Preface

This preface includes the following sections:

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Audience

This guide is intended primarily for data center administrators with responsibilities and expertise in one or more of the following:

• Virtual machine installation and administration
• Server administration
• Switch and network administration

Related Documentation

• Cisco ACI Simulator Release Notes
• Cisco ACI Simulator Getting Started Guide

The Application Centric Infrastructure documentation set includes the following documents that are available on Cisco.com at the following URL: http://www.cisco.com/c/en/us/support/cloud-systems-management/application-policy-infrastructure-controller-apic/tsd-products-support-series-home.html.

Web-Based Documentation

• Cisco APIC Management Information Model Reference
• Cisco APIC Online Help Reference
• Cisco APIC Python SDK Reference
• Cisco ACI Compatibility Tool
• Cisco ACI MIB Support List

Downloadable Documentation
• Cisco Application Policy Infrastructure Controller Release Notes
• Cisco Application Centric Infrastructure Fundamentals Guide
• Cisco APIC Getting Started Guide
• Cisco APIC REST API User Guide
• Cisco APIC Object Model Command Line Interface User Guide
• Cisco APIC Faults, Events, and System Messages Management Guide
• Cisco APIC Layer 4 to Layer 7 Device Package Development Guide
• Cisco APIC Layer 4 to Layer 7 Services Deployment Guide
• Cisco ACI Firmware Management Guide
• Cisco APIC Troubleshooting Guide
• Cisco ACI System Messages Reference Guide
• Cisco ACI Switch Command Reference, NX-OS Release 11.0
• Verified Scalability Guide for Cisco ACI
• Cisco ACI MIB Quick Reference
• Cisco Nexus CLI to Cisco APIC Mapping Guide

Documentation Feedback

To provide technical feedback on this document, or to report an error or omission, please send your comments to apic-docfeedback@cisco.com. We appreciate your feedback.
Introduction

- About the Application Policy Infrastructure Controller, on page 1
- About the ACI Simulator, on page 1

About the Application Policy Infrastructure Controller

The Cisco Application Centric Infrastructure (ACI) is a distributed, scalable, multitenant infrastructure with external end-point connectivity controlled and grouped through application-centric policies. The Application Policy Infrastructure Controller (APIC) is the unified point of automation, management, monitoring, and programmability for the ACI. The APIC supports the deployment, management, and monitoring of any application anywhere, with a unified operations model for the physical and virtual components of the infrastructure. The APIC programmatically automates network provisioning and control that is based on the application requirements and policies. It is the central control engine for the broader cloud network; it simplifies management and allows flexibility in how application networks are defined and automated. It also provides northbound Representational State Transfer (REST) APIs. The APIC is a distributed system that is implemented as a cluster of many controller instances.

About the ACI Simulator

The intent of the ACI Simulator is to provide real, fully-featured APIC controller software, along with a simulated fabric infrastructure of leaf switches and spine switches in one physical server. Because the ACI Simulator includes APICs with real production software, you can use it to understand features, exercise APIs, and initiate integration with third-party orchestration systems and applications. The native GUI and CLI of the APIC use the same APIs that are published to third parties.

The ACI Simulator includes simulated switches, so you cannot validate a data path. However, some of the simulated switch ports have been mapped to the front-panel server ports which allows you to connect external management entities such as ESX servers, vCenters, vShields, bare metal servers, L4-L7 services, AAA systems, and other physical or virtual service appliances. In addition, the ACI Simulator allows simulation of faults and alerts to facilitate testing and to demonstrate features.

One instance of the production APIC is shipped per server appliance. By contrast, the ACI Simulator includes three actual APIC instances and two simulated leaf switches and two simulated spine switches in a single server. As a result, the performance of the ACI Simulator is slower than deployments on production hardware.

Using the Simulator, you can perform operations on the simulated fabric using any of the following functional interfaces:
• graphical user interface (GUI)
• command line interface (CLI)
• application programming interface (API)

The ACI Simulator consists of simulation software running on a special version of the Cisco UCS C220 M3 or M4 High-Density Rack Server. For information about the hardware installation and requirements of the physical server, you can refer to the documentation for the Cisco UCS C220 Server at this URL: http://www.cisco.com/en/US/docs/unified_computing/ucs/c/hw/C220/install/C220.html

Note

The ACI Simulator software cannot be installed separately on a standard Cisco UCS C220 Server or on other servers. The software runs only on the ACI Simulator server, which has the following PID:

• APIC-SIM-S (based on Cisco UCS C220 M3 server)
• APIC-SIM-S2 (based on Cisco UCS C220 M4 server)
Simulator Topology

- Simulated Topology and Connections, on page 3
- Simulator Server Physical Connections, on page 4
- Connecting Network Service Appliances, on page 5
- Connecting AAA Server and Syslog Server, on page 7

