BGP Flow Specification for DetNet Flow Mapping

draft-xiong-idr-detnet-cflow-mapping-01

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The Data Plane with TSN and DetNet

- As defined in [RFC8655], the DetNet may provide the deterministic service for the TSN end system and the DetNet IP and MPLS flows may be carried over TSN sub-networks.

  - RFC 8938 (was draft-ietf-detnet-data-plane-framework)

  - RFC 9023 (was draft-ietf-detnet-ip-over-tsn)

  - RFC 9037 (was draft-ietf-detnet-mpls-over-tsn)

  - RFC 9024 (was draft-ietf-detnet-tsn-vpn-over-mpls)
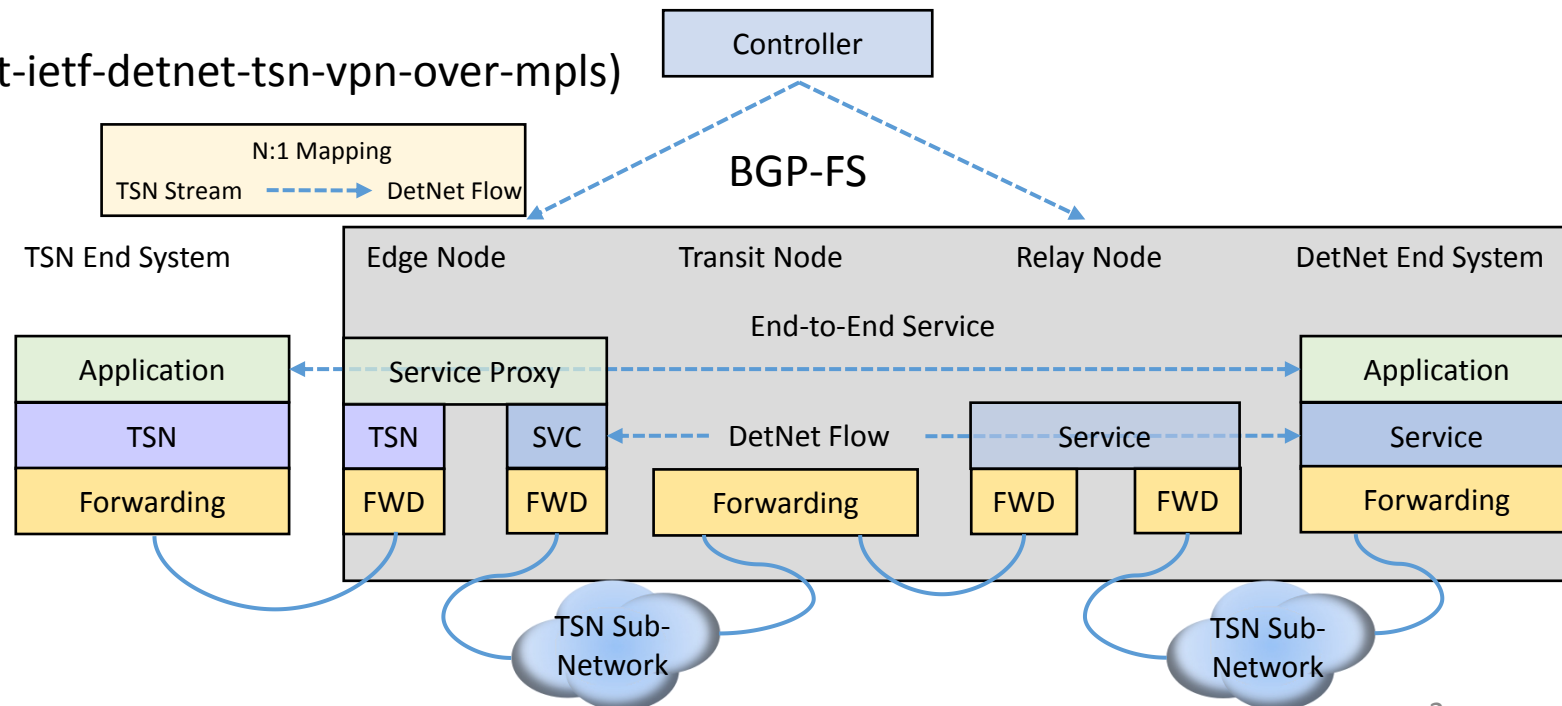
The Requirements for Flow Mapping

- As discussed in RFC8938, RFC9023, RFC9024, RFC9037, the primary requirements of the DetNet Controller Plane for the flow mapping is as follows.

  - The mapping between TSN Streams and DetNet flows is required for the service proxy function at DetNet Edge nodes and the mapping table can be configured and maintained in the control plane.

  - DetNet flow Mapping to TSN Streams : Mapping of a DetNet flow to a TSN Stream is provided via the combination of a passive and an active Stream identification function that operate at the frame level.

  - TSN Streams Mapping to DetNet flow : Implementations SHALL use management and control information to map a TSN Stream to a DetNet flow and N:1 mapping (aggregating multiple TSN Streams in a single DetNet flow) SHALL be supported.

- As described in [RFC8938], the DetNet data plane allows for the aggregation of DetNet flows.

  - IP, MPLS and TSN aggregation has both data plane and controller Plane aspects.

  - As defined in [RFC9023] and [RFC9037], 1:1 and N:1 mapping (aggregating multiple TSN Streams in a single DetNet flow) MUST be supported.

