Hybrid Two-step telemetry collection method

draft-mirsky-ippm-hybrid-two-step

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Update

- Discussion on the IPPM WG mailing list
- Added HTS use cases in an IOAM and Alternate Marking domains
- Clarified the "late follow-up packet" scenario
- Welcome Haoyu Song as the co-author

Telemetry collection

Several methods to collect telemetry information have been defined:

- IOAM Trace Option
  - telemetry information collected in a data packet that triggers origination of the information
  - Pre-allocated or Incremental
- IOAM Direct Export / Postcard-based Telemetry (PBT-I)
  - telemetry information originated based on IOAM-Namespace and IOAM Trace Type information and collected by a node generating a special packet
- PBT-M
  - telemetry information originated using a marking method, e.g., Alternate Marking per RFC 8321. The information is collected by a node generating a special packet

Hybrid Two-step

Hybrid Two-step:

- Use a specially constructed message, follow-up message, to collect telemetry information along the way of the data flow packet that triggers information's origination.

- A trigger packet is network layer-specific, and the corresponding follow-up packet uses the same transport network encapsulation.

- The follow-up message originated by the ingress node

- The follow-up message is intended to cross the same set of nodes and links as its trigger-packet.

- The follow-up packet may share the same QoS treatment by the transport network, or its QoS may differ. The former case referred to as "in-band", and the latter – out-of-band HTS.

- The follow-up message is terminated by the egress node, thus not leaving the domain.

- Only one outstanding follow-up message may be "in-flight", i.e., one set of telemetry can be held for the next follow-up message.

The Follow-up packet format

```
 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
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                               |
~                     Transport Network                         ~
|                       Encapsulation                          |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|Ver|HTS ShimLen|    Flags      |         Sequence Number       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|              Telemetry Data Profile (Optional)                |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                               |
~                     Telemetry Data TLVs                       ~
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
               Follow-up Packet Format


 0
 0 1 2 3 4 5 6 7
+-+-+-+-+-+-+-+-+
|F|  Reserved   |
+-+-+-+-+-+-+-+-+
Flags Field Format
```

5
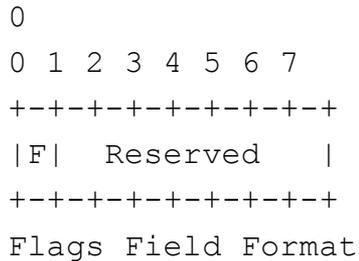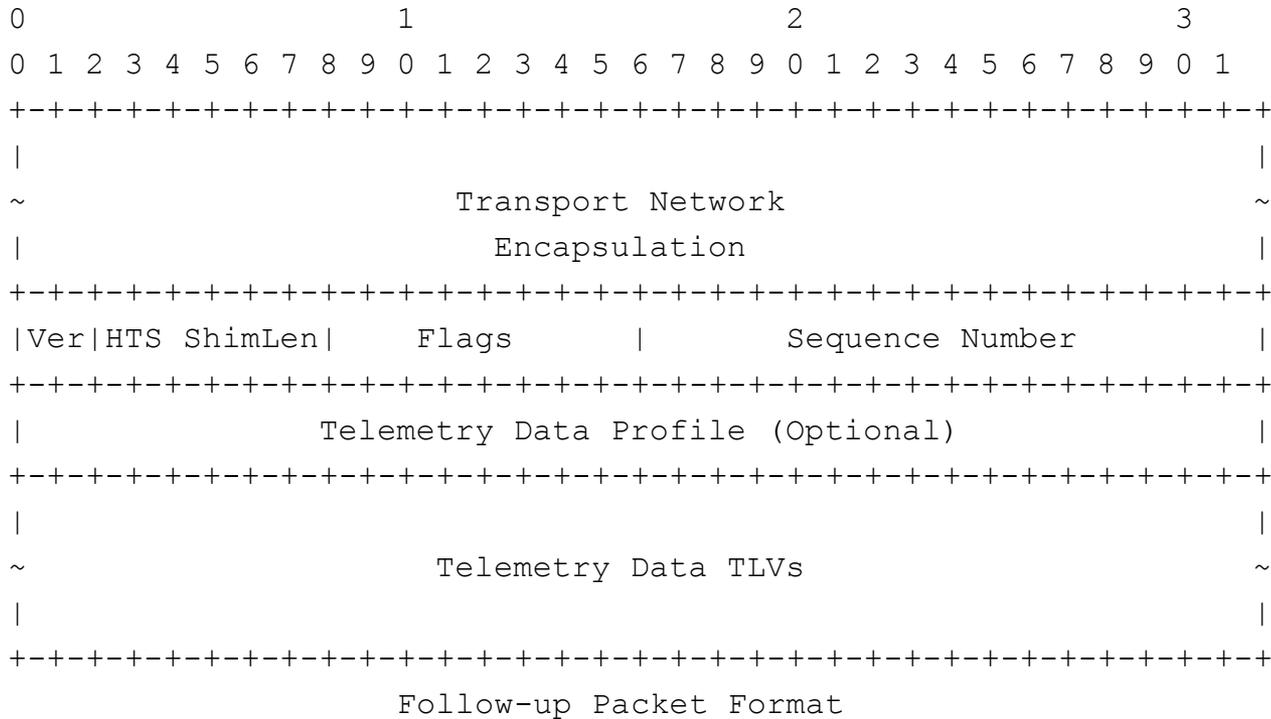
Theory of operation

