

Cisco Application Policy Infrastructure Controller Enterprise Module

General information

Q. What is the Cisco® Application Policy Infrastructure Controller Enterprise Module (APIC-EM) and what does it do?

A. It is Cisco's Software-Defined Networking (SDN) controller for enterprise networks. It works across WAN and campus networks to automate policy configuration tasks and simplify and accelerate network operations. It translates business policy directly into network device-level policy across your network to relieve you of the most complex and tedious IT tasks.

Q. How does the APIC-EM work?

A. It offers open, northbound APIs for business policy definition and network automation functions that can be invoked by any SDN application for centralized network control and management. The APIs abstract the network variabilities by device and feature into declarative business policies and make it easier to develop SDN applications.

Q. Do I need a new infrastructure to use the APIC-EM controller?

A. No. In addition to northbound APIs, the controller supports an open, southbound interface, with socket-based communication that is capable of supporting virtually any device protocol. The APIC-EM initially supports Command-Line Interface (CLI) and Simple Network Management Protocol (SNMP) as southbound interfaces to network elements. Since the APIC-EM uses standard communications procedures (SSH or Telnet using Box credentials), it can communicate with both existing network devices with no modifications and all new devices. Additional support for other southbound protocols is planned for future releases.

Q. Is the APIC-EM a hardware device or software application?

A. APIC-EM software is an ISO image that can run in the following environments:

- Bare-metal hardware (recommended) - ISO installed directly on hardware (a physical appliance) rather than on top of a host Operating System (OS). The hardware must be supported by Ubuntu 14.04 LTS.
- Virtual appliance - ISO installed within a virtual machine in a VMware vSphere environment.

Cisco also offers a hardware appliance option, which consists of the APIC-EM ISO preloaded on select Cisco Unified Computing System™ (UCS®) configurations. Customers can purchase the hardware appliance directly from [Cisco](#) or through our [resellers](#). See Tables 1 and 2 for the list of available SKUs.

Table 1. Virtual appliance SKUs

R-APICEM-SW-K9	Cisco APIC EM Controller Software
R-APICEM-SW-K9=	Cisco APIC EM Controller Software (Spare)

Table 2. Hardware appliance SKUs

APIC EM-APL-R-K9	Cisco APIC EM Controller Appliance 10C-64G-2T
APIC EM-APL-R-K9=	Cisco APIC EM Controller Appliance 10C-64G-2T (Spare)
APIC EM-APL-G-K9	Cisco APIC EM Controller Appliance 20C-128G-4T
APIC EM-APL-G-K9	Cisco APIC EM Controller Appliance 20C-128G-4T (Spare)

Q. What equipment is required to install the APIC-EM? Are there any special specifications?

A. The APIC-EM appliance requires compute and memory conventionally available on a wide array of x86 server products, including Cisco UCS. The requirements and specifications for virtual and physical appliances are as follows:

Virtual appliance requirements:

- VMware ESXi Version: 5.1/5.5/6.0
- Server: 64-bit x86
- Virtual CPU (vCPU): 6 (minimum)
- CPU speed: 2.4 GHz
- RAM: 64 GB (Single Node), 32 GB (Per Host for Multi-Node)
- Storage: 500 GB of available or usable storage after hardware RAID
- RAID level: Hardware-based RAID at RAID level 10
- Disk I/O speed: 200 MB per second
- Network adapter: 1 or more

Physical appliance specifications:

- Server: 64-bit x86
- CPU (cores): 6 (minimum)
- CPU speed: 2.4 GHz
- RAM: 64 GB (Single Node), 32 GB (Per Host for Multi-Node)
- Storage: 500 GB of available or usable storage after hardware RAID
- RAID level: Hardware-based RAID at RAID level 10
- Disk I/O speed: 200 MB per second
- Network adapter: 1 or more

Q. How is the APIC-EM different from the Cisco APIC?

A. The APIC-EM focuses on centralized network control across a broad range of existing Cisco enterprise products for the branch and campus, while the APIC focuses on centralized control of the data center. Both controllers use group-based policy constructs that can be used to express cross-domain requirements.

