

Network Working Group  
Internet Draft

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## Pseudowire Performance and Timing Measurement

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### Abstract

To-date, no intrinsic mechanisms exist for pseudowires that allow operators to measure the performance of a pseudowire. Only the existing Virtual Circuit Connectivity Verification protocol allows for the verification of connectivity of a pseudowire.

This document defines the problems that must be solved in this space, and provides discussion points around the issues of

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pseudowire performance measurement, including timing synchronization and packet loss detection.

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## [1.](#) Introduction

Current work is under way in the IETF's PWE3 working group to specify a suite of protocols to be used to transport various types of layer-2 data across public service transport networks such as MPLS and IP (L2TPv3).

This document defines the problems that must be solved in this space, and provides discussion points around the issues of pseudowire performance measurement, including timing synchronization and packet loss detection.

Some pseudowires carry data that requires strict timing to prevent jitter. For example, Time Division Multiplexing pseudowires that carry mobile phone transmissions have stringent timing parameters. Also, some deployments also require that packet loss detection be also possible.

This document provides discussion points around the issues of pseudowire timing and packet loss, as well as potential extensions

to the existing pseudowire control channel for detection and possible correction of timing issues.

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](#)].

### [3.](#) Terminology

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This document uses terminology from the pseudowire architecture specification [[RFC3985](#)].

### [4.](#) Discussion Points

#### 4.1 Current Limitations

VCCV presently provides only connectivity verification full PW OAM should also provide measurements of one way and round trip delay. Currently no mechanisms exist natively in PWE3 protocols to accomplish the following:

PDV (+ distribution? spectrum?)

Packet loss ratio or actual packet loss

Delay measurement

Jitter measurement

With regard to the above, detecting PL is straight forward if the PW is TDM, but for other PW types, you may need an OAM stream that has high enough rate to give you the statistics you need, and is guaranteed to follow the same path as the user data. This implies the use of VCCV to carry this control information.

For PWs it is also useful to monitor performance

characteristics in order to trigger backup PWs for fast switch-over.

Maintain clock synchronization for multiple PWs. Issue with clock synchronization information in control channel is that in some implementations this is handled via the "slow" forwarding path. In particular the problem with cellular applications is that they want very tight timing, which can not always be guaranteed over PSNs. Are there are better ways of doing this than using the PW control channel?

Tim Frost proposed NTP over PW in one of the NTP WG meetings and Ron Cohen proposed extending 1588 to MPLS recently. We should compare 1588 to adaptive methods. The current thinking is that 1588 doesn't really help unless there are "boundary clocks" - which require HW upgrades to switches.

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Do we really need to providing NTP-level wall-clocks for PWs?

Do we need to provide a PRC-like frequency standard?

Do we need to provide timing for 2G cellular sites or 3G cellular sites?

#### 4.2 CW format use PWACH

What should the time format be?

- RTP style 32 bit based on  $N \times 8\text{KHz}$
- NTP style seconds expressed as 32 bit integer + 32 bit fraction
- ICMP style 32 bit milliseconds
- IEEE 1588 style 32 bit seconds + 32 bit nanoseconds

How many timestamps should packet format support?

1. for approximate round-trip
2. for approximate one-way
3. for round-trip with  $D_t$

- 4. for ICMP-like timestamps
- N. More than 4 for IEEE 1588-like timestamps

#### 4.3 How do we handle loop-back requests?

#### 4.4 Current Proposals to Move Forward

Define new control channel types for performance measurement and timing.

### [10.](#) Security Considerations

TBD.

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### [12.](#) Acknowledgements

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### [13.](#) IANA Considerations

TBD.

## 14. References

### 14.1. Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [RFC2434] Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs", [BCP 26](#), [RFC 2434](#), October 1998.
- [RFC3985]
- [VCCV] Nadeau, T. D., Aggarwal, R., "Pseudo Wire Virtual Circuit Connectivity Verification (VCCV)", [draft-ietf-pwe3-vccv-08.txt](#), March 2006

### 14.2. Informative References

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