HTS Ingress node

HTS Egress node

A   B   C   D

HTS Transit node

Packet

HTS Trigger

HTS Follow-up Packet

On-path telemetry information
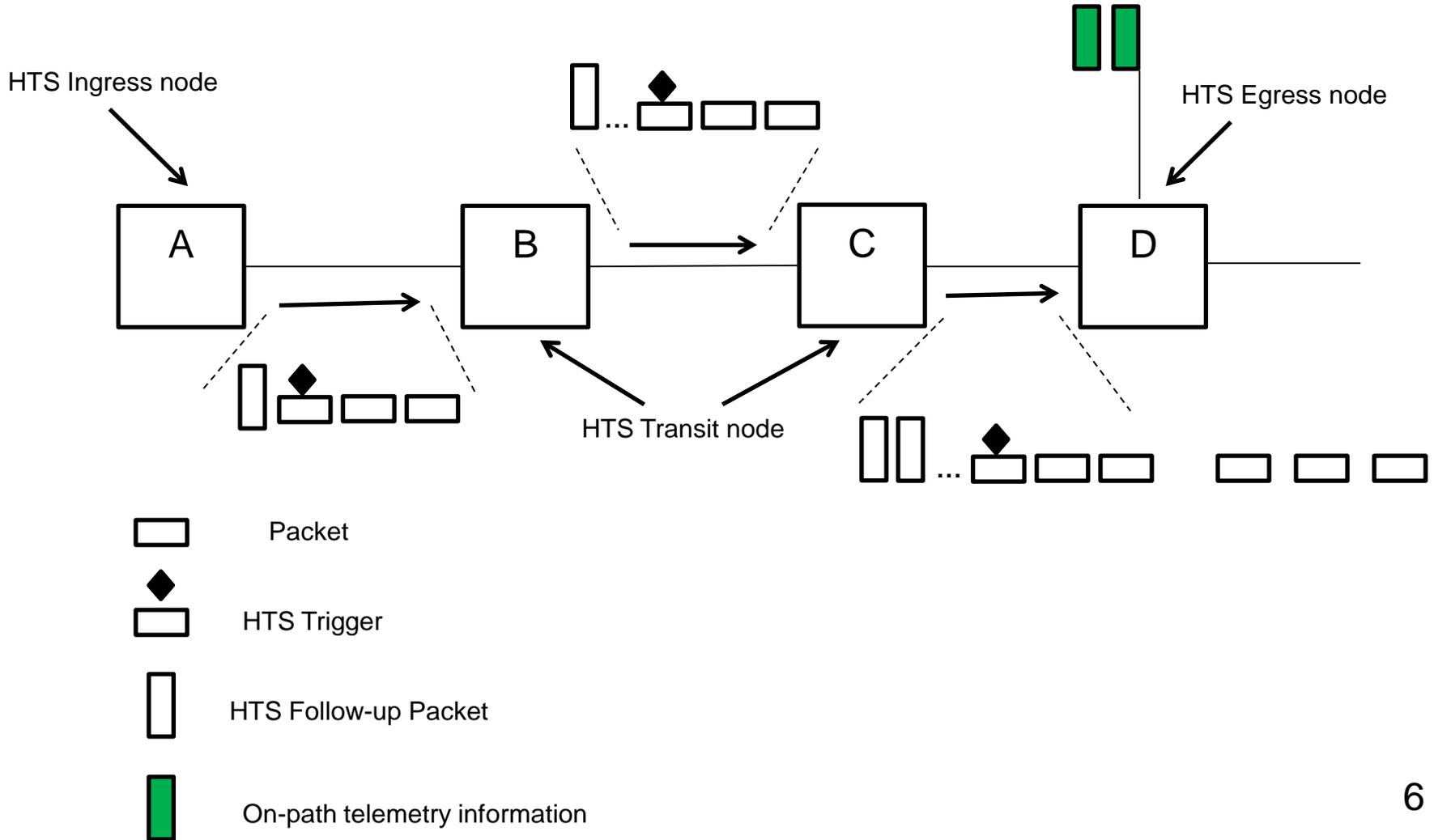
HTS in multicast distribution tree

