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ZebOS®
Network Platform

ZebOS Advanced Integration Suite

Overview

The ZebOS® Advanced Integration Suite (AIS) contains a software platform called the Hardware Integration Platform (HIP). It is developed for and pre-integrated with industry-leading merchant silicon and operating systems.

ZebOS AIS HIPs provide a comprehensive forwarding plane implementation, supporting Layer 2, Layer 3 , multicast, and MPLS-Traffic Engineering routing and switching. A ZebOS AIS HIP, when combined with ZebOS Network Platform Layer 2, Layer 3, multicast, and MPLS networking protocol modules for the control plane, provides a full system solution for enterprise switching, Metro Ethernet, access, edge, mobile wireless, and advanced IP service applications.

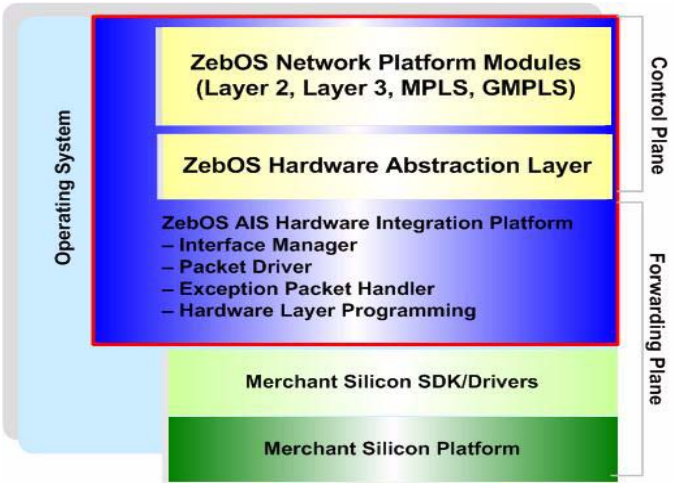
ZebOS AIS HIPs are fully system tested with the ZebOS protocol software on leading merchant silicon reference platforms. A well-defined extensible API between the ZebOS Network Platform (control plane) and the ZebOS AIS (forwarding plane), called the Hardware Abstraction Layer (HAL), allows easy addition of custom features and applications.

Selecting from IP Infusion's full range of ZebOS AIS Hardware Integration Platforms and ZebOS Network Platform Layer 2, Layer 3 and MPLS protocol modules, ODMs and OEMs can rapidly bring complete solutions to market without the costly and lengthy software and hardware integration development normally associated with complex switching and routing systems.

Modular and Portable Software Architecture

The ZebOS Network Platform is a complete collection of Layer 2, Layer 3, multicast and MPLS networking protocol software modules. ZebOS supports both IPv4 and IPv6 networks, and can support not only core, edge, and access routing and switching platforms, but can also act as the standard routing protocol for an entire range of IPv6-enabled devices. These include Small Office-Home Office (SO-HO) gateways, wireless, access and security devices, plus equipment that supports Virtual Private Network (VPN) and Voice-over-Internet Protocol (VoIP) technologies, and require exceptional Quality of Service (QoS) plus superior bandwidth management.

Both the ZebOS Network Platform and ZebOS AIS software suites utilize an industry-leading, scalable, modular and extensible architecture for building routing and switching solutions, in addition to IP services and application systems.



ZebOS Network Platform Modules with ZebOS AIS HIP

The ZebOS Hardware Abstraction Layer (HAL) isolates all of the hardware-platform-specific interactions into a small set of well-defined function calls for the ZebOS Network Platform (control plane). The ZebOS HAL provides a unified interface for the control plane to interact with the forwarding plane for all Layer 2, Layer 3, multicast and MPLS forwarding needs. Function calls above the ZebOS HAL run unmodified for any switching and routing hardware platform. The result is that customers have the complete flexibility to select only the protocol modules they require in the most cost- and code-space effective manner.

The ZebOS Hardware Integration Platform supports integration and optimization of the ZebOS Network Platform software with a silicon hardware platform and an operating system of choice. Depending on the system application, users can select an appropriate ZebOS HIP base module and required options. The available options for Layer 2, Layer 3, Enterprise and Metro Ethernet switching applications is shown in the following table. Availability of options may depend on the silicon used by the merchant.

	L2 Only Base Module	**L2, L3, Hybrid Base Module**	**IPv6 (Unicast & Multicast) Option**	**Stackable & Chassis System Option**	**MPLS & Traffic Engineering Option**
L2 Enterprise Switch	X		X		
Stackable L2 Enterprise Switch	X		X	X	
L3 Enterprise Switch		X	X		
Stackable L3 Enterprise Switch		X	X	X	
Metro Ethernet Switch (IPDSALM, EFM, xPON, Ethernet over Fiber/SONET/WDM)		X	X	X	X
Metro Ethernet MTU		X	X		X

Taking advantage of feature-rich merchant silicon, a ZebOS HIP base module includes support for hardware-based Quality of Service (QoS) management, rate limiting, traffic metering, and security needs, including packet filtering/remarking, denial-of-service attacks, CPU protection and packet tunneling.

