



Cisco ACI Multi-Site Orchestrator Release Notes, Release 2.2(1)

This document describes the features, issues, and limitations for the Cisco Application Centric Infrastructure (ACI) Multi-Site Orchestrator software.

Cisco ACI Multi-Site is an architecture that allows you to interconnect separate Cisco APIC cluster domains (fabrics), each representing a different availability zone, all part of the same region. This helps ensure multitenant Layer 2 and Layer 3 network connectivity across sites and extends the policy domain end-to-end across the entire system.

Cisco ACI Multi-Site Orchestrator is the intersite policy manager. It provides single-pane management that enables you to monitor the health of all the interconnected sites. It also allows you to centrally define the intersite policies that can then be pushed to the different Cisco APIC fabrics, which in turn deploys them on the physical switches that make up those fabrics. This provides a high degree of control over when and where to deploy those policies.

For more information, see [Related Content](#).

Date	Description
December 2, 2020	Additional open issue CSCvw61549.
July 20, 2020	Additional open issue CSCvu23330.
April 23, 2020	Additional open issue CSCvs57670.
April 19, 2020	Removed bug CSCvq19270 from open issues. The issue is resolved in all releases starting with Release 2.2(1c).
March 2, 2020	Additional open issue CSCvs91386.
November 4, 2019	Additional open issue CSCvr85866.
September 8, 2019	Release 2.2(1c) became available.

Contents

- Contents
- New Software Features
- New Hardware Features
- Changes in Behavior
- Open Issues
- Resolved Issues
- Known Behaviors
- Usage Guidelines

New Software Features

- Compatibility
- Scalability
- Related Content
- Legal Information

New Software Features

Cisco ACI Multi-Site, Release 2.2(1) supports the following new features.

New Software Features

Feature	Description
Cisco ACI Cloud APIC and Azure support	<p>Cisco ACI Multi-Site Orchestrator can now manage Cisco Cloud APIC sites deployed in Microsoft Azure cloud.</p> <p>For more information on Cloud APIC installation, configuration, and specific use cases with Cisco ACI Multi-Site, see the Cisco Cloud APIC documentation.</p>
DHCP Relay Policies	<p>A DHCP relay can be configured to allow endpoints in one EPG to obtain IP addresses via DHCP from a server that is located in another EPG and stretched BD deployed in a different site or even connected externally to the fabric and reachable via an L3Out connection</p> <p>For more information, see the “Administrative Operations” chapter of the Cisco ACI Multi-Site Configuration Guide, Release 2.2(x).</p>
Intersite L3Out	<p>ACI Multi-Site now supports a number of scenarios in which a single L3Out can be shared between multiple sites.</p> <p>For more information, see Intersite L3Out section in the “Schema Management” chapter of the Cisco ACI Multi-Site Configuration Guide, Release 2.2(x).</p>
EPG and BD migration between Schemas and/or Templates	<p>You can now move EPGs and bridge domains between different templates and/or schemas.</p> <p>For more information, see the “Schema Management” chapter of the Cisco ACI Multi-Site Configuration Guide, Release 2.2(x).</p>
Cisco ACI Multi-Site and Cisco APIC Mixed Version Interoperability Support	<p>Multi-Site Orchestrator releases have been decoupled from the APIC releases. The APIC clusters in each site as well as the Orchestrator itself can now be upgraded independently of each other and run in mixed operation mode.</p> <p>For more information, see the Interoperability Support section in the “Infrastructure Management” chapter of the Cisco ACI Multi-Site Configuration Guide, Release 2.2(x).</p>
Remote Backup Locations	<p>You can now configure a remote SCP or SFTP location from the Orchestrator GUI for your configuration backup file.</p> <p>For more information, see the “Administrative Operations” chapter of the Cisco ACI Multi-Site Configuration Guide, Release 2.2(x).</p>

System Configuration Options	<p>Two global system configuration settings have been added:</p> <p>System Alias and Banner</p> <p>Lockout timer for failed GUI login attempts</p> <p>For more information, see the “Administrative Operations” chapter of the Cisco ACI Multi-Site Configuration Guide, Release 2.2(x).</p>
------------------------------	--

New Hardware Features

There is no new hardware supported in this release.

The complete list of supported hardware is available in the [Cisco ACI Multi-Site Hardware Requirements Guide](#).

