

Routed Connectivity to External Networks

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About Routed Connectivity to Outside Networks

A Layer 3 outside network configuration (L3Out) defines how traffic is forwarded outside of the fabric. Layer 3 is used to discover the addresses of other nodes, select routes, select quality of service, and forward the traffic that is entering, exiting, and transiting the fabric.

Note For guidelines and cautions for configuring and maintaining Layer 3 outside connections, see Guidelines for Layer 3 Networking.

For information about the types of L3Outs, see External Layer 3 Outside Connection Types.

Layer 3 Out for Routed Connectivity to External Networks

Routed connectivity to external networks is enabled by associating a fabric access (infraInfra) external routed domain (13extDomP) with a tenant Layer 3 external instance profile (13extInstP or external EPG) of a Layer 3 external outside network (13extOut), in the hierarchy in the following diagram:



Figure 1: Policy Model for Layer 3 External Connections

A Layer 3 external outside network (l3extout object) includes the routing protocol options (BGP, OSPF, or EIGRP or supported combinations) and the switch-specific and interface-specific configurations. While the l3extout contains the routing protocol (for example, OSPF with its related Virtual Routing and Forwarding (VRF) and area ID), the Layer 3 external interface profile contains the necessary OSPF interface details. Both are needed to enable OSPF.

The <code>l3extInstP</code> EPG exposes the external network to tenant EPGs through a contract. For example, a tenant EPG that contains a group of web servers could communicate through a contract with the <code>l3extInstP</code> EPG according to the network configuration contained in the <code>l3extOut</code>. The outside network configuration can easily be reused for multiple nodes by associating the nodes with the L3 external node profile. Multiple nodes that use the same profile can be configured for fail-over or load balancing. Also, a node can be added to multiple l3extOuts resulting in VRFs that are associated with the l3extOuts also being deployed on that node. For scalability information, refer to the current *Verified Scalability Guide for Cisco ACI*.

Create L3Out Wizard

A new Create L3Out wizard is introduced in APIC release 4.2(1) that provides a straightforward walk-through for configuring an L3Out.

The Create L3Out wizard streamlines the process for configuring an L3Out, which defines how the ACI fabric connects to external layer 3 networks. With the Create L3Out wizard, you make the necessary basic configurations for the L3Out components in the following pages:

- Identity page: This page is used to configure the basic settings for the L3Out, as well as the static routing and dynamic routing protocols settings.
- Nodes and Interfaces page: This page is used to configure the node profiles and interface profiles for the Layer 3 and Layer 2 interface types.
- **Protocols page**: This page is used to configure specific polices based on the protocols that you selected in the Identity page.
- External EPG page: This page is used to configure the contract and subnets for the external EPG.

Example L3Out Configuration

There are many different options available to you when configuring an L3Out using the **Create L3Out** wizard. Following is one example L3Out configuration, where you will configure an OSPF L3Out with two external routers, that will help you to understand the general configuration process.



Note

This example uses Cisco APIC release 4.2(x) and the associated GUI screens.

Example Topology



Figure 2: Example Topology for an OSPF L3Out with Two External Routers

This basic L3Out example shows you how to:

- Configure an L3Out with the following specifications:
 - With Area 0 OSPF
 - With two external routers
 - With routed interfaces
 - On two border leaf switches
- Advertise a BD subnet using default route-map (default-export)

• Allow communication with a contract between EPG1 and external route (10.0.0.0/8)

Figure 3: OSPF Configuration Diagram



The preceding diagram illustrates the configuration for the example topology in Figure 2: Example Topology for an OSPF L3Out with Two External Routers, on page 4. The configuration flow for this example is as follows:

- 1. L3Out: This creates
 - L3Out itself (OSPF parameters)
 - Node, Interface, OSPF I/F Profiles
 - L3Out EPG with External Subnets for the External EPG scope
- 2. Advertise a BD subnet: This uses
 - default-export route-map
 - BD subnet with Advertise Externally scope
- 3. Allow EPG L3Out communication: This uses a contract between EPG1 and L3Out EPG1

