Simple Two-Way Direct Loss Measurement Procedure

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Rakesh Gandhi - Cisco Systems (rgandhi@cisco.com) - Presenter
Clarence Filsfils - Cisco Systems (cfilsfil@cisco.com)
Daniel Voyer - Bell Canada (daniel.voyer@bell.ca)
Mach(Guoyi) Chen - Huawei (mach.chen@huawei.com)
Bart Janssens - Colt (Bart.Janssens@colt.net)
Stefano Salsano - Universita di Roma "Tor Vergata" (stefano.salsano@uniroma2.it)

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Agenda

• Requirements and Scope
• Summary
• Next Steps
Requirements and Scope

Requirements:
- Direct Loss Measurement (DLM) for accurate data packet loss
- Support Alternate-Marking Method (AMM) [RFC8321]
- High scale for number of sessions and faster packet loss detection interval
  - Support hardware-based counter update for P2P links/circuits

Goals:
- Avoid maintaining each test session on Session-Reflector
- Avoid control protocol for signaling dynamic parameters

Scope:
- Follow STAMP [RFC8762] approach
Alternate Marking Method for Packet Loss

- RFC 8321 - Alternate-Marking Method for Passive and Hybrid Performance Monitoring
- RFC 8957 - Synonymous Flow Label Framework

A: packet with A coloring
B: packet with B coloring

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<tbody>
<tr>
<td></td>
<td>Traffic Flow</td>
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<tr>
<td>-----------</td>
<td>----------------</td>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>BBBBBBBB AAAAAAAAAA BBBBBBBBBBBBBB AAAAAAAAAAA BBBBBBBBBBBBBB AAAAAAAA</td>
<td></td>
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<tr>
<td>-----------</td>
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</tr>
<tr>
<td>...</td>
<td>Block 5</td>
<td>Block 4</td>
<td>Block 3</td>
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Figure 2: Traffic Coloring
Method 1: STAMP Test Packets with Direct Measurement TLV

Figure: STAMP Session-Sender Test Packet Format

Figure: STAMP Session-Reflector Test Packet Format
Method 2: Direct Loss Measurement Probe Packet for Data Packet Loss Detection

- Base Direct Loss Measurement probe packet format defined
  - Hardware efficient counter updating
  - Well-known locations for traffic counters
  - Block number of the counters for alternate-marking method [RFC8321]
  - Traffic class of the counters for per class packet loss
  - 32-bit and 64-bit Packets and Bytes counters
- DLM probe packet format is also defined for authenticated mode
- User-configured destination UDP Port is used for identifying DLM probe packets (different than port 862 and the port used by STAMP)
- Sequence Number allows to monitor DLM session state, out of order probe packets and probe packet drops
- Flags
  - X set to 1 for 64-Bit Counter, set to 0 for 32-Bit Counter
  - B set to 1 for Byte Counter, set to 0 for Packet Counter
  - T set to 1 for Sender-DSCP scoped Counter

![Table](image)

**Figure: Session-Reflector Direct Loss Measurement Probe Packet**
### Direct Measurement TLV vs. Direct Loss Measurement Probe Packet

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Alternate-marking method packet loss - using block number for counters (out-of-order data packet support)</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Counters:</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>- 32-bit and 64-bit Byte counters</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>- 64-bit packet counters</td>
<td></td>
<td></td>
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<tr>
<td>- Per Traffic Class Counters</td>
<td></td>
<td></td>
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<tr>
<td>Need to write timestamp (clock sync needed for one-way delay)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Counter at fixed location in the probe packet for hardware-based counter update in both directions (applicable to P2P links/circuits)</td>
<td>No (TLV-based)</td>
<td>No (TLV-based)</td>
<td>Yes</td>
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</tbody>
</table>

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Data Packet Loss Calculation

- Using the Counters C1, C2, C3 and C4 as per reference topology, from the n\textsuperscript{th} and (n-1)\textsuperscript{th} Direct Loss Measurement probe packets.
  - Transmit Loss \(TxL[n-1, n] = (C1[n] - C1[n-1]) - (C2[n] - C2[n-1])\)
  - Receive Loss \(RxL[n-1, n] = (C3[n] - C3[n-1]) - (C4[n] - C4[n-1])\)

- When using Alternate-Marking Method, all Counters used for the loss calculation belongs to the same Block Number, as described in Section 3.1 of [RFC8321].
Next Steps

• Welcome your comments and suggestions
• Requesting IPPM WG adoption
• Define New STAMP Direct Measurement TLV2?
Thank you