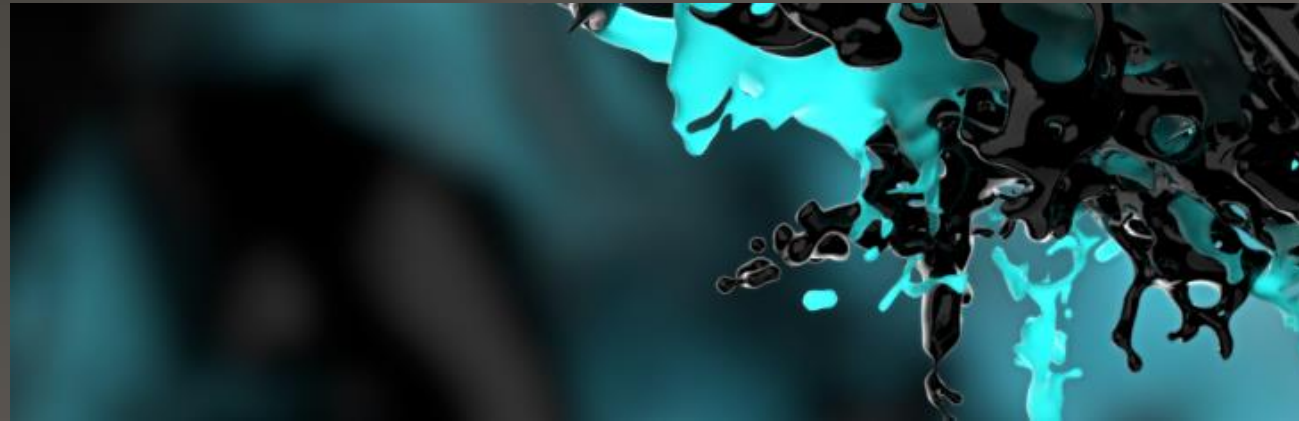# PCEP for SRv6

draft-negi-pce-segment-routing-ipv6-03

draft-dhody-pce-pcep-srv6-yang-00
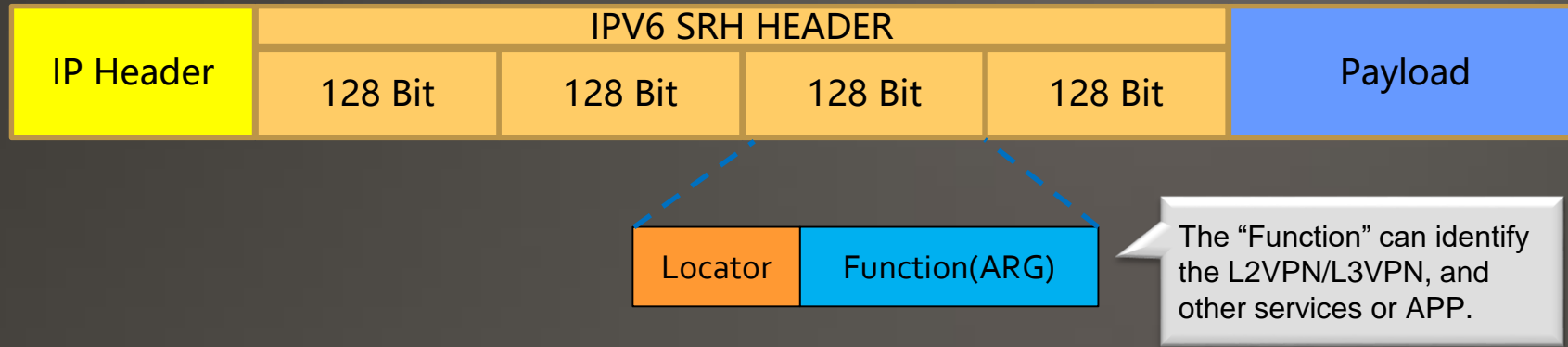
Mahendra Singh Negi	Dhruv Dhody	Siva Sivabalan	Prejeeth Kaladharan
Huawei		Cisco	RtBrick

Introduction & Motivation

- Segment Routing (SR) can be used to steer packets through an IPv6 or MPLS network using the source routing paradigm.
- Since SR can be applied to both MPLS and IPv6 data plane
  - A PCE be able to compute SR-Path for both MPLS and IPv6 forwarding plane
    - Segment identified by an IPv6 address
    - SID list as a list of IPv6 address (encoded in the SRH)
- PCEP Extension to support SRv6
  - Extended SR-ERO, SR-RRO sub-objects for SRv6
  - Capability advertisement for SRv6 in PCEP
  - A new path setup type for SRv6

SRH & SRv6 SID

IP Header	IPV6 SRH HEADER				Payload
	128 Bit	128 Bit	128 Bit	128 Bit	

Locator	Function(ARG)

The "Function" can identify the L2VPN/L3VPN, and other services or APP.