Prerequisites

Figure 4: Example Screen of Objects Created as Prerequisites

Example (\mathbf{F}) Static Ports 00 O Quick Start Ē. Ξ Õ Example Deployment Immediacy Path Primary VLAN Port Encap (or Mode for Micro-Seg Application Profiles Secondary VLAN for AP1 Micro-Seg) Application EPGs Node: Pod-1 SS EPG1 Pod-1/Node-101... unknown vlan-10 Immediate Trunk E Domains (VMs and Bare-Met EPG Members E Static Ports Pod-1/Node-101/eth1/1 Static Leafs Fibre Channel (Paths) Contracts Static Endpoint E Subnets L4-L7 Virtual IPs L4-L7 IP Address Pool 🖿 uSea EPGs Endpoint Security Groups Networking IP Address: 192.168.1.254/24 Eridge Domains Description: optional (1) BD1 DHCP Relay Labels Treat as virtual IP address: Subnets Make this IP address primary: 🗌 192.168.1.254/24 = → Scope: ✓ Advertised Externally Shared between VRFs To Proxy Subnets Subnet Control: No Default SVI Gateway VRFs Ouerier IP VRF1 L3 Out for Route Profile: select a value 🚞 External Bridged Networks Route Profile: select a value

- This configuration example focuses only on the L3Out configuration part. The other configurations such as for VRF, BD, EPG, Application Profiles, and Access Policies (Layer 3 Domain etc.) are not covered. The preceding screenshot displays the prerequisite tenant configurations that are as follows:
 - VRF1
 - BD1 with the subnet 192.168.1.254/24
 - EPG1 with a static port towards endpoints

Create Example L3Out Using the Create L3Out Wizard

This task creates the OSPF L3Out described in Example Topology. Following this task, Cisco ACI will be configured with two border leaf switches and OSPF neighborship with two external routers as shown in Figure 2: Example Topology for an OSPF L3Out with Two External Routers, on page 4.

Procedure

Step 1	In the GUI Navigation pane, under the Tenant Example, navigate to Networking > L3Outs .
Step 2	Right-click and choose Create L3Out.
Step 3	In the Create L3Out screen, Identity tab, perform the following actions:
•	Create L3Out
	1. Identity 2. Nodes And Interfaces 3. Protocols 4. External EPG
	Protocol
	BouteR
	Leaf Router
	Identity
	A Layer 3 Outside (L3Out) network configuration defines how the ACI fabric connects to external layer 3 networks. The L3Out supports connecting to external astronomy wild static control describe and describe control of COD CRDS and ECOD)
	networks using static routing and dynamic routing protocols (BGP, OSPP, and EIGRP).
	Prerequisites: Configure an L3 Domain and Fabric Access Policies for interfaces used in the L3Out (AAEP, VLAN pool, Interface selectors).
	Configure a BGP Route Reflector Policy for the fabric infra MP-BGP.
	Name: EXAMPLE_L3Out1 BGP EIGRP SOSPF
	VRF1 VRF1 OSPF Area ID: 0
	L3 Domain: EXAMPLE_L3_DOM V C Control: Viginate summary LSA
	Use for GOLF:
	OSPF Area Type: NSSA area Stud area
	Previous Cancel Next

- a) In the Name field, enter the name for an L3Out. (EXAMPLE_L3Out1)
- b) In the VRF field and the L3 Domain field, choose the appropriate values. (VRF1, EXAMPLE_L3DOM)
- c) In the **OSPF** field, check the checkbox.
- d) In the **OSPF Area ID** field, choose the value **0** or the text **backbone**.
- e) In the OSPF Area Type field, choose Regular area.
- f) Keep the rest of the fields with their default values.

