4map6 Segments for IPv4 Service delivery over IPv6-only underlay networks

<draft-dong-spring-sr-4map6-segment>

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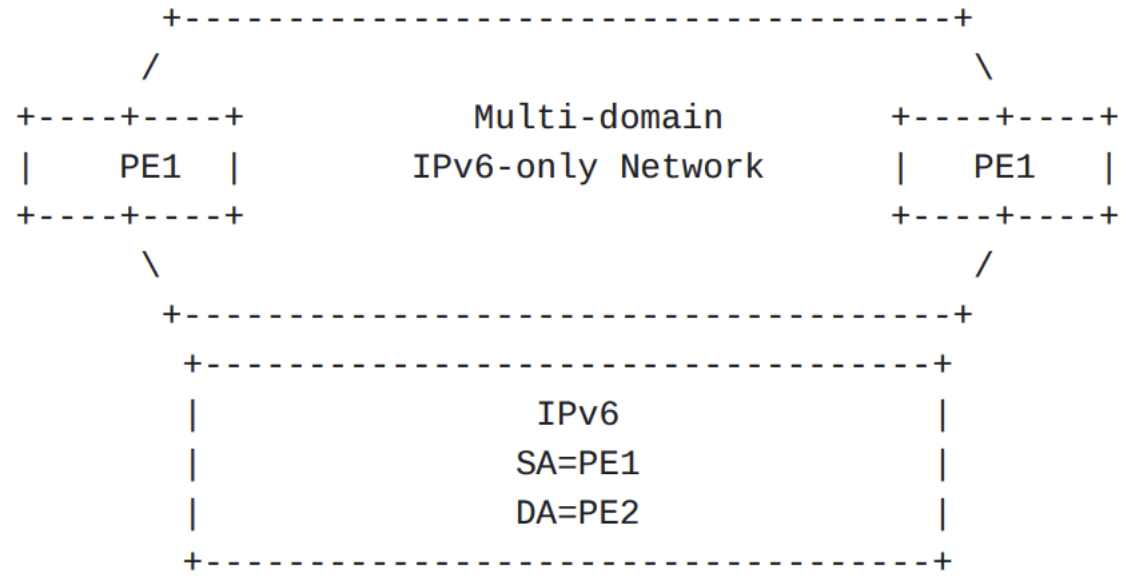
Overview

- [I-D./draft-ietf-v6ops-framework-md-ipv6only-underlay] proposes a framework for deploying IPv6-only as the underlay in multi-domain networks. In this framework, each PE will be identified by at least one IPv6 mapping prefix, it will also have one or more associated IPv4 address blocks which are extracted from local IPv4 routing table or address pool.
- Therefore, 4map6 segments, is defined for
  Segment Routing. They run in PE nodes an
  provide support for implementing IPv4/IPv
  conversion function based on mapping rul

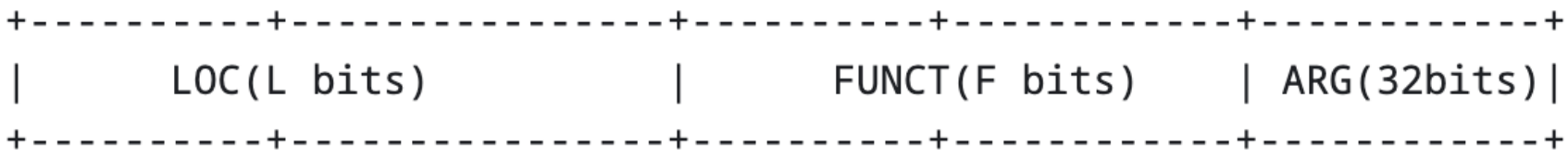


Updates compared to -v00

- ✓ Renamed‘M46S SID and M46D SID’by‘4map6 Segments’.
- ✓ Refined the architecture and relevant fields of the 4map6 SID.
- ✓ Added relevant SRv6 service TLV extension.
- ✓ Refined details behavior of 4map6 segment on ingress PE and egress PE.
- ✓ Refined the IANA Consideration.
- ✓ Modified some typos.

Main update 1

The the SID consists of LOC:FUNCT:ARG, where the address (LOC) is encoded in the L most significant bits of the SID, followed by F bits of the function (FUNCT), and A bits of the argument (ARG).

