



Cisco APIC and Static Management Access

[New and Changed Information](#) 2

Revised: June 21, 2022

New and Changed Information

The following table provides an overview of the significant changes up to this current release. The table does not provide an exhaustive list of all changes or of the new features up to this release.

Table 1: New Features and Changed Behavior in Cisco APIC

Cisco APIC Release Version	Feature	Description	Where Documented
Release 2.1(1h)	Global toggle between in-band and out-of-band default management connectivity	A toggle has been added to switch between in-band or out-of-band as the default management connectivity mode between the APIC server and other external management devices.	This content is available in Toggling between In-band and Out-of-band Default Management Connectivity , on page 12.
Release 1.3(1g)	-	Removed object model CLI procedures and replaced them with NX-OS Style CLI procedures.	This content is available in the Configuring Static In-Band Management Access Using the NX-OS Style CLI , on page 7 section and in the Configuring Static Out-of-Band Management Access Using the NX-OS Style CLI , on page 11 section with static management access examples.
Release 1.2(2g)	IPv6 configurations supported	IPv6 configurations are supported using static configurations (for in-band and out-of-band).	-
Release 1.0(2j)	-	This article was written.	-

About Static Management Access

Configuring static in-band and out-of-band management connectivity is simpler than configuring dynamic in-band and out-of-band management connectivity. When configuring in-band static management, you must specify the IP address for each node and make sure to assign unique IP addresses. For simple deployments where users manage the IP addresses of a few leaf and spine switches, it is easy to configure a static management access. For more complex deployments, where you might have a large number of leaf and spine switches that require managing many IP addresses, static management access is not recommended. We recommend that you configure a dynamic management access that automatically avoids the possible duplication of IP addresses.

Guidelines and Limitations for Static Management Access

The following guidelines and limitations apply for static management access:

- We recommend that you configure either in-band or out-of-band static management or in-band and out-of-band dynamic management. Do not combine the two methods in your deployments.
- IPv4 and IPv6 addresses are supported for in-band management access. IPv6 configurations are supported using static configurations (for both in-band and out-of-band). IPv4 and IPv6 dual in-band and out-of-band configurations are supported only through static configuration. For more information, see the *Configuring Static Management Access in Cisco APIC* KB article.
- Using log directive on filters in management contracts is not supported. Setting the log directive will cause zoning-rule deployment failure.
- A simple ping to a spine switch will fail if it generates an ARP request, because spine switches do not respond to ARP requests. When pinging a spine switch from the Cisco APIC, you must specify the source interface/address so that the Cisco APIC does not send an ARP request.
- A spine switch does not resolve ARP on the in-band management IP address. Due to this, any device in the in-band management network cannot communicate with the spine switch. Access to a spine switch is only possible over a Layer 3 network.

Static In-band Management

Configuring Static In-Band Management Access Using the GUI

Before you begin

Ensure that enough IP addresses are available to be allocated for the number of nodes that will be required for a deployment.

Procedure

- Step 1** On the menu bar, choose **FABRIC > Access Policies**. In the **Work** pane, click **Configure an Interface, PC, and VPC**.
- Step 2** In the **Configure Interface, PC, and VPC** dialog box, click the large + icon next to the switch diagram to create a new profile and configure VLANs for the APIC.
- Step 3** In the **Switches** field, from drop-down list, check the check boxes for the switches to which the APICs are connected.
- Step 4** In the **Switch Profile Name** field, enter a name for the profile.
- Step 5** Click the + icon to configure the ports.
- Step 6** Verify that in the **Interface Type** area, the **Individual** radio button is selected.
- Step 7** In the **Interfaces** field, enter the ports to which APICs are connected.
- Step 8** In the **Interface Selector Name** field, enter the name of the port profile.
- Step 9** In the **Interface Policy Group** field, from drop-down list, choose **Create Interface Policy Group**.
- Step 10** In the **Create Access Port Policy Group** dialog box, perform the following actions:
 - a) In the **Name** field, enter the name of the policy group.
You can leave the default values in the rest of the fields as they are.
 - b) In the **Attached Entity Profile** field, choose **Create Attachable Access Entity Profile**.
This new attach entity profile enables you to specify the VLAN ranges that will be used.

