Performance Measurement Using UDP Path for Segment Routing Networks

draft-gandhi-spring-rfc6374-srpm-udp-03

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

Agenda

- Requirements and Scope

- History of the Draft

- Updates Since IETF-104

- Summary

- Next Steps

Requirements and Scope

Requirements:

- Delay and Loss Performance Measurement (PM)
  - ✓ Links and End-to-end P2P/ P2MP SR Paths
  - ✓ Applicable to SR-MPLS/SRv6 data planes
- No need to negotiate UDP port to bootstrap PM session - spirit of SR
  - ✓ Stateless on egress node - spirit of SR
- Handle ECMP for SR Paths

Scope:

- Use RFC 6374 defined probe message formats
- Use RFC 7876 (IP/UDP OOB return path) defined probe response messages
- **User defined** IP/UDP path for PM probe messages

History of the Draft

- Mar 2018
  - Draft was published *draft-gandhi-spring-udp-pm-00*

- July 2018
  - Presented *draft-gandhi-spring-udp-pm-01* at IETF 102 Montreal in SPRING WG

- Nov 2018
  - Presented *draft-gandhi-spring-udp-pm-02* at IETF 103 Bangkok in SPRING and IPPM WGs

- Feb 14, 2019
  - Draft was renamed to *draft-gandhi-spring-rfc6374-srpm-udp-00*

- Mar 2019
  - Presented *draft-gandhi-spring-rfc6374-srpm-udp-00* at IETF 104 Prague in SPRING WG

Updates Since IETF-104 (Revision-00)

Updates:

- ✓ Add loopback measurement mode
- ✓ Elaborate on message processing rules (e.g. TTL value, UDP Checksum and Router Alert)
- ✓ Add example provisioning model
- ✓ Add details for P2MP SR Policy
- ✓ Move SR-MPLS Return Path TLV and Block Number TLV to SR-MPLS draft
  - ✓ They are not related to UDP path extensions
- ✓ Various editorial changes to address review comments

Open Items:

- ▪ None

Next Steps

- Welcome your comments and suggestions
- Like to request for WG adoption

Thank you

Backup

Probe Query Messages

- IP/UDP path is defined for PM probe query messages for delay and loss measurements for SR links and end-to-end P2P and P2MP SR Paths.

- For **end-to-end** performance measurement, the probe query messages are sent with MPLS label stack SR-MPLS Policies and SRH with SID list for SRv6 Policies.

- Payload contains [RFC6374] defined message for DM or LM.

- User-configured UDP port TBA1 is used for identifying DM probe packets.

- User-configured UDP port IANA-TBD2 is used for identifying LM probe packets.

```
+---------------------------------------------------------------+
| IP Header                                                     |
.  Source IP Address = Sender IPv4 or IPv6 Address             .
.  Destination IP Address = Responder IPv4 or IPv6 Address     .
.  Protocol = UDP                                              .
.                                                              .
+---------------------------------------------------------------+
| UDP Header                                                    |
.  Source Port = As chosen by Sender                          .
.  Destination Port = User-configured Port                    .
.                                                              .
+---------------------------------------------------------------+
| Payload = Message as specified in RFC 6374 for DM and LM.    |
.                                                              .
+---------------------------------------------------------------+
```

Probe Response Messages

- Probe response messages can be sent in-band (two-way measurement) or out-of-band (one-way measurement) for SR links and SR Policies.

- Use the information from the UDP Return Object (URO) TLV [RFC7876] from the received Probe query message payload, otherwise use the IP/UDP information (Source IP Address and Source UDP port) from the received Probe query message header.

```
+---------------------------------------------------------------+      +---------------------------------------------------------------+
| IP Header                                                     |      | IP Header                                                     |
.    Source IP Address = Responder IPv4 or IPv6 Address         .      .    Source IP Address = Responder IPv4 or IPv6 Address         .
.    Destination IP Address = URO.Address                       .      .    Destination IP Address = Source IP Address from Query      .
.    Protocol = UDP                                             .      .    Protocol = UDP                                             .
.    Router Alert Option Not Set                                .      .    Router Alert Option Not Set                                .
+---------------------------------------------------------------+      +---------------------------------------------------------------+
| UDP Header                                                    |      | UDP Header                                                    |
.    Source Port = As chosen by Responder                       .      .    Source Port = As chosen by Responder                       .
.    Destination Port = URO.UDP-Destination-Port                .      .    Destination Port = Source Port from Query                  .
.                                                               .      .                                                               .
+---------------------------------------------------------------+      +---------------------------------------------------------------+
| Message as specified in RFC 6374 Section 3.2 for DM, or       |      | Message as specified in RFC 6374 Section 3.2 for DM, or       |
. Message as specified in RFC 6374 Section 3.1 for LM           .      . Message as specified in RFC 6374 Section 3.1 for LM           .
.                                                               .      .                                                               .
+---------------------------------------------------------------+      +---------------------------------------------------------------+
```