Simulated Topology and Connections

The ACI Simulator implements the following topology:

- Two spine switches (spine1, spine2)
- Two leaf switches (leaf1, leaf2)
- Three instances of APIC (apic1, apic2, apic3)

These components are connected as follows:

- APIC instances apic1 and apic2 are connected to leaf1.
- APIC instance apic3 is connected to leaf2.
- Each leaf switch is connected to each spine switch

This diagram shows the components and connections simulated within the simulator server:
This figure shows the connection of several external ESX servers as an example. External servers connected to the simulator server ports shown will be connected to simulated leaf switches as shown. For example, a server connected to port 4 of the simulator server will appear as attached to port 2 of Leaf1.

The vCenter and vShield can be connected through the tenant management network or through the out-of-band management network. The ESX management connectivity to vCenter and vShield is external to the simulator server as shown in the figure.

**Note**

External servers are not part of the simulator, and need not be ESX servers. External servers may be connected directly to the simulator server ports or through an external switch such as a blade switch.

**Simulator Server Physical Connections**

The following figure shows the physical port connections to the rear panel of the simulator server.
To access the APIC, you must connect port 1 to your out-of-band management network. Port 2 can be connected to the tenant management network, which connects the leaf switches to the external network devices over layer 2 or layer 3. You can connect external hosts or layer 2 switches to any of the ports 3 through 8.

**Note**

The simulator server provides no data path switching between external network devices. You must connect the external servers to the tenant management network through additional interfaces on the external servers.

The following table lists ports for management and external server connections:

<table>
<thead>
<tr>
<th>Port</th>
<th>Speed</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1G</td>
<td>Out-of-band management</td>
</tr>
<tr>
<td>2</td>
<td>1G</td>
<td>Tenant management</td>
</tr>
<tr>
<td>3</td>
<td>1G</td>
<td>Leaf1 port 1</td>
</tr>
<tr>
<td>4</td>
<td>1G</td>
<td>Leaf1 port 2</td>
</tr>
<tr>
<td>5</td>
<td>1G</td>
<td>Leaf2 port 1</td>
</tr>
<tr>
<td>6</td>
<td>1G</td>
<td>Leaf2 port 2</td>
</tr>
<tr>
<td>7</td>
<td>10G</td>
<td>Leaf2 port 3</td>
</tr>
<tr>
<td>8</td>
<td>10G</td>
<td>Leaf1 port 3</td>
</tr>
</tbody>
</table>

**Connecting Network Service Appliances**

This section describes how to connect physical or virtual network service appliances such as firewalls (Cisco ASA, for example) or ADC (application delivery controllers such as F5 BigIP or Citrix NetScaler).

The APIC network service integration feature automates these functions:

- Service insertion—Configuring the network for redirecting traffic through network service appliances (nodes)
• Service configuration—Configuring the network service appliance based on endpoint group and application requirements

To enable the network service integration feature with the simulator server, connect the service appliances (physical or virtual) to the simulator server as shown in the following figure:

The management interface of physical appliances must have a layer 2 (L2) connection to the Eth1 interface port of the simulator server. The management interface of network service appliances must be connected to a port-group providing L2 connectivity to the out-of-band management network. Additionally, the automation of network connectivity for a virtual service appliance requires APIC to have connectivity to the vCenter server managing the virtual service appliance VM.

Note
The simulator server provides only the capability to validate service network configuration and service function configuration. As shown in the figure, data packets do not traverse through the simulator.
Connecting AAA Server and Syslog Server

The following figure shows how to connect the simulator to a AAA server and a syslog server, through either a L2 or L3 connection. Refer to the applicable configuration guides for configuring the external network, configuring the AAA (RADIUS, TACACS+, or LDAP) server, and configuring a syslog (or Cisco Call Home) server.
Connecting AAA Server and Syslog Server
First Time Access

- Prerequisites for Configuring the Simulator, on page 9
- Starting the Simulator, on page 9

Prerequisites for Configuring the Simulator

Three IP addresses are required. Each APIC instance requires a private IP address from within your network for out-of-band management.

Starting the Simulator

When the simulator server boots up, the ACI Simulator starts automatically, launching a separate initialization console for each APIC instance. You can switch between the consoles by using the following keyboard commands:

- Alt-F1— Connects to apic1 console
- Alt-F2— Connects to apic2 console
- Alt-F3— Connects to apic3 console

To continue the configuration and operation of the ACI Simulator, see the *Cisco ACI Simulator Getting Started Guide*.

