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# Abstract

This document discusses set of Operations, Administration and Maintenance (OAM) tools that can be used as common OAM of an overlay network independent of specific encapsulation at transport i.e. underlay, network. Requirements toward encapsulation of the overlay in order to support common OAM are listed as well.

# Introduction

This document lists the requirements for Operation, Administration, and Maintenance (OAM) of an overlay network. The list can further be used to for gap analysis of available OAM tools to identify possible enhancements of existing or whether new OAM tools are required to support proactive and on-demand path monitoring and service validation.

# Problem Statement

# The introduction and development of new service layers such as Service Function Chaining (SFC) and Bit-Ingress Explicit Replication (BIER), is driving the need to enhance existing and possibly create new OAM protocols and tools. This document discusses benefits of Common transport independent OAM solution to support components of network management framework known as Fault, Configuration, Accounting, Performance, and Security (FCAPS):

# Fault monitoring, defect detection and localization;

# Performance measurement, both passive and active.

# Requirements

* 1. The listed requirements MUST be supported with any type of transport layer over which the overlay network can be realized.
  2. It MUST be possible to initialize Overlay OAM session from any node in the overlay network.
  3. It SHOULD be possible to initialize an Overlay OAM session from a centralized controller.
  4. Overlay OAM MUST support proactive and on-demand OAM monitoring and measurement methods.
  5. Overlay OAM MUST support unidirectional OAM methods, both continuity check and performance measurement.
  6. Overlay OAM packets MUST be in-band with the monitored traffic, i.e. follow exactly the same path as data plane traffic, in forward direction, i.e. from ingress toward egress end point(s) of the OAM test session.
  7. Overlay OAM MUST support bi-directional OAM methods. Such OAM methods MAY combine in-band monitoring or measurement in forward direction and out-of-band notification in the reverse direction, i.e. from egress to ingress end point of the OAM test session.

## Fault Management

### Pro-active FM

Availability, not as performance metric, is understood as ability to reach the node, i.e. the fact that path between ingress and egress does exist. Such OAM mechanism also referred as Continuity Check.

* 1. Overlay OAM MUST support pro-active monitoring of any virtual node availability in the given overlay network.
  2. Overlay OAM MUST support Reverse Defect Indication (RDI) notification by egress to the ingress, i.e. source of continuity checking.
  3. Overlay OAM MUST support connectivity verification. Definition of mis-connectivity defect entry and exit criteria are outside the scope of this document.

### On-demand FM

## Performance Management

* 1. Overlay OAM MUST support active one-way packet delay measurement.
  2. Overlay OAM MUST support passive one-way packet delay measurement.
  3. Overlay OAM MUST support active two-way packet delay measurement.
  4. Overlay OAM MUST support packet delay variation measurement.
  5. Overlay OAM MUST support active end-2-end packet loss measurement.
  6. Overlay OAM MUST support passive end-2-end packet loss measurement.
  7. Overlay OAM SHOULD support active per-segment packet delay measurement.
  8. Overlay OAM SHOULD support passive per-segment packet delay measurement.
  9. Overlay OAM SHOULD support active per-segment packet loss measurement.
  10. Overlay OAM SHOULD support passive per-segment packet loss measurement.
  11. Overlay OAM MUST support delivered packet throughput measurement.

## Alarm Indication Suppression

* 1. Overlay OAM MUST support defect notification mechanism, like Alarm Indication Signal. Any virtual node in the given overlay network MAY originate a defect notification addressed to any node in that network.

## Overlay Network Resiliency

* 1. OAM MUST support methods to enable survivability of an overlay network. These recovery methods MAY use protection switching and restoration.

# Security Considerations