IOAM Update

IPPM WG,
IETF 105, Montreal - Wednesday 24 July 13:30 - 15:30

Exactly 3 years ago we've started a journey…

… together we've come a long way!

IETF 96 – Berlin
IOAM introduced to IEFT (those days as "In-Band" OAM)
Presentations to NVO3, RTGWG, SFC, SPRING
draft-brockners-proof-of-transit-01.txt
draft-brockners-inband-oam-requirements-01.txt
draft-brockners-inband-oam-data-01.txt
draft-brockners-inband-oam-transport-01.txt

WG Adoption in IPPM
draft-ietf-ippm-ioam-data-00

IETF 103 – Bangkok
Presentations to IPPM, SFC, NVO3
IOAM Namespaces included
Ordered POT discussed
Ethertype, IPv6 encaps
IOAM YANG model
draft-ietf-ippm-ioam-data-04
draft-spiegel-ippm-ioam-rawexport-01
draft-ioametal-ippm-6man-ioam-ipv6-options-01
draft-weis-ippm-ioam-eth-00
draft-zhou-ippm-ioam-yang-00

IETF 97 – Seoul
Presentations to OPSAWG, RTGWG
IOAM live demos as part of
Bits-n-Bytes
draft-brockners-proof-of-transit-02.txt
draft-brockners-inband-oam-requirements-02.txt
draft-brockners-inband-oam-data-02.txt
draft-brockners-inband-oam-transport-02.txt

IETF 100 – Singapore
Presentations to IPPM, LISP, NVO3, SFC
Introduction of dedicated encapsulation
drafts
draft-ietf-ippm-ioam-data-01
draft-weis-ippm-ioam-gre-00
draft-brockners-ippm-ioam-vxlan-gpe-00
draft-brockners-ippm-ioam-geneve-00
draft-brockners-sfc-ioam-nsh-00

IETF 98 – Chicago
Presentations to IPPM
IOAM live demos as part of
Bits-n-Bytes
Name change to In-situ OAM
Additional authors
draft-brockners-inband-oam-data-03.txt
draft-brockners-inband-oam-requirements-03.txt
draft-brockners-inband-oam-transport-03.txt
draft-brockners-proof-of-transit-03.txt

IETF 101 – London
Presentations to IPPM, SFC
IOAM timestamps, IOAM options header
draft-ietf-ippm-ioam-data-02

WG Adoption in SFC
draft-ietf-sfc-ioam-nsh-00
draft-ietf-sfc-proof-of-transit-00

IETF 104 – Bangkok
Presentations to IPPM, SFC
Flags – immediate export/postcard
discussion
Ordered POT
v6 encap/deployment
Profiles
draft-ietf-ippm-ioam-data-04
draft-ioametal-ippm-6man-ioam-ipv6-options-01
draft-ioametal-ippm-6man-ioam-ipv6-deployment-00
draft-song-ippm-postcard-based-telemetry-04
draft-mizrahi-ippm-ioam-profile-00

IETF 99 – Prague
Presentations to IPPM
Decision to progress the work in
IPPM
Additional authors
draft-brockners-inband-oam-data-06.txt

IETF 102 – Montreal
Presentations to IPPM, SFC
IOAM Namespaces discussed
draft-ietf-ippm-ioam-data-03
draft-spiegel-ippm-ioam-rawexport-00

Jul 2016 Oct 2016 Mar 2017 May 2017 Jul 2017 Sep 2017 Oct 2017 Mar 2018 Jun 2018 Oct 2018 Mar 2019 Jul 2019

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IOAM Ecosystem:
Several IOAM related documents:

Status and next steps to consider

Category	Draft Name	Next steps
Data fields	draft-ietf-ippm-ioam-data-06	< see later slides >
	draft-mizrahi-ippm-ioam-flags-00	< see later slides >
	draft-song-ippm-postcard-based-telemetry-04	Consider breaking out the IOAM specific part of the draft and create a dedicated draft for IOAM immediate export / postcard mode.

Category	Draft Name	Next steps
YANG/Operations	draft-zhou-ippm-ioam-yang-04	Draft is quite mature. Consider adopting as WG draft by IPPM WG.
	draft-mizrahi-ippm-ioam-profile-00	Continue to evolve as individual draft in IPPM.
Data Export	draft-spiegel-ippm-ioam-rawexport-02	Per IPPM WG discussion in Prague: Draft will be discussed in OPSAWG in Montreal. Based on OPSAWG feedback, work will either happen in OPSAWG or it'll come back to IPPM.

Category	Sub-Category	Draft Name	Next steps
Encapsulations	IPv6	draft-ioametal-ippm-6man-ioam-ipv6-options-01	Per the discussion in 6man in Prague, 6man seemed ok if IPPM does the work on v6 encap – and gives updates to 6man/seeks continued advise. Consider adopting as WG draft by IPPM WG.
		draft-ioametal-ippm-6man-ioam-ipv6-deployment-00	See above. Consider adopting as WG draft by IPPM WG.
	Protocols w/ Ethertype	draft-weis-ippm-ioam-eth-01	Ethertype receives quite a bit of interest (especially because of GRE). EtherType can be acquired from IEEE via IESG. WG document required. Consider adoption as WG draft by IPPM WG
	NSH	draft-ietf-sfc-ioam-nsh-01	Evolve in SFC WG
	Geneve	draft-brockners-ippm-ioam-geneve-02	Evolve in NVO WG
	Segment Routing IPv6	draft-gandhi-spring-ioam-sr-mpls-01	Continue to evolve in SPRING WG
		draft-ali-spring-ioam-srv6-01	Continue to evolve in SPRING WG
	MPLS	draft-song-mpls-extension-header-02	Continue to evolve in MPLS WG
	VXLAN-GPE	draft-brockners-ippm-ioam-vxlan-gpe-02	Evolve as individual draft.

