Enabling Management by REST API

Introduction

You can use the Cisco IOS XE REST API to manage the Cisco ASR 1001-X and ASR 1002-X as an alternative to configuring and managing selected features on the router using the Cisco IOS XE CLI. This chapter describes how to configure these Cisco ASR routers to enable management using the REST API. For detailed information about using the REST API, see the *Cisco IOS XE REST API Management Reference Guide*.

Overview of Installation

Installing the Cisco IOS XE REST API involves the following general steps:

1. Download the OVA package from Cisco.com.
   a. From the Cisco Routers product page, navigate to the Cisco CSR 1000V Cloud Services Router product page.
   http://www.cisco.com/c/en/us/products/routers/cloud-services-router-1000v-series/index.html
   b. Click the “Download Software” link.
   c. Select the Cisco IOS XE release package and follow the instructions for downloading the software.
2. Install the REST API OVA on the ASR platform.
3. Enable the REST API on the ASR platform. In the Enabling REST API Support Using the Cisco IOS XE CLI section, see:
   - Configuring the Data Plane Dual Management Interface to Support the REST API
   - Configuring the Management Plane Dual Management Interface to Support the REST API
   - Configuring the REST API Local Port and AutoSave Options
   - Configuring onep

Enabling REST API Support Using the Cisco IOS XE CLI

Configuring the Data Plane Dual Management Interface to Support the REST API

Beginning with Cisco IOS XE 3.16, it is possible to associate management container IP addresses with either:

- Data plane interface (see procedure below)

  or

- Management plane interface (see Configuring the Management Plane Dual Management Interface to Support the REST API, page 18-6)

Configuration Notes

Management Container IP Addresses in Subnet of Router Management Interface

To allocate the management container IP addresses to be associated with the router's management interface, ensure that the IP addresses configured for the management container are within the same subnet as the router's management interface. For example:

Management container IP address: 192.168.5.225

Router management interface: 192.168.5.224

Order of Configuring Gateway Port, Management Interface, and IP Addresses

Configuring the management container details in the following order:

1. vNIC gateway port (vnic gateway virtualportgroup0)
2. Guest IP addresses

The vNIC management interface (vnic management GigabitEthernet0) can be configured after the guest IP addresses.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface GigabitEthernet***x*
4. **ip address** *ipv4-addr subnet-mask*

5. **no shutdown**
6. **exit**
7. **interface virtualportgroup** *virtual-port-group-number*
8. **configure terminal**
9. **interface virtualportgroup 0**
10. **ip unnumbered GigabitEthernet0/0/0**
11. **exit**
12. **ip route** *ipv4-address ipv4-subnet-mask* **VirtualPortGroup0**
13. **exit**
14. **ip unnumbered GigabitEthernet***x*
15. **no shutdown**
16. **exit**
17. **virtual-service csr_mgmt**
18. **vnic gateway virtualportgroup** *virtual-port-group-number*
19. **guest ip address** *remote-mgmt-ipv4-addr*
20. **exit**
21. **vnic management GigabitEthernet0**
22. **exit**
23. **activate**
24. **end**
25. **ip route** *ip-address subnet-mask* **virtualportgroup** *virtual-port-group-number*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface GigabitEthernet***x* **Example:** `Router(config)# interface gigabitethernet1`	Enters interface configuration mode for the interface designated by *x*. The range of GigabitEthernet ports depends on the platform.

	Command or Action	Purpose
Step 4	**ip address** *ipv4-addr subnet-mask* **Example:** `Router(config-if)# ip address 172.25.29.235 255.255.255.128`	Configures the IP address for the management interface.
Step 5	**no shutdown** **Example:** `Router(config-if)# no shutdown`	Enables the management interface.
Step 6	**exit** **Example:** `Router(config-if)# exit`	Exits interface configuration mode.
Step 7	**interface virtualportgroup** *virtualportgroup-number* **Example:** `Router(config)# interface virtualportgroup 0`	Creates a virtual port group and enters virtual port group interface configuration mode.
Step 8	**configure terminal** **Example:** `Router(config)# configure terminal`	Enter interface configuration mode.
Step 9	**interface virtualportgroup 0** **Example:** `Router(config)# interface virtualportgroup 0`	Creates a virtual port group and enters virtual port group interface configuration mode.
Step 10	**ip unnumbered GigabitEthernet0/0/0** **Example:** `Router(config)# ip unnumbered GigabitEthernet0/0/0`	Enables IP processing on an interface without assigning it an explicit IP address.
Step 11	**exit** **Example:** `Router(config)# exit`	Exit interface configuration mode.
Step 12	**ip route** *ipv4-address ipv4-subnet-mask* **VirtualPortGroup0** **Example:** `Router# ip route 172.27.208.108 255.255.255.255 VirtualPortGroup0`	Creates an IP route that maps to the virtual port group. Use the same IP address that was configured using the guest ip address command.
Step 13	**exit** **Example:** `Router# exit`	Exit configuration mode.

