

ZebOS[®]
Network Platform

Provider Backbone Bridging Module

Introduction

The ZebOS[®] Provider Backbone Bridging (PBB) module provides network administrators with the capability to create Ethernet backbones for their Provider-Bridged-based service access networks. PBB overcomes two major scalability problems with 802.1ad Provider Bridging (PB). One is that the number of service instances (S-VID) for PB is restricted to 4,095, and the other is the sharing of MAC address space between service providers and subscribers. PBB eliminates these restrictions. First, an additional, dedicated MAC header for backbone MAC address separation has been introduced. This header can be used to identify a Backbone Destination Address (B-DA), a Backbone Source Address (B-SA), or a Backbone VLAN ID (B-VID). Second, a new instance tag (I-tag) is implemented for scaling the maximum number of service instances to 16 million, thereby overcoming limitations of PB.

Provider Backbone Bridging Features

Implementation of the IEEE 802.1ah standard clearly separates the service level (I-tag) from the network level (B-VID), thus allowing multiple service instances to be transported by a single Backbone VLAN (B-VLAN), as opposed to the 1:1 service-instance-to-VLAN scheme supported in IEEE 802.1ad. A PBB network has two types of bridge nodes: Backbone Edge Bridge (BEB) and Backbone Core Bridge (BCB). A BCB can be any 802.1ad-compliant VLAN bridge, while a BEB performs all the necessary 802.1ah-specific frame encapsulation and de-encapsulation at the edge of the network.

Frames sent across a PBB network are encapsulated with an additional backbone MAC header address, and a B-VLAN tag space that is independent of attached customer networks. Each customer service frame is recognized by a service instance ID (I-SID). The Ethernet Virtual Circuit (EVC) is recognized by the Service VLAN (S-VLAN).

The Enhanced Internal Sublayer Services (EISS) have been extended to support the PBB I- and B-component architecture. The Multiple Spanning Tree Protocol (MSTP) has been enhanced so that PBB MSTP is independent from the spanning tree operations of attached customer network(s).

I-Component and B-Component

IEEE 802.1ah specifies two types of network edge components: I-components and B-components. A backbone edge bridge can be either an I-BEB, a B-BEB, or an IB-BEB (an edge bridge with both types of components resident). There can be multiple I-components for a BEB, but only one B-component.

A B-Component handles B-VLAN bridging and is BCB-facing. An I-Component handles Customer VLAN (C-VLAN) and S-VLAN bridging and is customer-facing. The interface between I- and B-components is called an I-tagged interface, which means that these two components can exchange frames identified by the service instance identifier (I-SID) only.

Benefits

- Complete separation of customer and provider MAC address domains
- Supports up to 16 million service instances
- PBB MIB implementation
- PBB network specific Connectivity Fault Management (CFM)

Requirements

ZebOS NSM — Network Service Manager

ZebOS Layer 2 xSTP — Spanning Tree, Rapid Spanning Tree, and Multiple Spanning Tree Protocol

ZebOS Layer 2 VLAN — VLAN and Prioritization with Shared and Independent VLAN Learning (SVL/IVL)

Standards Support

- IEEE 802-1ah-Draft 4.1 — Provider Backbone Bridges

Standard Deliverables

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