Open Shortest Path First (OSPF)

EION Inc. OSPF is a portable software module that fully implements the Open Shortest Path First (OSPF) protocol to provide route generation as per RFC 2328.

Overview

EION Open IP Environment is a portable real-time software suite that IP-enables new and traditional network elements providing high performance interoperability across multiple platforms and products. Open IP Environment is based on a single, open, modular and scalable framework that allows system integrators and developers to incorporate services such as routing, Quality of Service (QoS), security, IP accounting and policy management into any type of device. Open IP Environment is platform and real-time operating system (RTOS) independent and can work on any type of device ranging from high end optical core switches to personal digital assistants (PDAs).

Framework Overview

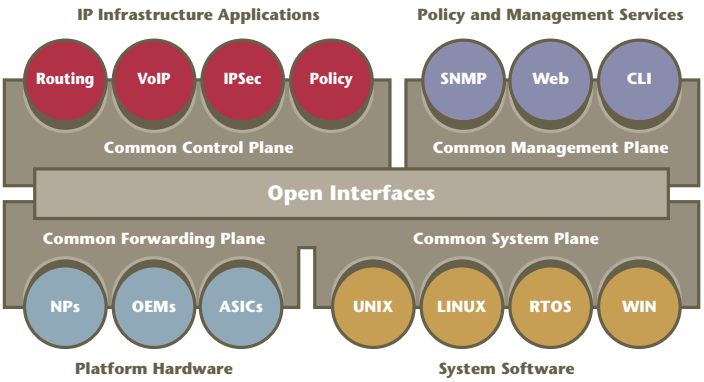
EION Open IP Environment framework consists of four planes: Common Control Plane, Common System Plane, Common Forwarding Plane and Common Management Plane. Each of these planes contains a set of components that are built to use well-defined interfaces.

Open IP Environment OSPF module resides within the Common Control Plane to deliver high performance and interoperable routing. This plane supports the Open IP Environment Internet Protocol (IP) infrastructure and enables a mix and match approach for adding support for networking protocols and/or services. The control plane holds together the routing protocol applications (RPAs) that deliver network functionality while also providing interchangeable access for all IP-based modules such as BGP, RIP and IPv4.

The Route Table Manager (RTM) is an Open IP Environment component within the Common Control Plane that maintains the unicast routing table and is responsible for the process of redistributing routes to the various RPAs. The RTM receives information from the Open IP Environment OSPF module and sends the “best” routes to the forwarding engine located within the Open IP Environment Common Forwarding Plane.

OSPF Overview

OSPF is a link state protocol. A link state protocol follows a replicated database approach where each router has a copy of the database. Each router contributes pieces to the database that describe the local environment of the routers. All routers piece together the information to obtain a current map of the network. The shortest path is calculated using an algorithm and based on information stored in the database. EION Open IP Environment OSPF is a portable software module that fully implements the OSPF protocol to provide route generation as per RFC 2328.



OSPF Performance

This module demonstrates significant performance improvements over previous OSPF implementations. Independent tests reveals that the Open IP Environment 2.1 OSPF module provides a 250% performance improvement.

OSPF Interactions

EION Open IP Environment OSPF module has been specifically designed to deliver time to market advantages through the built-in control-plane interaction with other Open IP Environment modules, such as the TCP/IP stack and RTM. The Open IP Environment OSPF module uses the TCP/IP stack provided by the IPv4 module to send and receive protocol data units (PDUs) from other OSPF peers.

Within the Open IP Environment, the OSPF module can be configured to use the Open IP Environment's Common System Plane functions such as timers, message queues, memory manager and thread manager libraries.

This module also uses the services of the Common Management Plane by developing appropriate management code in order to integrate with management services such as SNMP, EION Command Line Interface and/or web-based management.

Finally, the OSPF module seamlessly integrates with the Open IP Environment or third party forwarding engine to forward Protocol Data Units (PDUs), enhancing overall interoperability. The PDUs are forwarded through a network interface based on a forwarding table that provides the best route to the packet destination.