	Command or Action	Purpose
Step 14	**ip unnumbered GigabitEthernet***x* **Example:** `router(config-if)# ip unnumbered gigabitethernet1`	Enables IP processing on an interface without assigning it an explicit IP address.
Step 15	**no shutdown** **Example:** `router(config-if)# no shutdown`	Enables the virtual port group interface.
Step 16	**exit** **Example:** `router(config-if)# exit`	Exits virtual port group interface mode.
Step 17	**virtual-service csr_mgmt** **Example:** `router(config)# virtual-service csr_mgmt`	Configures the virtual services container and enters virtual services configuration mode.
Step 18	**vnic gateway virtualportgroup** *virtualportgroup_number* **Example:** `router(config-virt-serv)# vnic gateway virtualportgroup 0`	Creates a vNIC gateway interface for the virtual services container and maps it to the virtual port group.
Step 19	**guest ip address** *remote-mgmt-ipv4-addr* **Example:** `router(config-virt-serv-intf)# guest ip address 172.25.29.236`	Configures the remote-management IP address for the vNIC gateway interface for the virtual services container.
Step 20	**exit** **Example:** `router(config-virt-serv-intf)# exit`	Exits virtual services interface configuration mode and enters virtual services configuration mode.
Step 21	**vnic management GigabitEthernet0** **Example:** `router(config-virt-serv)# vnic management GigabitEthernet0`	(Cisco IOS XE 3.16S and later only) Beginning with Cisco IOS XE 3.16S, it is necessary to configure two vnic interfaces: • vnic gateway • vnic management
Step 22	**exit** **Example:** `router(config-virt-serv-vnic)# exit`	Exits vNIC management mode.
Step 23	**activate** **Example:** `router(config-virt-serv-vnic)# activate`	Activates the **csr_mgmt** virtual services container.

	Command or Action	Purpose
Step 24	**end** **Example:** `router(config-virt-serv)# end`	Exits virtual services configuration mode and enters global configuration mode.
Step 25	**ip route** *ipaddress subnetmask* **virtualportgroup** *virtualport-groupnumber* **Example:** `router(config)# ip route 172.25.29.236 255.255.255.255 VirtualPortGroup0`	Creates an IP route that maps to the virtual port group. Use the same IP address that was configured using the **guest ip address** command.

Configuring the Management Plane Dual Management Interface to Support the REST API

Beginning with Cisco IOS XE 3.16, it is possible to associate management container IP addresses with either:

- Management plane interface (see procedure below)

  or

- Data plane interface (see Configuring the Data Plane Dual Management Interface to Support the REST API, page 18-2)

Configuration Notes

Management Container IP Addresses in Subnet of Router Management Interface

To allocate the management container IP addresses to be associated with the router's management interface, ensure that the IP addresses configured for the management container are within the same subnet as the router's management interface. For example:

Management container IP address: 192.168.5.225

Router management interface: 192.168.5.224

Order of Configuring Gateway Port, Management Interface, and IP Addresses

Configuring the management container details in the following order:

1. vNIC gateway port (vnic gateway virtualportgroup0)
2. vNIC management interface (vnic management GigabitEthernet0)
3. Guest IP addresses

In contrast to the related procedure that uses the data plane interface, in this case, the vNIC management interface must be configured before configuring guest IP addresses.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface GigabitEthernet***x*

4. **ip address** *ipv4-addr subnet-mask*
5. **no shutdown**
6. **exit**
7. **interface virtualportgroup** *virtual-port-group-number*
8. **configure terminal**
9. **interface virtualportgroup 0**
10. **ip unnumbered GigabitEthernet0/0/0**
11. **exit**
12. **ip unnumbered GigabitEthernet***x*
13. **no shutdown**
14. **exit**
15. **virtual-service csr_mgmt**
16. **vnic gateway virtualportgroup** *virtual-port-group-number*
17. **exit**
18. **guest ip address** *guest-mgmt-ipv4-address*
19. **vnic management GigabitEthernet0**
20. **exit**
21. **activate**
22. **end**
23. **ip route** *ip-address subnet-mask* **virtualportgroup** *virtual-port-group-number*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface GigabitEthernet***x* **Example:** `Router(config)# interface gigabitethernet1`	Enters interface configuration mode for the interface designated by *x*. The range of GigabitEthernet ports depends on the platform.

	Command or Action	Purpose
Step 4	**ip address** *ipv4-addr subnet-mask* **Example:** `Router(config-if)# ip address 172.25.29.235 255.255.255.128`	Configures the IP address for the management interface.
Step 5	**no shutdown** **Example:** `Router(config-if)# no shutdown`	Enables the management interface.
Step 6	**exit** **Example:** `Router(config-if)# exit`	Exits interface configuration mode.
Step 7	**interface virtualportgroup** *virtualportgroup-number* **Example:** `Router(config)# interface virtualportgroup 0`	Creates a virtual port group and enters virtual port group interface configuration mode.
Step 8	**configure terminal** **Example:** `Router(config)# configure terminal`	Enter interface configuration mode.
Step 9	**interface virtualportgroup 0** **Example:** `Router(config)# interface virtualportgroup 0`	Creates a virtual port group and enters virtual port group interface configuration mode.
Step 10	**ip unnumbered GigabitEthernet0/0/0** **Example:** `Router(config)# ip unnumbered GigabitEthernet0/0/0`	Enables IP processing on an interface without assigning it an explicit IP address.
Step 11	**exit** **Example:** `Router(config)# exit`	Exit interface configuration mode.
Step 12	**ip unnumbered GigabitEthernet***x* **Example:** `router(config-if)# ip unnumbered gigabitethernet1`	Enables IP processing on an interface without assigning it an explicit IP address.
Step 13	**no shutdown** **Example:** `router(config-if)# no shutdown`	Enables the virtual port group interface.

