

Problem Statement with Aggregate Header Limit

draft-liu-spring-aggregate-header-limit-problem

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Background

Aggregate Header Limit (AHL)

- [RFC8883] the total header size that a router is able to process due to its processing limit
- related with the device's buffer size (for devices designed with parsing buffer)
- packet may be dropped or sent to slow path if the limit is exceeded

Total packet header chain size is increasing greatly in IPv6/SRv6

- IOAM: IOAM data fields in HBH/DOH
- Alternate-Marking: AltMark Option in HBH/DOH
- network slicing: NRP Option in HBH
- SR service programming: Metadata in SRH TLV
- BSID: a new SID list to the original packet
- other potential extension requirements, e.g, detnet



SID List
SRH TLV
HBH TLV
DOH TLV

SR Nodes

SR source nodes

- encapsulate the packet with SRH and other possible extension headers
- normally don't process the EHs

Transit Nodes

- forward packets destined to a remote segment
- don't process SRH and DoH, MAY process HbH

Intermediate SR nodes

- process a local segment in the DA
- process SRH(and possible SRH TLV), DoH ahead of SRH; MAY process HBH

IPv6 header

HbH

DoH

SRH

{segment list[0]...segment[n];

SRH TLV}

For an intermediate which is expected to process the SRH TLV, it should read all of these into its buffer.

Potential Problems

- **Combination** of different functions would make **total header size** even **bigger**
- The operator's network usually consists of different versions of devices from **multiple vendors**, which often have **different processing limits** and different **behaviors** after limit exceeding, difficult to manage
- **Path calculation** without the awareness of AHLs of the nodes and the prediction on which features would be enabled, may result in a path with **nodes with lower AHLs** than required
- **Packet encapsulation** triggered by function enablement, on the headend/intermediate node, packets may be encapsulated with **larger header size** than the downstream nodes able to process

Aggregate Header Limits of the nodes/path need to be aware of.

Usecases with AHL

Centralized Controller

➤ Input

- an SR path is required from S to D
- the AHLs of the nodes in the network
- per-hop IOAM and network slicing(using NRP-ID in HBH) would be enabled on this path

➤ Output

- an segment list between S to D, leaving out the space for HBH header with options for IOAM and NRP-ID

Headend/intermediate nodes

➤ Input

- function enablement on certain SR path requires increasing the size of packet header that needs to be processed
- the AHLs of the downstream endpoint nodes are not sufficient

➤ Output

- not to enable the function on the path and log an error

How to obtain AHL

Existing mechanism

- [RFC8883]: an ICMPv6 Destination Unreachable error with code for "Headers too long", when a node discards a packet due to aggregate header limit exceeding
- May not work well when
 - there're a large amount of paths: the burden of sending and receiving ICMP messages increases
 - the paths are dynamic: the segment lists may change over time, more difficult to get the AHL in advance

Possible options

- IGP signaling
 - AHLs of all the nodes in the domain can be obtained easily, regardless of the amount or type of the paths
- For the controller
 - via BGP-LS or other south-north mechanisms

Next Steps

➤ Welcome feedback and comments !

Thank You !