

Graceful Insertion and Removal Mode on Cisco Nexus Switches



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Introduction

The primary goal of this document is to provide guidelines for implementing the graceful insertion and removal (GIR) mode on Cisco Nexus® Family switches for a variety of customer profiles.

Readers will learn how to use custom profiles in GIR mode to isolate a switch from the network.

Target Audience

This document is written for planning, implementation, and maintenance teams.

Prerequisites

This document assumes that the reader is already familiar with the basic operations of GIR mode. Please refer to the [configuration guide](#) for more information.

Graceful Insertion and Removal

Starting with Cisco® NX-OS Software Release 7.1(0) N1(1b) for Cisco Nexus fixed switches (Cisco Nexus 5000 and 6000 Series Switches) and with NX-OS Release 7.2 for Cisco Nexus modular switches (Cisco Nexus 7000 Series Switches and Cisco Nexus 7700 platform switches), you can use GIR, or maintenance, mode to isolate a switch from the network to perform real-time debugging without affecting traffic, and you can upgrade or downgrade the switch with little service disruption.

You can use GIR mode to simplify the maintenance process for customers. Currently during maintenance windows for module installation, cabling, and erasable programmable logic device (EPLD) upgrades, you need to isolate the switch using a series of commands and scripts, which is cumbersome process for customers. GIR mode provides an easy method for isolating a switch for maintenance windows and then bringing it back into service. You can configure GIR mode for each virtual device context (VDC) on Cisco Nexus 7000 Series and Cisco Nexus 7700 platform switches, using the existing configuration profile foundation in NX-OS.

The following protocols are currently supported in GIR mode:

- Border Gateway Protocol Version 4 (BGPv4)
- BGP Version 6 (BGPv6)
- Multiprotocol BGP (MP-BGP) address families (Virtual Private Network Version 4 [VPNv4], VPNv6, and Layer 2 VPN [L2VPN] Ethernet VPN [EVPN])
- Enhanced Interior Gateway Routing Protocol (EIGRP)
- Enhanced Interior Gateway Routing Protocol Version 6 (EIGRPv6)
- Intermediate System-to-Intermediate System (ISIS)
- Open Shortest Path First (OSPF)
- Open Shortest Path First Version 3 (OSPFv3)
- Virtual PortChannel (vPC and vPC+)
- Cisco FabricPath

Note: On the Cisco Nexus fixed switches (Cisco Nexus 5000 and 6000 Series Switches), some of the protocols listed here are supported starting with NX-OS Release 7.2.

Configuration Profile for GIR in Cisco NX-OS

Configuration profiles in NX-OS provide a flexible and comprehensive way to systemically isolate a switch from the network with little service disruption. GIR mode uses the configuration profile to either enter or exit GIR (maintenance) mode. GIR mode currently supports a system-generated autoconfiguration profile and a custom manually generated configuration profile.

```
//Command example for a configuration profile
config profile maintenance-mode type admin
  router isis 102
    set-overload-bit always
  vpc domain 20
  shutdown
```

System Autogenerated Configuration Profile

When you use the autoconfiguration profile in GIR mode, the system checks for supported protocols and adds them to the configuration profile. When you enter GIR (maintenance) mode, the system automatically generates a profile in which all supported protocols are shut down. In addition, the autoconfiguration profile shuts down all the interfaces on the switch. The configuration profile is generated and applied when you enter GIR mode by using the **system mode maintenance** command in the command line interface (CLI).

```
//Entering GIR mode using autoconfiguration profile
```

```
N7K-1-Core(config)# system mode maintenance
BGP is not enabled, nothing to be done
EIGRP is not enabled, nothing to be done
OSPF is up.... will be shutdown
  OSPF TAG = 100, VRF = default
  config terminal
  router ospf 100
  shutdown
  end
OSPFv3 is not enabled, nothing to be done
ISIS is not enabled, nothing to be done
VPC is not enabled, nothing to be done
Interfaces will be shutdown
Do you want to continue (y/n)? [n] y
Generating maintenance-mode profile
Progressing.....Done.
System mode operation completed successfully
```

CLI command to enter GIR mode

System checks for supported protocols, adds them to the profile, and shuts down the protocols

When you exit GIR mode, the normal-mode configuration profile is generated, and all protocols that were shut down along with the interfaces will be brought up. You exit GIR mode with the **no system maintenance mode** command.

```
//Exiting GIR mode using autoconfiguration profile
```

```

N7K-1-Core(config)# no system mode maintenance

BGP is not enabled, nothing to be done

EIGRP is not enabled, nothing to be done

OSPF is running..... will be brought-up
  OSPF TAG = 100, VRF = default
    config terminal
    router ospf 100
    no shutdown
    end

OSPFv3 is not enabled, nothing to be done

ISIS is not enabled, nothing to be done

vPC is not enabled, nothing to be done

Interfaces will be brought up
Do you want to continue (y/n)? [n] y

Generating normal-mode profile
Progressing.....Done.

System mode operation completed successfully

```

CLI command to exit GIR mode

Protocols and interfaces that were previously shut up are brought up

You should use autogenerated profiles when you need a quick and easy way to completely isolate the switch from the network. When you use this mode, some traffic loss is expected because you are shutting down the protocols as well as the interfaces. If you need a more graceful shutdown and insertion method, then use GIR mode with manually generated custom profiles.

