

In-situ OAM

IPPM

November 6th, 2018

There are quite a few IOAM related drafts...

- IOAM data fields definition
 - ★ [draft-ietf-ippm-ioam-data](#)
- IOAM data export
 - ★ draft-spiegel-ippm-ioam-rawexport-01
- IOAM data fields encapsulation for different protocols:
 - ★ Generic encap for protocols with Ethertype (GRE, etc): draft-weis-ippm-ioam-eth
 - VXLAN GPE: draft-brockners-ippm-ioam-vxlan-gpe
 - GENEVE: draft-brockners-ippm-ioam-geneve
 - IPv6: draft-ioametal-ippm-6man-ioam-ipv6-options
 - SRv6: draft-ali-spring-ioam-srv6
 - SR-MPLS: draft-gandhi-spring-ioam-sr-mpls
 - NSH encapsulation - draft-ietf-sfc-ioam-nsh
- Other IOAM related work
 - Proof of transit - draft-ietf-sfc-proof-of-transit
 - YANG Data Model for In-Situ OAM - draft-zhou-ippm-ioam-yang
 - ...

★ Covered in this presentation

Data Fields for In-situ OAM

[draft-ietf-ippm-ioam-data-04](#)

IPPM

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draft-ietf-ippm-ioam-data -03 to -04 updates

1. Introduction of IOAM Namespace Identifier

- Concept of Namespace ID was already discussed at IPPM WG meeting in IETF 102
- Example use cases
 - Distinguish different operational domains
 - Provide additional context for IOAM data fields and thus ensure that IOAM data is unique (e.g. for node-id)
 - Identify different sets of devices (e.g., different types of devices) in a deployment

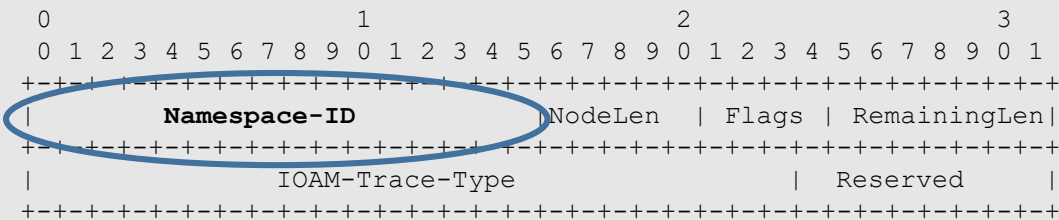
IOAM Namespace (see section 4.1)

IOAM data fields are defined within an IOAM namespace. An IOAM namespace is identified by a 16-bit namespace identifier (Namespace-ID). Namespace identifiers **MUST** be present and populated in all IOAM option headers. The Namespace-ID value is divided into two sub-ranges:

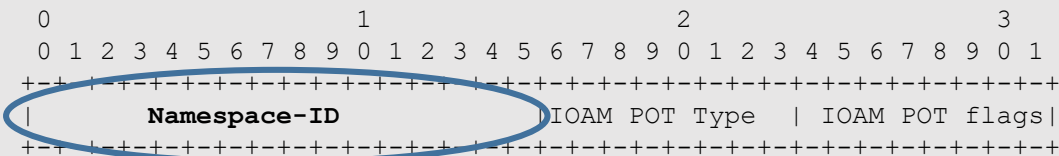
- An operator-assigned range from 0x0001 to 0x7FFF
- An IANA-assigned range from 0x8000 to 0xFFFF
- The Namespace-ID value of 0x0000 is defined as the default value and **MUST** be known to all the nodes implementing IOAM

Namespace ID as a data field

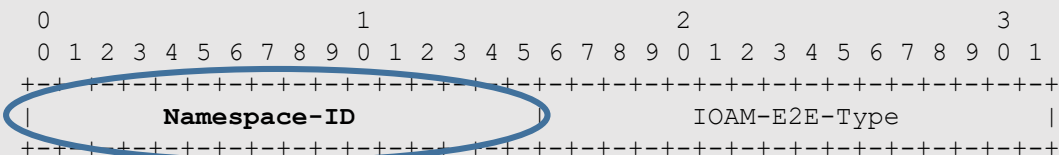
IOAM Trace Option headers (pre-allocated and incremental)



IOAM POT Option header



IOAM E2E Option header

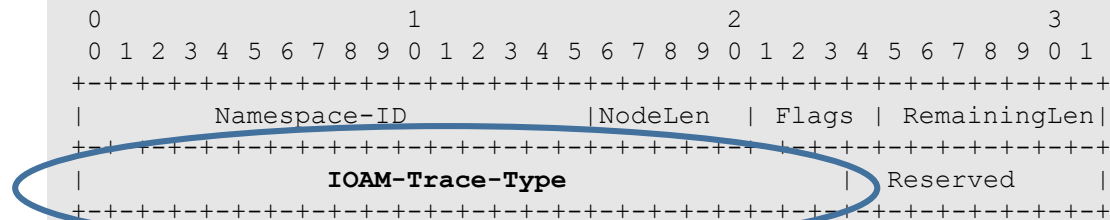


[draft-ietf-ippm-ioam-data](#) -03 to -04 updates (contd.)