- Step 11** In the **Create Attachable Access Entity Profile** dialog box, perform the following actions:
- In the **Name** field, enter a name.
 - Expand **Domains to be Associated to Interfaces** field. In the **Domain Profile** field, from the drop-down list, choose **Create Physical Domain**.
 - In the **Create Physical Domain** dialog box, in the **Name** field, enter the name.
 - In the **VLAN Pool** field, from the drop-down list, choose **Create VLAN Pool**.
 - In the **Create VLAN Pool** dialog box, in the **Name** field, enter the pool name.
 - In the **Allocation Mode** area, click the **Static Allocation** radio button.
 - Expand **Encap Blocks**. In the **Create Ranges** dialog box, in the **Range** fields, add a VLAN range.
 - In the **Create VLAN Pool** dialog box, click **Submit**.
 - In the **Create Physical Domain** dialog box, click **Submit**.
 - In the **Create Attachable Access Entity Profile** dialog box, click **Update** and then **Submit**.
 - In the **Create Access Port Policy Group** dialog box, click **Submit**.
 - In the **Configure Interface, PC, and VPC** dialog box, click **Save**.
- Step 12** Expand the **Configured Switch Interfaces** area to configure the VLANs for the VMM server ports, and perform the following actions:
- In the **Switches** drop-down list, check the check boxes for the switches that you want to connect to the APICs.
 - In the **Switch Profile Name** field, enter a name for the profile.
 - Click the + icon to configure the ports.
 - In the **Interface Type** area, verify the **Individual** radio button is selected.
 - In the **Interfaces** field, enter the ports to which the VMM servers are connected.
 - In the **Interface Selector Name** field, enter the name of the port profile.
 - In the **Interface Policy Group** field, from the drop-down list, choose the policy group that was created earlier. Click **Save**, and click **Save** again.
 - In the **Configure Interface, PC, and VPC** dialog box, click **Submit**.
- The VLAN and the ports to which the APIC and the VMM servers are connected are now configured.
- Step 13** Choose **TENANTS > mgmt**. In the **Navigation** pane, expand **Tenant mgmt > Networking > Bridge Domains** to configure the bridge domain on the in-band connection.
- Step 14** Right-click the in-band bridge domain, click **Create Subnet**, and perform the following actions:
- In the **Create Subnet** dialog box, in the **Gateway IP** field, enter the in-band management gateway IP address.
 - In the **Mask** field, enter the subnet mask if it does not self-populate. Click **Submit**.
- You can leave the default values in the rest of the fields as they are.
- Step 15** On the menu bar, choose **TENANTS > mgmt**. In the **Navigation** pane, expand **Tenant mgmt > Node Management EPGs**, click **In-Band EPG - default**, and perform the following actions to set the VLAN on the in-band connection:
- In the **Work** pane, in the **In-Band EPG default** area, verify that the default is displayed.
 - In the **Encap** field, enter the VLAN.
 - Expand **Provided Contracts**. In the **Name** field, from the drop-down list, click the default contract radio button to enable EPG to provide the default contract that will be consumed by the EPGs on which the VMM servers are located.
 - Click **Update**, and click **Submit**.
 - In the **Status** dialog box where the **Changes Saved Successfully** message is displayed, click **OK**.
- Step 16** On the menu bar, choose **TENANTS > mgmt**. In the **Navigation** pane, expand **Tenant mgmt > Node Management Addresses**, right-click **Node Management Addresses**, and click **Create Static Node Management Addresses**.

- Step 17** In the **Create Static Node Management Addresses** dialog box, perform the following actions:
- In the **Node Range** fields enter the range of nodes.
 - In the **Config** field, click the checkbox for **In-Band Addresses**.
The **In-Band IP Addresses** area is displayed.
 - In the **In-Band Management EPG** field, from drop-down list, choose the EPG.
 - In the **In-Band Starting IP Address** field, enter the starting IP address.
 - In the **Mask** field, enter the net mask.
 - In the **In-Band Gateway** field, enter the in-band gateway address. Click **Submit**.
 - In the **Confirm** dialog box that displays for confirmation that this will assign new management IP addresses to the selected range of nodes., click **Yes** to proceed.