Changes in Behavior

If you are upgrading to this release, you will see the following changes in behavior:

- Release 2.2(1) adds a GUI lockout timer for repeated failed login attempts. This is enabled by default when you upgrade to Release 2.2(1) or later and is set to 5 login attempts before a lockout with the lockout duration incremented exponentially every additional failed login attempt.
- If you configure read-only user roles in Release 2.1(2) or later and then choose to downgrade your Multi-Site Orchestrator to an earlier version where the read-only roles are not supported:
 - You will need to reconfigure your external authentication servers to the old attribute-value (AV) pair string format. For details, see the “Administrative Operations” chapter in the *Cisco ACI Multi-Site Configuration Guide*.
 - The read-only roles will be removed from all users. This also means that any user that has only the read-only roles will have no roles assigned to them and a Power User or User Manager will need to re-assign them new read-write roles.
- Starting with Release 2.1(2), the 'phone number' field is no longer mandatory when creating a new Multi-Site Orchestrator user. However, because the field was required in prior releases, any user created in Release 2.1(2) or later without a phone number provided will be unable to log into the GUI if the Orchestrator is downgraded to Release 2.1(1) or earlier. In this case, a Power User or User Manager will need to provide a phone number for the user.
- If you are upgrading from any release prior to Release 2.1(1), the default password and the minimum password requirements for the Multi-Site Orchestrator GUI have been updated. The default password has been changed from **‘We1come!’** to **‘We1come2msc!’** and the new password requirements are:
 - At least 12 characters
 - At least 1 letter
 - At least 1 number
 - At least 1 special character apart from * and space

You will be prompted to reset your passwords when you:

Open Issues

- First install Release 2.2(x)
- Upgrade to Release 2.2(x) from a release prior to Release 2.1(1)
- Restore the Multi-Site Orchestrator configuration from a backup
- Starting with Release 2.1(1), Multi-Site **Orchestrator encrypts all stored passwords, such as each site's APIC passwords and the external authentication provider passwords.** As a result, if you downgrade to any release prior to Release 2.1(1), you will need to re-enter all the passwords after the Orchestrator downgrade is completed.

To update APIC passwords:

- a. Log in to the Orchestrator after the downgrade.
- b. From the main navigation menu, select Sites.
- c. For each site, edit its properties and re-enter its APIC password.

To update external authentication passwords:

- a. Log in to the Orchestrator after the downgrade.
- b. From the navigation menu, select Admin → Providers.
- c. For each authentication provider, edit its properties and re-enter its password.

Open Issues

This section lists the resolved issues. Click the bug ID to access the Bug Search tool and see additional information about the issue. The "Fixed In" column of the table specifies the relevant releases.

Bug ID	Description	Exists in
CSCvu23330	In multisite environment the instantiation of the service graph fails with fault F1690	2.2(1c) and later
CSCvr85866	Unable deploy configurations with EPG or Bridge Domain (BD) network masks greater than 30.	2.2(1c) and later
CSCvn71413	High CPU usage when deploying large schemas.	2.2(1c) and later
CSCvo84218	When service graphs or devices are created on Cloud APIC by using the API and custom names are specified for AbsTermNodeProv and AbsTermNodeCons, a brownfield import to the Multi-Site Orchestrator will fail.	2.2(1c) and later
CSCvo20029	Contract is not created between shadow EPG and on-premises EPG when shared service is configured between Tenants.	2.2(1c) and later
CSCvp97388	After migrating an EPG object from Site X to Site Y, the VRF object referenced by the migrated object is not deleted from Site X	2.2(1c) and later

