



Required Device Configuration

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Required Platform Configurations

You must make the following configuration changes on these platforms for the corresponding Cisco APIC-EM features to properly work.

Table 1: Required Platform Configurations

Feature	Platform	Required Configuration
Discovery (device inventory collection)	Cisco ASR 9000 router or any other Cisco device that requires NETCONF support for their device pack.	Configure NETCONF on these platforms. For information, see NETCONF Configuration, on page 2 .
Discovery (host inventory collection)	Devices connected to hosts using SNMP.	Configure SNMP traps on these devices. For information, see SNMP Trap Configuration, on page 3 .
	Devices connected to hosts using IPDT.	Enable IPDT for these devices. For information, see IP Device Tracking Configuration, on page 3 .
	<ul style="list-style-type: none"> • Cisco Series 2504 WLC • Cisco Series 5508/5520 WLC • Cisco Series 8510/8540 WLC 	Configure SNMP traps and object identifiers on these wireless LAN controllers. For information, see Wireless LAN Controller Configuration, on page 4 .

Feature	Platform	Required Configuration
Path Trace	<ul style="list-style-type: none"> • Cisco ASR 1000 • Cisco ASR 9000 • Cisco ISR-G2 • Cisco ISR-4451 -X 	Configure NetFlow on these routers. For information, see Cisco NetFlow Configuration , on page 3.
	Devices connected to a voice or video endpoint (for example, Cisco IP phones).	Enable IPDT for these devices to discover voice/data VLAN information about the endpoints. For information, see IP Device Tracking Configuration , on page 3.

NETCONF Configuration

You must enable the NETCONF protocol for the Cisco ASR 9000 router or for any other Cisco device that requires NETCONF support for their device pack. If NETCONF is not enabled, then the controller's inventory collection process will be incomplete for that device.



Note

Though NETCONF typically runs over SSH or on its own port, with the Cisco APIC-EM and for the Cisco ASR 9000 router NETCONF is run over a CLI session.

For specific information about enabling NETCONF for your own Cisco device, refer to that device's documentation. As an example, a typical configuration sequence on a terminal to enable NETCONF on a Cisco device is as follows:

```
#ssh server v2
#netconf agent tty
#!
#xml agent tty
#!
#commit
#end
#crypto key generate rsa
```



Note

The rsa key needs to be generated to succeed with SSH. For this reason, the crypto key generate rsa command needs to be executed in exec mode at the end of the configuration sequence if it has not already been done.

Cisco NetFlow Configuration

Cisco NetFlow needs to be enabled on the following devices to support the Cisco APIC-EM path trace functionality:

- Cisco ASR 1000
- Cisco ASR 9000
- Cisco ISR-G2
- Cisco ISR-4451 -X

The controller pulls cached NetFlow records from the device for path trace. To enable NetFlow on your devices, refer to your specific device documentation. For general information about Cisco NetFlow technology, see [Cisco IOS Flexible NetFlow Technology Q&A](#).

SNMP Trap Configuration

To ensure that Cisco APIC-EM captures data about the hosts connected to your network devices, you must set up SNMP traps or notifications. Enter the following SNMP commands to set up SNMP traps on the devices that connect to hosts within your network:

- 1 **snmp-server enable traps snmp linkdown linkup**
- 2 **snmp-server host *IP address* version 2c public**

**Note**

For Cisco Nexus devices, enter the following SNMP commands instead of the commands listed above:

- 1 **snmp-server enable traps snmp linkdown linkup**
- 2 **snmp-server host *IP address* use-vrf default**

After configuring SNMP traps on the network devices, the following data is captured and made available in the controller's GUI:

- Host data including the MAC address, IP address, and type
- Device interface status

IP Device Tracking Configuration

The Cisco APIC-EM discovery function uses several protocols and methods to retrieve network information, such as hosts IP addresses, MAC addresses, and network attachment points. To use IP Device Tracking (IPDT) for discovery, you must manually enable IPDT on the devices and interfaces for this protocol to be used to collect host information. To enable IPDT on your devices, refer to your specific device documentation. For general information about IPDT, see [IP Device Tracking \(IPDT\) Overview](#).

Wireless LAN Controller Configuration

The Cisco APIC-EM accepts SNMP traps from several Cisco Wireless LAN Controllers (WLCs). The SNMP traps are used to update the host inventory database. You need to configure the WLCs so that the Cisco APIC-EM is the trap receiver, and the WLCs send the enhanced traps to the Cisco APIC-EM.

The following WLCs require SNMP traps to be enabled:

- Cisco Series 2504 Wireless LAN Controller
- Cisco Series 5508/5520 Wireless LAN Controller
- Cisco Series 8510/8540 Wireless LAN Controller

The following table specifies the SNMP traps and object identifiers that must be set on the WLCs.

Trap Name	OID
ciscoLwappDot11ClientAssocTrap	1.3.6.1.4.1.9.9.599.0.9
ciscoLwappDot11ClientDeAuthenticatedTrap	1.3.6.1.4.1.9.9.599.0.10
ciscoLwappDot11ClientMovedToRunStateNewTrap	1.3.6.1.4.1.9.9.599.0.11
ciscoLwappDot11ClientMobilityTrap	1.3.6.1.4.1.9.9.599.0.12

The following configurations must be set to enable the above SNMP traps:

- config trapflags client enhanced-802.11-associate enable
- config trapflags client enhanced-802.11-deauthenticate enable
- config trapflags client enhanced-authentication enable
- config trapflags client enhanced-802.11-stats enable



Note

When setting the SNMP traps on the WLCs, ensure you configure the IP address of the Cisco APIC-EM as the SNMP trap destination IP address. You set the Cisco APIC-EM IP address using the configuration wizard during the deployment process. For information about this process and the controller IP address, see the *Cisco Application Policy Infrastructure Controller Enterprise Module Deployment Guide* for additional information.