2. IOAM Trace Options

- Introduction and rearrangement of IOAM header fields allowed to also grow IOAM trace-type field to 24-bits
- Need expressed for larger trace-type field to future proof definition in earlier IPPM meetings

IOAM Trace Option headers (pre-allocated and incremental)



[draft-ietf-ippm-ioam-data](#) -03 to -04 updates (contd.)

3. “app-data” data field (trace option) renamed to “namespace specific data”

```
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
+-----+
|                               namespace specific data                               |
+-----+
```

4. “buffer occupancy” data field added

```
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
+-----+
|                               buffer occupancy                               |
+-----+
```

- indicate the current status of the buffer occupancy.
- current number of memory buffers used by the set of queues that share a common buffer pool.

IOAM Encapsulation for protocols which leverage Ethertype

[draft-weis-ippm-ioam-eth-00](#)

IOAM Raw Data Export with IPFIX

[draft-spiegel-ippm-ioam-rawexport-01](#)

[draft-spiegel-ippm-ioam-rawexport](#) -00 to -01 updates

- ioamEncapsulationType
 - Updated references to encapsulations for different protocols
 - Added codepoint for *IPv6*
 - Renamed *GENEVE* codepoint to *GENEVE Option*
 - Added codepoint for *GENEVE Next Protocol*
- Added two new information elements that optimize use of IP packet section and Ethernet frame section
 - Templates can use existing *ipHeaderPacketSection* or new *ipHeaderPacketSectionWithPadding*
 - First example uses *ipHeaderPacketSection*
 - Other examples use *ipHeaderPacketSectionWithPadding*
 - Templates can use existing *dataLinkFrameSection* or new *ethernetFrameSection*
 - Example changed from *dataLinkFrameSection* to *ethernetFrameSection*

ipHeaderPacketSectionWithPadding Differences

| sectionExportedOctets exists? | Fixed vs variable length | ipHeaderPacketSection: Padding allowed? | ipHeaderPacketSectionWithPadding: Padding allowed? |
|-------------------------------|--------------------------|---|--|
| Yes | Fixed length | Yes | Yes |
| Yes | Variable length | ? | Up to 3 octets of padding * |
| No | Fixed length | No | Yes, if the total length of the IP packet is less than the fixed length of this Information Element, in which case the remainder MUST be padding |
| No | Variable length | No | Up to 3 octets of padding *, if the total length of the IP packet is less than the fixed length of this Information Element, in which case the remainder MUST be padding |

* used to preserve 4-octet alignment of subsequent IEs or subsequent records within the same set

ipHeaderPacketSectionWithPadding Text

- First 3 paragraphs (IP header contents, use of sectionOffset, payload and security considerations) are identical to *ipHeaderPacketSection*
- Use of padding with fixed or variable length IE is different:
 - When this Information Element has a fixed length, this MAY include padding octets that are used to fill out that fixed length.
 - When this information element has a variable length, the variable length MAY include up to 3 octets of padding, used to preserve 4-octet alignment of subsequent Information Elements or subsequent records within the same set.
 - In either case of fixed or variable length, the amount of populated octets MAY be specified in the sectionExportedOctets field corresponding to this Information Element, in which case the remainder (if any) MUST be padding. If there is no sectionExportedOctets field corresponding to this Information Element, then all octets MUST be populated unless the total length of the IP packet is less than the fixed length of this Information Element, in which case the remainder MUST be padding.

ethernetFrameSection

- Allows padding similar to *ipHeaderPacketSectionWithPadding*
 - Last 3 paragraphs are the same except for *IP packet* → *Ethernet frame*
- Eliminates need to include *dataLinkFrameType* and *dataLinkFrameSize*
- First paragraph text:

This Information Element carries a series of n octets from the IEEE 802.3 Ethernet frame of a sampled packet, starting after the preamble and start frame delimiter (SFD), plus sectionOffset octets into the frame if there is a sectionOffset field corresponding to this Information Element.
- Second paragraph (payload and security considerations) is the same as *dataLinkFrameSection* and *ipHeaderPacketSection*

Next Steps

Next Steps

- IOAM data fields definition
 - [draft-ietf-ippm-ioam-data](#) – Draft requires several editorial fixes. With those, we should be ready for considering WGLC.
- IOAM data export
 - draft-spiegel-ippm-ioam-rawexport-01: [Adopt as WG document?](#)
- IOAM data fields encapsulation for different protocols:
 - VXLAN GPE: draft-brockners-ippm-ioam-vxlan-gpe
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[Joint review of drafts between IPPM and working groups which “own” the parent protocol. Please review.](#)

Thank you