The first node that was ID specified in the node range is allocated with the first or starting IP address. The next node ID is allocated with the next IP address and so on sequentially.

- Step 18** To verify, in the **Navigation** pane, expand **Node Management Addresses > Static Node Management Addresses**, and in the **Work** pane, view the IP addresses allocated for each node.

Note You can pre-provision nodes with IP addresses. Therefore, even though nodes may be assigned with IP addresses, some nodes may be present and some nodes may not exist yet as they have been pre-provisioned.

Configuring Static In-Band Management Access Using the REST API

Procedure

- Step 1** Create a VLAN namespace.

Example:

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- api/policymgr/mo/uni.xml -->
<polUni>
  <infraInfra>
    <!-- Static VLAN range -->
    <fvnsVlanInstP name="inband" allocMode="static">
      <fvnsEncapBlk name="encap" from="vlan-10" to="vlan-11"/>
    </fvnsVlanInstP>
  </infraInfra>
</polUni>
```

- Step 2** Create a physical domain.

Example:

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- api/policymgr/mo/uni.xml -->
<polUni>
  <physDomP name="inband">
    <infraRsVlanNs tDn="uni/infra/vlanns-inband-static"/>
  </physDomP>
</polUni>
```

- Step 3** Create selectors for the in-band management.

Example:

```

<?xml version="1.0" encoding="UTF-8"?>
<!-- api/policymgr/mo/.xml -->
<polUni>
  <infraInfra>
    <infraNodeP name="vmmNodes">
      <infraLeafS name="leafS" type="range">
        <infraNodeBlk name="single0" from_="101" to_="101"/>
      </infraLeafS>
      <infraRsAccPortP tDn="uni/infra/accportprof-vmmPorts"/>
    </infraNodeP>

    <!-- Assumption is that VMM host is reachable via eth1/40. -->
    <infraAccPortP name="vmmPorts">
      <infraHPortS name="portS" type="range">
        <infraPortBlk name="block1"
          fromCard="1" toCard="1"
          fromPort="40" toPort="40"/>
        <infraRsAccBaseGrp tDn="uni/infra/funcprof/accportgrp-inband" />
      </infraHPortS>
    </infraAccPortP>

    <infraNodeP name="apicConnectedNodes">
      <infraLeafS name="leafS" type="range">
        <infraNodeBlk name="single0" from_="101" to_="102"/>
      </infraLeafS>
      <infraRsAccPortP tDn="uni/infra/accportprof-apicConnectedPorts"/>
    </infraNodeP>

    <!-- Assumption is that APIC is connected to eth1/1. -->
    <infraAccPortP name="apicConnectedPorts">
      <infraHPortS name="portS" type="range">
        <infraPortBlk name="block1"
          fromCard="1" toCard="1"
          fromPort="1" toPort="3"/>
        <infraRsAccBaseGrp tDn="uni/infra/funcprof/accportgrp-inband" />
      </infraHPortS>
    </infraAccPortP>

    <infraFuncP>
      <infraAccPortGrp name="inband">
        <infraRsAttEntP tDn="uni/infra/attentp-inband"/>
      </infraAccPortGrp>
    </infraFuncP>

    <infraAttEntityP name="inband">
      <infraRsDomP tDn="uni/phys-inband"/>
    </infraAttEntityP>
  </infraInfra>
</polUni>

```

Step 4 Configure an in-band bridge domain and endpoint group (EPG).