WAN Interface Configuration for EasyQoS

In order for the Cisco APIC-EM to identify the WAN interfaces that need policies, you must specify the interface type (WAN) and (optionally) its subline rate and service-provider Class-of-Service model.

When the Cisco APIC-EM discovers the device and places it in its inventory, the Cisco APIC-EM identifies these specifically marked interfaces as WAN interfaces. The subline rate information is used to trigger a

congestion event on the device when this contracted rate is reached (even if the physical WAN interface itself is not congested). As a result of the congestion event, the Cisco APIC-EM updates the device configuration with the queuing policy that reflects the configured business-intent.

Before you can implement a policy of this type, you need to configure the following strings on the device using the command line interface (CLI):

- WAN interface—To indicate to the Cisco APIC-EM that the interface needs special handling, you need to include `#WAN#` in the interface description.
- Subline rate (MB)—You need to indicate the interface subline rate by including `#rateM#` in the interface description. The rate must be a value below the actual line rate of the interface.
- Service provider profile—You need to specify one of the following four Service Provider profiles by including `#SPPProfileNumber#` in the interface description.

Table 2: SP Profile 1 (SPP1): 4-Class Model

Class Name	DSCP	Priority Class	SLA	
			Bandwidth (%)	Remaining Bandwidth (%)
Default	0	—	—	31
Voice	EF	Yes	10	—
Class 1 Data	AF31	—	—	44
Class 2 Data	AF21	—	—	25

Table 3: SP Profile 2 (SPP2): 5-Class Model

Class Name	DSCP	Priority Class	SLA	
			Bandwidth (%)	Remaining Bandwidth (%)
Class 3 Data	AF11	—	—	1
Voice	EF	Yes	10	—
Class 1 Data	AF31	—	—	44
Class 2 Data	AF21	—	—	25

Table 4: SP Profile 3 (SPP3): 6-Class Model

Class Name	DSCP	Priority Class	SLA	
			Bandwidth (%)	Remaining Bandwidth (%)
Class 1 Data	AF31	—	—	10
Class 3 Data	AF11	—	—	1
Video	AF41	—	—	34
Voice	EF	Yes	10	—
Default	0	—	—	30
Class 2 Data	AF21	—	—	25

Table 5: SP Profile 4 (SPP4): 8-Class Model

Class Name	DSCP	Priority Class	SLA	
			Bandwidth (%)	Remaining Bandwidth (%)
Network-Control Management	CS6	—	—	5
Streaming Video	AF31	—	—	10
Call Signalling	CS3	—	—	4
Scavenger	CS1	—	—	1
Interactive Video	AF41	—	—	30
Voice	EF	Yes	10	—
Default	0	—	—	25
Critical Data	AF21	—	—	25

Example

```
interface GigabitEthernet0/2
  description AT&T Circuit from SJ-13-12 to RTP-Ridge-7 #WAN#50M#SPP4#
```



Note You may want to create a script to automate these device configuration changes.

Performance Monitor Configuration

When you run a path trace to collect **Perf Mon** statistics, the Cisco APIC-EM automatically configures all of the devices in the requested path with the necessary flow monitor commands. The Cisco APIC-EM removes the configuration from the device if there is no corresponding path trace request present or after 24 hours of the path trace request, whichever is first.

The following configuration is sent to each device in the requested path:

```

flow record type performance-monitor APIC_EM-FLOW_ANALYSIS_PERFMON_RECORD
  match ipv4 protocol
  match ipv4 source address
  match ipv4 destination address
  match transport source-port
  match transport destination-port
  match transport rtp ssrc
  collect ipv4 dscp
  collect ipv4 ttl
  collect transport rtp jitter mean
  collect transport rtp jitter minimum
  collect transport rtp jitter maximum
  collect interface input
  collect interface output
  collect counter bytes long
  collect counter packets long
  collect counter bytes rate
  collect counter packets drop (not applicable to routers)
flow monitor type performance-monitor APIC_EM-FLOW_ANALYSIS_PERFMON_MONITOR
  description APIC_EM flow-analysis request monitor
  record APIC_EM-FLOW_ANALYSIS_PERFMON_RECORD

ip access-list extended APIC_EM-FLOW_ANALYSIS_ACL
  class-map APIC_EM-FLOW_ANALYSIS_PERFMON_CLASSMAP
  match access-group name APIC_EM-FLOW_ANALYSIS_ACL
policy-map type performance-monitor APIC_EM-FLOW_ANALYSIS_PERFMON_POLICYMAP
  class APIC_EM-FLOW_ANALYSIS_PERFMON_CLASSMAP
  flow monitor APIC_EM-FLOW_ANALYSIS_PERFMON_MONITOR
interface GigabitEthernet x/y
  service-policy type performance-monitor input APIC_EM-FLOW_ANALYSIS_PERFMON_POLICYMAP

ip access-list extended APIC_EM-FLOW_ANALYSIS_ACL
  permit ip host aa.bb.cc.dd host ww.xx.yy.zz

```

¹ aa.bb.cc.dd is source ip and ww.xx.yy.zz is destination ip.