Custom Manual Configuration Profile

If you don't want to use system autogenerated profiles, you can use manually generated custom profiles to enter and exit GIR mode. Before you enter GIR mode, you create a custom profile named **maintenance-mode** and then use the command **system mode maintenance dont-generate-profile** to enter GIR mode.

To exit GIR mode, first create a custom profile called **normal** and then use the command **no system mode maintenance dont-generate-profile** to exit GIR mode.

Note: You must create these profiles manually before you first enter GIR mode.

//Entering and exiting GIR mode using manual configuration profile

Profile to enter GIR mode	Profile to exit GIR mode
<pre> config-profile maintenance-mode type admin router ospf 100 max-metric router lsa router isis 102 set-overload-bit always vpc domain 20 shutdown </pre>	<pre> config-profile normal-mode type admin router ospf 100 no max-metric router lsa router isis 102 no set-overload-bit always vpc domain 20 no shutdown </pre>

Snapshots and Verification

A snapshot of the system status is automatically generated after the switch enters GIR mode, and another snapshot is automatically generated after the switch exits GIR mode. You can compare the snapshots before the switch enters GIR mode and after it returns to normal mode to check the health of the system.

```
//List all snapshots
N7K-1-Core# show snapshot
Snapshot Name                Time                Description
-----
snapshot_before_maintenance  Mon Jun 1 09:24:41 2015  system-internal-snapshot
snapshot_after_maintenance   Mon Jun 1 09:32:45 2015  system-internal-snapshot
```

You can use the CLI command **show snapshots compare before_maintenance after_maintenance** to compare the snapshots to check the health of the system.

To verify the mode that the switch is currently running, use this command:

```
//Verify GIR mode
N7K-1-Core# show system mode
System Mode: Normal
N7K-1-Core # show system mode
System Mode: Maintenance
```

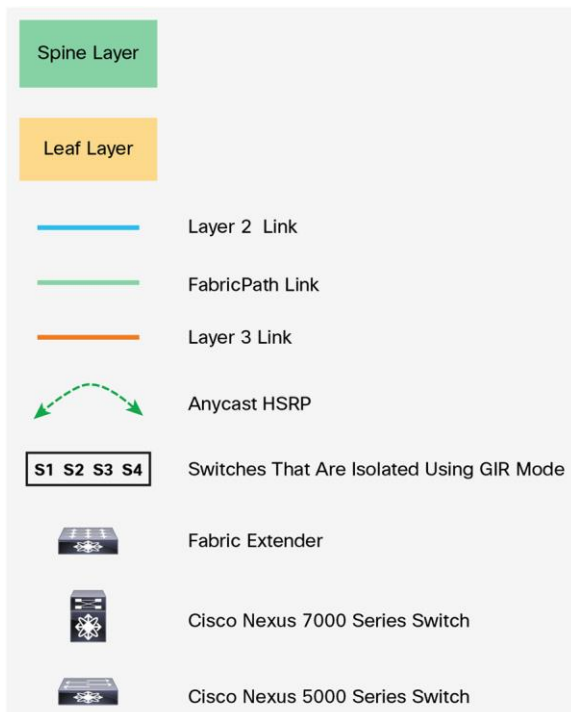
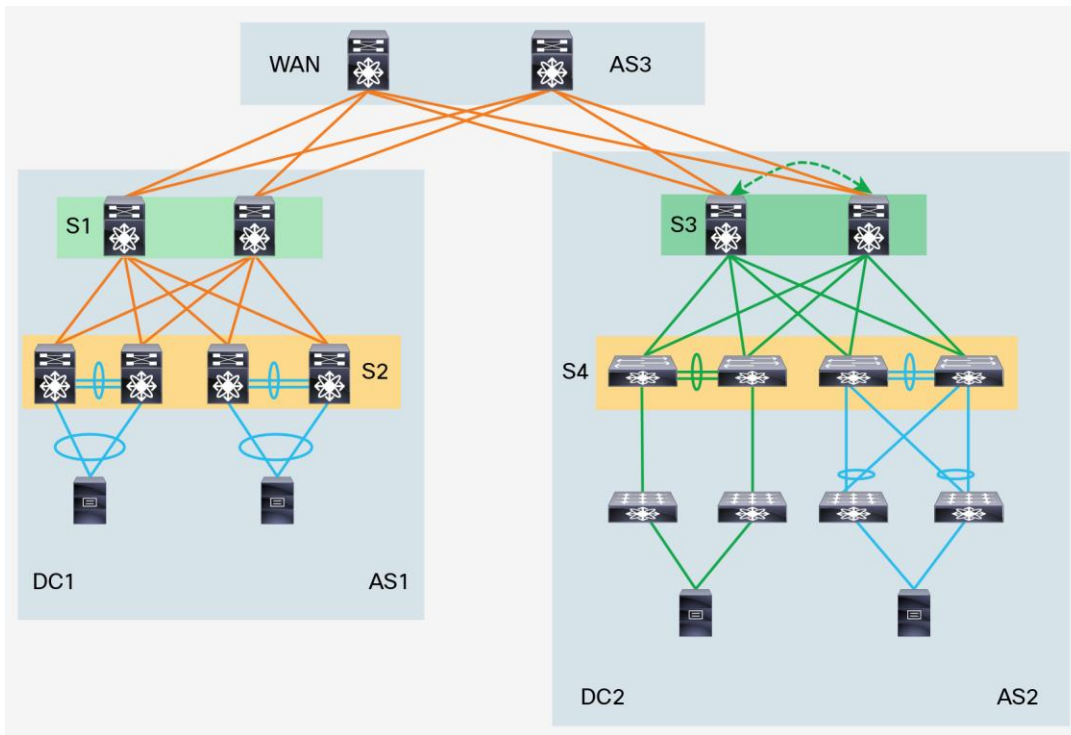
Sample Topology