Q. What are the applications supported in Release 1.5?

A. Applications supported and available in APIC-EM Release 1.5 include:

- Path Trace
- Next-Generation Plug and Play (PnP)
- Intelligent WAN (IWAN) App
- EasyQoS App
- Cisco Active Advisor
- Cisco Integrity Verification
- SD-Bonjour

Q. What do the apps do?

A. Briefly, the apps provide the following capabilities (Release 1.5):

- PnP: Zero-touch device provisioning
- Path Trace: Enhanced application flow visibility
- IWAN App: Automated configuration of Cisco Intelligent WAN features through business intent policy. With it, IWAN setup requires only a few mouse clicks to setup a branch
- EasyQoS App: Business intent driven, end-to-end orchestration of QoS for enterprise networks
- Active Advisor: Simplifies network discovery and finds security alerts that apply to your devices. It also analyzes contract coverage and end-of-life status, and can compare your network against Cisco Validated Designs
- Integrity Verification: Collects integrity measurements from monitored devices, evaluates these measurements for correctness and unexpected changes, and obtains visibility into the results with the objective of identifying a compromise quickly to minimize its impact
- SD-Bonjour: Enables policy-based Apple Bonjour discovery and distribution across a user-defined network. In this distributed architecture, the next-generation Cisco Catalyst® switches perform Service Discovery Gateway (SDG) agent functions

Industry efforts and standards

Q. How is the APIC-EM related to the open-source OpenDaylight Project?

A. The APIC-EM is well-suited for customers who are interested in transforming their network investments with SDN-led control, automation, and management using a minimal Operating Expenditure (OpEx) model with out-of-box applications, embedded best practices, and open APIs. The OpenDaylight Project controller is an open-source SDN platform suited for customers who want to build their own unique solutions based on open-source components. Cisco is among the top contributors to the Open Daylight project and is committed to its success.

Q. What southbound APIs does the APIC-EM support to interact with networking devices such as routers, switches, and mobility infrastructure?

A. In Release 1.5, the APIC-EM supports the Cisco CLI and SNMP. It also uses the PnP protocol for the Next-Generation PnP application. Support for other emerging industry protocol standards are under development.

Further, the southbound interface uses a device abstraction model, which is standards-based. In the future, Cisco will make available an SDK so that other vendors, independent developers, and customers can incorporate model support for their own devices so they can be managed by the APIC-EM.

Q. Do routers, switches, and other networking devices need to support OpenFlow to work with the APIC-EM?

A. No. Only CLI and SNMP are required. The APIC-EM also supports a wide range of Cisco IOS® Software classic and IOS XE versions across an array of platforms. For additional details, refer to the [release notes](#).

Q. What types of northbound APIs does the APIC-EM support to interact with the application layer, such as customer applications, services, and policy engines?

A. The APIC-EM supports the Representational State Transfer (REST) API format to interface with an array of applications built by Cisco, our partners, and independent developers and customers.

Relationship to other Cisco management systems

Q. What's the difference between the APIC-EM and Cisco Identity Services Engine (ISE)?

A. The APIC-EM is a policy enforcement engine. The Identity Services Engine is a source of user identity information that can be integrated with the APIC-EM to facilitate policy enforcement. The advanced policy management technology built into the APIC-EM allows for the dynamic application of policies against various operational scenarios.

Q. What's the difference between the APIC-EM and the Cisco Prime™ Infrastructure network management system?

A. The APIC-EM is a policy-based SDN controller that translates business intent defined through its northbound APIs into active network configuration changes in the network elements. In this sense, the APIC-EM acts as a system of change. Cisco Prime Infrastructure provides device lifecycle management, change audit, configuration compliance, reporting, visualization, and feature-level monitoring and troubleshooting. It acts as a system of record.

Q. Can the APIC-EM and Cisco Prime Infrastructure communicate?

A. Yes, communication between Prime Infrastructure 3.x and the APIC-EM is done through REST APIs. APIC-EM-hosted SDN applications can automatically insert new devices and groupings into Cisco Prime Infrastructure, so that its system-of-record duties are provisioned automatically as changes happen in the network. Over time, Prime Infrastructure will migrate to becoming an application with all communication to the network executed through the APIC-EM, making the controller the single point of truth in the network.

Q. Since both the APIC-EM and Prime Infrastructure can configure and help troubleshoot my networking devices, what should be my primary tool for network configuration, monitoring, and troubleshooting?

A. The two work together, so it is recommended that you use both. APIC-EM-hosted SDN applications make managing the network simpler by translating business-intent policy into specific network configuration commands. Prime Infrastructure continues as a customizable, feature-level configuration system that allows full access to CLI. It can be used to provision any network requirement that is not sufficiently addressed by policy abstraction.

Supported functions, devices, and software

Q. What is the high-availability model for the APIC-EM? How many redundant APIC-EM instances are supported?

A. The high-availability capability supports transparent scalability of deployed instances based on service loads. For Release 1.5, the APIC-EM supports N+1 redundancy with a three-node cluster. All the nodes work in active-active load-sharing mode for optimized performance, scale, and availability.