Open Issues

CSCvq58349	shadow of extepg's vrf not getting updated.	2.2(1c) and later
CSCvq87959	A template contains an external EPG, L3out and a VRF (CTX) and is stretched to two sites. If the VRF (CTX) reference is changed to a different VRF'(CTX'), the old VRF(CTX) object is not deleted from the APIC sites.	2.2(1c) and later
CSCvq93031	<p>Unsupported Scenario: (Multiple VRFs OnPrem having contract with Single VRF InCloud)</p> <p>User has EPG-A in VRF-A and EPG-B in VRF-B having Contract C-A with CLOUD_EPG-C in VRF-C.</p> <p>Above configuration creates 2 shadow l3outs(for VRF-A and VRF-B) in On-prem APIC for shadowInstP of CLOUD_EPG-C.</p> <p>When user removes the contract C-A from EPG-B(VRF-B), the shadow L3out for VRF-B is not deleted along with shadowInstP of CLOUD_EPG-C.</p> <p>User may see shadow L3out for VRF-B along with shadowInstP of CLOUD_EPG-C in On-Prem APIC which could be confusing.</p>	2.2(1c) and later
CSCvq94082	Downgrade execution fails complaining about the certs location from a release higher than 2.1.1 to 2.0.1 or below. This bring up all services except the UI service since certs are missing from docker swarm.	2.2(1c) and later
CSCvq96258	<p>capic-sync docker images of older versions are now being cleaned up at the end of the upgrade but if there are none to cleaned up then, user might see a message which can be safely ignored:</p> <p>message user might see is:</p> <p>Removing the capic-sync images failed in <node-no></p>	2.2(1c) and later
CSCvq96263	After updating a template to delete a VRF object from it and deploying the change, the VRF object is not deleted from the APIC.	2.2(1c) and later
CSCvq96471	After downgrading from 2.2(1x) MSO image to 1.2(5b) MSO image, the MSO UI incorrectly shows templates as un-deployed even when no configuration changes were applied after the downgrade.	2.2(1c) and later
CSCvq97495	After un-deploying and deleting a template that contains an external EPG, L3out and a VRF (CTX), unable to create and deploy a new template with the same external EPG, L3out and VRF (CTX) names. Following error is seen - "Bad Request: VRF: ctx<VRF name> is already deployed by schema: <schma name> - template: <template name> on site <site name>"	2.2(1c) and later
CSCvq97517	<p>Undeploying a template from a Cloud site throws an error to delete the contextprofiles before deleting the VRF instance, which is getting deleted as part of the template undeployment.</p> <p>Given that the cloudCtxprofile configuration changes/deletion may not work after an import (if the names given to cloudCtxProfiles on Cloud APIC are not of the VRF-region format), brownfield import from Cloud APIC is not supported completely in the 4.2(1) release"</p>	2.2(1c) and later
CSCvr08538	Stale contract stale entry may persist after the contract is deleted.	2.2(1c) and later

Resolved Issues

CSCvn98355	Inter-site shared service between VRF instances across different tenants will not work, unless the tenant is stretched explicitly to the cloud site with the correct provider credentials. That is, there will be no implicit tenant stretch by Multi-Site Orchestrator.	2.2(1c) and later
CSCvr17557	Undeploy and redeploy external EPG from one site causing L3Out to EPG traffic disruption.	2.2(1c) and later
CSCvq79052	Updating TEP pool may cause a validation error.	2.2(1c) and later
CSCvr19577	If a template with empty AP (cloudApp without any cloudEpgs) is defined and it's undeployed, it deletes the cloudApp. If other templates are defined with same AP name and have cloudEpgs, then as a result of cloudApp deletion, all those cloudEpgs defined in other templates are also deleted.	2.2(1c) and later
CSCvs91386	When creating or editing a user, internal role IDs (for example, SITEMANAGER) are displayed instead of role labels (for example, "Site and Tenant Manager"). Additionally, role descriptions are missing.	2.2(1c) and later
CSCvs57670	+ The verification is always successful, even in scenarios when we know it should fail (ex. we delete from the APIC GUI an object created and still configured in the MSC GUI) + The "Last verified" date doesn't change after triggering the verification	2.2(1c) and later
CSCvw61549	Unable to select the site local L3Out for a newly created BD from MSO.	2.2(1c) and later

Resolved Issues

This section lists the resolved issues. Click the bug ID to access the Bug Search tool and see additional information about the issue. The "Fixed In" column of the table specifies whether the bug was resolved in the base release or a patch release.

