Introducing Cisco’s Application eXtension Platform (AXP) – Architecture and Use Cases

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Evolving Branch Router Needs

- Security
- IP voice and video
- WAN/app optimization
- Mobility
- Monitoring

- Only Cisco developed services are integrated
- Customers, System Integrators and ISVs would like to add their own value-added functionality into the router
- They don’t just want to host applications but to integrate their applications into the network to solve business problems
Linux-based integration environment with downloadable SDK
Multi-app support: segment and guarantee CPU, memory, disk
Extensible Cisco CLI with Cisco IOS APIs
Cisco ISR 1841, 2800, 3800 series support

www.cisco.com/go/axp
AXP Technical Overview

Dedicated Application Resources
- Dedicated CPU, memory and Disk
- Application separated from core router functionality
- Full networking

Standards-Based Hosting Infrastructure
- Hardened Cisco Linux OS with virtualization
- Complete install/upgrade packaging utilities
- Logging and debugging infrastructure

Programming Support
- Support for Native x86 C/C++
- Java support w/ optional OSGI and Tomcat
- Scripting Support (bash, perl, python)

Value-Added Features
- Serial tunneling providing application access to external devices
- Syslog server to store logs from router and other local devices
- Netflow collector to persist and analyze flows locally

Cisco IOS APIs Integrate the Application into the Network
- Programmatically configure and monitor Cisco IOS
- React to changes in network conditions
- Programmatically Influence Routing, QoS and IP-SLA
- Monitor packets flowing through network
AXP Software Development Kit

- Packaging Tools
  - Bundling tool—create a single software image
  - RPM conversion tool—port standard Linux components
  - Dependency Tool—identifies missing libraries and executables
- CLI Extension API
  - Customer Application Commands
- Header files and source code for Cisco IOS API
- Sample Source Code
Application Packaging

Vendor’s X.509 Certificate (includes public keys)

Checksum of Certificate Encrypted with AXP Private key

Vendor’s Private Key

Application Files

Sign application files

Compress Application Files

Install / Update

Signed Application Bundle
API Overview

- **IOS Service API (CLI)**
  - Query and configuration capabilities into IOS router configuration.

- **CLI Service API (CLI)**
  - Query and configuration capabilities into AXP service module configuration.

- **AXP Trigger API**
  - Send notifications to the application based on events. Allows the application to react to network conditions, changes to IOS configuration and other IOS events.

- **Network Packet Monitoring**
  - Mechanisms to send packets to 3rd party application for analysis or processing.
  - Promiscuous mode

- **Serial Port Control**
  - Access to serial port on IOS router where blade is deployed

- **Other Add on Packages**
  - e.g. OSGi
Application must depend upon package

axp-iosapi.<platform>.<version>.pkg

Can run user or privileged mode commands i.e: ‘show …’ to receive router configuration data and ‘config t …’ to configure the router.
No application dependency required since functionality is built in.

Can run user or privileged mode commands i.e: ‘show …’, ‘config t …’ on router
**AXP Trigger API**

- Application must depend upon package
  - axp-eemapi.<platform>.<version>.pkg
- Embedded IOS events trigger an XML-RPC call to an application (eg: config change, interface state change)
- Applications use API’s to listen for events that they are interested in hearing about
- Configured via the CLI
• No package dependency is required.
• Configure the ISR to copy packets to the service module. This configuration can be done via the Router IP Traffic Export (RITE) or Network Analysis Module (NAM) features available via IOS.
• RITE provides more granular control because it supports Access Control Lists (ACL), but will not copy router generated packets.
Remote Serial Device API

- Application must depend upon package
  - axp-vserial.<platform>.<version>.pkg
- Local AXP host TTY device interacts with the external IOS serial device
- Device name: /dev/modem
- Serial port settings (eg. baud rate) configured through IOS
Other Add-On Packages

• ProSyst Open Services Gateway Initiative (OSGi)
  • axp-prosyst-mbs6.<platform>.<version>.pkg
    • Allows Java applications to be remotely started, stopped, installed, updated and uninstalled

• Tomcat
  • axp-tomcat5.<platform>.<version>.pkg
    • Package to embed Apache Tomcat

• SSH
  • axp-ssh-4.6p1-k9.<platform>.<version>.pkg
    • Enables ssh tunneling to the application

• Perl
  • axp-perl-5.8.8.<platform>.<version>.pkg
    • Provides Perl language support.
**Problem**
- More devices cause operational complexity
- Achieving end-to-end management and increased availability from infrastructure to service level

**Solution**
- Prosyst mPower Remote manager on Cisco AXP
- Based on open standards—Java, OSGi, OMA
  Dynamic injection of new applications, libraries and services without device downtime

**Benefits**
- Manages Cisco AXP-based applications
- Efficient application delivery and services on-demand
- Provides complete router and application lifecycle management
Use Case: Connected Healthcare

Problem
• Doctors struggle to care for patients without knowledge of past treatments / illnesses
• Dangerous medical mistakes, wrong prescriptions

Solution
• Healthcare Connector Application
• Cisco ISR 1841 w/ integrated AXP AIM blade
• USB support for card readers other devices
• Programmatic control of VPN by application

Benefits
• Meets stringent privacy and encryption standards for health record transmission
• Fully-integrated solution (HW/SW platform) with utilization of ISR USB ports for integration of smart card readers
• Easily managed for physician’s office and health clinics
• Low-cost
## Use Case: Utilities & Building Monitoring

### Problem
- Multiple devices needed to communicate, collect and transmit process manufacturing data
- Supervisory and process control networks must be robust, secure meeting regulatory compliances

### Solution
- **Branch:** Cisco ISRs + AXP NME + OSIsoft server/DB/interfaces
- **Centralized:** OSIsoft server/DB/UI + northbound integration into SAP, etc.

### Benefits
- Frequent collection and Integrated analysis of granular IT + Operations data
- Enables Troubleshooting and predictive analysis
- Security/Regulatory Compliance
- Mean-time-to-repair (MTTR) reduced significantly
Summary

- Cisco’s ISRs and the AXP module provide an interactive application model between 3rd party applications and network infrastructure.
- Prosyst and OSGi provide a lightweight framework and application management capability to the AXP.
- Combining AXP and OSGi allows for improved time to market and reduced development costs.
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http://www.cisco.com/go/axp