Cisco NFVIS 4.4.1 Enterprise Network Function Virtualization Infrastructure Software User Manual

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Cisco NFVIS 4.4.1 Enterprise Network Function Virtualization Infrastructure Software

Product Information

The product is an NFVIS system that supports BGP (Border Gateway Protocol) for dynamic routing between BGP autonomous systems. It allows the NFVIS system to learn routes announced from remote BGP neighbors and apply them to the NFVIS system. Additionally, it allows you to announce or withdraw NFVIS local routes to/from remote BGP neighbors.

Feature History

Feature Name	Release Information	Description
BGP Support on Remote Subnets Over IP Sec	NFVIS 4.4.1	This feature enables the NFVIS system to learn routes announced by remote BGP neighbors over IPSec and apply them to the NFVIS system.
BGP Support Announcing Local Subnets (Route Distribution)	NFVIS 3.10.1	This feature allows you to announce or withdraw NFVIS local routes to/from remote BGP neighbors using route distribution.

How NFVIS BGP Works

- The NFVIS BGP feature works in conjunction with a remote BGP router. It learns routes announced from the remote BGP neighbor and applies them to the NFVIS system.
- It also allows you to announce or withdraw NFVIS local routes to/from the remote BGP neighbor.
- Starting from NFVIS 4.4.1 release, the NFVIS BGP feature can learn routes from the BGP neighbor over a secure overlay tunnel.
- These learned routes/subnets are added to the NFVIS routing table for the secure tunnel, making them accessible over the tunnel.

Product Usage Instructions

Configure BGP on NFVIS

To configure a BGP neighbor on NFVIS, you have two options:

1. Using a neighbor's IP address
2. Using a name string

Using a Neighbor's IP Address

If you want to configure a BGP neighbor using an IP address, follow these steps:

1. Access the configuration terminal of the router:

```
config terminal
```

1. Specify the BGP AS number and the neighbor IP address:

```
router bgp [AS number] neighbor [neighbor IP address] remote-as [remote AS number]
```

1. Exit the configuration terminal:

```
exit
```

1. Commit the changes:

```
commit
```

Using a Name String

If you want to configure a BGP neighbor using a name string, follow these steps:

1. Access the configuration terminal of the router:

```
config terminal
```

1. Specify the BGP AS number and the neighbor name string:

```
router bgp [AS number] neighbor [name string] remote-as [remote AS number]
```

1. Exit the configuration terminal:

```
exit
```

1. Commit the changes:

```
commit
```

Deleting BGP Configurations

If you want to delete BGP configurations, follow these steps:

1. Access the configuration terminal of the router:

```
config terminal
```

1. Delete the BGP configurations:

```
no router bgp [AS number]
```

1. Commit the changes:

```
commit
```

Specifications

Property	Type	Description	Mandatory
as	Uint32	Local BGP AS number	Yes
router-id	IPv4	IPv4 address for local system	No
neighbor	List	List of neighbors	Yes
remote-IP	String	IPv4 address or Secure Overlay BGP neighbor name for BGP neighbor system	Yes
remote-as	Uint32	Remote BGP AS number	Yes
description	String	Description	No

FAQ

Q: What is BGP?

- **A:** BGP stands for Border Gateway Protocol, which is a dynamic routing protocol used to exchange route information between BGP autonomous systems.

Q: What does the NFVIS BGP feature do?

- **A:** The NFVIS BGP feature allows the NFVIS system to learn routes announced by remote BGP neighbors and apply them to the NFVIS system. It also allows you to announce or withdraw NFVIS local routes to/from remote BGP neighbors.

Q: How does the NFVIS BGP feature work with a secure overlay?

- **A:** Starting from NFVIS 4.4.1 release, the NFVIS BGP feature can learn routes from the BGP neighbor over a secure overlay tunnel. These learned routes/subnets are added to the NFVIS routing table for the secure tunnel, making them accessible over the tunnel.