Known Behaviors

Bug ID	Description	Fixed in
CSCvo62510	Deploying a service graph with "redirect to" rule and custom URL causes a fault	2.2(1c)
CSCvo96508	When a contract is set up between a cloud EPG in a Cloud APIC site and an external EPG (I3extInstP) in an L3Out in a on-premises APIC site, the routes representing the cloud EPG may not be exported out of the routing protocol on the on-premises L3Out. As a result, traffic from a source external to the on-premises L3Out may not be able to reach the endpoint (VM) in the AWS site.	2.2(1c)
CSCvo71137	cloudExtEPG requires an application profile association and the user cannot choose application profiles that are defined from a different template or a different schema.	2.2(1c)
CSCvp95742	"Futures timed out" error message appears when logging in to the Orchestrator GUI	2.2(1c)
CSCvp99309	During upgrade, network issues between nodes may cause "socket.timeout" exception to be thrown by the python scripts.	2.2(1c)
CSCvq84062	Downloaded configuration backups are saved in 'msc-backup-<timestamp>.tar.gz' format. The import backup functionality only supports files in '<timestamp>.tar.gz' format, so importing a previously downloaded backup fails.	2.2(1c)
CSCvj19791	Network Time Protocol (NTP) configuration is missing	2.2(1c)
CSCvm87972	Unexpected behavior during dual MSO member failure/recovery.	2.2(1c)
CSCvp38505	No way to verify how many Policy Object are associated in each schema.	2.2(1c)
CSCvp91142	Multi-Site Orchestrator cannot set BGP ASN above 2,147,483,647	2.2(1c)
CSCvp95742	"Future timeout error" message when logging into the UI and high CPU due to Java process.	2.2(1c)
CSCvq24356	Multi-Site Orchestrator open ssh version is lower than the stable openssh version.	2.2(1c)
CSCvq67103	LDAP search packet is showing the filter as \$userid instead of the actual username.	2.2(1c)

Known Behaviors

This section lists known behaviors. Click the Bug ID to access the Bug Search Tool and see additional information about the issue. The "Exists In" column of the table specifies the relevant releases.

Bug ID	Description
CSCvo82001	Unable to download Multi-Site Orchestrator report and debug logs when database and server logs are selected
CSCvo32313	Unicast traffic flow between Remote Leaf Site1 and Remote Leaf in Site2 may be enabled by default. This feature is not officially supported in this release.
CSCvn38255	After downgrading to a release prior to Release 2.1(1), preferred group traffic continues to work. You must disable the preferred group feature before downgrading to an earlier release.
CSCvn90706	No validation is available for shared services scenarios
CSCvo59133	The upstream server may time out when enabling audit log streaming
CSCvd59276	<p>For Cisco ACI Multi-Site, Fabric IDs Must be the Same for All Sites, or the Querier IP address Must be Higher on One Site.</p> <p>The Cisco APIC fabric querier functions have a distributed architecture, where each leaf switch acts as a querier, and packets are flooded. A copy is also replicated to the fabric port. There is an Access Control List (ACL) configured on each TOR to drop this query packet coming from the fabric port. If the source MAC address is the fabric MAC address, unique per fabric, then the MAC address is derived from the fabric-id. The fabric ID is configured by users during initial bring up of a pod site.</p> <p>In the Cisco ACI Multi-Site Stretched BD with Layer 2 Broadcast Extension use case, the query packets from each TOR get to the other sites and should be dropped. If the fabric-id is configured differently on the sites, it is not possible to drop them.</p> <p>To avoid this, configure the fabric IDs the same on each site, or the querier IP address on one of the sites should be higher than on the other sites.</p>
CSCvd61787	<p>STP and "Flood in Encapsulation" Option are not Supported with Cisco ACI Multi-Site.</p> <p>In Cisco ACI Multi-Site topologies, regardless of whether EPGs are stretched between sites or localized, STP packets do not reach remote sites. Similarly, the "Flood in Encapsulation" option is not supported across sites. In both cases, packets are encapsulated using an FD VNID (fab-encap) of the access VLAN on the ingress TOR. It is a known issue that there is no capability to translate these IDs on the remote sites.</p>
CSCve40295	<p>Proxy ARP is not supported in Cisco ACI Multi-Site Stretched BD without Flooding use case.</p> <p>Unknown Unicast Flooding and ARP Glean are not supported together in Cisco ACI Multi-Site across sites.</p>
CSCvi61260	If an infra L3Out that is being managed by Cisco ACI Multi-Site is modified locally in a Cisco APIC, Cisco ACI Multi-Site might delete the objects not managed by Cisco ACI Multi-Site in an L3Out.
CSCvp10518	Downgrading From 2.1(1) to 2.0(2) may fail if node runs out of space
CSCvq07769	"Phone Number" field is required in all releases prior to Release 2.2(1). Users with no phone number specified in Release 2.2(1) or later will not be able to log in to the GUI when Orchestrator is downgraded to a an earlier release.

Usage Guidelines

This section lists usage guidelines for the Cisco ACI Multi-Site software.