This document demonstrates how to use the current GIR mode with the custom profile feature to isolate a switch from the network for debugging and planned and unplanned maintenance.

Although GIR mode is designed to isolate switches in a graceful way with little impact on traffic, the amount of packet loss varies depending on the features you have configured, especially Layer 2 features. Therefore, you should test your GIR-mode profile before putting it into production.

This document first presents a simple network as an example to illustrate how to isolate a switch running various Layer 2 and Layer 3 protocols (Figure 1).

Figure 1. Simple Network Example



This example uses two data centers (DC1 and DC2) connecting to a common WAN layer. The WAN layer switches are running IS-IS protocol and BGP with the data center spine-layer switches.

In DC1, the two spine-layer switches are running OSPF protocol within the data center and IS-IS and BGP to the WAN. The leaf-layer switches are configured as a vPC pair to the servers.

DC2 uses a simple FabricPath network in which the spine-layer switches are Anycast Hot Standby Router Protocol (HSRP) peers. The switch virtual interfaces (SVIs) are hosted on the spine switches, and they also participate in BGP routing with the WAN layer.

This document also demonstrates Layer 2-only spine switch isolation. A pair of Layer 2 leaf switches is configured as a vPC+ pair with dual-homed fabric extenders (FEXs) with vPC+ connected to them. The server uses a Link Aggregation Control Protocol (LACP) Enhanced vPC+ (evPC+) connection to the two dual-homed fabric extenders. The other pair of Layer 2 leaf switches is configured as a vPC+ pair but with single-homed fabric extenders connected to them. The server uses an LACP vPC+ connection to the two single-homed fabric extenders.

Isolating a Layer 3 Switch (S1)

Switch S1 is running OSPF with other switches in data center 1 and running IS-IS and BGP with the WAN switches. You need to configure the GIR customer profile mode to isolate this switch. For OSPF, use the **max metric router-Isa** command to remove the switch from the OSPF forwarding path in the network. For IS-IS, use the **overload bit** command to remove the switch from the IS-IS forwarding path in the network. For eBGP, use the **as-path prepend** command to remove the switch from the eBGP forwarding path.

Procedure Summary

Create a custom manual GIR-mode configuration profile using the following steps

- Step 1.** Use the **max-metric router Isa** command under **router ospf** to gracefully remove the switch from the transit path for OSPF.
- Step 2.** Use the **set-overload-bit always** command under **router isis** to gracefully remove the switch from the transit path for IS-IS.
- Step 3.** Use the **as-path prepend** command under **router BGP, neighbor address-family** to gracefully remove the switch from the transit path for BGP.
- Step 4.** Finish the maintenance and debugging work on this switch.
- Step 5.** Remove the **max-metric router Isa** command under **router ospf** to gracefully insert the switch into the network.
- Step 6.** Remove the **set-overload-bit always** command under **router isis** to gracefully insert the switch into the network.
- Step 7.** Remove the **as-path prepend** command under **router BGP, neighbor address-family** to gracefully insert the switch into the network.

