

Performance Measurement On Link Aggregation Group(LAG)

draft-li-ippm-pm-on-lag-03

Zhenqiang Li
Mach Chen (Presenter)
Greg Mirsky

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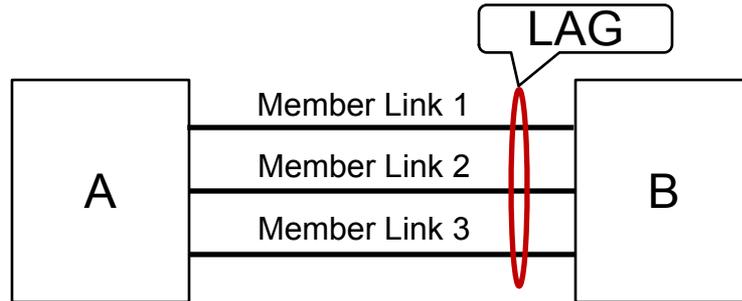
Motivation

- Link Aggregation Group (LAG) is widely used in the field
 - Combine multiple physical links into a single logical link
 - Provide higher bandwidth and better resiliency
- Active IP Performance Monitoring OAM protocols view a LAG as a single logical link
 - The measured metrics reflect the performance of one member link or an average of some/all member links of the LAG
- In some cases, the delays of the member links of a LAG are different because the member links traverse different transport paths
- It is necessary to know the delay and loss of each member link of a LAG to steer a flow that requires a time-sensitive service accordingly.
- This document defines extensions to OWAMP, TWAMP and STAMP to implement performance measurement on a particular member link of a LAG.

Summary of the Proposals

- Micro Session for LAG
 - Per session per each member link of a LAG;
 - All micro sessions of a LAG share the same 4-tuple;
 - Member link is used to differentiate the sessions of a LAG;
- OWAMP/TWAMP-Control
 - New commands are defined to indicate whether a session is a micro session;
 - OWAMP: Request-OW-Micro-Session;
 - TWAMP: Request-TW-Micro-Session;
 - Session-Sender: Sends Control packets of a micro session over the corresponding member link;
 - Session-Receiver/Reflector: Creates a micro session, build the association between the micro session and the receiving member link;
- OWAMP/TWAMP/STAMP-Test
 - Reuses the OWAMP/TWAMP/STAMP-Test packet formats and procedures with minor extensions (e.g., carry member link information for validation check);
 - Session-Sender: Sends Test packets of a micro session over the corresponding member link;
 - Session-Receiver/Reflector: Associates received Test packets with a micro session by using the combination of “4-tuple + receiving member link”;

Example: TWAMP Micro Session



- Hosts A and B are connected by a LAG (Consisted of three member links: Link 1, Link 2, and Link 3). Three micro sessions to be established:
 - micro session 1 for member link 1;
 - micro session 2 for member link 2;
 - micro session 3 for member link 3;
- TWAMP-Control:
 - A sends Control packet (Command Type: Request-TW-Micro-Session) over member link 1 to B;
 - B creates a micro session (micro session 1) and builds an association between micro session 1 and the receiving member link (member link 1);
- TWAMP-Test:
 - A sends Test packet of micro session 1 over member link 1;
 - B associates the Test packet with micro session 1, by using:
 - 4-tuple + receiving member link (member link 1);
 - B sends reflected Test packet over member link 1 back to A;

Comments from List

- Thanks to Xiao Min, Yali Wang, Tal Mizrahi, Giuseppe Fioccola, Rakesh Gandhi for their valuable comments;
 - Positive comments received;
 - Most of the comments addressed in versions 02 and 03;
 - Hold back the suggestion to separate the draft into several drafts, for example:
 - One for OWAMP/TAWMP, one for STAMP;
 - Ask for more feedbacks from the WG;
 - Hold back the update to address the comment regarding potential conflicts with other ongoing extensions (Test packet formats) in stamp-srpm, twamp-srpm drafts

