IPv6 Encapsulation for IOAM - Enhancement of IPv6 Extension Headers

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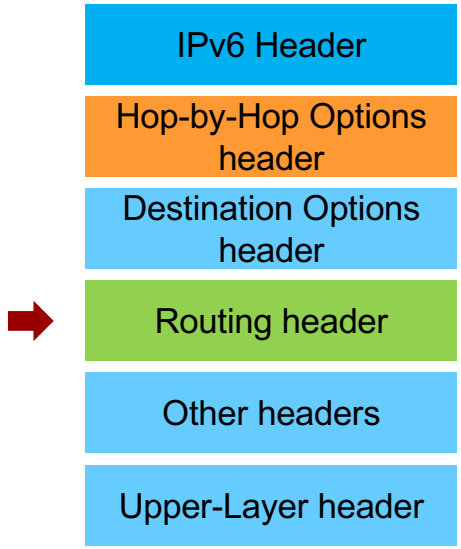
Optimization of IPv6 Encapsulation for IOAM: Instruction and Recording are separated

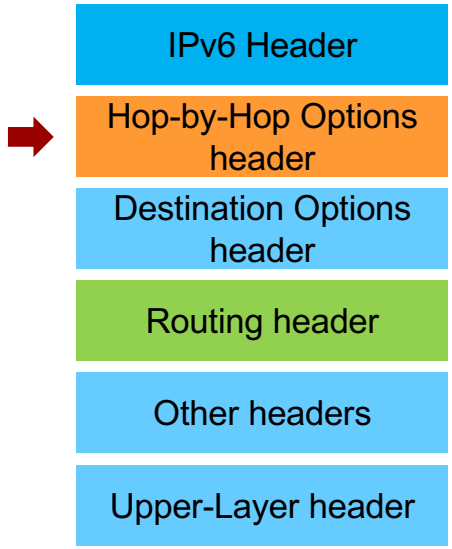
- **The instruction part (uniform IPv6 service option)**
  - Placed in the IPv6 extension headers, i.e. HBH and SRH
    - either in the HBH indicating the path service processed by all IPv6 enabled nodes along the path
    - or in the SRH TLVs indicating the path service processed only by the SRv6 nodes along the SRv6 path
  - fixed as much as possible to facilitate hardware processing to keep forwarding performance
- **The recording part (unified container)**
  - to record the service metadata of IOAM and other possible path services
  - enables to stop recording when too much data carried to reach the hardware limitation



IPv6 Header [RFC8200]

Issues with Hop-by-Hop Options Header

- More and more services require to process the information carried in the packets or write metadata into the packets in a hop-by-hop behavior but at wire speed
  - IOAM
- Currently, due to lack of service requirements as well as limited hardware processing capabilities, the HBH Options are usually dispatched to CPU or ignored
  - Reduce the forwarding performance greatly
  - Damage the end-to-end service consistency due to the different handling of various vendors
- No desired processing procedures defined in the existing specs
  - Such as [RFC8200] and [RFC6564] only define
- Can we solve it only by configuration?
  - All the options will be treated in the same way
  - Each option will be examined one by one



IPv6 Header [RFC8200]

Proposals on Extension Headers

- Enhanced Hop-by-Hop Options Header
  - All the options that need to be treated at wire speed will be put in the new HBH Options Header, with a different next header value to indicate
  - New specifications on the missing procedures are required to be defined for serving the new services well, i.e. IOAM
- IPv6 Metadata Header
  - A unified metadata header, IPv6 Metadata Header (MH), is defined as a container to record the metadata of SFC, IOAM and other newly emerging path services in IPv6.
    - Locations for the IPv6 Metadata Header
    - Interactions between the IPv6 MH and AH, ESP, FH