Example:

```

<?xml version="1.0" encoding="UTF-8"?>
<!-- api/policymgr/mo/.xml -->
<polUni>
  <fvTenant name="mgmt">
    <!-- Configure the in-band management gateway address on the
    in-band BD. -->
    <fvBD name="inb">
      <fvSubnet ip="<subnet_ip_address>"/>
    </fvBD>
  </fvTenant>

```

```

    <mgmtMgmtP name="default">
      <!-- Configure the encap on which APICs will communicate on the
           in-band network. -->
      <mgmtInB name="default" encap="vlan-10">
        <fvRsProv tnVzBrCPName="default"/>
      </mgmtInB>
    </mgmtMgmtP>
  </fvTenant>
</polUni>

```

Step 5 Create static in-band management IP addresses and assign them to node IDs.

Example:

```

<polUni>
  <fvTenant name="mgmt">
    <mgmtMgmtP name="default">
      <mgmtInB name="default">
        <mgmtRsInBStNode tDn="topology/pod-1/node-101"
                          addr="<ip_address_1>"
                          gw="<gw_address>"
v6Addr = "<ip6_address_1>"
v6Gw = "<ip6_gw_address>"/>
        <mgmtRsInBStNode tDn="topology/pod-1/node-102"
                          addr="<ip_address_2>"
                          gw="<gw_address>"
v6Addr = "<ip6_address_2>"
v6Gw = "<ip6_gw_address>"/>
        <mgmtRsInBStNode tDn="topology/pod-1/node-103"
                          addr="<ip_address_3>"
                          gw="<gw_address>"
v6Addr = "<ip6_address_3>"
v6Gw = "<ip6_gw_address>"/>
        <mgmtRsInBStNode tDn="topology/pod-1/node-104"
                          addr="<ip_address_4>"
                          gw="<gw_address>"
v6Addr = "<ip6_address_4>"
v6Gw = "<ip6_gw_address>"/>

        <mgmtRsInBStNode tDn="topology/pod-1/node-105"
                          addr="<ip_address_5>"
                          gw="<gw_address>"
v6Addr = "<ip6_address_5>"
v6Gw = "<ip6_gw_address>"/>

      </mgmtInB>
    </mgmtMgmtP>
  </fvTenant>
</polUni>

```

Configuring Static In-Band Management Access Using the NX-OS Style CLI

Before you begin

Ensure that enough IP addresses are available to be allocated for the number of nodes that will be required for a deployment.

Procedure

Configure the static in-band management configuration using the NX-OS Style CLI as follows:

Example:

```
apic1(config)# switch 101
apic1(config-switch)# interface inband-mgmt0
apic1(config-switch-if)# ip address <ip_address_1/mask> gateway <gw_address>

apic1(config)# switch 102
apic1(config-switch)# interface inband-mgmt0
apic1(config-switch-if)# ip address <ip_address_2/mask> gateway <gw_address>

apic1(config-switch-if)# show inband-mgmt
```

Table 2: In-Band Management Node Details

Type	Node ID	IP Address	Gateway	Inband EPG	Operational State
<node name>	<node ID>	<IP address/mask>	<gateway IP>	<EPG name>	<oper state>

Table 3: In-Band Management EPG Details

Name	Qos	Tag	Nodes	Vlan	Operational State
<in-band EPG name>	<Qos value>	<policy tag>	<node ID>	<in-band Vlan>	<oper state>

Table 4: In-Band Management EPG Contract Details

In-band Management EPG	Contracts	App EPG	L3 External	EPG	Operational State
<in-band EPG name>	<in-band contract>	<app EPG name>	<external-L3 EPG>	<epg name>	<oper state>

Static Out-of-Band Management

Configuring Static Out-of-Band Management Access Using the GUI

Before you begin

The APIC out-of-band management connection link must be 1 Gbps.

Procedure

-
- Step 1** On the menu bar, choose **TENANTS > mgmt**. In the **Navigation** pane, expand **Tenant mgmt**.
 - Step 2** Right-click **Node Management Addresses**, and click **Create Static Node Management Addresses**.
 - Step 3** In the **Create Node Management Addresses** dialog box, perform the following actions:
 - a) In the **Node Range** field, enter the range of node IDs.
 - b) In the **Config** field, check the check box for **Out of-Band Addresses**.