Detailed Steps

- Step 1.** Configure a route map to set the **as-path prepend** command.

```
//Command example
```

```
Switch-S1(config)# route-map prepend
Switch-S1(config-route-map)# match as-path 1
Switch-S1(config-route-map)# set as-path prepend last-as 3
```


Step 2. Configure the custom maintenance-mode profile to enter GIR mode.

//Command example

```
Switch-S1(config)# configure profile maintenance-mode type admin
Switch-S1(config-profile)# router ospf 100
Switch-S1(config-profile-router)# max-metric router-lsa
Switch-S1(config-profile-router)# router isis 100
Switch-S1(config-profile-router)# set-overload-bit always
Switch-S1(config-profile-router)# router bgp 1
Switch-S1(config-profile-router)# neighbor 30.30.30.30
Switch-S1(config-profile-router-neighbor)# address-family ipv4 unicast
Switch-S1(config-profile-router-neighbor-af)# route-map prepend out
Switch-S1(config-profile-router-neighbor-af)# end
```

Step 3. Configure the custom normal-mode profile to exit GIR mode.

//Command example

```
Switch-S1(config)# configure profile normal-mode type admin
Switch-S1(config-profile)# router ospf 100
Switch-S1(config-profile-router)# no max-metric router-lsa
Switch-S1(config-profile-router)# router isis 100
Switch-S1(config-profile-router)#no set-overload-bit always
Switch-S1(config-profile-router)# router bgp 1
Switch-S1(config-profile-router)# neighbor 30.30.30.30
Switch-S1(config-profile-router-neighbor)# address-family ipv4 unicast
Switch-S1(config-profile-router-neighbor-af)# no route-map prepend out
Switch-S1(config-profile-router-neighbor-af)# end
```

Step 4. Put the switch into GIR mode. A snapshot of the system status is automatically generated before the switch enters GIR mode.

//Command example

//Go to GIR mode using custom-generated profile on switch Switch-S1

```
Switch-S1 (config)# system mode maintenance dont-generate-profile
Do you want to continue (y/n)? [n] y
Progressing.....Done.
System mode operation completed successfully
```

Step 5. Verify if switch is in GIR mode

//Verify GIR mode

```
Switch-S1# show system mode
System Mode: Maintenance
```

Step 6. Finish the maintenance work on the switch.

Step 7. Exit GIR mode. A snapshot of the system status is automatically generated after the switch exits GIR mode.

```
//Command example
//Exit GIR mode using custom-generated profile on switch Switch-S1
Switch-S1 (config)# no system mode maintenance dont-generate-profile
Do you want to continue (y/n)? [n] y
Progressing.....Done.
Generating Current Snapshot
Please use 'show snapshots compare before_maintenance after_maintenance' to
check the health of the system

//List snapshots
Switch-S1# show snapshots
Snapshot Name          Time                               Description
-----
before_maintenance    Tue Jun 21 03:30:40 2015    system-internal-snapshot
after_maintenance     Tue Jun 21 07:31:00 2015    system-internal-snapshot

//Compare snapshots
Switch-S2# show snapshots compare before_maintenance after_maintenance
=====
Feature                Tag                before_maintenance  after_maintenance
=====
[interface]
-----
[interface:mgmt0]
vdc_lvl_in_pkts        2556937            **2556958**
vdc_lvl_in_ucast       2369718            **2369737**
vdc_lvl_in_mcast       116517             **116519**
vdc_lvl_in_bytes       276719204          **276721725**
vdc_lvl_out_pkts       2386177            **2386182**
vdc_lvl_out_ucast      2347255            **2347260**
vdc_lvl_out_bytes      258472362          **258472892**

<SNIP>
```

Isolate a vPC Switch (S2)

In this case, Switch S2 is running in a vPC environment with SVIs for the VLANs present in the vPC domain. OSPF is used as a routing protocol between the vPC switch and the spine switches. For the vPC domain, use the vPC shutdown feature implemented in NX-OS 7.2 to shut down the vPC. For OSPF, use the command **max metric router-Isa** to remove the switch from the OSPF forwarding path in the network.

Procedure Summary

Create a custom manual maintenance-mode configuration profile following the steps presented here.

- Step 1.** Use the **VPC shutdown** command under the **VPC domain** to isolate the switch from forwarding in the vPC domain.
- Step 2.** Use the **max-metric router Isa** command under **router ospf** to gracefully remove the switch from the transit path for OSPF.

Step 3. Finish the maintenance and debugging work on this switch.

