Generalized Arguments of SRv6 Segment

draft-lm-spring-srv6-generalized-arguments-00

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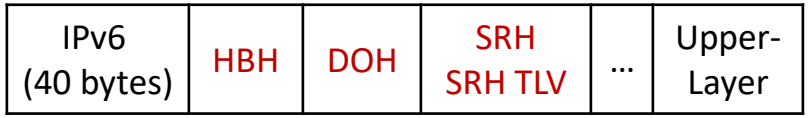
Background

In these years, some new features are created:

- *Network slicing, IOAM, Alternate Marking, APN6, DetNet, etc.*

The instructions/commands of these new features can be processed at:



1. All nodes along an SR path: using the IPv6 Hop-by-Hop Options header (HBH).
2. Endpoints of an SR path: using the IPv6 Destination Options Header (DOH) or the SRH TLV.

The usage of the Options or TLVs will cause two issues:

1. Lengthening the packet header, and reducing transmission efficiency.
2. Making the forwarding processing complex, affecting forwarding performance.

Besides, another issue:

In the SRv6 C-SID compression (NEXT Flavor) solution, if all the C-SIDs of the SID list can be put in the IPv6 DA of a packet,

→ there is no SRH or DOH-before-SRH anymore after the compression ➔ No space for the instructions using DOH / SRH TLV

Idea

In order to address these challenges, use the Arguments of the SRv6 SID to carry those instructions.

Benefits:

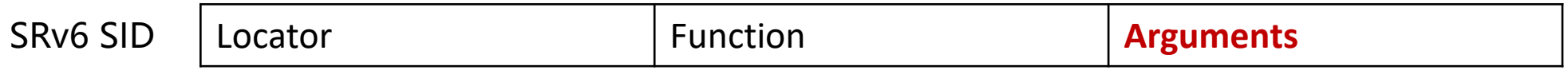
1. Reducing the needed space of the IPv6 extension header or SRH TLV ➔ Reduce the transmission overhead.
2. The SRv6 Arguments can be read and processed as a part of the IPv6 address
   → Avoid processing the extension header or SRv6 TLV behind the basic IPv6 header ➔ Better forwarding performance.
3. The instructions for the SRv6 and the new features are all put in the Arguments part of the SRv6 SID or IPv6 address
   ➔ Unify and simplify the packet processing.

In addition, there are several kinds of Arguments for the SRv6 End SID and End.X SID, which need to be compatible:

1. SRv6 C-SID compression (NEXT Flavor): using Arguments to carry multiple C-SIDs.
2. SRv6 C-SID compression (REPLACE Flavor): using Arguments to carry the CL field.
3. SRv6 C-SID compression (NEXT & REPLACE Flavor): using Arguments to carry multiple C-SIDs and the CL field.

What is Generalized Arguments?

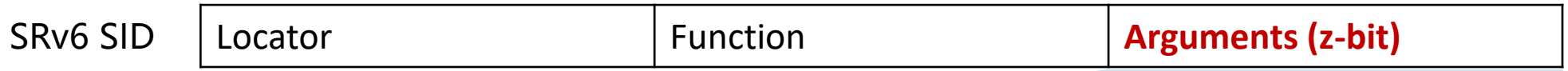
- makes the SRv6 Arguments structured and generalized
- allocates spaces for the instructions of multiple new features and SRv6 SID

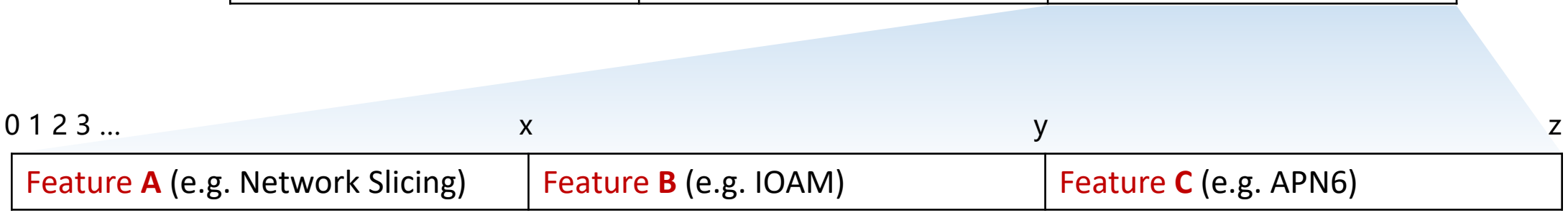


Method A: **Template**

- Network devices have configured a template, then devices read and process the content of the Arguments according to it.

