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ZebOS®
Network Platform

Layer 2 OAM Modules

Operations, Administration and Management for Layer 2

Overview

The ZebOS Network Platform offers a package of protocol modules for Layer 2 Operations, Administration and Management (OAM) that support the advent of the Ethernet as a Metropolitan Wide-Area Networking (WAN) technology. This package addresses two important areas of Ethernet OAM that includes the monitoring and troubleshooting of end-to-end Ethernet service instances and the monitoring and troubleshooting of individual Ethernet links.

Ethernet to the First Mile

The ZebOS Ethernet to the First Mile (EFM) Protocol module is a set of extensions to the IEEE 802.3 MAC (Media Access Control) and MAC sublayer and introduces the concept of an Ethernet Passive Optical Network (EPON). The ZebOS EFM Module describes subscriber access technologies and the physical-layer specifications for subscriber access. Residing in an optional OAM layer, ZebOS EFM provides mechanisms for monitoring link operations, including Critical Link Events and Link Events signaled via Link Event TLV (Type-Length-Value) messages.

Connectivity Fault Management

The ZebOS Connectivity Fault Management (CFM) Protocol module addresses the per-customer and per-service granularity required to manage individual Layer 2 Ethernet services. The ZebOS CFM Module lets service providers configure Maintenance End Points (MEP) on a per-port, per-VLAN, or per-domain basis; and to configure Maintenance Intermediate Points (MIP) on a per-port and per-level basis. Enhanced CFM services may operate over LAN segments, C-VLAN (customer VLAN), S-VLAN (service VLAN), B-VLAN (backbone VLAN), and backbone service instances identified by service instance IDs (I-SIDs).

Link Layer Discovery Protocol

The ZebOS Link Layer Discovery Protocol (LLDP) Module runs on an IEEE 802.1-compliant LAN bridge as an agent that provides a mechanism for all bridges connected to the LAN to send and receive connectivity and management-related information amongst each other. A separate daemon that is a client of NSM manages the LLDP module in ZebOS. The LLDP module supports both the LLDP protocol features and the LLDP Management Information Base (MIB).

Features

Ethernet to the First Mile

- Remote Fault Detection and Loopback Controls
- Dynamically Track Connection Health
- Locate Failing Links or Fault Conditions
- Supports Interlayer Service Interfaces in the OAM Sublayer

Connectivity Fault Management

- Detect, Verify and Isolate Connectivity Failures in Bridged VLANs
- Entities outside the Service Provider (SP) Domain can Manage All Functions
- Lets an SP assign selected customers restricted access to manage all functions for their own domains
- Supports Connectivity Check (CC), Link Trace, Loopback and Fault Notification messages
- Enforces Discovery, Link Monitoring and Remote Loopback
- Enhancements for Provider Backbone Bridges

Link Layer Discovery Protocol

- Define Managed Objects to Discover the Physical Topology of Adjacent LAN stations
- Three operational modes: Transmit-only, Receive-only, and Transmit and Receive

Benefits

- Platform-independent software
- Industry-standard Command Line Interface (CLI) management
- Ability to assign administrators the capability to manage their own domains
- Ability to assign a local administrator to manage all domains within a service area

Requirements

- ZebOS Network Services Module

Standards Supported

- Ethernet Link OAM — IEEE 802.3ah - 2004 clause 57 and RFC 4878 — EFM MIB
- Ethernet Service OAM — IEEE 802.3ah - 2004 clause 57 and ITU-T Y.1731/05-2006,
- IEEE 802.1ag - 2007 amendment 5
- IEEE 802.1Qay/D4.5 - clause 26.9 — Ethernet Protection Switching
- ITU-T G.8031 - 06/200; ITU-T G.8031 Amendment 1 - 10/2007
- ITU-T G.8032, 06/2008
- IEEE 802.3-2002 clause 43 — Link Aggregation/Static aggregation
- IEEE 802.3 LAG-MIB

Standard Deliverables

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