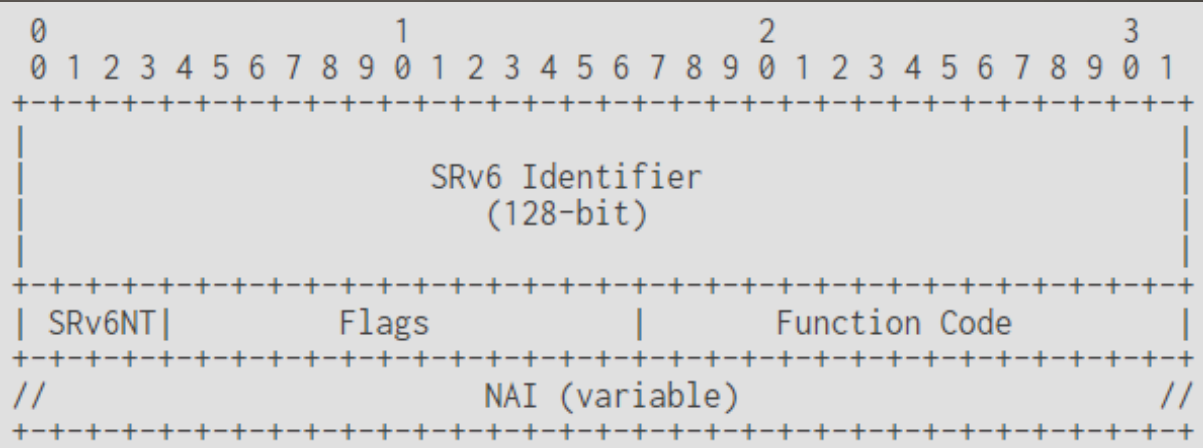| Version	Traffic Class	Flow Label	
Pload Length		Next=43	Hop Linmit
Source Address			
Destination Address			
Next Header	Hdr Ext Len	Routing Type	Segments Left
Last Entry	Flags	Tag	
Segment List[0]			
Segment List[1]			
Segment List[2]			
Paylod			

Update

- Update the SRv6 Capability handling
  - As per the PST and PCEP-SR
  - SRv6-PCE-CAPABILITY sub-TLV is defined
- Alignment with PCEP-SR
  - Use of NAI-Type (NT) instead of SID-Type (ST)
  - Error Handling
  - SR-ERO interpretation
  - SRv6NT = Node ~ LOC

```
 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=TBD1           |           Length=4           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|    max-SL   |    Reserved     |            Flags           |L|
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```
SRv6-PCE-CAPABILITY sub-TLV