- As defined in [RFC8955], the nodes that applied a Flow Specification can fillter the received pakects according to the matching criteria and can forward the flows based on the associated actions.

- This document proposes extensions to BGP Flow Specification for the mapping of DetNet flows and TSN streams by using the traffic filtering rules to identify the packet and using the associated action to map the packet to the related service.

BGP-FS Extensions for TSN Stream Mapping to DetNet Flow

- Filtering Rules for TSN Streams

    - As IEEE Std 802.1Q defined, a Stream ID is a 64-bit field that uniquely identifies a stream and the Stream identification functions are defined in IEEE 802.1CB and IEEE P802.1CBdb.

    - The Ethernet Layer 2 traffic filtering rules defined in draft-ietf-idr-flowspec-l2vpn can be used in TSN Stream identification.

    - This document proposes a new type in L2 components flowspec Type for TSN traffic filtering in Mask-and-Match Stream identification.

- Traffic Action for TSN Streams

    - The action is to accept the TSN streams that matches that particular rule and map the streams to the DetNet flows.

    - The action for L3 traffic with extended communities types per RFC8955, RFC8956 and draft-ietf-idr-bgp-flowspec-label can be used to the DetNet IP/MPLS flows.

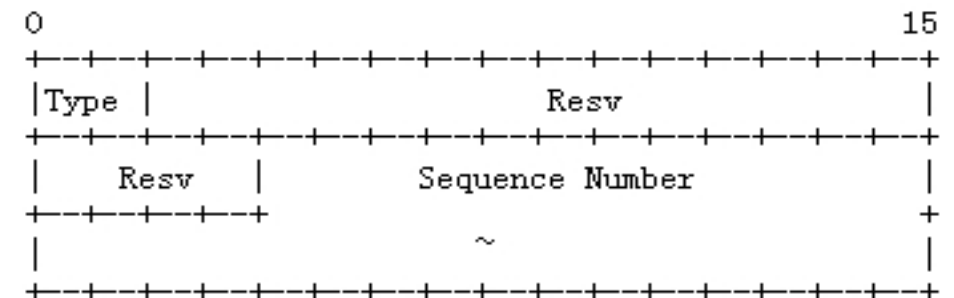   - This document proposes the Sequence-action extended community.

```
Type TBD1 - Mac Service Data Unit

Encoding: <type (1 octet), length (1 octet), [op, value]+>

Defines a list of {operation, value} pairs used to match 6-octet Mac
Service Data Unit field.  Values are encoded as 6-octet quantities.
op is encoded as specified in Section 4.2.1.1 of [RFC8955].
```

```
 0                                             15
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
 |Type |              Resv                 |
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
 |   Resv   |      Sequence Number       |
 +-+-+-+-+-+                                 +
 |                    ~                     |
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Figure 2: Sequence-action

BGP-FS Extensions for DetNet Flow Mapping to TSN Stream

- Filtering Rules for DetNet Flows

  - The L3 traffic filtering rules defined in [RFC8955] and [RFC8956] can be used for DetNet IP flow.

  - The S-label in DetNet MPLS flow can use the filtering rules defined in draft-ietf-idr-flowspec-mpls-match.

  - This document proposes a d-CW type in L3 components flowspec Type for DetNet MPLS flows.

- Traffic Action for DetNet Flows

  - The extended action for an DetNet traffic filtering flowspec is to accept the DetNet flows that matches that particular rule and map the flows to the TSN streams.

  - This document proposes the TSN-action extended community.

  - The TSN-profile can be converted to the stream related parameters and requirements including TSN Stream ID, stream_handle, sequence_number and traffic_scheduling information.

```
Type TBD3 - d-CW

Encoding: <type (1 octet), length (1 octet), [op, value]+>

Defines a list of {operation, value} pairs used to match Sequence.
Values are encoded as 4-octet quantities, where the four most
significant bits are set to zero and ignored for matching and the 28
least significant bits contain the sequence value. op is encoded as
specified in Section 4.2.1.1 of [RFC8955].
```
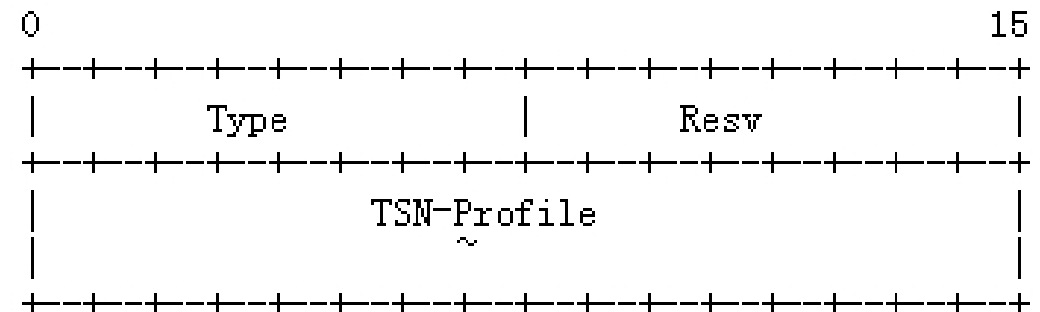
```
0                                                             15
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|              Type              |              Resv           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                          TSN-Profile                        |
|                              ~                              |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Figure 3: TSN-action

Next Step

- Present and discuss in IDR WG.

- Comments and discussions are very welcome!

Thank you!