Step 4. Remove the **max-metric router lsa** command under **router ospf** to gracefully insert the switch into the network.

Step 5. Reenable the **VPC domain**.

Detailed Steps

Step 1. Configure the custom maintenance-mode profile to enter GIR mode.

//Command example

```
Switch-S2(config)# configure profile maintenance-mode type admin
Switch-S2(config-profile)# router ospf 100
Switch-S2(config-profile-router)# max-metric router-lsa
Switch-S2(config-profile-router)# vpc domain 100
Switch-S2(config-profile-vpc-domain)# shutdown
Switch-S2(config-profile-vpc-domain)# end
```

Step 2. Configure the custom normal-mode profile to exit GIR mode.

//Command example

```
Switch-S2(config)# configure profile normal-mode type admin
Switch-S2(config-profile)# router ospf 100
Switch-S2(config-profile-router)# no max-metric router-lsa
Switch-S2(config-profile-router)# vpc domain 100
Switch-S2(config-profile-vpc-domain)#no shutdown
Switch-S2(config-profile-vpc-domain)# end
```

Step 3. Put the switch into GIR mode. A snapshot of the system status is automatically generated before the switch enters GIR mode.

//Command example

//Go to GIR mode using custom-generated profile on switch Switch-S2

```
Switch-S2 (config)# system mode maintenance dont-generate-profile
Do you want to continue (y/n)? [n] y
Progressing.....Done.
System mode operation completed successfully
```

Step 4. Verify that the switch is in GIR mode.

//Verify GIR mode

```
Switch-S2# show system mode
System Mode: Maintenance
```

Step 5. Finish maintenance work on the switch.

Step 6. Exit GIR mode. A snapshot of the system status is automatically generated after the switch exits GIR mode.

//Command example

//Exit GIR mode using custom-generated profile on switch Switch-S2

```
Switch-S2 (config)# no system mode maintenance dont-generate-profile
Do you want to continue (y/n)? [n] y
Progressing.....Done.
Generating Current Snapshot
```

Please use 'show snapshots compare before_maintenance after_maintenance' to check the health of the system

```
//List snapshots
Switch-S2# show snapshots
Snapshot Name          Time                               Description
-----
before_maintenance    Tue Jun 23 06:30:40 2015      system-internal-snapshot
after_maintenance     Tue Jun 23 06:31:00 2015      system-internal-snapshot
```

Isolate a Cisco FabricPath Spine Switch (S3)

In this case, switch S3 is running in a FabricPath environment with an Anycast HSRP gateway between the spine switches. For Layer 3 connectivity, BGP is running between the FabricPath switch and the WAN switches.

Procedure Summary

Create a custom manual maintenance-mode configuration profile using the following steps.

- Step 1.** Use the **set-overload-bit always** command under **fabricpath domain** to gracefully remove the spine switch from the transit path.
- Step 2.** Use the **as-path prepend** command under **router BGP, neighbor address-family** to gracefully remove the switch from the transit path for BGP.
- Step 3.** Finish the maintenance and debugging work on this switch.
- Step 4.** Remove the **set-overload-bit always** command under **fabricpath domain** to gracefully reinsert the spine switch into the FabricPath network.
- Step 5.** Remove the **as-path prepend** command under **router BGP, neighbor address-family** to gracefully insert the switch into the network.

Detailed Steps

- Step 1.** Configure a route map to set the **as-path prepend** command.

```
//Command example
Switch-S3(config)# route-map prepend
Switch-S3(config-route-map)# match as-path 2
Switch-S3(config-route-map)# set as-path prepend last-as 3
```

- Step 2.** Configure the custom maintenance-mode profile to enter GIR mode.

```
//Command example
Switch-S3(config)# configure profile maintenance-mode type admin
Switch-S3(config-profile)# fabricpath domain default
Switch-S3(config-profile-fabricpath-isis)# set-overload-bit always
Switch-S3(config-profile-router)# router bgp 2
Switch-S3(config-profile-router)# neighbor 40.40.40.40
Switch-S3(config-profile-router-neighbor)# address-family ipv4 unicast
Switch-S3(config-profile-router-neighbor-af)# route-map prepend out
Switch-S3(config-profile-router-neighbor-af)# end
```

Step 3. Configure the custom normal-mode profile to exit GIR mode.

//Command example

```
Switch-S3(config)# configure profile maintenance-mode type admin
Switch-S3(config-profile)# fabricpath domain default
Switch-S3(config-profile-fabricpath-isis)# no set-overload-bit always
Switch-S3(config-profile-router)# router bgp 2
Switch-S3(config-profile-router)# neighbor 40.40.40.40
Switch-S3(config-profile-router-neighbor)# address-family ipv4 unicast
Switch-S3(config-profile-router-neighbor-af)# no route-map prepend out
Switch-S3(config-profile-router-neighbor-af)# end
```

Step 4. Put the switch into GIR mode. A snapshot of the system status is automatically generated before the switch enters GIR mode.