Q. How long does it take the APIC-EM software to update the network after the changes have been made?

A. Usually, just a matter of minutes. Larger configurations might take longer, especially when bringing up new devices.

Q. What network devices are supported by the APIC-EM?

A. All models of Cisco Catalyst® 2000, 3000, 4000, and 6000 switches; Integrated Services Routers Generation 2 (ISR G2) and 4000 Series ISRs; Aggregation Services Routers (ASR 1000 and 9000 Series); Cisco wireless LAN controllers (2500, 5500, 8500, Wireless Service Module 2 [WiSM2], 5760) and access points, and Cisco Nexus® 5000 and 7000 platforms are supported. For more details, refer to the [APIC-EM release notes and data sheet](#).

Note: IWAN App supports both ISR 4000 Series as well as ISR G2 (1900, 2900, 3900, and 892FSP).

Q. Does the APIC-EM support any Wi-Fi access points?

A. Yes, multiple Wi-Fi access points are supported by the APIC-EM. Refer to the [release notes](#) for more details.

Q. Does the APIC-EM support the wireless LAN controller built into the Catalyst 3850?

A. Support for the 3850-based wireless LAN controller is expected to be available in future releases.

Q. Is there any limit on how many networking devices the APIC-EM can interact with at any time?

A. Architecturally, the APIC-EM has been built to scale transparently by monitoring services loading and adding or reducing additional service instantiations as necessary. Scale numbers that are qualified and supported in Release 1.5 are:

- Network devices: 8000
- Wireless access points: 8000
- End hosts (wired and wireless): 80,000

Q. Are Cisco Adaptive Security Appliances (ASA) and Cisco Next Generation Intrusion Prevention Systems (NGIPS) supported?

A. Support for ASA firewalls and NGIPS is planned and will be available in future releases.

Q. How does the APIC-EM auto-detect network devices and learn the topology?

A. The APIC-EM uses Cisco Discovery Protocol and Link Layer Discovery Protocol (LLDP) to auto-detect network devices and create the real-time topology model. Alternatively, devices can also be discovered by directly providing subnet IP information in the controller.

Q. What Cisco IOS Software versions does the APIC-EM support? Are Cisco IOS-XE and NX-OS supported as well?

A. Several versions of Cisco IOS, IOS –XE and NX-OS Software are supported. Refer to the APIC-EM [release notes](#) for further details about minimum OS versions, which have been qualified in the lab.

Pricing, licensing, and availability

Q. When will the APIC-EM be available to the field for testing and training?

A. The APIC-EM is now GA (General Availability) and available for production deployments. Please download the APIC-EM Release 1.5 software from <https://software.cisco.com> to get started.

Q. How do I purchase and license the APIC-EM?

A. APIC-EM software is offered at no charge and only requires acceptance of a one-time click-through license. The APIC-EM can be redistributed to any groups inside the same company under this license. The APIC-EM is available for download through the [DevNet Cisco](#) developer program or [Cisco Software Central](#). Cisco will also offer a commercial, Cisco UCS-based hardware appliance option, which contains a pre-loaded version of the APIC-EM. Refer to item 1 of this document for details.

Licenses for the Path Trace, PnP, Active Advisor, Integrity Verification, and SD-Bonjour apps are covered by the same APIC-EM click-through license. The IWAN App is covered under a different commercial license structure. Refer to the APIC-EM for IWAN App FAQ for more details.

Q. How is the APIC-EM supported?

A. Support for the APIC-EM and the Path Trace, PnP, and IWAN apps (referred to as APIC-EM apps) are provided by the Cisco Technical Assistance Center with a valid Smart Net Total Care license on at least one network element managed by the controller. Support for the hardware appliance option is provided with purchase of the Cisco Software Support Service for the appliance. Support for the IWAN application is provided with the purchase of the Cisco Software Support Service for the software under both Cisco ONE™ and Management 3.x options.

Developer support for other applications is available from DevNet. Community-based support is free of charge. Optional live support for pay is also available. Certification services offered by DevNet can also enable any ecosystem partner to help ensure the applications they develop are in compliance with Cisco standards and best practices.

Q. Where can I download the APIC-EM and IWAN App software?

A. For Release 1.5 both the APIC-EM and IWAN App are bundled together into a single software package. Visit <https://software.cisco.com/> to download the software. You will need to be a registered user to access the software portal.

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