For more details about other Open IP Environment modules and planes, please refer to the relevant product briefs.

OSPF Features

EION Open IP Environment OSPF module demonstrates the following key features:

- Intra and inter-area routing
- Type 1/2 external routing
- OSPF "not so stubby area" (NSSA) Option
- Interdomain Routing Protocol (IDRP) for IP-OSPF Interaction
- Opaque link state availability (LSA) Option
- Manual and automatic virtual links
- Load Sharing among equal cost paths
- Broadcast, point-to-point and multi-point-to-point models
- MD5 authentication
- On-the-fly configuration
- Incremental SPF
- OSPF module has been ported using a number of compilers to ENDIAN types, CISC and RISC processors and a number of operating systems.

For a complete list of Open IP Environment OSPF RFC support, please refer to the last page of this product brief.

OSPF Management Support

The module supports the comprehensive Management Information Base (MIB) defined in RFC 1850. All objects are defined in a high-level description file to allow easy integration with Open IP Environment and third party SNMP agents.

In addition, OSPF implements management via EION Command Line Interface (CLI). EION CLI is packaged with industry standard commands which can be easily integrated into the customer's specific device. Please refer to the EION Command Line Interface Product Brief for more information.

OSPF Module Implementation

EION Open IP Environment OSPF module is implemented in the "C" programming language and runs as a single thread. The module has been configured to periodically relinquish control. This permits utilizing of the CPU for other activities in the system.

Through the publication of APIs, the Open IP Environment OSPF module has been designed for ease of portability and modularity. Open IP Environment provides an architecture to allow you to implement OSPF within the Open IP Environment framework, or alternatively to adapt the OSPF module to your specific environment.

Ease of Portability

EION Open IP Environment provides a set of interoperable modules that are available for use in both established and "greenfield" products. The customer has the choice to pick and choose Open IP Environment modules to incorporate into the customer's established products, preserving the investment in prior development. The customer also has the option to use modules within the Open IP Environment framework to develop a new software base to address going-forward opportunities. It is also possible to compile the software for a variety of target processors. Therefore, protocol composition can be statically changed by modifying the configuration to suit your needs.

Established products typically have a well-developed architecture and an existing suite of applications, and these products will be looking to Open IP Environment for additional capabilities. The portable and modular Open IP Environment components can be integrated into an existing execution environment to work within an existing code base, with minimal modifications to the customer's environment.

Greenfield products typically require a full suite of applications plus the Open IP Environment framework to provide an appropriate execution environment. The Open IP Environment framework and modules are well-positioned to address such greenfield opportunities.

Benefits

In a market that demands ever-increasing IP support, it is difficult to maintain sufficient in-house expertise in every area. EION Open IP Environment framework and OSPF module solve this problem by:

- Allowing OEMs to focus on their real value added solutions, not underlying infrastructure
- Reducing the length of time to market via ease of integration of key components such as OSPF
- Enabling the freedom to choose among different software and hardware platforms
- Enabling ease of portability to traditional and new network enabled devices
- Enabling accelerated development of highly customized IP-enabled products via well documented APIs
- Enabling a pick and choose approach to Open IP Environment modules via a flexible open framework addressing various devices and applications from PDAs to carrier grade optical switches
- Delivering components of the framework that are scalable, modular, and portable that consistently demonstrate high performance attributes
- Delivering standards-based interfaces and common programming languages such as C, C++ and Java to developers, enhancing overall productivity with a small learning curve.
- Delivering configured and managed modules that use one or several of the following management capabilities:
  - EION Command Line Interface
  - Simple Network Management Protocol (SNMP)
  - Web-based management.

EION Open IP Environment OSPF Feature Summary

RFC and Draft Support

- RFC 1587 OSPF NSSA Option
- RFC 1745 BGP-4/IDRP for IP-OSPF Interaction
- RFC 1850 OSPFv2 MIB
- RFC 2328 OSPF Version 2
- RFC 2370 OSPF Opaque LSA Option

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