//Command example

```
//Enter GIR mode using custom-generated profile on switch Switch-S3
Switch-S3 (config)# system mode maintenance dont-generate-profile
Do you want to continue (y/n)? [n] y
Progressing.....Done.
System mode operation completed successfully
```

Step 5. Verify that the switch is in GIR mode.

//Verify GIR mode

```
Switch-S3# show system mode
System Mode: Maintenance
```

Step 6. Finish maintenance work on the switch.

Step 7. Exit GIR mode. A snapshot of the system status is automatically generated after the switch exits GIR mode.

//Command example

```
//Exit GIR mode using custom-generated profile on switch Switch-S3
Switch-S3 (config)# no system mode maintenance dont-generate-profile
Do you want to continue (y/n)? [n] y
Progressing.....Done.
Generating Current Snapshot
```

Isolate Cisco FabricPath Layer 2 Spine Switch (S4)

Use spine switch S4 as an example. In this case, spine switch S4 is a Layer 2-only spine switch. It doesn't have VLAN SVIs, and it doesn't have a Classical Ethernet port connected to the end host. Its function in this network is to perform Layer 2 FabricPath packet switching from one leaf switch to another leaf switch. In this case, you use a custom manual configuration profile with the **set-overload-bit always** command to enter GIR mode to remove the spine switch from the transit path gracefully. After maintenance work is performed in GIR mode, you use a custom manual normal-mode configuration profile with the **no set-overload-bit always** command to exit GIR mode to reinsert the FabricPath spine node into the FabricPath network gracefully. Starting from NX-OS 7.2.0 for Cisco Nexus 5000, 6000, and 7000 Series Switches, the **set-overload-bit** command is available in the maintenance-mode configuration profile.

The following example shows the procedures with NX-OS 7.2.0. Note that for Cisco Nexus 5000 and 6000 Series Switches that use NX-OS 7.1.0, the **set-overload-bit** command is not available in the maintenance-mode configuration profile.

Procedure Summary

Create a custom manual maintenance-mode configuration profile using the following steps.

- Step 1.** Create a custom manual GIR-mode configuration profile with the **set-overload-bit always** command under **fabricpath domain**.
- Step 2.** Create a custom manual normal-mode configuration profile with the **no set-overload-bit always** command under **fabricpath domain**.
- Step 3.** Put the spine switch into GIR mode using the preconfigured custom manual configuration profile. The spine switch is gracefully removed from the FabricPath network transit path. Finish the maintenance work.
- Step 4.** Exit GIR mode using the custom manual normal-mode configuration profile. The spine switch is gracefully reinserted into the FabricPath network.

Detailed Steps

- Step 1.** Create a custom manual GIR-mode configuration profile with the **set-overload-bit always** command under **fabricpath domain**.

```
//Custom manual GIR-mode configuration profile
configure profile maintenance-mode type admin
    fabricpath domain default
        set-overload-bit always
```

- Step 2.** Create a custom manual normal-mode configuration profile with the **no set-overload-bit always** command under **fabricpath domain**.

```
//Custom manual normal-mode configuration profile
configure profile normal-mode type admin
    fabricpath domain default
        no set-overload-bit always
```

- Step 3.** Put the spine switch into GIR mode using the preconfigured custom manual configuration profile. The spine switch is gracefully removed from the FabricPath network transit path. Finish the maintenance work.

```
SP2# conf t
Enter configuration commands, one per line. End with CNTL/Z.
SP2(config)# system mode maintenance dont-generate-profile
Do you want to continue (y/n)? [n] y
Progressing.....Done.
System mode operation completed successfully
SP2(config)# end
```

- Step 4.** Exit GIR mode using the custom manual normal-mode configuration profile. The spine switch is gracefully reinserted into the FabricPath network. Traffic again starts being forwarded to this spine switch for transit to another leaf switch.

```
SP2# conf t
Enter configuration commands, one per line. End with CNTL/Z.
SP2(config)# no system mode maintenance dont-generate-profile
Do you want to continue (y/n)? [n] y
```

```
Progressing.....Done.
Generating Current Snapshot
<snip>
```

Isolate Cisco FabricPath Layer 2 Spine Switch with Classical Ethernet Port Connectivity

If a Layer2 FabricPath spine switch has Classical Ethernet ports - for example, if some end hosts are connected to the spine nodes - the spine switch is not just forwarding traffic between the leaf switches. It is also the traffic destination switch for its directly connected end hosts. To completely stop the spine switch from attracting any traffic, you can use a custom manual maintenance-mode configuration profile with **set-overload-bit always** and **system interface shutdown** commands to enter GIR mode. After maintenance work is performed in GIR mode, you use a custom manual normal-mode configuration profile with no **set-overload-bit always** and no **system interface shutdown** commands to exit GIR mode to reinsert the FabricPath spine node into the FabricPath network. The **set-overload-bit always** command removes the spine switch from the transit path. The **system interface shutdown** command stops the spine switch from attracting traffic to its directly connected end hosts.