Previous Cancel Next

Cro	ato I 3Out	r	5		,	1	0	0
Cre	ale LSOul							U
					1. Identity	2. Nodes And Interface:	s 3. Protocols	4. External EPG
	Nodes and Interf	faces						
	The L3Out configu in a single node pr separate interface	ration ofile a profile	consists of node pro nd is required for no e is required for the If	files and interface des that are part o Pv4 and IPv6 confi	profiles. An L3Out can span a a VPC pair. Interface profiles juration, that is automatically	cross multiple nodes in the fa can include multiple interface taken care of by this wizard.	bric. All nodes used by th is. When configuring dual	e L3Out can be includ stack interfaces a
	Use Defaults:	2						
1	nterface Types	_						
	Layer 3:	Rou	ed Routed Sub	SVI Floating	M)			
	Laver 2:	Port	Direct Port Channe	el				
1	Nodes							
	Node ID		Rout	ter ID	Loopback Address			
	leaf2 (Node-102)		< 2.2.	2.2		🖀 🕂 Hide Interfaces		
					Leave empty to not configure any Loopback	A		
	Interface		IP Address	MTU (bytes)			Click	+ icon to add
	eth1/11	\sim	172.16.1.1/30	inherit	(ii) (ii)		anot	her node
			address/mask		▲			
	Interface		IP Address	MTU (bytes)			Click	, icon to adv
	eth1/12	~	address/mask	inherit			anot	her interface
	Node ID		Rout	ter ID	Loopback Address			
	leaf3 (Node-103)		∨ 3.3.	3.3	Leave errors to not configure	Hide Interfaces		
					any Loopback			
	Interface		IP Address	MTU (bytes)				
		~	172.16.3.1/30	inherit	(iii) (iii)			
	eth1/11							
	eth1/11		address/mask					
	Interface		address/mask	MTU (bytes)				

S

- a) In the Interface Types area, in the Layer 3 field and in the Layer 2 field, ensure that your selections match the choices in the preceding screenshot (Routed and Port).
- b) In the **Nodes** area, in the **Node ID** field, from the drop-down list, choose the appropriate node ID. (leaf2 (Node 102))
- c) In the **Router ID** field, enter the appropriate router ID. (2.2.2.2)

The Loopback Address field auto populates based on the router ID value you enter. You do not require the loopback address, so delete the value and leave the field blank.

- d) In the **Interface** field, choose the interface ID. (eth 1/11)
- e) In the **IP Address** field, enter the associated IP address. (172.16.1.1/30)
- f) In the **MTU** field, keep the default value. (inherit)
- g) Click the + icon next to the MTU field to add an additional interface for node leaf2. (Node-102)
- h) In the **Interface** field, choose the interface ID. (eth1/12)
- i) In the **IP Address** field, enter the associated IP address. (172.16.2.1/30)
- j) In the **MTU** field, keep the default value. (inherit)
- Step 5 To add another node, click the + icon next to the Loopback Address field, and perform the following actions:
 - Note When you click the + icon, the new **Nodes** area is displayed below the area that you had populated earlier.

- a) In the Nodes area, in the Node ID field, from the drop-down list, choose the node ID. (leaf3 (Node-103))
- b) In the **Router ID** field, enter the router ID. (3.3.3.3)

The **Loopback Address** field auto populates based on the router ID value you enter. You do not require the loopback address, so delete the value and leave the field blank.

- c) In the **Interface** field, choose the interface ID. (eth1/11)
- d) In the IP Address field, enter the IP address. (172.16.3.1/30)
- e) In the MTU field, keep the default value. (inherit)
- f) Click the + icon next to the MTU field to add an additional interface for node leaf3. (Node-103)
- g) In the **Interface** field, choose the interface ID. (eth1/12)
- h) In the IP Address field, enter the associated IP address. (172.16.4.1/30)
- i) In the **MTU** field, keep the default value. (inherit), and click **Next**. We have specified the node, interface, and IP address for each interface.

Step 6 Click **Next** to view the **Protocols** screen.

This screen allows you to specify the OSPF interface level policy to configure hello-interval, network-type, etc. Create L3Out

			1. Identity	2. Nodes And Interfaces	3. Protocols	4. External EPG
col Associations						
OSPF						
Node ID: 102						
Interface 1/11,1/12	Policy select a value	~		Hide Policy]	
Node ID: 103						
Interface 1/11,1/12	Policy select a value	<u>~</u>		Hide Policy]	
					Previous	Cancel Next

In this example, nothing is selected. Therefore, the default policy is used. The default OSPF interface profile uses **Unspecified** as network-type which defaults to broadcast network type. To optimize this with point-to-point network-type for sub-interface, see **Change the OSPF Interface Level Parameters (Optional)**.

Step 7 Click Next.

The **External EPG** screen is displayed with L3Out EPG details. This configuration is to classify the traffic into the EPG to apply to the contract.

