOP] of:
   a. E1 circuits - TBA by IANA
   b. T1 circuits - TBA by IANA
   c. E3 circuits - TBA by IANA
   d. T3 circuits - TBA by IANA
2. Structure-aware emulation [PWE3-CESoPSN], [PWE3-TDMoIP] of:
   a. CESoPSN basic mode - TBA by IANA
   b. TDMoIP basic mode - TBA by IANA
   c. CESoPSN service with CAS - TBA by IANA
   d. TDMoIP with CAS - TBA by IANA

TDM pseudowires use their own control word. Therefore the L2-Specific Sublayer AVP MUST either be omitted or set to zero.

TDM pseudowires use their own sequencing. Therefore the Data Sequencing AVP MUST either be omitted or set to zero.

3. Creation of the TDM Pseudowire Session

When LCCE wants to open a Session for TDM PW it should include the TDM PW AVP and the RTP AVP (if needed) in the ICRQ or OCRQ message. The LCCE peer must validate that TDM PW AVP and make sure it can supply the requirements derived from the RTP AVP (if any exist). If the peer agrees with the CESoPSN AVP it will send an appropriate ICRP or OCRP message with RTP AVP (if needed). The Initiator need to validate that it can supply the requirements derived from the received RTP AVP.

The two peers MUST agree on the values in the TDM PW AVP:

1. Bit Rate MUST be equal on both sides.
2. The Flavor bit MUST be equal on both sides
3. The Payload Bytes and the R bit MAY NOT be the same.

4. IANA Considerations

This draft requires assignment of the following values by IANA:

1. PW types listed in Section 2.1 above.
2. New attribute IDs for TDM PW and and RTP AVPs.

Security Considerations

There are no additional security considerations on top of the ones discussed in [L2TP]

Copyright notice

References

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