Q: How can I configure a BGP neighbor on NFVIS?

- **A:** You can configure a BGP neighbor on NFVIS either using a neighbor IP address or a name string. Refer to the “Configure BGP on NFVIS” section for detailed instructions.

Q: How can I delete BGP configurations on NFVIS?

- **A:** To delete BGP configurations on NFVIS, follow the steps mentioned in the “Deleting BGP Configurations” section.

BGP Support on NFVIS

Table 1: Feature History

Feature Name	Release Information	Description
BGP Support on Remote Subnets Over IPSec.	NFVIS 4.4.1	This feature allows the NFVIS system to learn routes that are announced from the remote BGP neighbor and apply the learned routes to the NFVIS system.
BGP Support Announcing Local Subnets (Route Distribution)	NFVIS 3.10.1	This feature allows you to announce or withdraw NFVIS local routes to the remote BGP neighbor using route distribution.

- Border Gateway Protocol (BGP) is the dynamic routing protocol to exchange route information between BGP autonomous systems.
- The NFVIS BGP feature works together with a remote BGP router. This feature allows the NFVIS system to learn routes announced from the remote BGP neighbor and apply the learned routes to the NFVIS system. This feature also allows you to announce or withdraw NFVIS local routes from the remote BGP neighbor.
- Starting from the NFVIS 4.4.1 release, the NFVIS BGP feature works with the secure overlay feature to learn routes from the BGP neighbor over a secure overlay tunnel. These learned routes or subnets are added to the NFVIS routing table for the secure tunnel, which makes the routes accessible over the tunnel.
- Configure BGP on NFVIS, on page 1
- Route Distribution, on page 4
- BGP Route Annoucement over MPLS or IPSec, on page 5

Configure BGP on NFVIS

- A BGP neighbor can be configured using a neighbor IP address or a name string.

- If a BGP neighbor is specified using a name string, it must be used in conjunction with the secure overlay bgp-neibhor-name field. A BGP session is established over the secure overlay tunnel. If the neighbor name matches the BGP-neighbor-name field configured in the secure-overlay configuration, then NFVIS will determine the active remote system IP address used for the IPSec connection and replace the neighbor name with that IP.
- This will establish a BGP neighbor session with that IP address. For more information on how to configure secure overlay with BGP name, see Secure Overlay and Single IP Configuration.
- If a BGP neighbor is specified using an IP address which is headend VPN responder's tunnel IP address, which is the same as the IP address of a a headend VPN responder tunnel, a BGP session is established over the secure overlay tunnel.
- This example shows how to create or update BGP configuration for a neighbor with a specified name string:

```
config terminal
router bgp 200
    neighbor csrbgp remote-as 65000
        commit
```

- This example shows how to create or update BGP configuration with a specified neighbor IP address:

```
config terminal
router bgp 200
     neighbor 166.34.121.112 remote-as 65000
         exit
     neighbor 166.35.121.112 remote-as 65000
         commit
```

- This example shows how to delete BGP configurations:

```
no router bgp 200
commit
```

- The following table provides the syntax description for each parameter in the commands mentioned in the examples above:

Property	Type	Description	Mandatory
as	Uint32	Local BGP AS number	Yes
router-id	IPv4	H.H.H.H: IPv4 address for local system	No
neighbor	list	Neighbor list	Yes
remote-ip	String	IPv4 address or Secure Overlay BGP neighbor name for BGP neighbor system	Yes
remote-as	Uint32	Remote BGP AS number	Yes
description	String	Description of neighbor	No