Note The **Out-of-Band IP addresses** area is displayed.

- c) In the **Out-of-Band Management EPG** field, choose the EPG from the drop-down list.
- d) In the **Out-of-Band Starting IP Address** field, enter the starting IP address.
- e) In the **Mask** field, enter the mask if it is not already assigned.
- f) In the **Out-of-Band Gateway** field, enter the IP address. Click **Submit**.

The static node management IP addresses are configured.

Step 4 To verify, in the **Navigation** pane, expand **Node Management Addresses**, and click **Static Node Management Addresses**.

In the **Work** pane, the node management IDs and assigned IP addresses are displayed.

Step 5 In the **Navigation** pane, expand **Security Policies > Out-of-Band Contracts**.

Step 6 Right-click **Out-of-Band Contracts**, and click **Create Out-of-Band Contract**.

Step 7 In the **Create Out-of-Band Contract** dialog box, perform the following tasks:

- a) In the **Name** field, enter a name for the contract (oob-default).
- b) Expand **Subjects**. In the **Create Contract Subject** dialog box, in the **Name** field, enter a subject name (oob-default).
- c) Expand **Filters**, and in the **Name** field, from the drop-down list, choose the name of the filter (default). Click **Update**, and click **OK**.
- d) In the **Create Out-of-Band Contract** dialog box, click **Submit**.

An out-of-band contract that can be applied to the out-of-band EPG is created.

Step 8 In the **Navigation** pane, expand **Node Management EPGs > Out-of-Band EPG - default**.

Step 9 In the **Work** pane, expand **Provided Out-of-Band Contracts**.

Step 10 In the **OOB Contract** column, from the drop-down list, choose the out-of-band contract that you created (oob-default). Click **Update**, and click **Submit**.

The contract is associated with the node management EPG.

Step 11 In the **Navigation** pane, right-click **External Network Instance Profile**, and click **Create External Management Entity Instance**.

Step 12 In the **Create External Management Entity Instance** dialog box, perform the following actions:

- a) In the **Name** field, enter a name (oob-mgmt-ext).
- b) Expand the **Consumed Out-of-Band Contracts** field. From the **Out-of-Band Contract** drop-down list, choose the contract that you created (oob-default). Click **Update**.
Choose the same contract that was provided by the out-of-band management.
- c) In the **Subnets** field, enter the subnet address. Click **Submit**.

Only the subnet addresses you choose here will be used to manage the switches. The subnet addresses that are not included cannot be used to manage the switches.

The node management EPG is attached to the external network instance profile. The out-of-band management connectivity is configured.

Configuring Static Out-of-Band Management Access Using the REST API

Before you begin

The APIC out-of-band management connection link must be 1 Gbps.

Procedure

Step 1 Create an out-of-band contract.

Example:

```
<polUni>
  <fvTenant name="mgmt">
    <!-- Contract -->
    <vzOOBBrCP name="oob-default">
      <vzSubj name="oob-default">
        <vzRsSubjFiltAtt tnVzFilterName="default" />
      </vzSubj>
    </vzOOBBrCP>
  </fvTenant>
</polUni>
```

Step 2 Associate the out-of-band contract with an out-of-band EPG.

Example:

```
<polUni>
  <fvTenant name="mgmt">
    <mgmtMgmtP name="default">
      <mgmtOoB name="default">
        <mgmtRsOoBProv tnVzOOBBrCPName="oob-default" />
      </mgmtOoB>
    </mgmtMgmtP>
  </fvTenant>
</polUni>
```

Step 3 Associate the out-of-band contract with an external management EPG.

Example:

```
<polUni>
  <fvTenant name="mgmt">
    <mgmtExtMgmtEntity name="default">
      <mgmtInstP name="oob-mgmt-ext">
        <mgmtRsOoBCons tnVzOOBBrCPName="oob-default" />
        <!-- SUBNET from where switches are managed -->
        <mgmtSubnet ip="<mgmt_subnet_ip_address>" />
      </mgmtInstP>
    </mgmtExtMgmtEntity>
  </fvTenant>
</polUni>
```

Step 4 Create static out-of-band management IP addresses and assign them to node IDs.

