IOAM Discussion – IETF 104

IPPM WG,
Prague - March 25, 2019 - 9:00-11:00

Agenda - 40min total

- IOAM data draft / WG document (10min)
  - draft-ietf-ippm-ioam-data-05 – 10min
- Review of individual IOAM drafts by category (16min, 1min each max)
- Discussion and Hums (14min)
  - Which categories of IOAM documents make sense for IPPM to adopt?
  - WG adoption of certain drafts (for those categories and drafts which apply)?

Drafts for 1min lightening talks

- *IOAM encapsulation (11min)*
  - Draft-weis-ippm-ioam-eth-01 (new)
  - Draft-ioametal-ippm-6man-ioam-ipv6-options-01
  - Draft-ioametal-ippm-6man-ioam-ipv6-deployment-00 (new)
  - Draft-brockners-ippm-ioam-geneve-02 (new)
  - Draft-gafni-ippm-ioam-ipv4-options-00 (new)
  - Draft-ali-6man-spring-srv6-oam-00 (new)
  - Draft-anand-ippm-po-ioam-02 (new)
  - Draft-gandhi-spring-ioam-sr-mpls-00
  - Draft-ali-spring-ioam-srv6-00
  - Draft-song-mpls-extension-header-02 (new)
  - Draft-li-6man-ipv6-sfc-ifit-00 (new)
- *IOAM data export (1min)*
  - Draft-spiegel-ippm-ioam-rawexport-01
- *IOAM YANG models/operations (2 min)*
  - Draft-zhou-ippm-ioam-yang-03 (new)
  - Draft-mizrahi-ippm-ioam-profile-00 (new)
- *IOAM tools (1min)*
  - Draft-xiao-ippm-ioam-conf-state-03 (new)
- *IOAM - additional options (1min)*
  - Draft-song-ippm-postcard-based-telemetry-02 (new)

(new) = new document or revision since IETF 103

IOAM Side Meetings

- IOAM document editing sessions
  - Mon, March 25, 6:30pm – 8:00pm, Room Tyrolka
  - Wed, March 27, 1:30pm-3:00pm, Room TBD

- IOAM Use-Cases and Deployment discussion
  - Tue, March 26, 6:30pm – 8:00pm, Room Tyrolka

Data Fields for In-situ OAM

draft-ietf-ippm-ioam-data-05

draft-ietf-ippm-ioam-data-05

Key Updates

- Lot’s of clarifications and editorial updates
- “Immediate Export” flag
- “Active” flag

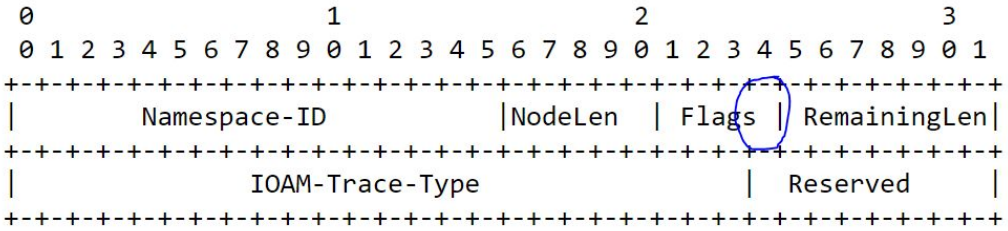
Updates from -04 to -05 (Editorial)

1. Additional examples to provide context for Namespace
2. Clarification: Transit node behaviour to process Pre-allocated trace option
3. Flags:
   a. 2 new flags (next slides)
   b. Clarification on Loopback bit
4. RFC 2119 language
5. Editorial fix for IOAM trace type bits (was wrongly mentioned as 16 bits in text). Also fixed the examples to use 24 bits for trace type.
6. Explanation of stacking node data to keep it uniform between Pre-allocated trace and Incremental trace options
7. Clarification: buffer occupancy field
8. IOAM E2E option: s/tube/"packet group"

Updates from -04 to -05: Immediate Export

Introducing new flag: Immediate Export

- Enable to export telemetry data immediately from the network node to the collector, rather than embedding it into the packet
- 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



Updates from -04 to -05: Active Flag

- In -04, “Scope, Applicability, and Assumptions” included:
  - “Combination with active OAM mechanisms: IOAM should be usable for active network probing, …”
  - However, no mechanism was provided to distinguish active OAM
- New “Active” flag indicates that this is an active OAM packet
  - “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