```
 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
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|L|   Type    |     Length    |  NT   |     Flags     |F|S|C|M|
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                       SID (not included)                     |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
//                       SRv6I (variable)                     //
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```
SR-ERO Sub-object
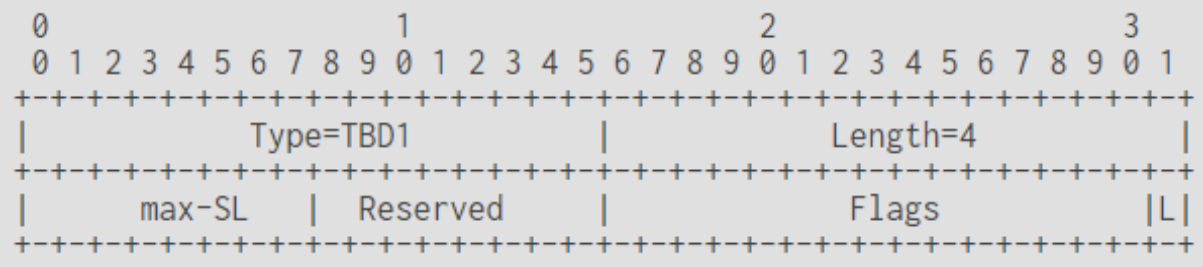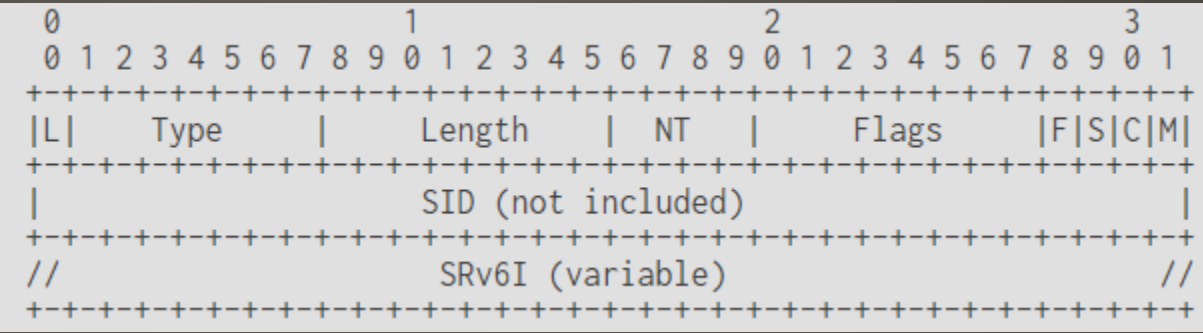
```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                              |
|                                                              |
|                      SRv6 Identifier                         |
|                        (128-bit)                             |
|                                                              |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| SRv6NT|        Flags          |        Function Code          |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
//                       NAI (variable)                        //
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```
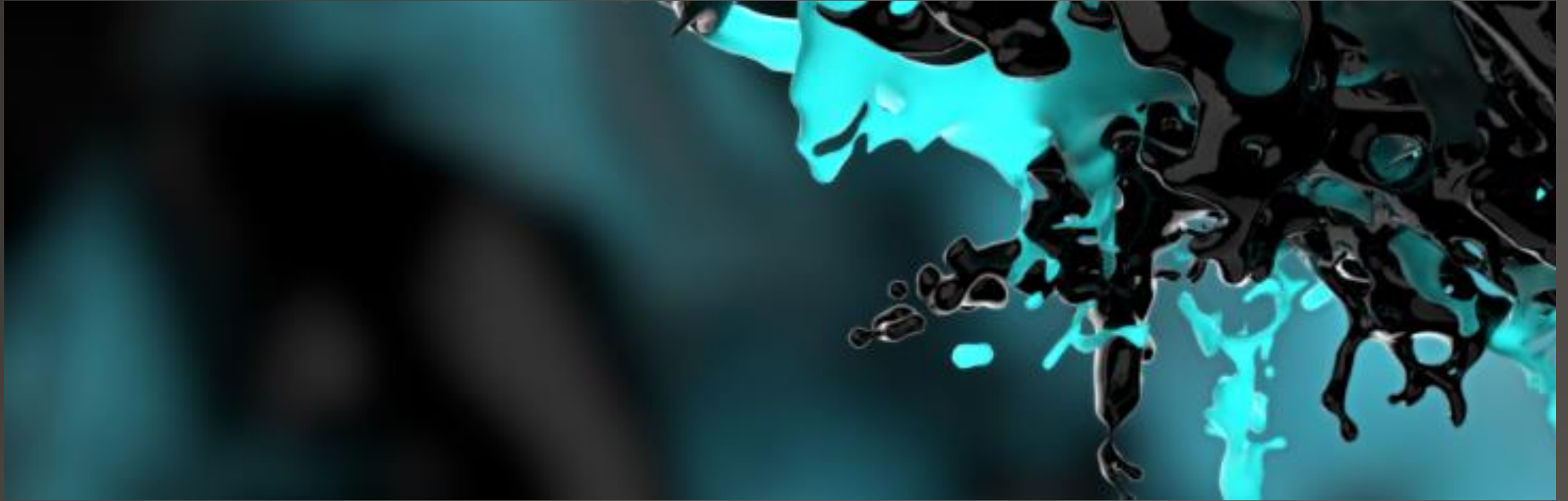SRv6I

SRv6 Yang

- Capability for SRv6
  - Max-SL

- A feature for SRv6

- A new PST for SRv6

- A SRv6 Path
  - List of SRv6 SID (IPv6 address)

```
module: ietf-pcep-srv6
  augment /p:pcep/p:entity/p:capability:
    +--rw srv6 {srv6}?
        +--rw enabled?      boolean
        +--rw max-sl?       uint8
        +--rw sl-limit?     boolean
  augment /p:pcep/p:entity/p:peers/p:peer/p:capability:
    +--rw srv6 {srv6}?
        +--rw enabled?      boolean
        +--rw max-sl?       uint8
        +--rw sl-limit?     boolean
  augment /p:pcep/p:entity/p:lsp-db/p:lsp:
    +--ro srv6 {srv6}?
        +--ro segment-list
            +--ro segment* [index]
                +--ro index          uint32
                +--ro sid-value?    st:srv6-sid
  groupings:
  segment-list
      +---- segment-list
          +---- segment* [index]
              +---- index?          uint32
              +---- sid-value?     st:srv6-sid

  segment-properties
      +---- index?          uint32
      +---- sid-value?     st:srv6-sid

  srv6
      +---- srv6 {srv6}?
          +---- enabled?      boolean
          +---- max-sl?       uint8
          +---- sl-limit?     boolean
```

Questions & Next Steps

- Support for SRv6 in PCEP is a reasonable requirement!

- Is this the right approach?
- Is this a good base for the WG to consider adoption?
  - draft-negi-pce-segment-routing-ipv6-03

- Refine the document!

Thank You!