Next steps

- Solicit more review and comments
- Refine the document according to the feedbacks from WG

Supplemental slides

Micro OWAMP

- Extensions to OWAMP-Control
 - A new command (Request-OW-Micro-Session) is defined
 - When receives the command, if the session is accepted, the OWAMP Server MUST build an association between the session and the receiving member link;
- Extensions to OWAMP-Test
 - Reuses the OWAMP-Test packet format and procedures, and
 - The micro OWAMP Sender MUST send the micro OWAMP-Test packets over the member link with which the session is associated.
 - The micro OWAMP receiver MUST use the receiving member link correlate the Test packet to a micro OWAMP session.

Micro TWAMP-Control

- Extensions to TWAMP-Control
 - A new command (Request-TW-Micro-Session) is defined
 - When receives the command, if the session is accepted, the TWAMP Server MUST build an association between the session and the receiving member link;
 - To build the association, two potential options:
 - Automatically associate the session with the receiving member link (proposed in the draft),
 - » Control messages (Request and Response) are required to send along the specified member link;
 - » Most of them are implementation detail, friend for deployment and operations;
 - Carry the member link identifiers in the control message
 - » Extensions to control messages needed;
 - » Operators need to specify which member link is associated with which session on both Sender and Server sides, prone to error;

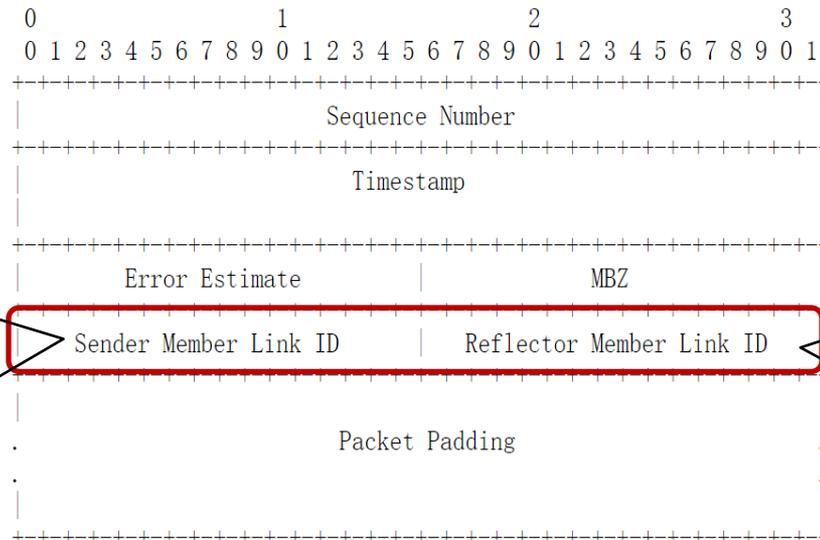
Micro TWAMP-Test

- Extensions to TWAMP-Test

- Reuse the TWAMP-Test packet formats with following additions:
 - Two new fields: Send Member Link ID and Reflector Member Link ID
 - Used for validation checking;
- Reuse the TWAMP-Test procedure with following additions:
 - The micro TWAMP Sender MUST send the micro TWAMP-Test packets over the member link with which the session is associated.
 - The micro TWAMP reflector MUST use the “4-tuple + receiving member link” to correlate the Test packets to a micro TWAMP session.

✓ Copied to the reflected Test packet and send back to the Sender.

✓ Used for the Sender to check whether the reflected Test packet is received from the expected link.



Used for Reflector to check whether the Test packet is received from the expected link

Figure 1: Session-Sender Packet format in Unauthenticated Mode

Micro STAMP-Test

- Extensions to STAMP-Test

- Reuse the STAMP-Test packet formats with following additions:
 - Two new fields: Send Member Link ID and Reflector Member Link ID
- Reuse the STAMP-Test procedures with following additions:
 - The micro STAMP Sender MUST send the micro STAMP-Test packets over the member link with which the session is associated.
 - The micro STAMP receiver MUST use “4-tuple + the receiving member link” to correlate the Test packet to a micro STAMP session.