Review of individual IOAM drafts

IOAM Encapsulation

EtherType Protocol Identification of In-situ OAM Data

draft-weis-ippm-ioam-eth-01

Abstract

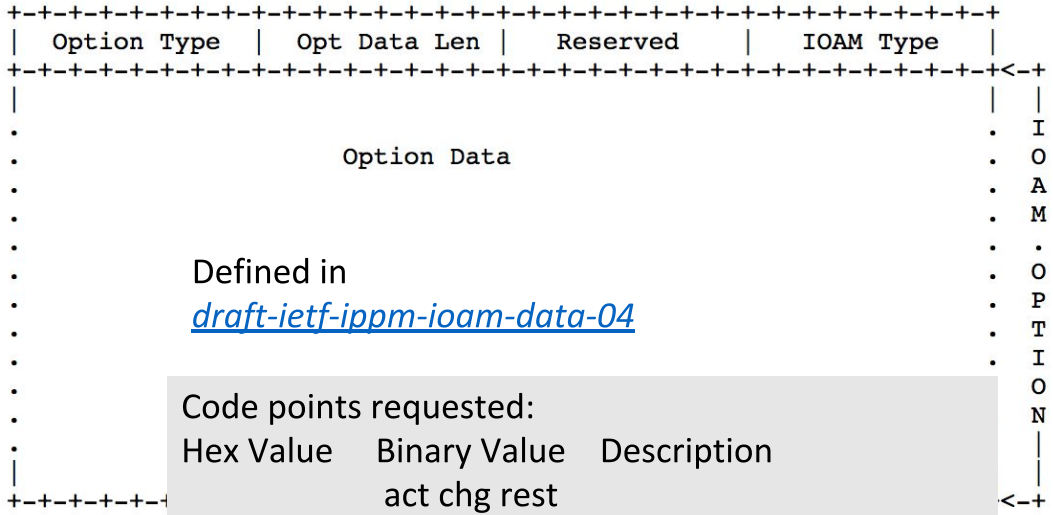
In-situ Operations, Administration, and Maintenance (IOAM) records operational and telemetry information in the packet while the packet traverses a path between two points in the network. This document defines an EtherType that identifies IOAM data fields as being the next protocol in a packet, and a header that encapsulates the IOAM data fields.

Authors request adoption of draft in IPPM WG? [X] Yes [ ] No

IOAM over IPv6

(draft-ioametal-ippm-6man-ioam-ipv6-options-01)

IPv6 Option format for carrying in-situ OAM data fields:



Defined in
draft-ietf-ippm-ioam-data-04

Code points requested:

Hex Value	Binary Value act chg rest	Description
TBD_1_0	00 0 TBD_1	IOAM Destination Option
TBD_1_1	00 1 TBD_1	IOAM HbH Option

IOAM Option	IPv6 Option type
Pre-allocated Tracing Option	HbH Option
Incremental Tracing Option	HbH Option
Proof of Transit Option	HbH Option
Edge to Edge Option	Destination Option

Authors request adoption of draft in IPPM WG?

[X] Yes [ ] No

Deployment Considerations for In-situ OAM with IPv6 Options

draft-ioametal-ippm-6man-ioam-ipv6-deployment-00

Abstract

In-situ Operations, Administration, and Maintenance (IOAM) records operational and telemetry information in the packet while the packet traverses a path between two points in the network. This document outlines how IOAM can be enabled in an IPv6 network.

Authors request adoption of draft in IPPM WG? [X] Yes [ ] No

Geneve encapsulation for In-situ OAM Data
draft-brockners-ippm-ioam-geneve-02

Abstract

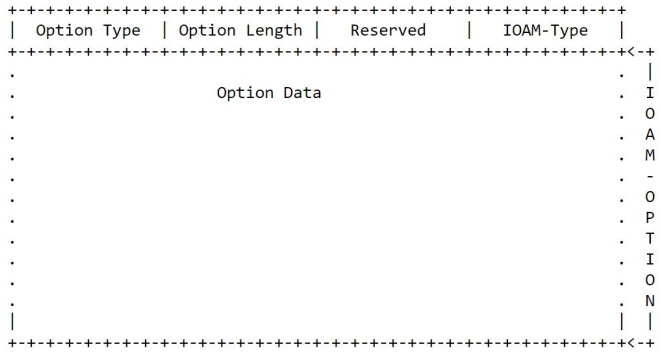
In-situ Operations, Administration, and Maintenance (IOAM) records operational and telemetry information in the packet while the packet traverses a path between two points in the network. This document outlines how IOAM data fields are encapsulated in Geneve.

Authors request adoption of draft in IPPM WG? [X] Yes [ ] No

In-situ OAM IPv4 Options
draft-gafni-ippm-ioam-ipv4-options-00

This document outlines how IOAM data fields are encapsulated in IPv4

- Utilizing IPv4 options
- Not a new idea - present in the original RFC 791
- Native to IPv4, doesn’t add any header, following headers can be processed by IPv4 supported node
- Although limited in space, support simple use cases
  - Can be resolved by using Immediate Export



Authors request adoption of draft in IPPM WG?

[X] Yes [ ] No

Integrated Packet-Optical In-Situ OAM
draft-anand-ippm-po-ioam-02

Abstract

This document proposes a way to extend in-situ OAM techniques to include operational data from multiple network layers with a view to create an integrated record of OAM information as the data flows between two network entities. An instance of this technique that is elaborated here focuses on packet-optical networks that are traditionally transport centric. The mechanisms described are general enough to allow future extensibility of in-situ OAM techniques into other non-packet domains.