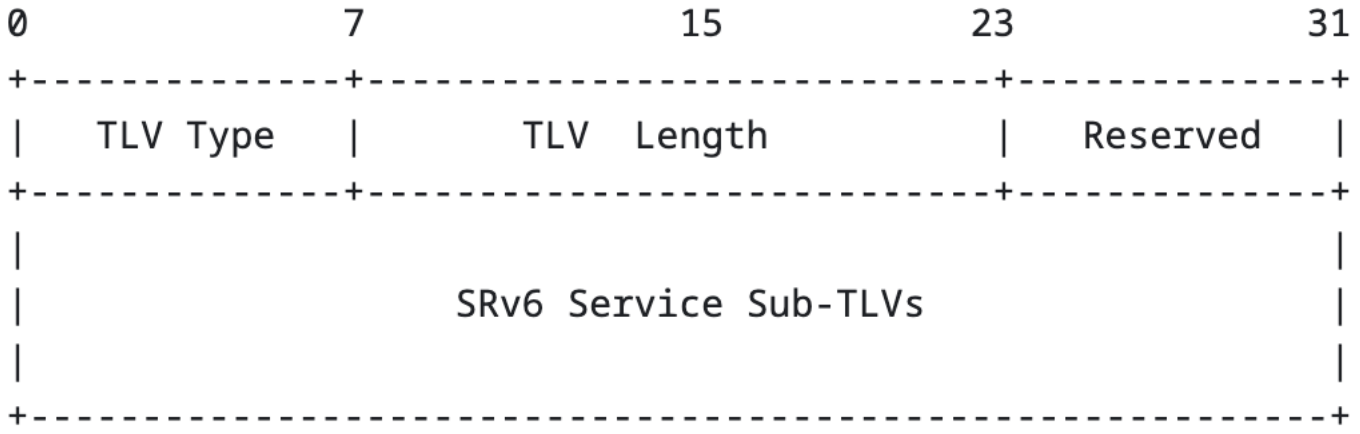


SID architecture

- The LOC field has the positioning function, which is unique in the SR domain. It is used to identify the node that instantiates the 4map6 SID.
- The FUNCT field identifies the behavior bound to the 4map6 SID.
- The ARG field contains the behavioral identity of whether stateless encapsulation or translation is performed at that point and the IPv4 address associated with the PE node. The value of L+F should be less than or equal to 96 since 32 bits are required for IPv4 address.

Main update 2

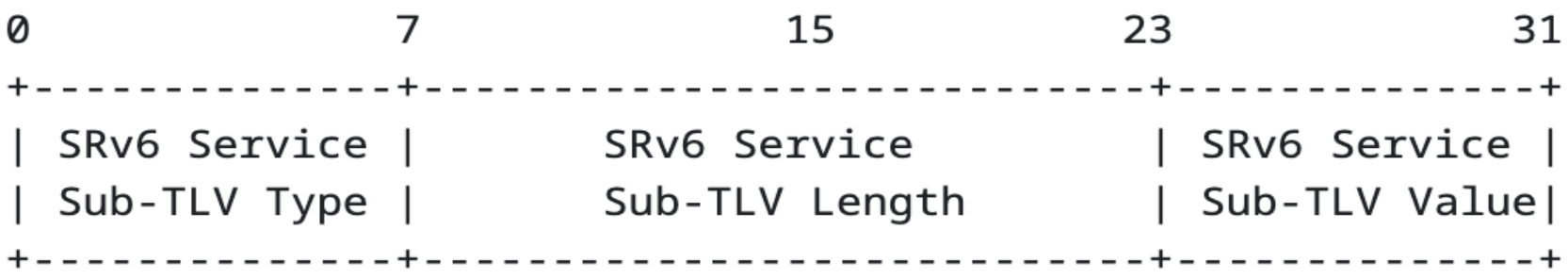
In Section 3 defines a new BGP prefixed SID attribute extension TLV in the SRv6 Service TLVs to implement SID signaling for the 4map6 service of the SRv6 service



SRv6 Service TLV

- TLV Type (8 bits):
  - Used to identify different TLVS, SRv6 4map6 Service TLV is **8**.
- TLV Length (16 bits):
  - Total length of the TLV.
- RESERVED (8 bits)
- SRv6 Service Sub-TLVs (variable):

Main update 3



SRv6 Service Sub-TLV

- SRv6 Service Sub-TLV Type (8 bits):
  - This field identifies the type of SRv6 service information, which takes the value 1, indicates the SRv6 SID Information Sub-TLV.
- SRv6 Service Sub-TLV Length (16 bits):
  - The sub-TLV length.
- SRv6 Service Sub-TLV Value (variable):
  - The SRv6 SID information of 4map6 Service is filled in the SRv6 Service Sub-TLV Value field.

Main update 4

In Section 4，4map6 SID nodes operate in pairs. For a particular data stream, one node is the ingress PE, denoted by PE1, and the other is the egress PE, denoted by PE2. Each PE maintains a Mapping rule Database (MD).

```
+------------------+------------------+------------------------------+
|IPv4 Address Prefix|IPv6 Mapping Prefix|Encapsulation or Translation E/T|
+------------------+------------------+------------------------------+
```

- The table entries in the MD database consist of IPv4 address prefixes, IPv6 mapping prefixes, and the **encapsulation or translation** processing E/T way of IPv4 packets.
- Before transmitting an IPv4 packet from PE1 to PE2, the address mapping rule corresponding to its IPv4 destination address needs to be transferred from PE2 to PE1.
- PE2, which supports 4map6 service based on SRv6, publishes the 4map6 SID corresponding to the IPv4 destination address in the BGP Prefix-SID attribute.
- PE2 announces its capabilities to other nodes in the format of the 4map6 SID of the SRv6 domain in the control plane.

Main update 5

We updated the content of IANA Consideration.

Value	Hex	Endpoint behavior	Reference
TBD		End.4map6	[This.ID]

End.4map6 Endpoint Behavior

Next Steps

- Collect feedback from SPRING WG
  - Some discussion now on mailing list
  - We encourage more discussion

- Prepare new version for IETF 121