In-situ OAM (IOAM) in Geneve
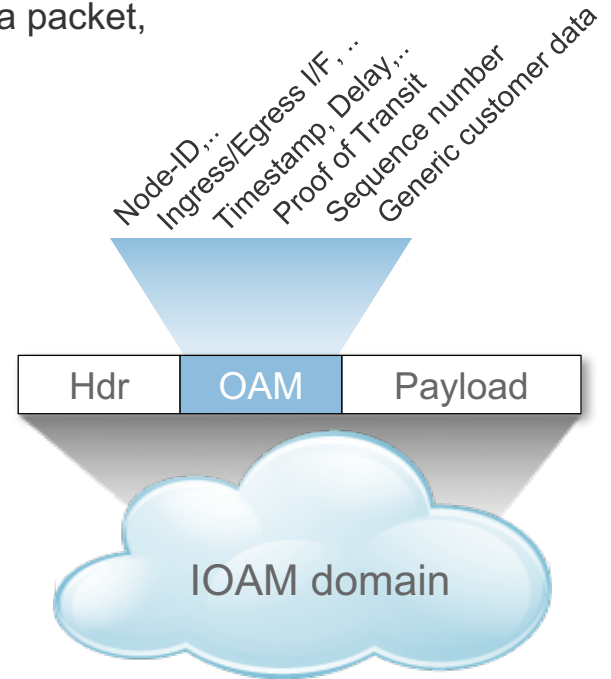
draft-brockners-nvo3-ioam-geneve-00

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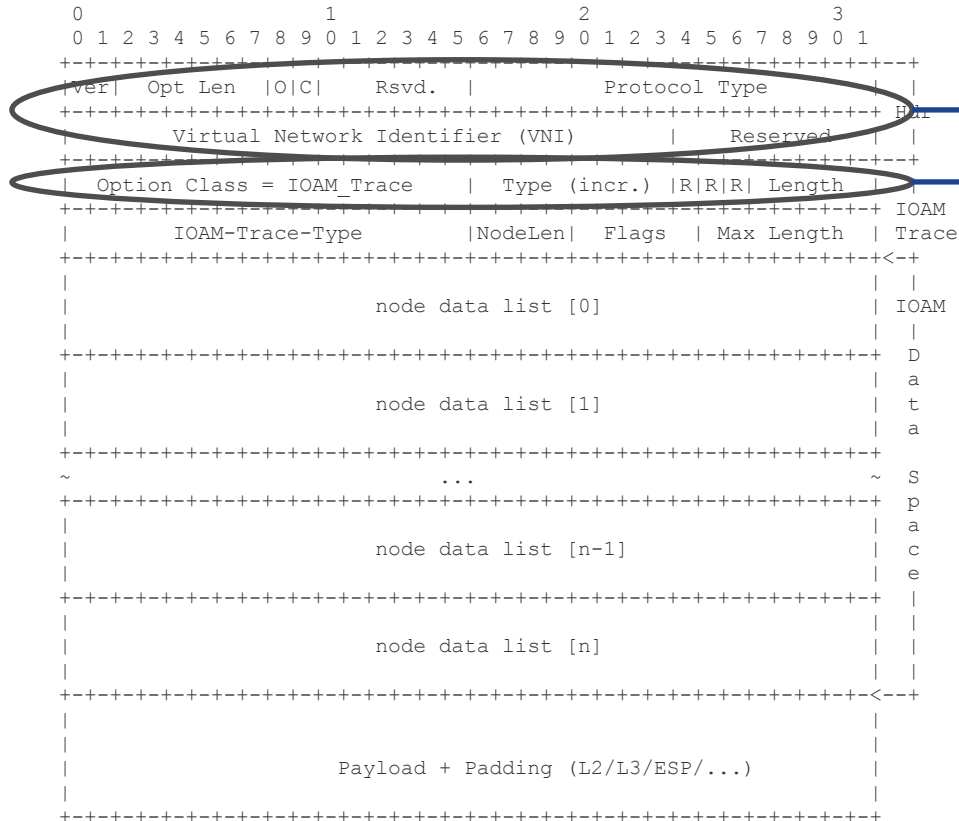
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In-situ OAM in a nutshell

- Gather telemetry and OAM information along the path within the data packet, (hence "in-situ OAM") as part of an existing/additional header

  - No extra probe-traffic (as with ping, trace, ..)