Step 8 In the **External EPG** screen, perform the following actions:

Create L3Out						08
			1. Identity	2. Nodes And Interface	s 3. Protocols	4. External EPG
External EPG						
The L3Out Net for applying co fabric.	work or External ntracts. Route co	EPG is used for traffic classification ontrol policies are used for filtering	, contract association: dynamic routes excha	s, and route control policies. nged between the ACI fabric	Classification is matching ext and external devices, and le	ternal networks to this EPG aked into other VRFs in the
	Name:	L3Out_EPG1				
p	rovided Contract:	select a value				
Co	nsumed Contract:	common/default 🗸 🛃				
Default EPG for all e	xternal networks:					
Subnets						
						會 +
IP Address	Scope	Nam	e	Aggregate	Route Control Profile	Route Summarization Policy
10.0.0/8	External	Subnets for the External EPG				
172.16.0.0/21	External	Subnets for the External EPG				
					Previous	Cancel Finish

- a) In the **External EPG** area, **Name** field, enter a name for the external EPG. (L3Out_EPG1)
- b) In the Provided Contract field, do not choose a value.

In this example, there is no provided contract for L3Out_EPG1 because a normal EPG (EPG1) is the provider.

c) In the **Consumed Contract** field, choose **default** from the drop-down list.

Step 9 In the **Default EPG for all external networks** field, uncheck the checkbox, and perform the following actions:

- a) Click the + icon in the **Subnets** area, to display the **Create Subnet** dialog box.
- b) In the IP Address field, enter the subnet. (10.0.0/8)
- c) In the **External EPG Classification** field, check the checkbox for **External Subnets for the External EPG**. Click **OK**.
- **Step 10** Click the + icon in the **Subnets** area once more to display the **Create Subnet** dialog box, and perform the following actions:

a) In the **IP Address** field, enter the subnet. (172.16.0.0/21)

This subnet covers all the interfaces in the L3Out. This can be each individual subnet for each routed interface instead.

- b) In the **External EPG Classification** field, check the checkbox for **External Subnets for the External EPG**. Click **OK**.
- c) Click Finish.

The L3Out OSPF is now deployed.

Review - Create Example L3Out Using the Create L3Out Wizard

Review how the configuration using the wizard is presented in the Cisco APIC GUI, and verify that the configurations are accurate.

Note Although this is an optional configuration, it is a best practice to specify the L3Out interface subnets in case endpoints have to communicate with those IPs.

Procedure

Step 1 Navigate to your Tenant_name > Networking > L3Outs > EXAMPLE_L3Out1, in the Work pane, scroll to view the details as follows:

At this location in the GUI, verify the main L3Out parameters such as VRF, domain, and OSPF parameters that are configured in the **Identity** screen in the **Create L3Out** wizard.



- **Step 2** Verify that OSPF is enabled with the specified parameters such as Area ID and Area Type.
- **Step 3** Under Logical Node Profiles, *EXAMPLE_L3Out1_nodeProfile* is created to specify border leaf switches with their router IDs.
- **Step 4** Under Logical Interface Profile, *EXAMPLE_L3Out1_interfaceProfile* is created.

Verify the interface parameters such as interface ID, IP addresses, in this example, as routed interfaces. The default MAC addresses gets auto populated. OSPF interface profile is also created under this for OSPF interface level parameters.

The review is complete.

Configure Advertise the BD Subnet with a Route Map

In this example, a route map, default-export, is used with the IP prefix list to advertise the BD subnet.

Note

This **default-export** route map will be applied to the L3Out (EXAMPLE_L3Out1) without being associated to anything specific.

Procedure

Step 1 To enable a BD subnet to be advertised, navigate to Tenant > Networks > Bridge Domains > BD1 > Subnets > 192.168.1.254/24, and select Advertised Externally scope.

Example	©€€	Subnet - 192.168.1.254/2	24		0	. 0
✓ ➡ Bridge Domains ✓ ⓓ BD1		Policy	Operational	Faults	Hist	tory
> 🚞 DHCP Relay Labels	s	8 👽 🛆 🕚		Ō	+	**-
✓	1	Properties				
192.168.1.254	24	IP Address:	192.168.1.254/24			
> 🚞 ND Proxy Subnets		Description:	optional			
> 🚞 VRFs						
> 🚞 External Bridged Network	s	Treat as virtual IP address:				
✓ ➡ L3Outs		Make this IP address primary:				
✓		Scope:	Private to VRF Advertised Externa	ally		
🗸 🚞 Logical Node Profi	es		Shared between \	/RFs		
✓	ut1_nodeProfile	Subnet Control:	No Default SVI Ga	teway		
🗸 🚞 Logical Inter	face Profiles	1.2 Out for Pouto Profile:	Querier IP			
V 🗧 EXAMPL	E_L3Out1_interfacePr	Lo Out for Route Profile.	select a value			
E OSPF	Interface Profile	Route Prome:	select a value			
> 🚞 Configured	Nodes					
> 🚞 External EPGs						
🗸 🚞 Route map for imp	ort and export route c					
efault-export						
> 🚞 Dot1Q Tunnels						
> 🚞 Contracts		Show	v Usage			
> 🚞 Policies		Child	- codgo			

