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## Service OAM Module

### Overview

The ZebOS Network Platform Service OAM (SOAM) module provides a robust set of management tools to help maintain Ethernet service networks. Service OAM consists of Fault Management and Performance Management capabilities that easily incorporate into network elements to help support Ethernet services.

OAM (Operations, Administration and Maintenance) services help manage network infrastructures and services provided across a network infrastructure. The ZebOS Service OAM module provides the framework necessary for systems to operate within MEF-compliant Metro Ethernet Networks (MENs). Service OAM requirements represent expectations of Service Providers when managing Ethernet Services within a MEN, and Subscribers when managing Ethernet services across a MEN. The Service OAM framework describes the high-level constructs used to model different MEN and Service components that are relevant for OAM. The framework also describes the relationship between Service OAM and the architectural constructs of Ethernet Services (ETH), Transport Service (TRAN) and Application Service (APP) Layers as identified in the MEF 4 specifications.

Service OAM supports OAM across a specific Class of Service (CoS) instance when multiple CoS instances are supported within an Ethernet service that need to be managed for the purposes of performance monitoring.

### System Design

By design, subscribers connect to a Metro Ethernet Network (MEN) across a User Network Interface (UNI). Network elements (such as, IP, ATM, and Frame Relay elements) inside MEN interconnect through Internal Network-to-Network Interfaces (I-NNIs), and two autonomous MENs interconnect at an External NNI (E-NNI). MEN can also interconnect with other transport networks via Network Interworking NNI (NI-NNI) or with other service networks through Service Interworking NNI (SI-NNI).

The MEN layered network model includes the data, control and management planes. These planes are present for all three Layers of this model and are called the Transport Service Layer (TRAN Layer), Ethernet Service Layer (ETH Layer) and Application Service Layer (APP Layer).

### OAM Domain

An OAM domain operates within the Ethernet layer level as either a network or sub-network. It belongs to the same administrative entity that exchanges OAM frames. Typically, each service provider and/or network operator associates with this administrative boundary. Services might occur across a single or multiple networks. The OAM domain determines the span of the OAM flow across the administrative boundary.

### OAM Components

The following are the OAM components.

**Maintenance Entity (ME)** – The ME of OAM determines the application OAM flow. It represents an OAM entity that requires management. That is, each ME corresponds directly with the Ethernet layer and is essentially an association between two maintenance endpoints within an OAM Domain, where each endpoint corresponds to a provisioned reference point that requires management.

**Maintenance Entity (ME)** – A Maintenance Entity Group (MEG) includes any ME that belongs to the same service within the same OAM domain. A MEG contains a single ME for a point-to-point EVC and contains multiple MEs for a multipoint-to-multipoint EVC that has multiple UNIs.

**Maintenance Entity Group Endpoint (MEP)** – In a point-to-point EVC, there are two MEPs—one on each endpoint of the ME. In a multipoint-to-multipoint EVC, where there are multiple UNIs, there are multiple MEPs—again, one on each endpoint.

**Maintenance Entity Group Intermediate Point (MIP)** – A MIP is a provisioned OAM reference point capable of reacting to diagnostic OAM frames initiated by MEPs. A MIP does not initiate proactive or diagnostic OAM frames. The number of MIPs in a point-to-point EVC or multipoint-to-multipoint EVC depends on the specific deployment.

**Traffic Conditioning Point (TrCP)** – A TrCP corresponds to the Ethernet Subscriber Conditioning Function (ESCG). Traffic conditioning occurs at the UNI-C/UNI-N, as well as at other locations in the network. For example, SOAM occurs between peer MEP instances of an ME. From the network, traffic conditioning performed at TrCPs might occur before or after a given MEP and within the same NE as the MEP. As a result, OAM frames generated by a given MEP may be subject to traffic conditioning.

**Maintenance Entity Group Level** – A MEG Level helps distinguish between OAM frames belonging to different nested MEs. MEs that belong to the same MEG share a common MEG level. Ethernet OAM identifies eight MEG Levels. When subscribers, service providers, and network operators share the MEG Levels space, allocation of MEG Levels can be negotiated among the different roles involved.

**Maintenance Entity Group Class of Service (CoS)** – The Maintenance Entity Group CoS represents one or more priorities associated with the OAM frames for a given ME. Each ME within a MEG shares a common CoS profile. An EVC ME can associate with OAM frames with multiple priorities, since an EVC can associate with service frames with different CoS levels.

## Features

- Full implementation of MEF 17 (Service OAM)
- Bidirectional Forwarding Detection (BFD) module, which features support for static routes, BGP, IS-IS, and OSPFv2
- Fault management used to detect, verify, localize, and notify faults
- Performance monitoring, including performance parameter measurements
- Auto-discovery, including discovering service-aware network elements within provider networks
- Supports both Intra- and inter-provider Service OAM

## Requirements

- ZebOS Network Services Manager

## Standards Supported

- MEF 2 - Requirement and Framework for Ethernet Service Protection
- MEF 11 - User Network Interface (UNI) Requirements and Framework (UNI Type 1 and 2 only). Includes:
  - MEF 20 Section 8 - UNI Type 2 Discovery and Configuration
  - MEF 20 Section 9 - Supporting E-LMI for UNI Type 2
  - MEF 20 Section 10 - Supporting Ethernet OAM (Link and Service level OAM)
  - MEF 10.1 - UNI and EVC per UNI Service attributes

- MEF 10.1 - EVC Service attributes
- MEF 16 - Ethernet Local Management Interface (E-LMI)
- MEF 17 - Service OAM Framework and Requirements

### **Standard Deliverables**

- Source Code (written in ANSI compliant C)
- Installation Guide
- Configuration Guide
- Command Reference Guide
- Developer Guide