The following example displays the BGP session details:

```
nfvis# support show bgp

BIRD 1.6.8 ready.
name    proto    table    state    since    info
bgp1    BGP      bgptable  UP     23:53:18  Established
  Preference:     100
  Input filter:   ACCEPT
Output filter: Accept
Import limit:  15
   Action:     restart
Routes:        1 import, 0 exported, 1 preferred
Route change stats:     recieved  rejected  filtered  ignored  accepted
  Import updates:              1         0         0        0         1
  Import withdraws:            0         0       ---        0         0
  Export updates:              1         1         0      ---         0
  Export withdraws:            0       ---       ---      ---         0
BGP state:     Established
  Neigbour addres: 166.34.121.112
  Neigbour AS:     65000
  Neigbour ID:     166.34.121.112
  Neigbour caps:   refresh enhanced-refresh AS4
  Session:         external multihop AS4
  Source Address:  112.112.112.1
  Route limit:     1/15
  Hold timer:      204/240
  Keepalive timer: 65/80
```

The following example displays the BGP routes learnt through BGP:

```
nfvis# support show bgp route

BIRD 1.6.8 ready.
91.91.91.0/24      dev ipsec0 [bgp1 23:53:18 from 166.34.121.112] (100) [AS65000?]
```

Note NFVIS can learn up to 15 prefixes.

BGP Neighbor Configuration Example

```
router bgp 65000
 bgp router-id 166.34.121.112
 bgp always-compare-med
 bgp log-neighbor-changes
 bgp deterministic-med
 bgp listen range 112.112.0.0/16 peer-group uCPEs
 bgp listen range 90.90.90.0/24 peer-group uCPEs
 bgp listen range 10.20.0.0/24 peer-group uCPEs
 bgp listen limit 255
 no bgp default ipv4-unicast
 !
 address-family ipv4 vrf private-vrf
  redistribute connected
  redistribute static
  neighbor uCPEs peer-group
  neighbor uCPEs remote-as 200
  neighbor uCPEs ebgp-multihop 10
  neighbor uCPEs timers 610 1835
  neighbor uCPEs prefix-list allow-list out
 exit-address-family
```

Route Distribution

The Route Distribution feature works together with a remote BGP router. It allows you to announce or withdraw specified routes to the remote BGP router.
You can use this feature to announce the route of int-mgmt-net subnet to a remote BGP router. A remote user, can access the VMs attached to int-mgmt-net through the VMs' IP address on int-mgmt-net-br through a BGP router, when the routes are successfully inserted on the remote BGP router.

To configure or update route distribution:

```
configure terminal
router bgp 172.25.221.17local-bridge wan-br local-as 45.45remote-as 65000 network-subnet
12.12.12.0/24
commit
```

Table 2: Property Description

Property	Type	Description	Mandatory
neighbor-address	IPv4	BGP neighbor IPv4 addre ss. It is the key of the rout e distribution list.	Yes
local-address	IPv4	Local IPv4 address. This address must be configured as neighbor IP address on the remote B GP router. If not configured, local-address is set to local-bridge's IP a ddress.	No
local-as		Local autonomous system number. It can be in following two formats: <decimal number, 1.0 .. 6 5535.65535> <unsignedInt, 1 .. 429496 7295>	Yes
local-bridge		Local bridge name for adv ertising routes (default wa n-br).	No
remote-as		Remote autonomous syst em number. It can be in fo llowing two formats: <decimal number, 1.0 .. 6 5535.65535> <unsignedInt, 1 .. 429496 7295>	Yes
router-id	IPv4	Local router ID	No

Property	Type	Description	Mandatory
network-subnet		List of network subnet to be announced.	Yes
subnet	IPv4 prefix	Network subnet to be ann ounced H.H.H.H/N	Yes
next-hop	IPv4	IPv4 address of next hop. Default local-address or I P address of local-bridge.	No

- Use the no router bgp command to delete route distribution. To verify the route-distrubition status use the show router bgp command.