Branch Node forwards HTS over the first branch and then originates
HTS Follow-up packets downstream

HTS Ingress node

HTS Egress node

A   B   C   D

HTS Transit node

E   F   G

H

Packet

HTS Trigger

HTS Follow-up Packet

On-path telemetry information
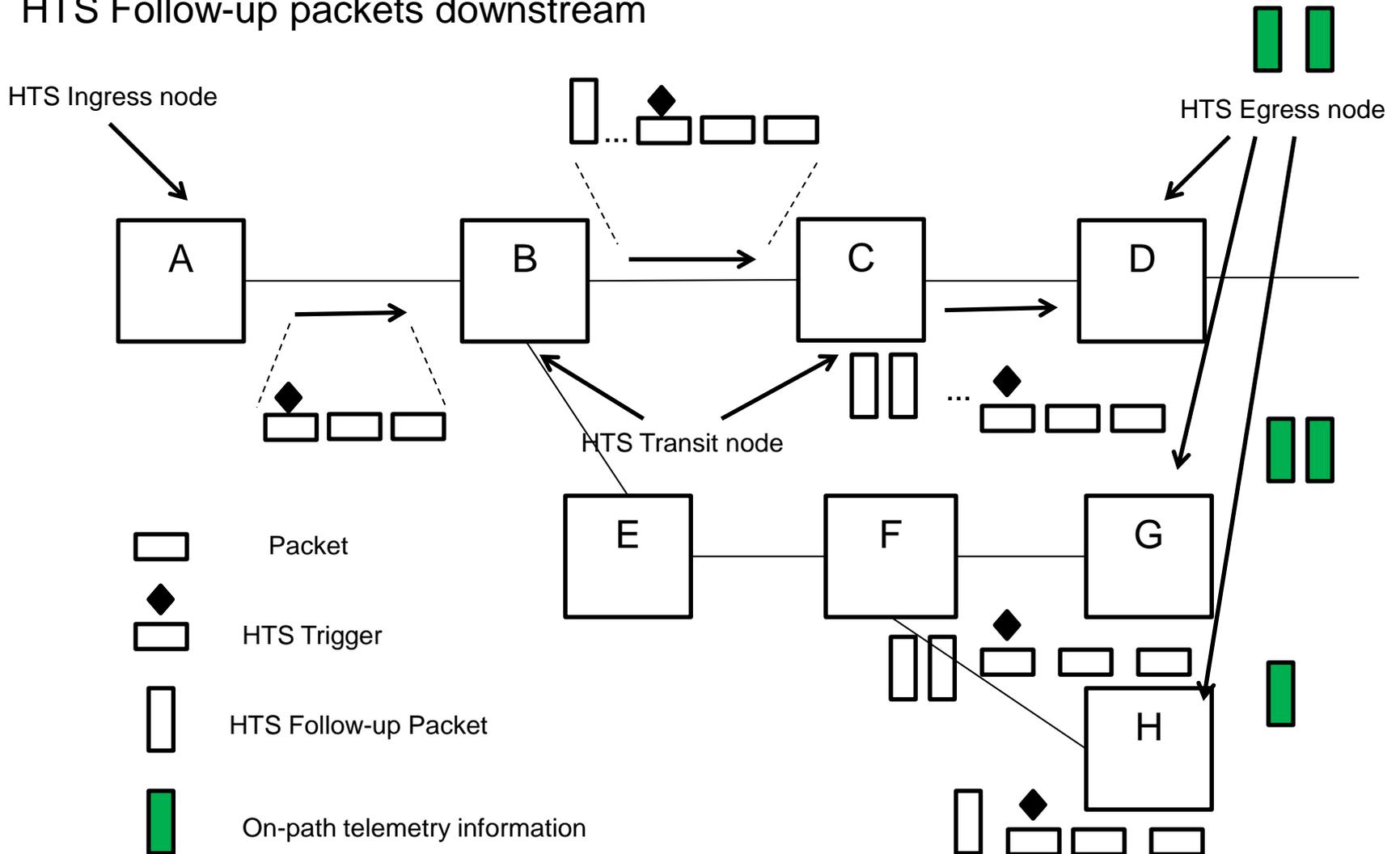
IOAM with HTS

- HTS use in an IOAM domain is one of the interesting use cases.

- A trigger packet includes IOAM Namespace-ID and IOAM-Trace-Type.

- The ingress HTS node copies IOAM Namespace-ID and IOAM-Trace-Type into the follow-up packet's Telemetry Data Profile field.

- IOAM-Trace-Type information defined in [I-D.ietf-ippm-ioam-data] can be used in the Telemetry Data Profile field.

Next steps

- Your comments, suggestions, questions always welcome and greatly appreciated
- WG adoption