



Routing Policy Server (RPS)

EION Open IP Environment Routing Policy Server is a portable software module that manages routing policy information and provides consistent interfaces for system management, forwarding engine and Routing Protocol Applications (RPAs).

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).

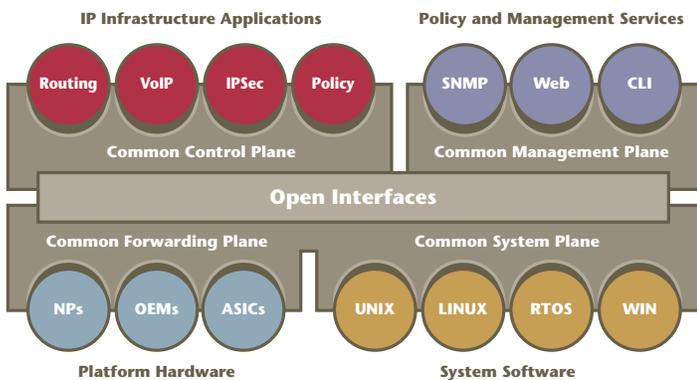
Open IP Environment RPS module resides within the Common Control Plane to deliver high performance and interoperable management of configured policy information. This plane supports the Open IP Environment Internet Protocol (IP) infrastructure and enables a mix and match approach for adding support for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

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.

RPS Overview

EION Open IP Environment RPS is a portable software module that manages configured policy information and provides a consistent interface to all RPAs. Each routing protocol uses this interface to access and apply the policies to their internal databases in determining which routes to accept or announce. The RPAs only send a route update or submit a received route update to Unicast Route Table Manager (U-RTM) or Multicast Route Table Manager (M-RTM) when the routes successfully pass the RPS policy filtering, i.e. the screening of incoming and outgoing route updates.



RPS is a policy-based routing framework that provides a mechanism for expressing and implementing data packet forwarding and routing based on policies defined by network administrators. It provides a flexible mechanism for routing packets through routers, complementing the existing mechanism provided by routing protocols.

RPS interacts with a central Policy database that consists of all the configured access lists and route maps. Once RPS receives a "policy change" it updates (adds, modifies or deletes) the central policy database using the core RPS routines. Core RPS routines handle the locking and unlocking of the database during this period. After the policy database is updated, RPS sends event notifications to RPAs to inform them about the policy change.

The RPS provides a caching mechanism that enables RPAs to quickly retrieve policy information. In this mechanism, individual RPAs maintain a local storage (cache) for frequently accessed policy objects such as access control lists and route maps. RPA local storage

reduces latency and response time for routing policy retrieval and reduces server load (fewer requests for the RPS to handle).

RPS Interactions

EION Open IP Environment RPS module is designed with well-defined application programming interfaces (APIs) that enhance interoperability with other modules in the Common Control, Common Forwarding, Common System and Common Management planes. Its modular and portable design also permits RPS to support routing policy retrieval and evaluation with third-party RPAs. However, maximum time to market reduction usually occurs when RPS is used within the Open IP Environment framework.

The RPS implementation resides in the Common Control Plane and interacts with the Open IP Environment unicast RPAs. The RPAs access the routing policy database using set of APIs provided by RPS. When routing policies change, RPS informs the registered RPAs of this change. RPAs then decide whether they need to re-apply the Accept/Announce policy routines. There are two types of interactions between the RPAs and RPS: connection management to create and destroy the RPS/RPA relationship, and routing policy retrieval and evaluation.

Within the Open IP Environment framework, the RPS module uses the Open IP Environment Common System Plane functions such as timers, message queues, memory manager and thread manager libraries. In addition, RPS integrates with Open IP Environment or third party forwarding engines to provide routing policies for incoming and out-going IP packets. All packets received on an interface with policy-based routing enabled are considered for policy-based routing. The forwarding engine passes the packets through access lists for packet filtering. Based on criteria defined in the access lists, packets are either forwarded to the appropriate next hop or dropped. To improve filtering performance, forwarding engines maintain their own local copy of the access lists that are used for packet filtering. The RPS downloads forwarding filters to the forwarding engine using the Open IP Environment Quality-of-Service (QoS) classifier APIs.

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

RPS Features

EION Open IP Environment Routing Policy Server demonstrates the following key features:

- Provides access control lists (ACLs), which are used for packet filtering, route redistribution and for accept and announce policies as part of route maps.
- Provides route maps, which are used in route redistribution, or to implement protocol-specific accept and announce policies.
- Manages the configured routing policies and provides a consistent interface to all routing protocol applications (RPAs). Each routing protocol uses this interface to access and apply the policies to their internal routing tables in determining which routes to accept or announce.
- Provides a registration mechanism for the RPAs. The Routing Policy engine uses this mechanism to generate a notification event to the registered RPAs whenever a policy changes.
- Supports general Announce and Accept Policies common to all protocols.
- Provides interfaces with the forwarding engine to add or delete access lists used for incoming and outgoing packet filtering.

RPS Management Support

EION Open IP Environment Routing Policy Server implements management via EION Command Line Interface (CLI) to manage its configuration and to access route policies. RPS also provides well-defined APIs to define and edit access lists and route maps.

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.

RPS Module Implementation

EION Open IP Environment RPS module is implemented in the "C++" programming language and runs as a single thread.

Open IP Environment RPS module is designed for portability and modularity. The design includes open and published APIs. Open IP Environment provides an architecture to allow you to implement RPS within the Open IP Environment framework, or alternatively to adapt the RPS 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 RPS 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 RPS
- 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.

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