Authors request adoption of draft in IPPM WG? ☐ Yes ☐ No

Segment Routing with MPLS Data Plane encapsulation for In-situ OAM Data

draft-gandhi-spring-ioam-sr-mpls-00

Abstract

In-situ Operations, Administration, and Maintenance (IOAM) records operational and telemetry information in the data packet while the packet traverses a path between two points in the network. This document defines how IOAM data fields are transported with the Segment Routing with MPLS data plane (SR-MPLS) encapsulation.

Authors request adoption of draft in IPPM WG? [ ] Yes [X] No

Segment Routing Header encapsulation for In-situ OAM Data
draft-ali-spring-ioam-srv6-00

Abstract

In-situ Operations, Administration, and Maintenance (IOAM) records operational and telemetry information in the data packet while the packet traverses a path between two points in the network. This document defines how IOAM data fields are transported as part of the Segment Routing with IPv6 data plane (SRv6) header.

Authors request adoption of draft in IPPM WG? [X] Yes [ ] No

MPLS Extension Header
draft-song-mpls-extension-header-02

Abstract

Motivated by the need to support multiple in-network services and functions in an MPLS network, this document describes a method to encapsulate extension headers into MPLS packets. The encapsulation method allows stacking multiple extension headers and quickly accessing any of them as well as the original upper layer protocol header and payload. We show how the extension header can be used to support several new network applications and optimize some existing network services.

Authors request adoption of draft in IPPM WG? ☐ Yes ☐ No

Consideration of IPv6 Encapsulation for SFC and IFIT
draft-li-6man-ipv6-sfc-ifit-00

Abstract

Service Function Chaining (SFC) and In-situ Flow Information Telemetry (IFIT) are important path services along with the packets. In order to support these services, several encapsulations have been defined. The document analyzes the problems of these encapsulations in the IPv6 scenario and proposes the possible optimized encapsulation for IPv6.

Authors request adoption of draft in IPPM WG? ☐ Yes ☐ No

IOAM Data Export

In-situ OAM raw data export with IPFIX
draft-spiegel-ippm-ioam-rawexport-01

- Discusses how IOAM information can be exported in raw, i.e. uninterpreted, format from network devices to data processing systems, such as monitoring or analytics systems, using IPFIX
- Off-loads interpretation, aggregation and formatting of IOAM data from the nodes which performs data-plane operations
- Identifies existing IPFIX information elements used to report forwarding status, and to export packet sections that provide context, e.g. to be used for flow identification
- Defines new IPFIX information elements for IOAM raw export, e.g. to carry IOAM data
- Includes examples of possible IPFIX messages including data sets, but does not mandate any specific IPFIX template or message format.

Authors request adoption of draft in IPPM WG? [X] Yes [ ] No

IOAM YANG Models/Operations

A YANG Data Model for In-Situ OAM
draft-zhou-ippm-ioam-yang-03

Abstract

In-situ Operations, Administration, and Maintenance (IOAM) records operational and telemetry information in user packets while the packets traverse a path between two points in the network. This document defines a YANG module for the IOAM function.

Authors request adoption of draft in IPPM WG? [X] Yes [ ] No

In Situ OAM Profiles
draft-mizrahi-ippm-ioam-profile-00

- Use case driven profile
- Defines a subset of the functionality of IOAM
- A set of rules that limit the scope
- Simplifies implementation and interop testing

- Examples:
  - Which IOAM options are used
  - Which data types are used
  - …
  - Opaque State Snapshot semantics
  - …

Can be defined using the IOAM YANG model

Defined in an IOAM profile specification

Authors request adoption of draft in IPPM WG?

[X] Yes [ ] No

IOAM Tools

Echo Request/Reply for In-situ OAM Capabilities
draft-xiao-ippm-ioam-conf-state-03

Abstract

This document describes an extension to the echo request/reply mechanisms used in MPLS LSP, SRv6, and SFC environments, which can be used within an IOAM domain, allowing the IOAM encapsulating node to acquire IOAM capabilities of each IOAM transit node and/or IOAM decapsulating node.

Reasons for IPPM WG to adopt it

- It's interesting and useful
- It's tightly based on IOAM Data IPPM WG draft

Authors request adoption of draft in IPPM WG? [X] Yes [ ] No

IOAM - additional options

Postcard-based In-band Flow Data Telemetry
draft-song-ippm-postcard-based-telemetry-02

Abstract

The Postcard-Based Telemetry (PBT) allows network OAM applications to collect telemetry data about any user packet. Unlike the E2E and trace modes in in-situ OAM (IOAM), PBT does not require user packets to carry the telemetry data, but directly exports the telemetry data from the data collecting node to a collector through separated OAM packets called postcards. Two variations of PBT are described: one requires inserting an instruction header to user packets to guide the data collection and the other only marks the user packets or configure the flow filter to invoke the data collection. PBT provides a complement to IOAM and address several implementation and deployment challenges of it.

Authors request adoption of draft in IPPM WG? ☐ Yes ☐ No

Discussion

Discussion and Hums

- Which categories of IOAM documents make sense for IPPM to adopt?
- Which drafts should the WG consider adopting (for those categories and drafts which apply)?