Procedure Summary

Create a custom manual maintenance-mode configuration profile using the following steps.

Detailed Steps

Step 1. Create a custom manual GIR-mode configuration profile with the **set-overload-bit always** and **system interface shutdown** commands.

```
//Custom manual GIR-mode configuration profile
configure profile maintenance-mode type admin
    fabricpath domain default
        set-overload-bit always
    system interface shutdown
```

Step 2. Create a custom manual normal-mode configuration profile with the **no set-overload-bit always** and **no system interface shutdown** commands.

```
//Custom manual normal-mode configuration profile
configure profile normal-mode type admin
    fabricpath domain default
        no set-overload-bit always
    no system interface shutdown
```

Step 3. Put the spine switch into GIR mode using the preconfigured custom manual GIR-mode configuration profile with **system mode maintenance dont-generate-profile** command. The spine switch is not attracting any traffic anymore. Finish the maintenance work.

Step 4. Exit GIR mode using the custom manual normal-mode configuration profile with the **no system mode maintenance dont-generate-profile** command. The spine switch is reinserted into the FabricPath network.

Isolate vPC+ Switch with Single-Homed Fabric Extenders

Usually, leaf switches are connected to the end host and are not in the traffic transit path. Therefore, the overload bit doesn't help isolate leaf nodes. Also, when the overload bit is set on a vPC+ FabricPath switch, the vPC+ switch continues to advertise the vPC+ emulated switch ID and continues to draw traffic to itself, so the overload bit doesn't help in this scenario either. As mentioned earlier, GIR mode supports interface shutdown. It also supports vPC and vPC+ shutdown. The scenario here focuses on the Layer 2 vPC+ connection at the access and leaf layers to illustrate how to use GIR mode to isolate a vPC+ switch from the rest of the FabricPath network.

The fabric extender uses a single-homed connection to the leaf vPC+ switches, and hosts use vPC+ connections to the fabric extender host interface (HIF). If a system autogenerated configuration profile is used, the vPC+ primary parent switch automatically generates the vPC+ shutdown procedure and interface shutdown procedure. Because all interfaces are shut down, including the fabric extender fabric uplink, the fabric extender goes offline from this parent switch. The use of a system autogenerated configuration profile is not recommended for a single-homed fabric extender vPC+ switch. Instead, a manual custom configuration profile that excludes the fabric extender fabric interface from shutdown is recommended. The step-by-step procedure demonstrates how to isolate single-homed fabric extender vPC+.

Procedure Summary

Create a custom manual maintenance-mode configuration profile using the following steps.

- Step 1.** Create a custom manual GIR-mode configuration profile that excludes the fabric extender fabric interface from shutdown.
- Step 2.** Create a custom manual normal-mode configuration profile.
- Step 3.** Put the vPC+ leaf switch into GIR mode using the preconfigured custom manual GIR-mode configuration profile. Finish the maintenance work (In Service Software Upgrade [ISSU], reload, debugging, etc.).
- Step 4.** Exit GIR mode using the custom manual normal-mode configuration profile.

Detailed Steps

- Step 1.** Create a custom manual GIR-mode configuration profile that excludes the fabric extender fabric interface from shutdown.

```
//Custom manual GIR-mode configuration profile
configure profile maintenance-mode type admin
  vpc domain 5
  shutdown
  system interface shutdown exclude fex-fabric
```

- Step 2.** Create a custom manual normal-mode configuration profile.

```
//Custom manual normal-mode configuration profile
configure profile normal-mode type admin
  vpc domain 5
  no shutdown
  no system interface shutdown exclude fex-fabric
```

- Step 3.** Put the vPC+ leaf switch into GIR mode using the preconfigured custom manual GIR-mode configuration profile. Finish the maintenance work (ISSU, reload, debugging, etc.).

```
LEAF3# conf t
Enter configuration commands, one per line. End with CNTL/Z.
```

```

LEAF3(config)# system mode maintenance dont-generate-profile
Do you want to continue (y/n)? [n] y
Progressing.....Done.
System mode operation completed successfully
LEAF3(config)# end
//FEX stays online
LEAF3# sh fex
      FEX          FEX          FEX          FEX          Fex
Number  Description  State      Model         Serial
-----
103     FEX0103      Online    N2K-C2232PP-10GE  SSI14150LRR