IOAM Data Fields

draft-ietf-ippm-ioam-data-06

Key Updates

- Clarifications and editorial updates
- Text specific to active flags moved into the dedicated document "draft-mizrahi-ippm-ioam-flags" per the discussion at the last IPPM WG meeting in Prague/IETF 104

Updates from -05 to -06

- Minor nits (typos, change of author affiliation, etc.)
- Clarification about the use of namespaces:
  - Namespaces add further context to IOAM option types and associated IOAM data fields.
  - Any IOAM namespace MUST interpret the IOAM option types and associated IOAM data fields per the definition in this document.
  - Namespaces group nodes to support different deployment approaches of IOAM (see a few example use-cases below) as well as resolve issues which can occur due to IOAM data fields not being globally unique (e.g. IOAM node identifiers do not have to be globally unique).
  - IOAM data fields are defined within an IOAM namespace.

Updates reflecting the document split

- Section 3 (Scope, Applicability, and Assumptions)
  - Discussion about active network probing removed.
- Section 4.2.1. (Pre-allocated and Incremental Trace Options)
  - Text for bits 1,2,3 removed. Only the description of bit 0 (Overflow bit) was kept.
- Section 7.4. (IOAM Trace Flags Registry)
  - Text for bits 1,2,3 removed. Only the description of bit 0 (Overflow bit) was kept.
- Section 8 (Security Considerations)
  - Adjusted discussion of immediate export

draft-ietf-ippm-ioam-data-06 - Next Steps
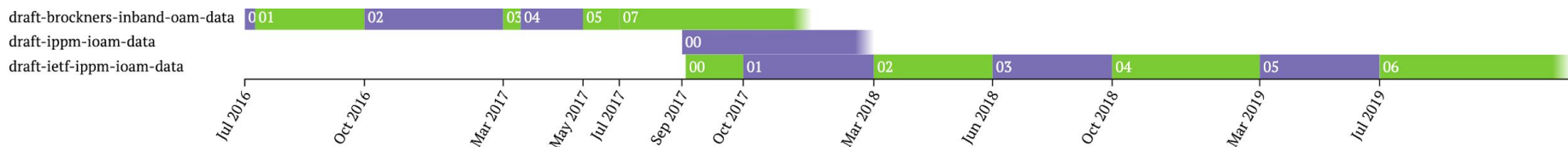
- Document has gone through many iterations
- Document is stable - the only active discussion was around flags which now moved to a new document

- Document is considered ready for WGLC

Flags Discussion

draft-mizrahi-ippm-ioam-flags-00

Not really a new -00 individual draft:
Text specific to active flags from draft-ietf-ippm-ioam-data-05 was taken into this new document.

Document split is to isolate the conversations a bit more (flags vs. data fields) and allow the data-fields draft to progress at a (faster) pace than the flags discussion, which seems to require a bit more time.

Loopback Flag ("L-Bit")
(existing since WG adopted I-D, i.e. draft-ietf-ippm-ioam-data-00)

- Loopback Flag allows a source node to discover the path of a packet within a single RTT.
- Loopback flag triggers each transit node to send a copy of the packet back to the source, along with forwarding the packet.
  - Assumption is that a return path exists
  - Encapsulating node MUST be the source of the packet
  - Encapsulating node sets L-bit for specific packets;
    Could combine with the A-bit.
  - L-bit is cleared for packet returned to the source (i.e. the copy).

Immediate Export Flag ("I-Bit")
(originally introduced with draft-ietf-ippm-ioam-data-05)

- Enable to export telemetry data immediately from the network node to the collector, rather than embedding it into the packet
  - Encapsulating node sets the I-Bit.
  - Transit nodes are expected to export the requested data rather than add it to the packet.
  - Decapsulating node is expected to export the requested data and remove the IOAM header as usual.
- Motivations: Security, space, implementation simplicity, potential loss of telemetry data (packet drop => Embedded telemetry loss)
- Potentially coupled with e2e type to add flow/serial number context to the collector

- Discussion: Evolve flag to Immediate-Export IOAM Option

Active Flag - ("A-Bit")
(originally introduced with draft-ietf-ippm-ioam-data-05)

- Draft-ietf-ippm-ioam-data-6 includes in, "Scope, Applicability, and Assumptions" section
  - "Combination with active OAM mechanisms: IOAM should be usable for active network probing, …"
  - However, no mechanism was provided so far to distinguish packets used for specific measurements
- "Active" flag indicates that this is packet used for measurements
  - "Active" is used in the sense defined in RFC 7799
  - At the IOAM decapsulating node, in addition to processing and/or exporting trace metadata, the packet must be discarded rather than forwarded (after IOAM decapsulation).
- Examples:
  - Probes
  - Cloned or sampled (possibly truncated) copies of data packets

draft-mizrahi-ippm-ioam-flags - Next steps

- Recap
  - A "flags draft" for IOAM is required to complement draft-ietf-ippm-ioam-data
  - Content from draft-mizrahi-ippm-ioam-flags-00 was part of draft-ietf-ippm-ioam-data-05
  - Document split was done to separate stable parts from parts which require more discussion, enabling progression at different speeds

- draft-mizrahi-ippm-ioam-flags-00 is a good starting point for flags definition: Adopt as WG document?