MPLS-based Service Function Path (SFP) Consistency Verification

draft-lm-mpls-sfc-path-verification-01

Yao Liu (ZTE)
Greg Mirsky(ZTE)

MPLS WG      IETF#109      Nov, 2020
Background and Motivation

• **MPLS-based Service Function Path (SFP)**
  - SR-MPLS Service Programming (SFC-SR) : each SF is associated with an MPLS label, an SFP can be encoded as a stack of MPLS labels and pushed on top of the packet. [draft-ietf-spring-sr-service-programming]
  - MPLS-based Network Service Header (SFC-MPLS) : a basic unit of representation is used, which comprises two MPLS labels, one carries a label to provide a context within the SFC scope, and the other carries a label to show which SF is to be enacted. [RFC8595]

• This document defines extensions of the MPLS LSP ping to support verification between the control/management plane and the data plane state for SFC-SR and SFC-MPLS
Updates from Interim Meeting

• IANA Considerations section has been added for newly defined (sub-)TLVs.

• Acronyms section and Security Consideration section have been added.

• Introduce the use of Special-purpose label (SPL) in the active OAM mechanism for SFC-MPLS
New TLVs

SFC Validation TLV

An MPLS SFC validation request/reply is an MPLS echo request/reply that includes an SFC validation TLV.

SFC Information Sub-TLV: ONLY included in the reply message.

SFC Info Sub-TLV for SFC-SR

SFC Info Sub-TLV for SFC-MPLS
New TLVs

SFC Basic Unit FEC Sub-TLV

```
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Route Distinguisher (RD) |
| (8 octets) | 
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| SF Type | Reserved |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

a Sub-TLV for TLV Types 1(FEC TLV), 16, and 21
defined only for SFC-MPLS

Route Distinguisher (RD): defined in SFIR Route Type specific NLRI [draft-ietf-bess-nsh-bgp-control-plane].

SF Type: It is defined in [draft-ietf-bess-nsh-bgp-control-plane] and indicates the type of SF, such as DPI, firewall, etc.
Special-purpose Label (SPL) in SFC-MPLS

• An SFF needs to identify an OAM packet with the SFP scope because an SF may not be capable of processing the SFP OAM payload.

• Using an SPL in the basic unit allows for a closer functional match between NSH and SFC-MPLS.

• An SPL unit MAY be present in one or more basic units.
G-ACh over SFC-MPLS

G-ACh: Generic Associated Channel, over which OAM and other control messages can be exchanged [RFC5586].

GAL: G-ACh Label. If the GAL immediately follows the SFC Context label, then the packet is recognized as an SFP OAM packet.

Processing Rules:

- An SFF MUST NOT pass the OAM packet to a local SFI or SFC proxy.
- The SFF MUST decrement SF Label entry's TTL value. If the resulting value equals zero, the SFF MUST pass the SFP OAM packet to the control plane for processing.
- If the TTL value is not zero, the SFP OAM packet is processed as defined in [RFC8595], according to the type of MPLS forwarding used in the SFP.
GAL in SFC-MPLS Packet

GAL in Label Swapping Mode

GAL in Label Stacking Mode or Mix Mode
Theory of Operation for SFC-MPLS

1. **SFC Context Label**
   - No: Special Purpose Label
   - Yes: SPL Processing

   SPL Processing
   - No: Decrement TTL in SI Label
   - Yes: Pass packet to an SF instance

   Decrement TTL in SI Label
   - No: Lookup by SF Label
   - Yes: Special Purpose Label

   Lookup by SF Label
   - No: Send to the next SFF
   - Yes: Send to the local control plane

   Send to the next SFF
   - No: TTL == 0
   - Yes: SFC Validation TLV

   SFC Validation TLV

   The SFF generates a reply message, with the SFC info sub-TLV included.

   The SFF check if it is its RD and whether it advertised that Service Function Type.

   FEC TLV (Basic Unit FEC Sub-TLV)

   update RFC 8595
Next Steps

• Your feedback and comments are welcome and much appreciated
Thank You !