Loss and Delay Measurement in Transparent Interconnection of Lots of Links (TRILL)

draft-mizrahi-trill-loss-delay-00

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Performance Monitoring (PM)

- One of the key aspects of OAM.
- Verify Service Level Agreement (SLA).
- Detect performance degradation and network anomalies.
TRILL OAM

Fault Management

TRILL OAM

TRILL Fault Management
draft-tissa-trill-oam-fm

L2 OAM

Connectivity Fault Management
IEEE 802.1ag
TRILL Loss / Delay

TRILL PM is based on ITU-T G.8013/Y.1731 PM.

TRILL OAM
- TRILL Fault Management
  draft-tissa-trill-oam-fm

L2 OAM
- Connectivity Fault Management
  IEEE 802.1ag

TRILL OAM
- TRILL Loss / Delay
  draft-mizrahi-trill-loss-delay

Performance Monitoring
- Ethernet OAM
  ITU-T Y.1731
TRILL Loss / Delay - Overview

- **Loss Measurement (LM).**
  - Loss rate / Packet Delivery Rate (PDR).
  - Synthetic LM
    - One-Way LM (OWLM)
    - Two-Way LM (TWLM)

- **Delay Measurement (DM).**
  - Delay / delay variation (jitter).
    - One-Way DM (OWDM)
    - Two-Way DM (TWDM)
TRILL Loss / Delay – Overview (2)

One-way / two-way.
- One-way: RB1 sends PM messages, RB2 monitors.
- Two-way: RB1 sends PM messages, RB2 responds, RB1 monitors.

Proactive / on-demand.

P2P / P2MP.

Packet formats – identical to ITU-T G.8013/Y.1731.
One-Way Delay Measurement (OWDM)

- Receiver computes delay / delay variation.
- Typically proactive.
- Measuring delay requires time synchronization. Measuring delay variation does not require synchronization.
Two-Way Delay Measurement (TWDM)

Sender computes delay / delay variation.

On-demand
or
Proactive

two-way delay = \((T_4 - T_1) - (T_3 - T_2)\)

one-way delay \{sender->reflector\} = \(T_2 - T_1\)

one-way delay \{reflector->sender\} = \(T_4 - T_3\)
One-Way Loss Measurement (OWLM)

Measurement is based on a sequence of 1SL messages sent during a measurement interval.

On-demand – sequence of messages is sent on-demand. or

Proactive.
Two-Way Loss Measurement (TWLM)

Sender

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Reflector

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far-end packet loss = \((TX_c - TX_p) - (TRX_c - TRX_p)\)

near-end packet loss = \((TRX_c - TRX_p) - (RX_c - RX_p)\)

» Sender computes packet loss ratio for each direction.
Two-Way PM

Forward and reverse directions may use:
- Different physical path.
- Different <Flow Entropy>.

Current draft defines Reflector Entropy TLV:
- Allows sender to define the <Flow Entropy> for the response message.

Optionally: sender may ignore information about reverse path:
- Sender monitors only Sender->Reflector direction.
Using Two-Way PM for Forward Measurement

Sender

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\[ T_1 \quad T_4 \] \( \cdots \) \( \rightarrow \) \text{time} \n
\[
\text{Sender}\rightarrow\text{Reflector delay} = T_2-T_1 \\
\text{(ignore } T_3, T_4) \]

Reflector

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\[ T_2 \quad T_3 \]

\[ \text{Sender}\rightarrow\text{Reflector loss} = (TX_c-TX_p) - (TRX_c-TRX_p) \]
Status of this Draft

- February 2013 – draft 00.

Next steps:
- Fix some inconsistencies with Y.1731.
- Deepak Kumar to join as a co-author.
- More comments from WG.
- Request WG adoption.
Thanks
Why Synthetic Loss Measurement?

- **TRILL**: multipoint-to-multipoint connectivity.

- User packets can be delivered to more RBridges or more ports than are necessary (e.g. due to broadcast, un-pruned multicast or unknown unicast flooding).

- Loss Measurement using user data traffic requires a 1:1 relationship between the transmitter and receiver which correspond to the measurement endpoints.

- ➤Current draft performs LM counting based on synthetic frames rather than user data frames.
Why Synthetic Loss Measurement?

- Monitoring granularity:
  - Network OAM
  - Service OAM
  - Flow OAM

- Current draft performs LM counting based on synthetic frames rather than user data frames.

RB1 <-> RB3 PM:
- When counting user traffic: counter at RB1 ≠ counter at RB2
- Synthetic LM RB1 <-> RB3: counter at RB1 = counter at RB2