	Command or Action	Purpose
Step 14	**exit** **Example:** `router(config-if)# exit`	Exits virtual port group interface mode.
Step 15	**virtual-service csr_mgmt** **Example:** `router(config)# virtual-service csr_mgmt`	Configures the virtual services container and enters virtual services configuration mode.
Step 16	**vnic gateway virtualportgroup** *virtualportgroup_number* **Example:** `router(config-virt-serv)# vnic gateway virtualportgroup 0`	Creates a vNIC gateway interface for the virtual services container and maps it to the virtual port group.
Step 17	**exit** **Example:** `router(config-virt-serv-intf)# exit`	Exits virtual services interface configuration mode and enters virtual services configuration mode.
Step 18	**vnic management GigabitEthernet0** **Example:** `router(config-virt-serv)# vnic management GigabitEthernet0`	(Cisco IOS XE 3.16S and later only) Beginning with Cisco IOS XE 3.16S, it is necessary to configure two vnic interfaces: • vnic gateway • vnic management
Step 19	**guest ip address** *guest-mgmt-ipv4-address* **Example:** `guest ip address 172.27.141.225`	Configures the remote-management IP address for the vNIC gateway interface for the virtual services container.
Step 20	**exit** **Example:** `router(config-virt-serv-vnic)# exit`	Exits vNIC management mode.
Step 21	**activate** **Example:** `router(config-virt-serv)# activate`	Activates the **csr_mgmt** virtual services container.

	Command or Action	Purpose
Step 22	**end** **Example:** `router(config-virt-serv)# end`	Exits virtual services configuration mode and enters global configuration mode.
Step 23	**ip route** *ipaddress subnetmask* **virtualportgroup** *virtualport-groupnumber* **Example:** `router(config)# ip route 172.25.29.236 255.255.255.255 VirtualPortGroup0`	Creates an IP route that maps to the virtual port group. Use the same IP address that was configured using the **guest ip address** command.

Configuring the REST API Local Port and AutoSave Options

Beginning with Cisco IOS XE Release 3.13S, you can configure the REST API local port and autosave options.

SUMMARY STEPS

1. **remote-management**
2. **restful-api local port** *local-port-number*
3. **restful-api autosave** *interval*

DETAILED STEPS

	Command or Action	Purpose
Step 1	**remote-management** **Example:** `router(config)# remote-management`	Enters remote-management configuration mode.
Step 2	**restful-api local-port** *local-port-number* **Example:** `router(cfg-remote-mgmt)# restful-api local-port 55443`	Configures the REST API local port number. The valid range depends on whether the REST API virtual services container uses the same IP address as the management interface, or if it uses a different IP address: • Valid range if the dual management interface is configured is from 1 to 61000. • Valid range if the shared management interface is configured is from 55001 to 61000. In both cases, the default value is 55443.
Step 3	**restful-api autosave** *interval* **Example:** `Router(cfg-remote-mgmt)# restful-api autosave 60`	Configures the REST API autosave interval. The range is from 30-300 seconds, and the default is 30.

Configuring onep

The Open Network Environment Programming Interface (onep) is used to define the service set for Cisco IOS and the REST API. Configure onep as follows.

SUMMARY STEPS

1. **conf t**
2. **onep**
3. **service set vty**
4. **end**

DETAILED STEPS

	Command or Action	Purpose

Step 1	**conf t**
	
	Example:
	`asr1k#conf t`
	`Enter configuration commands, one per line. End with CNTL/Z.`
		Enters configuration mode.

Step 2	**onep** **Example:** `asr1k(config)#onep`	Enters onep mode.
Step 3	**service set vty** **Example:** `asr1k(config-onep)#service set vty`	Select the vty service set.

Step 4	**end**
	
	Example:
	`asr1k(config-onep)#end`
	`asr1k#`
		Exit onep mode.

Disabling REST API Support

Support for the REST API is enabled by default. The following procedure disables the REST API.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **remote-management**
4. **no restful-api**

5. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode.
Step 3	**remote-management** **Example:** `router(config)# remote-management`	Enters remote-management configuration mode.
Step 4	**no restful-api** **Example:** `router(cfg-remote-mgmt)# no restful-api`	Disables support for the REST API.
Step 5	**end** **Example:** `router(cfg-remote-mgmt)# end`	Exits remote-management configuration mode and enters configuration mode.

Note When REST API support is disabled using the **no restful-api** command, the REST API PUT, POST and DELETE operations are disabled. However, the GET operation is still available.

Viewing the REST API Container Status

Use the **show virtual-service detail** command to view the REST API container status.