Note

Before configuring the simulator server, read the *Cisco ACI Simulator Release Notes* to learn about any functional or configuration differences between the simulator and the actual APIC.
Installing the ACI Simulator Software

This chapter contains the following sections:

- Installing the ACI Simulator Software, on page 11
- Installing the Simulator using a PXE Server, on page 11
- Installing the Simulator Using Virtual Media, on page 13

Installing the ACI Simulator Software

You can use one of the following methods to install your ACI simulator software:

- Using a PXE server
- Using virtual media

Installing the Simulator using a PXE Server

Follow these steps to install the ACI simulator software using a Preboot Execution Environment (PXE) server:

Note

The paths of configuration files may vary for your PXE server depending on your Linux distro and how the PXE server is installed.

Before you begin

- You must be familiar with setting up a PXE server on a Linux distribution operating system.

Procedure

Step 1

Configure the PXE server with a simulator image as follows:

a) Add an entry for the simulator image to your PXE menu.

   Edit the /tftpboot/boot_msg to add the entry for the simulator image.
Installing the ACI Simulator Software

Installing the Simulator using a PXE Server

b) Mount the ISO simulator image.

**Example:**

```bash
# mkdir -p /var/www/html/option50
sudo mount -o loop -t iso9660 /local/aci-mnsim-dk9.1.0.1.247e.iso /var/www/html/option50
```

c) Copy vmlinux and initrd from the mounted ISO simulator image to your tftpboot path.

**Example:**

```bash
# mkdir -p /tftpboot/ifcimages
# cp -f /var/www/html/option50/images/pxeboot/vmlinuz /tftpboot/ifcimages/
# cp -f /var/www/html/option50/images/pxeboot/initrd.img /tftpboot/ifcimages/
```

d) Create a kickstart file that will be served by an HTTP server.

**Example:**

```bash
# mkdir -p /var/www/html/kickstart
[root@tftpserver ~]# cat /var/www/html/kickstart/ks-50
IFC Kickstart script for UCS C200
install
url --url=http://<tftpserver-httpserver-ip>/option50
lang en_US.UTF-8
keyboard us
network --onboot yes --device eth0 --bootproto dhcp --noipv6
network --onboot no --device eth1 --bootproto dhcp --noipv6
network --onboot no --device eth2 --bootproto dhcp --noipv6
network --onboot no --device eth3 --bootproto dhcp --noipv6
```

e) Add an entry to the /tftpboot/pxelinux.cfg/default so that it points to the kickstart file for the ACI simulator image.

**Example:**

```bash
[root@pxeserver ~]# cat /tftpboot/pxelinux.cfg/default
label 50
kernel ifcimages/vmlinuz dd blacklist=isci blacklist=ahci nodmraid noprobe=ata1
noprobe=ata2 noprobe=ata3 noprobe=ata4
ksdevice=eth0
```

f) Restart the PXE and HTTP servers.

**Example:**

```bash
[root@pxeserver ~]# service xinetd restart
[root@pxeserver ~]# service httpd restart
```

---

**Step 2**
Reboot the simulator server, and enter F12 to start a network boot.

**Step 3**
Choose the options configured on the PXE server to boot the simulator image. Choose Enter. The simulator setup screen appears in approximately 15 minutes.

**Step 4**
Follow the steps in *Cisco ACI Simulator Installation Guide* to setup each Cisco APIC.

Entering ALT+F1 connects to the apic1 console, ALT+F2 connects to the apic2 console, and ALT+F3 connects to the apic3 console.
Installing the Simulator Using Virtual Media

Procedure

**Step 1**  
Mount the virtual media using the Cisco UCS virtual media instructions by performing the following tasks:

a) Enter the IP address to access Cisco Integrated Management Controller (CIMC) using a web browser.  
   You can use a Google Chrome browser.  
   **Note**  
   See Recommended Cisco APIC and Cisco Nexus 9000 Series ACI-Mode Switches Releases for information regarding recommended CIMC Firmware Version.  
   See Cisco Host Upgrade Utility User Guide for information regarding upgrading CIMC

b) Enter the username and password.  
c) Launch the KVM console.  
d) Mount the ACI simulator ISO image using the virtual media.

**Step 2**  
Reboot the simulator.

**Step 3**  
Enter **F6** to enter the boot selection menu.

**Step 4**  
Choose a **KVM virtual DVD** from the available boot options.  
Wait for the simulator installation to complete and the setup screen to appear. It could take from 20 to 60 mins to complete. If you have a dedicated CIMC NIC with 1Gbps speed, the setup screen could appear sooner.

**Step 5**  
Press any key to reboot the simulator.

**Step 6**  
Follow the steps in *Cisco APIC Management, Installation, Upgrade, and Downgrade Guide* to setup each Cisco APIC.  
Entering **ALT+F1** connects to the apic1 console, **ALT+F2** connects to the apic2 console, and **ALT+F3** connects to the apic3 console.