Authenticated Mode

- Define Sequence Number TLV for Probe Query and Response messages.

- Useful when some probe query messages are lost, or they arrive out of order.

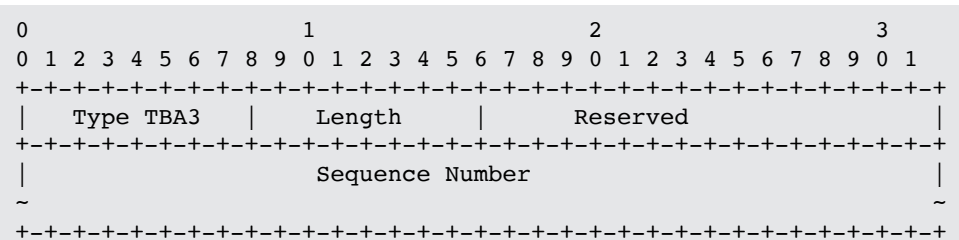- Used for authentication of probe messages.

```
0                   1                   2                   3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|   Type TBA3   |     Length    |           Reserved            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                        Sequence Number                        |
~                                                               ~
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

     Figure 10: Sequence Number TLV – Unauthenticated Mode
```

```
0                   1                   2                   3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|   Type TBA4   |     Length    |           Reserved            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                        Sequence Number                        |
~                                                               ~
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
~                          Comp.MBZ                             ~
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                       HMAC (16 octets)                        |
|                                                               |
|                                                               |
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

      Figure 11: Sequence Number TLV – Authenticated Mode
```
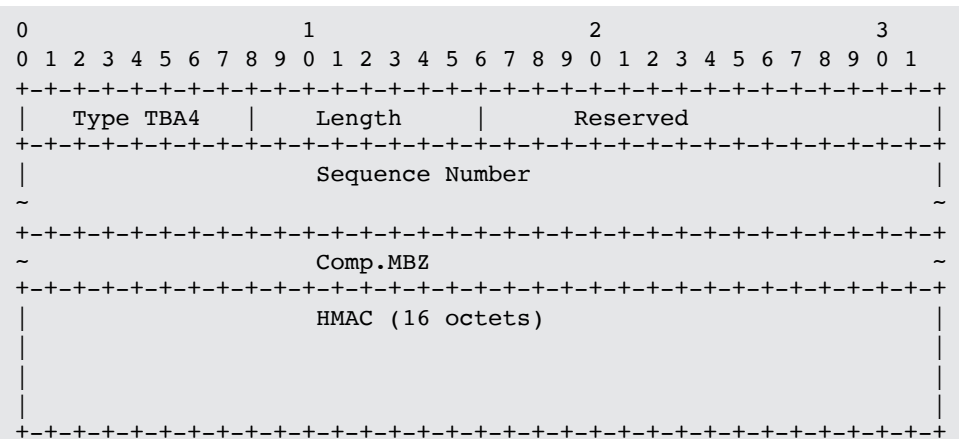
ECMP Support for SR Path

- SR Path can have ECMP between the ingress and transit nodes, between transit nodes and between transit and egress nodes.
- Sending PM probe queries that can take advantage of the hashing function in forwarding plane.
- Existing forwarding mechanisms are applicable to PM probe messages:
    - For IPv4
        - Destination addresses in IPv4 header (e.g. 127/8)
    - For IPv6
        - Destination addresses in IPv6 header (e.g. FFFF:7F00/104)
        - Flow label in IPv6 header

Thank you

108th IETF @ Madrid