Example:

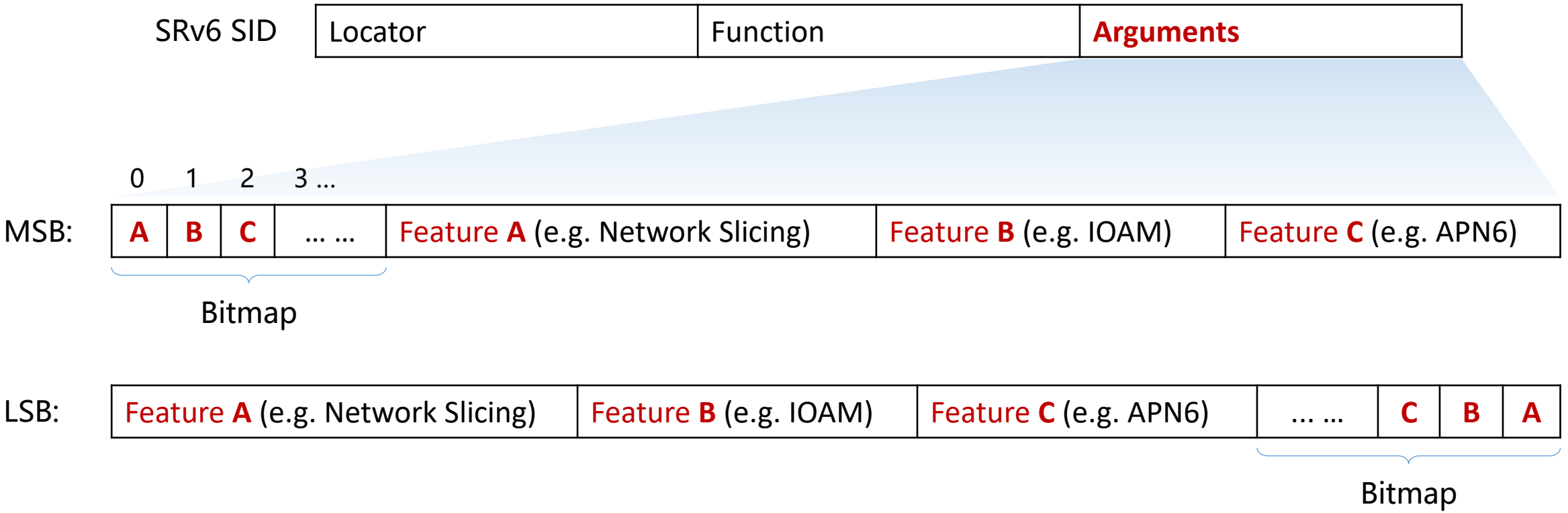




What is Generalized Arguments?

Method B: **Bitmap**

- Define a bitmap in the Arguments, used as an indicator.
- Each bit in the bitmap indicates whether the instructions of a specific feature exist and are valid.



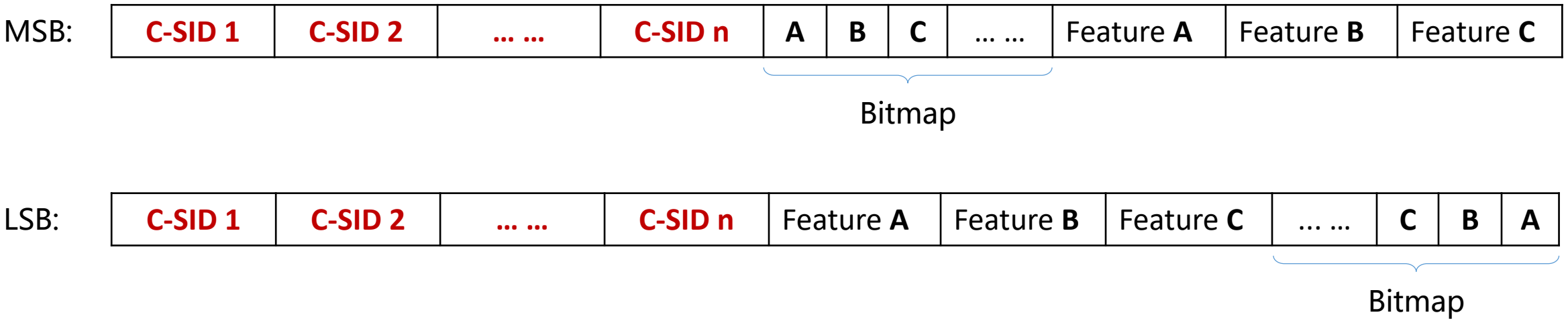
Consideration of SRv6 C-SID Compression scenario

Background:

- For NEXT or NEXT-and-REPLACE flavor, it is required to shift the C-SID in the SRv6 SID.

Generalized Arguments:

- C-SIDs are always placed from the most significant bit (MSB).
- The remaining part of the Generalized Arguments following the C-SIDs should not be shifted.



Next step

To be defined:

- Which bit in the bitmap corresponds to which feature
- How long is the space of Generalized Arguments allocated for a specific feature
- What instructions/fields of the specific feature need to be carried in the Generalized Arguments