Step 2 To create a route map under your L3Out (EXAMPLE_L3Out1), navigate to Route map for import and export route control.

Example		Name: default-export		Non Differentials	
> C Quick Start		Description: Optional	watch Ro	using Policy Univ	
✓ III Example	•				
> 🧮 Application Profiles	Contexts				
V Im Networking	Order	Name	Action	Description	B +
> 🛅 Bridge Domains	0	BD_Subnets	Permit		
> 🧰 VRFs					
> 🚞 External Bridged Networks					
🗸 🚞 L3Outs		Order			
✓		Neme: 0	A b c c b c c c c c c c c c c		
Logical Node Profiles		Name: BD	_Subnets	8	
EXAMPLE_L3Out1_nodeProfile		Action:	Deny Permit		
Logical Interface Profiles		Description: Op	tional		
EXAMPLE_L3Out1_interfacePr					
SPF Interface Profile		Match Rule: BD	1_prefix	~ 🛛	
> E Configured Nodes		Set Rule: sel	ect a ralue		
External EPGs					
E L3Out_EPG1					
✓					
default-export		Match Prefix:	•		
> 🧮 Dot1Q Tunnels		indicit Profix.			
> 🧮 Contracts			IP	Description	Aggregate
> 🧮 Policies			192.168.1.0/24		False
> 🖿 Services					

- Step 3 Right-click and choose Create Route map for import and export route control.
- Step 4 In the Create Route map for import and export route control dialog box, in the Name field, choose default-export.
- **Step 5** In the **Type** field, choose **Matching Route Policy Only**.
 - **Note** Match Routing Policy Only: By choosing this Type with default-export route map, all route advertisement configuration is performed by this route map. BD associations and export route control subnets configured under the external EPG will not apply. You should configure all match rules within this route-map for all routes that will be advertised from this L3Out.

Match Prefix and Routing Policy: By choosing this **Type** with default-export route map, route advertisement is matched by any match rules configured in this route map **in addition to** any BD to L3Out associations and export route control subnets defined under the External EPG.

When using a route profile, it is recommended to use **Match Routing Policy Only** for a simpler configuration that is easier to maintain.

- **Step 6** In the **Contexts** area, click the + icon, to display the **Create Route Control Context** dialog box, and perform the following actions:
 - a) In the **Order** field, configure the order. (0)

In this example, we have only one order.

- b) In the Name field, enter a name for the context. (BD_Subnets)
- c) In the Action field, choose Permit.

This enables the route map to permit the prefix we will configure.

In this example, we require the match rule that requires the IP prefix list, **BD1_prefix**. This IP prefix list points to the BD subnet advertised.

- **Step 7** In the Match Rule field, create the IP prefix-list by performing the following actions;
 - a) Choose Create Match Rule for a Route-Map.
 - b) In the Name field, enter a name *BD1_prefix*.
 - c) In the Match Prefix area, click the + icon, and enter the BD subnet (192.168.1.0/24).

Verify the Contract

In this task, you verify the contract to enable communication between an endpoint (192.168.1.1) and external prefixes (10.0.0.0/8, and optionally 172.16.0.0/21). In this example, the EPG for the endpoint is EPG1 and the external EPG for external prefixes is L3Out_EPG1.

The required configuration should already be present from the Create L3Out wizard.

