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**Operations, Administration and Maintenance (OAM) for Deterministic  
Networks (DetNet) with IP Data Plane  
draft-mirsky-detnet-ip-oam-00**

Abstract

This document defines the principals for using Operations, Administration, and Maintenance protocols and mechanisms in the Deterministic Networking networks with IP data plane.

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[1](#). **Introduction**

[I-D.ietf-detnet-architecture] introduces and explains Deterministic Networks (DetNet) architecture.

Operations, Administration and Maintenance (OAM) protocols are used to detect, localize defects in the network, and monitor network performance. Some OAM functions, e.g., failure detection, work in the network proactively, while others, e.g., defect localization, usually performed on-demand. These tasks achieved by a combination of active and hybrid, as defined in [[RFC7799](#)], OAM methods.

[I-D.mirsky-detnet-oam] lists the functional requirements toward OAM for DetNet domain. The list can further be used 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. Also, the document defines the OAM use principals for the DetNet networks with IP data plane.

## 2. Conventions used in this document

### 2.1. Terminology

The term "DetNet OAM" used in this document interchangeably with longer version "set of OAM protocols, methods and tools for Deterministic Networks".

DetNet Deterministic Networks

DiffServ Differentiated Services

DSCP DiffServ Code Point

OAM: Operations, Administration and Maintenance

PREF Packet Replication and Elimination Function

POF Packet Ordering Function

RDI Remote Defect Indication

Underlay Network or Underlay Layer: The network that provides connectivity between the DetNet nodes. MPLS network providing LSP connectivity between DetNet nodes is an example of the underlay layer.

DetNet Node - a node that is an actor in the DetNet domain. DetNet domain edge node and node that performs PREF within the domain are examples of DetNet node.

## **2.2. Keywords**

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in

[BCP](#)

[14](#) [[RFC2119](#)] [[RFC8174](#)] when, and only when, they appear in all capitals, as shown here.

## **3. Active OAM for DetNet Networks with IP Data Plane**

OAM protocols and mechanisms act within the data plane of the particular networking layer. And thus it is critical that the data plane encapsulation supports OAM mechanisms in such a way that

DetNet

OAM packets are in-band with a DetNet flow being monitored, i.e., DetNet OAM test packets follow precisely the same path as DetNet

data

plane traffic both for unidirectional and bi-directional DetNet paths.

The DetNet data plane encapsulation in a transport network with IP encapsulations specified in [[I-D.ietf-detnet-ip](#)]. For the IP underlay network, DetNet flows are identified by the 6-tuple that is the destination IP address, source IP address, IP protocol, source port number, destination port number, and differentiated services (DiffServ) code point (DSCP). Active IP OAM protocols like Bidirectional Forwarding Detection (BFD) [[RFC5880](#)] or STAMP [[I-D.ietf-ippm-stamp](#)], use UDP transport and the well-known UDP port numbers as the destination port. Thus a DetNet node should be able to associate an IP DetNet flow with the particular test session to



ensure that test packets experience the same treatment as the DetNet flow packets.

#### **4. Use of Hybrid OAM in DetNet**

Hybrid OAM methods are used in performance monitoring and defined in [[RFC7799](#)] as:

Hybrid Methods are Methods of Measurement that use a combination of Active Methods and Passive Methods.

A hybrid measurement method may produce metrics as close to passive, but it still alters something in a data packet even if that is the value of a designated field in the packet encapsulation. One example

of such a hybrid measurement method is the Alternate Marking method (AMM) described in [[RFC8321](#)]. One of the advantages of the use of AMM in a DetNet domain with IP data plane is that the marking is applied to a data flow, thus ensuring that a measured metrics are directly applicable to the DetNet flow.

#### **5. OAM of DetNet IP Interworking with OAM of DetNet MPLS**

TBA

#### **6. OAM of DetNet IP Interworking with OAM of TSN**

TBA

#### **7. IANA Considerations**

This document does not have any requests for IANA allocation. This section can be deleted before the publication of the draft.

#### **8. Security Considerations**

This document describes the applicability of the existing Fault Management and Performance Monitoring IP OAM protocols, and does not raise any security concerns or issues in addition to ones common to networking or already documented for the referenced OAM protocols.

#### **9. Acknowledgment**

TBA





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