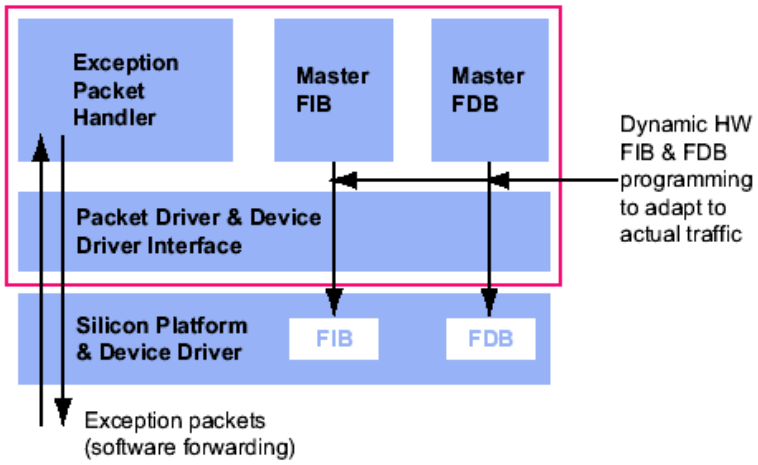
Comprehensive Forwarding Plane Implementation

The ZebOS AIS HIP includes an advanced interface manager that provides a logical view of hardware platform interfaces. The interface manager insulates interconnect topology details of merchant silicon chips within and across hardware platforms, so that hardware platform physical and logical interfaces can be easily managed and configured from the control plane via the ZebOS Integrated Management Interface (IMI). The interface manager implementation encompasses Layer 2 ports, Layer 3 interfaces, aggregates (Layer 2 or Layer 3), Switched-Virtual-Interface, and all possible Layer 2/Layer 3/VLAN/aggregate hierarchies. The Interface Manager simplifies systems management, and provides a uniform mechanism for all of the ZebOS ARS Layer 2, Layer 3 and MPLS protocols to view and interact with the physical and virtual interfaces.

The ZebOS AIS HIP also contains a Packet Driver that provides a logical pipe between the control and forwarding planes for all ZebOS Layer 2, Layer 3, multicast and MPLS protocol control packets.

High Performance Scalable Frame/Packet Forwarding

ZebOS AIS HIP supports a master FIB and an FDB in software, as extensions to the hardware/silicon-based FIB and FDB, for performance scaling. The ZebOS HIP includes an Exception Packet Handler to handle packets received from the Packet Driver that fail to find a destination using forwarding information from the hardware layer. The Exception Packet Handler can appropriately route exception packets, as it has access to both the master FIB and FDB. The Exception Packet Handler can also program the hardware layer so that future packets to the same destination can be routed using a fast-path (hardware-switched path), if required.



Exception Packet Handling Mechanism

With the software-based master FIB and FDB in the ZebOS HIP, customers can scale routing performance beyond the limited size of the local forwarding database in hardware using larger RAM and a more powerful CPU.

Advanced Distributed Stacking/Chassis Support

The advanced architecture of a ZebOS HIP maintains modular, portable, Layer 2/Layer 3, hybrid, and adaptive packet handling benefits, while supporting a distributed forwarding plane for maximum performance and scalability. A unified management view of a stacked or chassis system is supported with the ZebOS HIP distributed forwarding plane architecture, which manages Layer 2/Layer 3 switching and routing across an entire system.

A ZebOS HIP design supports the concept of master/slave instances required to support a distributed forwarding plane, in a stackable or chassis-based system, with a single point of management. In response to a system change event, one of the stackable units or chassis processor cards becomes the Master to perform system interconnection, discovery, topology management, and dynamic reconfiguration.

Integration of Customer Features and Functions

The flexible ZebOS AIS architecture allows developers to easily expand, adapt or configure it according to their unique needs. The well-defined HAL API permits ZebOS Network Platform modules and custom applications to interface with the operating system and forwarding plane for routing and forwarding table updates. The ZebOS HAL API is also highly extensible, to enable expansion of the support of merchant silicon hardware platform and operating system for customer-specific applications.

Summary of ZebOS AIS HIP Benefits

- Integration and optimization of ZebOS Network Platform software with a hardware platform and operating system of choice
- Flexible and cost-effective ZebOS Network Platform Layer 2, Layer 3 and MPLS protocol module selection for the control plane, independent of the hardware platform and operating system
- Unified forwarding plane interface for all Layer 2, Layer 3 and MPLS forwarding needs
- Scalable hybrid hardware plus software frame and packet forwarding
- Stackable and chassis system support with single IP address management
- Advanced distributed forwarding plane architecture to achieve scalable performance
- Hot-swappable stackable unit/chassis port blade insertion and removal

Requirements

- ZebOS Network Services Module

Supported Merchant Silicon

- Broadcom StrataXGS families
- Intel IXP2400 series

Standard Deliverables

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