Procedure

Example	$\bigcirc \bigcirc \bigcirc \bigcirc$						
> C Quick Start							
✓							
> 🚞 Application Profiles							
V I Networking							
> 🚞 Bridge Domains							
> 🚞 VRFs							
> 🚞 External Bridged	Networks						
∨ 🚞 L3Outs							
✓	Dut1	External EPG Insta	nce Profile - L3Ou	_EPG1			
🗸 🚞 Logical No	de Profiles			Poli	cy Operational Stats	Health F	Faults
V 📮 EXAMP	LE_L3Out1_nodeProfile				General Contracts	Subject Label	IS EPV
\sim 🚞 Logi	cal Interface Profiles	🕈 Healthy 😣 💟					Ó
- 🗧 E	XAMPLE_L3Out1_interfaceProfile	Properties	nets:				
	OSPF Interface Profile		 IP Address 	Scope	Name Aggregate	Route Control Profile	Route Summaria
> 🚞 Con	figured Nodes		10.0.0/8	External Subnets for the External EPG			Policy
V 🚞 External EP	Gs		172.16.0.0/21	External Subnets for the External EPO			
E L3Out_	EPG1						
Route map	for import and export route con	External EPG Instar	nce Profile - L3Out	_EPG1			
= default-	export			Poli	Cy Operational Stats	Health F	aults
> 🚞 Dot1Q Tunnels					General Contracts	Subject Label	s EP
> 🚞 Contracts		1	Provided Contracts	Consumed Contracts	Contract Interfaces Tabo	o Contracts In	nherited C
> 🚞 Policies		Name	Tenant	Type	QoS Class	State	0
		44.0		Contrast.			

Step 2 In the **Work** pane, in the **External EPG Instance Profile** area, under **Policy** > **General** sub-tab, look at the Properties and verify that the two subnets are displayed with **External Subnets for the External EPG**.

- **Step 3** Next, click the **Contracts** sub-tab and verify the contract you specified earlier is consumed correctly. In case you want to add more contracts, you can perform the actions from this location in GUI.
- **Step 4** Navigate to **Application Profile** > **Application EPGs** > *EPG1* > **Contracts**, and verify that EPG1 is providing the appropriate contract.

Change the OSPF Interface Level Parameters (Optional)

If you wish to change the OSPF interface-level parameters, such as **Hello Interval**, **OSPF network type**, then you can configure it in the OSPF Interface Profile. The node level OSPF parameters are already configured.

Procedure







This modifies your OSPF interface level parameters.

Advertise Host Routes

Enabling Advertise Host Routes on the BD, individual host-routes (/32 and /128 prefixes) are advertised from the Border-Leaf switches (BL). The BD must be associated to the L3out or an explicit prefix list matching the host routes. The host routes must be configured to advertise host routes out of the fabric.

Border-Leaf switches along with the subnet advertise the individual end-point(EP) prefixes. The route information is advertised only if the host is connected to the local POD. If the EP is moved away from the local POD or once the EP is removed from EP database (even if the EP is attached to a remote leaf), the route advertisement is then withdrawn.



Advertise Host Route configuration guidelines and limitations are:

- When host routes are advertised, the VRF Transit Route Tag is set in order to prevent them from being
 advertised back into the fabric and installed. In order for this loop protection to work properly, external
 routers must preserve this route-tag if advertising to another L3Out.
- If a bridge domain is tied to an EPG that has the same subnet configured for internal leaking, you must also enable the "Advertised Externally" flag on the EPG subnet.
- The Advertise Host Routes feature is supported on Generation 2 switches or later (Cisco Nexus N9K switches with "EX", "FX", or "FX2" on the end of the switch model name or later; for example, N9K-93108TC-EX).
- Host route advertisement supports both BD to L3out Association and the explicit route map configurations. We recommend using explicit route map configuration which allows you greater control in selecting individual or a range of host routes to configure.

- EPs/Host routes in SITE-1 will not be advertised out through Border Leafs in other SITEs.
- When EPs is aged out or removed from the database, Host routes are withdrawn from the Border Leaf.
- When EP is moved across SITEs or PODs, Host routes should be withdrawn from first SITE/POD and advertised in new POD/SITE.
- EPs learned on a specific BD, under any of the BD subnets are advertised from the L3out on the border leaf in the same POD.
- EPs are advertised out as Host Routes only in the local POD through the Border Leaf.
- Host routes are not advertised out from one POD to another POD.
- In the case of Remote Leaf, if EPs are locally learned in the Remote Leaf, they are then advertised only through a L3out deployed in Remote Leaf switches in same POD.
- EPs/Host routes in a Remote Leaf are not advertised out through Border Leaf switches in main POD or another POD.
- EPs/Host routes in the main POD are not advertised through L3out in Remote Leaf switches of same POD or another POD.
- The BD subnet must have the Advertise Externally option enabled.
- The BD must be associated to an L3out or the L3out must have explicit route-map configured matching BD subnets.
- There must be a contract between the EPG in the specified BD and the External EPG for the L3out.