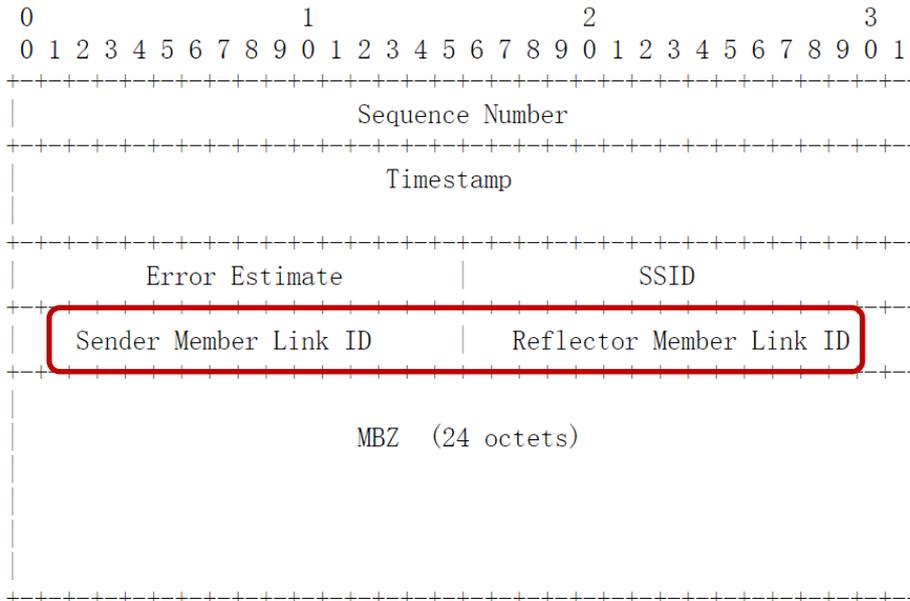


Figure 5: Session-Sender Test Packet in Unauthenticated Mode

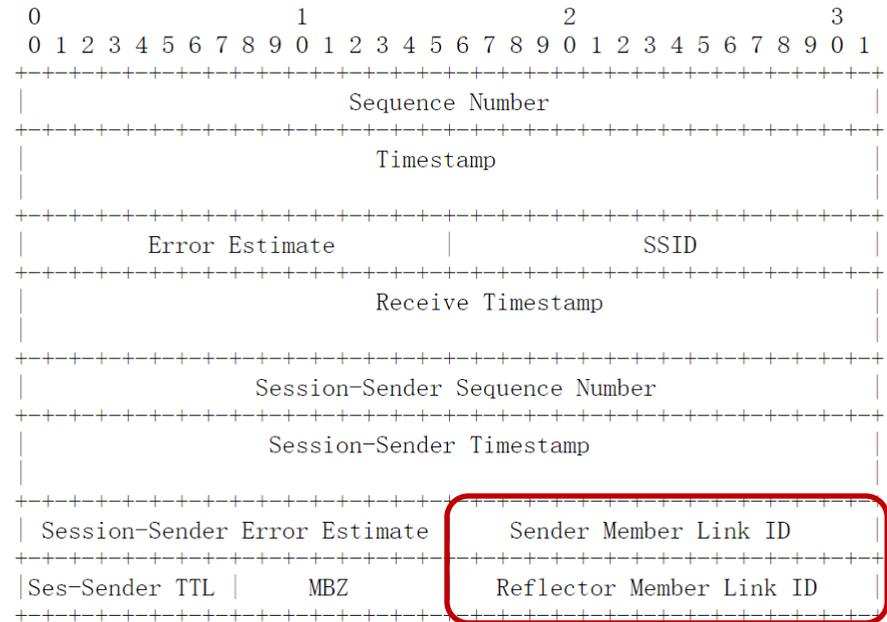


Figure 7: Session-Reflector Test Packet in Unauthenticated Mode