```

Step 4. Exit maintenance mode using the custom manual normal-mode configuration profile.

```

LEAF3# conf t
Enter configuration commands, one per line. End with CNTL/Z.
LEAF3(config)# no system mode maintenance dont-generate-profile
Do you want to continue (y/n)? [n] y
Progressing.....Done.
Generating Current Snapshot
<snip>

```

Isolate vPC+ Switch with Dual-Homed Fabric Extenders

Fabric extenders can be dual-homed connected to leaf vPC+ switches, and hosts can be connected to fabric extender HIFs using evPC+ for Cisco Nexus 5000 and 6000 Series Switches. Note that the Cisco Nexus 7000 currently doesn't support vPC+ with dual-homed fabric extenders. You can use GIR mode to isolate a vPC+ switch with dual-homed fabric extenders, but software upgrade from maintenance mode is not currently supported. The recommended approach is to use ISSU to perform software upgrades for vPC+ with dual-homed fabric extenders.

Procedure Summary

Create a custom manual maintenance-mode configuration profile using the following steps.

Step 1. Isolate the vPC+ primary parent switch and fabric extender with the system-autogenerated GIR-mode configuration profile. The configuration profile contains a vPC+ shutdown procedure and interface shutdown procedure. Because all interfaces are shut down, the fabric extenders go offline from this parent switch.

Step 2. Finish the maintenance work.

Note: Software upgrade from GIR mode is currently not supported for dual-homed fabric extender vPC+. You should use ISSU to perform software upgrades for vPC+ with dual-homed fabric extenders.

Step 3. Exit GIR mode (return to normal mode) with the system autogenerated normal-mode profile.

Detailed Steps

Step 1. Isolate the vPC+ primary parent switch and fabric extender with the system autogenerated GIR-mode configuration profile. The configuration profile contains a vPC+ shutdown procedure and interface shutdown procedure. Because all interfaces are shut down, the fabric extenders go offline from this parent switch.

```

LEAF1# conf t

```

Enter configuration commands, one per line. End with CNTL/Z.

```
LEAF1(config)# system mode maintenance
```

```
<snip>
```

```
vPC is running... will be shutdown
```

```
    vPC Domain id = 4
```

```
        config terminal
```

```
        vpc domain 4
```

```
        shutdown
```

```
    end
```

```
Interfaces will be shutdown
```

```
Do you want to continue (y/n)? [n] y
```

```
Generating maintenance-mode profile
```

```
<snip>
```

//The following GIR-mode configuration profile is generated automatically and is shown in "show running-config"

```
configure profile maintenance-mode type admin
```

```
    vpc domain 4
```

```
        shutdown
```

```
    system interface shutdown
```

Step 2. Finish the maintenance work.

Note: Software upgrade from GIR mode is currently not supported for dual-homed fabric extender vPC+. You should use ISSU to perform software upgrades for vPC+ with dual-homed fabric extenders.

Step 3. Exit GIR mode (return to normal mode) with the system autogenerated normal-mode profile.

```
LEAF1# conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
LEAF1(config)# no system mode maintenance
```

```
<snip>
```

```
vPC is running... will be brought-up
```

```
    vPC Domain id = 4
```

```
        config terminal
```

```
        vpc domain 4
```

```
        no shutdown
```

```
    end
```

```
Interfaces will be brought up
```

```
Do you want to continue (y/n)? [n] y
```

```
Generating normal-mode profile
```

```
Progressing.....Done.
```

```
Generating Current Snapshot
```

```
<snip>
```

//The following normal-mode profile is generated automatically and is shown in "show running-config"

```
configure profile normal-mode type admin
```

```
vpc domain 4
  no shutdown
no system interface shutdown
```

Conclusion

The GIR-mode feature lets the network operator define an operational mode for Cisco Nexus devices that allows the operator to perform graceful removal and insertion of devices with little service disruption. When a device is in GIR mode and not actively forwarding any traffic, the network operator can perform tasks such as control-plane debugging and device upgrade and reload processes. Without the GIR feature, network operators need to perform many steps and enter many commands manually to isolate and then return Cisco Nexus devices to the network: a cumbersome and error-prone process. This feature also allows network operators to perform network operations programmatically.

For More Information

See the GIR-mode configuration guides:

- [Cisco Nexus 5600 Series NX-OS System Management Configuration Guide, Release 7.x](#)
- [Cisco Nexus 6000 Series NX-OS System Management Configuration Guide, Release 7.x](#)
- [Cisco Nexus 7000 Series NX-OS System Management Configuration Guide, Release 7.x](#)



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