- **Note** If there is no contract between the BD/EPG and the External EPG the BD subnet and host routes will not be installed on the border leaf.
 - Advertise Host Route is supported for shared services. For example: epg1/BD1 deployed is in VRF-1 and L3out in another VRF-2. By providing shared contract between EPG and L3out host routes are pulled from one VRF-1 to another VRF-2.
 - When Advertise Host Route is enabled on BD custom tag cannot be set on BD Subnet using route-map.
 - When Advertise Host Route is enabled on a BD and the BD is associated with an L3Out, BD subnet is marked public. If there's a rogue EP present under the BD, that EP is advertised out on L3Out.

Configuring Route Reflectors

ACI fabric route reflectors use multiprotocol BGP (MP-BGP) to distribute external routes within the fabric. To enable route reflectors in the ACI fabric, the fabric administrator must select the spine switches that will be the route reflectors, and provide the autonomous system (AS) number. It is recommended to configure at least two spine nodes per pod as MP-BGP route reflectors for redundancy.

After route reflectors are enabled in the ACI fabric, administrators can configure connectivity to external networks through leaf nodes using a component called Layer 3 Out (L3Out). A leaf node configured with an L3Out is called a border leaf. The border leaf exchanges routes with a connected external device via a routing protocol specified in the L3Out. You can also configure static routes via L3Outs.

After both L3Outs and spine route reflectors are deployed, border leaf nodes learn external routes via L3Outs, and those external routes are distributed to all leaf nodes in the fabric via spine MP-BGP route reflectors.

Check the *Verified Scalability Guide for Cisco APIC* for your release to find the maximum number of routes supported by a leaf.

Configuring an MP-BGP Route Reflector Using the GUI

Procedure

Step 1	1 On the menu bar, choose System > System Settings .									
Step 2	In the Na	In the Navigation pane, right-click BGP Route Reflector, and click Create Route Reflector Node.								
Step 3	In the Create Route Reflector Node dialog box, from the Spine Node drop-down list, choose the appropriate spine node. Click Submit .									
	Note	Repeat the above steps to add additional spine nodes as required.								
	The spin	e switch is marked as the route reflector node.								
Step 4	In the BGP Route Reflector properties area, in the Autonomous System Number field, choose the appropriate number Click Submit .									
	Note	The autonomous system number must match the leaf connected router configuration if Border Gateway Protocol (BGP) is configured on the router. If you are using routes learned using static or Open Shortest Path First (OSPF), the autonomous system number value can be any valid value.								
Step 5	On the m	enu bar, choose Fabric > Fabric Policies > Pods > Policy Groups.								
Step 6	In the Na	wigation pane, expand and right-click Policy Groups, and click Create Pod Policy Group.								
Step 7	In the Create Pod Policy Group dialog box, in the Name field, enter the name of a pod policy group.									
Step 8	In the BG The BGF on the lea	GP Route Reflector Policy drop-down list, choose the appropriate policy (default). Click Submit . Proute reflector policy is associated with the route reflector pod policy group, and the BGP process is enabled af switches.								
Step 9	On the m	enu bar, choose Fabric > Fabric Policies > Profiles > Pod Profile default > default.								
Step 10	In the W o Submit . The pod	ork pane, from the Fabric Policy Group drop-down list, choose the pod policy that was created earlier. Click								
	The pou	poncy group is now applied to the fabric poncy group.								

Verifying the MP-BGP Route Reflector Configuration

Procedure

Step 1

Verify the configuration by performing the following actions:

- a) Use secure shell (SSH) to log in as an administrator to each leaf switch as required.
- b) Enter the show processes | grep bgp command to verify the state is S.

If the state is NR (not running), the configuration was not successful.

Step 2 Verify that the autonomous system number is configured in the spine switches by performing the following actions:

- a) Use the SSH to log in as an administrator to each spine switch as required.
- b) Execute the following commands from the shell window

Example:

cd /mit/sys/bgp/inst

Example:

grep asn summary

The configured autonomous system number must be displayed. If the autonomous system number value displays as 0, the configuration was not successful.