  - "Hybrid, Type-1 OAM" per RFC 7799

- Generic, Transport independent data-fields for IOAM
  - Scope: Per-hop, specific-hops only, end-to-end
  - Data fields include: Node IDs, interface IDs, timestamps, sequence numbers, ...

- Encapsulation
  - IOAM data fields can be embedded into a variety of transports, including: IPv6, SRv6, NSH, GRE, Geneve, VXLAN-GPE ...

- *Base IOAM document adopted by IPPM!*
  - *draft-ietf-ippm-ioam-data-01*

Node-ID ,..
Ingress/Egress I/F ,..
Timestamp, Delay,..
Proof of Transit
Sequence number
Generic customer data

Hdr	OAM	Payload

IOAM domain

IOAM over Geneve
(draft-brockners-nvo3-ioam-geneve-00)

```
 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
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|ver|  Opt Len  |O|C|   Rsvd.  |          Protocol Type         |    |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+ Hdr
|        Virtual Network Identifier (VNI)    |    Reserved       |   |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|    Option Class = IOAM_Trace   |  Type (incr.) |R|R|R| Length  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+ IOAM
|         IOAM-Trace-Type          |NodeLen| Flags | Max Length  | Trace
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+<-+
|                                                              |  |
|                  node data list [0]                          | IOAM
|                                                              |  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+  D
|                                                              |  a
|                  node data list [1]                          |  t
|                                                              |  a
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
~                          ...                                 ~  S
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+  p
|                                                              |  a
|                 node data list [n-1]                         |  c
|                                                              |  e
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+  |
|                                                              |  |
|                  node data list [n]                          |  |
|                                                              |  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+<--+
|                                                              |
|                                                              |
|             Payload + Padding (L2/L3/ESP/...)                |
|                                                              |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Geneve header

Geneve tunnel option

Option Class and Type specify which data field resides in the option.

Open Questions

- Section 4: Discussion of the encapsulation approach
  - An encapsulation of IOAM data fields in Geneve should be friendly to an implementation in both hardware as well as software forwarders and support a wide range of deployment cases, including large networks that desire to leverage multiple IOAM data fields at the same time.

- Tunnel option length field:
  - Geneve tunnel option limits length to 128 bytes, which limits the range of deployment cases.

- Metadata approach discussion:
  - Use of the Geneve tunnel option requires iterative lookups (nested TLVs) which present a challenge for some hardware implementations.
  - Single length field for all options allows nodes not interested in the IOAM information to skip the information easily. I.e. no need for parsing each header of the list to find the L4 header.

vs.
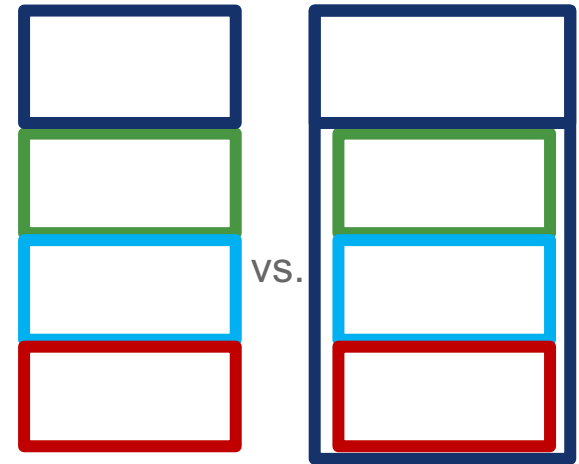
Status and next steps

- Data Fields for In-situ OAM
  - Adopted by IPPM
  - draft-ietf-ippm-ioam-data

- IOAM encapsulations into protocols
  - draft-brockners-nvo3-ioam-geneve-00 (this discussion)
  - draft-brockners-ioam-vxlan-gpe-00
  - draft-brockners-sfc-ioam-nsh-00
  - … more to come…

- IOAM in Geneve in NVO3 WG
  - Feedback from NVO3 WG appreciated, especially on open questions
  - WG adoption?