- In Cisco ACI Multi-Site topologies, we recommend that First Hop Routing protocols such as HSRP/VRRP are not stretched across sites.
- HTTP requests are redirected to HTTPS and there is no HTTP support globally or per user basis.
- Up to 12 interconnected sites are supported.
- Proxy ARP glean and unknown unicast flooding are not supported together.

Unknown Unicast Flooding and ARP Glean are not supported together in Cisco ACI Multi-Site across sites.

- Flood in encapsulation is not supported for EPGs and Bridge Domains that are extended across ACI fabrics that are part of the same Multi-Site domain. However, flood in encapsulation is fully supported for EPGs or Bridge Domains that are locally defined in ACI fabrics, even if those fabrics may be configured for Multi-Site.
- The leaf and spine nodes that are part of an ACI fabric do not run Spanning Tree Protocol (STP). STP frames originated from external devices can be forwarded across an ACI fabric (both single Pod and Multi-Pod), but are not forwarded across the inter-site network between sites, even if stretching a BD with BUM traffic enabled.
- GOLF L3Outs for each tenant must be dedicated, not shared.

The inter-site L3Out functionality introduced on MSO release 2.2(1) does not apply when deploying GOLF L3Outs. This means that for a given VRF there is still the requirement of deploying at least one GOLF L3Out per site in order to enable north-south communication. An endpoint connected in a site cannot communicate with resources reachable via a GOLF L3Out connection deployed in a different site.

- While you can create the L3Out objects in the Multi-Site Orchestrator GUI, the physical L3Out configuration (logical nodes, logical interfaces, and so on) must be done directly in each site's APIC.
- VMM and physical domains must be configured in the Cisco APIC GUI at the site and will be imported and associated within the Cisco ACI Multi-Site.

Although domains (VMM and physical) must be configured in Cisco APIC, domain associations can be configured in the Cisco APIC or Cisco ACI Multi-Site.

- Some VMM domain options must be configured in the Cisco APIC GUI.

The following VMM domain options must be configured in the Cisco APIC GUI at the site:

- NetFlow/EPG CoS marking in a VMM domain association
- Encapsulation mode for an AVS VMM domain

- Some uSeg EPG attribute options must be configured in the Cisco APIC GUI.

The following uSeg EPG attribute options must be configured in the Cisco APIC GUI at the site:

- Sub-criteria under uSeg attributes
- match-all and match-any criteria under uSeg attributes

- Site IDs must be unique.

In Cisco ACI Multi-Site, site IDs must be unique.

- To change a Cisco APIC fabric ID, you must erase and reconfigure the fabric.

Cisco APIC fabric IDs cannot be changed. To change a Cisco APIC fabric ID, you must erase the fabric configuration and reconfigure it.

However, Cisco ACI Multi-Site supports connecting multiple fabrics with the same fabric ID.

- Caution: When removing a spine switch port from the Cisco ACI Multi-Site infrastructure, perform the following steps:
 - a. Click Sites.
 - b. Click Configure Infra.
 - c. Click the site where the spine switch is located.
 - d. Click the spine switch.
 - e. Click the x on the port details.
 - f. Click Apply.

- Shared services use case: order of importing tenant policies

When deploying a provider site group and a consumer site group for shared services by importing tenant policies, deploy the provider tenant policies before deploying the consumer tenant policies. This enables the relation of the consumer tenant to the provider tenant to be properly formed.

- Caution for shared services use case when importing a tenant and stretching it to other sites

When you import the policies for a consumer tenant and deploy them to multiple sites, including the site where they originated, a new contract is deployed with the same name (different because it is modified by the inter-site relation). To avoid confusion, delete the original contract with the same name on the local site. In the Cisco APIC GUI, the original contract can be distinguished from the contract that is managed by Cisco ACI Multi-Site, because it is not marked with a cloud icon.

- When a contract is established between EPGs in different sites, each EPG and its bridge domain (BD) are mirrored to and appear to be deployed in the other site, while only being actually deployed in its own site. These mirrored objects are known as "shadow" EPGs and BDs.

For example, if one EPG in Site 1 and another EPG in Site 2 have a contract between them, in the Cisco APIC GUI at Site 1 and Site 2, you will see both EPGs. They appear with the same names as the ones that were deployed directly to each site. This is expected behavior and the shadow objects must not be removed.

For more information, see the Schema Management chapter in the [Cisco ACI Multi-Site Configuration Guide](#).

- Inter-site traffic cannot transit sites.