CHECK IP Addresses

Example:

```
<polUni>
  <fvTenant name="mgmt">
    <mgmtMgmtP name="default">
      <mgmtOoB name="default">
        <mgmtRsOoBStNode tDn="topology/pod-1/node-101"
          addr="<ip_address_1>"
          gw="<gw_address>" />
        <mgmtRsOoBStNode tDn="topology/pod-1/node-102"
          addr="<ip_address_2>"
          gw="<gw_address>" />
        <mgmtRsOoBStNode tDn="topology/pod-1/node-103"
          addr="<ip_address_3>"
        />
      </mgmtOoB>
    </mgmtMgmtP>
  </fvTenant>
</polUni>
```

```

                                gw="<gw_address>"/>
        </mgmtOoB>
    </mgmtMgmtP>
</fvTenant>
</polUni>

```

Configuring Static Out-of-Band Management Access Using the NX-OS Style CLI

Before you begin

Ensure that enough IP addresses are available to be allocated for the number of nodes that will be required for a deployment.

Procedure

Configure the static out-of-band (OOB) management configuration using the NX-OS Style CLI as follows:

Example:

```

apicl(config)# switch 101
apicl(config-switch)# interface mgmt0
apicl(config-switch-if)# ip address <ip_address_1/mask> gateway <gw_address>

apicl(config)# switch 102
apicl(config-switch)# interface mgmt0
apicl(config-switch-if)# ip address <ip_address_2/mask> gateway <gw_address>
apicl(config-switch-if)# show oob-mgmt

```

Table 5: Out-of-Band Management Node Details

Type	Node ID	IP Address	Gateway	Out-of-Band EPG	Operational State
<node name>	<node ID>	<IP address/mask>	<gateway IP>	<EPG name>	<oper state>

Table 6: Out-of-Band Management EPG Details

Name	Qos	Tag	Nodes	Operational State
<OOB EPG name>	<Qos value>	<policy tag>	<node ID>	<oper state>

Table 7: Out-of-Band Management EPG Contract Details

Out-of-Band Management EPG	Contracts	Consumer OOB-Mgmt L3 External EPG	Operational State
<OOB EPG name>	<OOB contract>	<OOB External_L3 EPG>	<oper state>

Toggling between In-band and Out-of-band Management

Toggling between In-band and Out-of-band Default Management Connectivity

With APIC 2.1(1x), you can set a global toggle between In-band and out-of-band as the default management connectivity between the APIC server and other external management devices.

Toggling in-band or out-of-band management in the APIC GUI

You can make either in-band management access or out-of-band management access the default management connectivity mode for the APIC server.

Prior to Release 2.2(1x):

- On the menu bar, choose **Fabric > Fabric Policies > Global Policies > Connectivity Preferences**.
In the **Connectivity Preferences** page, click either **inband** or **ooband**.

For Release 2.2(x) and 2.3(x):

- On the menu bar, choose **Fabric > Fabric Policies > Global Policies > APIC Connectivity Preferences**.
In the **APIC Connectivity Preferences** page, click either **inband** or **ooband**.

For Release 3.0(1x) or later:

- On the menu bar, choose **System > System Settings > APIC Connectivity Preferences**.
In the **APIC Connectivity Preferences** page, click either **inband** or **ooband**.

Toggling in-band or out-of-band management using the NX-OS Style CLI

You can make either in-band management access or out-of-band management access the default management connectivity mode for the APIC server by using the following CLI command sequence:

```
apic1# configure
apic1(config)# mgmt_connectivity pref {inband|ooband}
```

Toggling in-band or out-of-band management using the REST API

You can make either in-band management access or out-of-band management access the default management connectivity mode for the APIC server by posting the following REST API structure:

```
POST https://APIC-IP/api/node/mo/.xml
<polUni>
<fabricInst>
  <mgmtConnectivityPrefs interfacePref="ooband"/> <!-- or "inband" --->
</fabricInst>
</polUni>
```

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