Site traffic cannot transit sites on the way to another site. For example, when Site 1 routes traffic to Site 3, it cannot be forwarded through Site 2.

- The ? icon in Cisco ACI Multi-Site opens the menu for Show Me How modules, which provide step-by-step help through specific configurations.

- If you deviate while in progress of a Show Me How module, you will no longer be able to continue.
- You must have IPv4 enabled to use the Show Me How modules.

- User passwords must meet the following criteria:

- Minimum length is 8 characters
- Maximum length is 64 characters
- Fewer than three consecutive repeated characters

Compatibility

- At least three of the following character types: lowercase, uppercase, digit, symbol
 - Cannot be easily guessed
 - Cannot be the username or the reverse of the username
 - Cannot be any variation of " cisco" , " isco" , or any permutation of these characters or variants obtained by changing the capitalization of letters therein
- If you are associating a contract with the external EPG, as provider, choose contracts only from the tenant associated with the external EPG. Do not choose contracts from other tenants. If you are associating the contract to the external EPG, as consumer, you can choose any available contract.
 - Policy objects deployed from ACI Multi-Site software should not be modified or deleted from any site-APIC. If any such operation is performed, schemas have to be re-deployed from ACI Multi-Site software.
 - The Rogue Endpoint feature can be used within each site of an ACI Multi-Site deployment to help with misconfigurations of servers that cause an endpoint to move within the site. The Rogue Endpoint feature is not designed for scenarios where the endpoint may move between sites.

Compatibility

This release supports the hardware listed in the [Cisco ACI Multi-Site Hardware Requirements Guide](#).

Multi-Site Orchestrator releases have been decoupled from the APIC releases. The APIC clusters in each site as well as the Orchestrator itself can now be upgraded independently of each other and run in mixed operation mode. For more information, see the Interoperability Support section in the “Infrastructure Management” chapter of the [Cisco ACI Multi-Site Configuration Guide](#).

Scalability

For the verified scalability limits, see the [Cisco ACI Verified Scalability Guide](#).

Related Content

See the [Cisco Application Policy Infrastructure Controller \(APIC\)](#) page for ACI Multi-Site documentation. On that page, you can use the "Choose a topic" and "Choose a document type" fields to narrow down the displayed documentation list and find a desired document.

The documentation includes installation, upgrade, configuration, programming, and troubleshooting guides, technical references, release notes, and knowledge base (KB) articles, and videos. KB articles provide information about a specific use cases or topics. The following tables describe the core Cisco Application Centric Infrastructure Multi-Site documentation.

Document	Description
Cisco ACI Multi-Site Release Notes	This document. Provides release information for the Cisco ACI Multi-Site Orchestrator product.
Cisco ACI Multi-Site Fundamentals Guide	Provides basic concepts and capabilities of the Cisco ACI Multi-Site.
Cisco ACI Multi-Site Hardware Requirements Guide	Provides the hardware requirements and compatibility.
Cisco ACI Multi-Site Installation and Upgrade Guide	Describes how to install Cisco ACI Multi-Site Orchestrator and perform day-0 operations.
Cisco ACI Multi-Site Configuration Guide	Describes Cisco ACI Multi-Site configuration options and procedures.
Cisco ACI Multi-Site REST API Configuration Guide	Describes how to use the Cisco ACI Multi-Site REST APIs.
Cisco ACI Multi-Site Troubleshooting Guide	Provides descriptions of common operations issues and Describes how to troubleshoot common Cisco ACI Multi-Site issues.
Cisco ACI Verified Scalability	Contains the maximum verified scalability limits for Cisco Application Centric Infrastructure (Cisco ACI), including Cisco ACI Multi-Site.
Cisco ACI YouTube channel	Contains videos that demonstrate how to perform specific tasks in the Cisco ACI Multi-Site.

Documentation Feedback

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

Legal Information

Cisco and the Cisco logo are trademarks or registered trademarks of Cisco and/or its affiliates in the U.S. and other countries. To view a list of Cisco trademarks, go to this URL: <http://www.cisco.com/go/trademarks>. Third-party trademarks mentioned are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (1110R)

Any Internet Protocol (IP) addresses and phone numbers used in this document are not intended to be actual addresses and phone numbers. Any examples, command display output, network topology diagrams, and other figures included in the document are shown for illustrative purposes only. Any use of actual IP addresses or phone numbers in illustrative content is unintentional and coincidental.

© 2019 Cisco Systems, Inc. All rights reserved.