- Remote BGP Router Configuration Example
- The NFVIS route distribution feature works together with the remote BGP router. The configuration on NFVIS and on remote BGP router must match.
- This example shows the configuration on a remote BGP router.

```
router bgp 65000
  bgp log-neighbor-changes
  neighbor 172.25.221.106 remote-as 45.45
  neighbor 172.25.221.106 update-source GigabitEthernet2
```

BGP Route Annoucement over MPLS or IPSec

Table 3: Feature History

Feature Name	Release Information	Description
BGP Route Annoucement over MPLS or IPSec	NFVIS 4.5.1	This feature allows you to configure NFVIS to announce routes through BGP over MPLS. NFVIS allows the routes learned through BGP available over the IPSec tunnel over an MPLS connection.

- With this feature enhancement, the existing routes learnt through BGP over IPSec tunnel are now allowed over MPLS connection. Additionally, NFVIS can now announce routes through BGP, using the same router bgp command that is used for learning routes over BGP. For more information on this command, see the
- Cisco IOS XE router bgp command.
- You can pair the secure overlay configurations to announce NFVIS routes over BGP through IPSec tunnel.
- The existing router bgp configurations can be updated to add the route announcement feature. Make sure that you remove the existing route distribution configurations before you configure the router bgp command.
- The following example shows how to configure the announcement of 10.20.0.0/24 subnet over BGP.

```
router bgp 65000
  neighbor 172.25.221.17 remote-as 65001
  address-family ipv4 unicast
    network 10.20.0.0 mask 255.255.255.0
    neighbor 172.25.221.17 activate
```

- The following example shows how to remove the announcement of 10.20.0.0/24 subnet from BGP.

```
router bgp 65000
  address-family ipv4 unicast
    no network 10.20.0.0 mask 255.255.255.0
```

- The following example shows how to remove a neighbor from the IPv4 address family, and disable route announcements for the same neighbor.

```
router bgp 65000
  address-family ipv4 unicast
    no neighbor 172.25.221.17 activate
```

- To view the local BGP status for BGP over MPLS use the show bgp ipv4 unicast command.

```
nfvis# show bgp ipv4 unicast

Family Transmission Router ID       Local AS Number
ipv4   unicast      10.20.0.1       65000
```

- To view the BGP neighbor status for BGP over MPLS use the show bgp ipv4 unicast summary command.

```
nfvis# show bgp ipv4 unicast summary

Neighbor        IP Version AS Number Up/Down
172.25.221.17   4          65001     up
```

- To view the BGP learned or announced routes for BGP over MPLS use the show bgp ipv4 unicast route command.

```
nfvis# show bgp ipv4 unicast route

Network            Next-Hop        Metric LocPrf Path
10.30.30.0/24      172.25.221.17   0      100    65001 ?
10.40.40.0/24      172.25.221.17   0      100    65001 ?
10.20.0.0/24       0.0.0.0
```

- To view the local BGP status for BGP over IPSec tunnel use the show bgp vpnv4 unicast command.

```
nfvis# show bgp vpnv4 unicast

Family Transmission Router ID       Local AS Number
vpnv4  unicast      10.20.0.1       200
```

- To show BGP neighbor status for BGP over IPSec tunnel:

```
nfvis# show bgp vpnv4 unicast summary

Neighbor        IP Version AS Number Up/Down
10.90.90.1      4          65000     up
```

- To show BGP learned/announced routes for BGP over IPSec tunnel:

```
nfvis# show bgp vpnv4 unicast route

Network            Next-Hop        Metric LocPrf Path
10.91.91.0/24      10.90.90.1      0      100    65000 ?
10.92.92.0/24      10.90.90.1      0      100    65000 ?
10.20.0.0/24       0.0.0.0                       i
```

- **Note** When you configure BGP route announcement over IPSec tunnel, ensure that you configure secure overlayto use the virtual IP address for the local tunnel IP address (no local-system-ip-addr configured).
- When you configure BGP route announcement, the only configurable address-family or transmission combination is ipv4 unicast for both IPSec and MPLS. To view the BGP status, the configurable address-family or transmission for IPSec is vpnv4 unicast and for MPLS is ipv4 unicast.

Documents / Resources

	Cisco NFVIS 4.4.1 Enterprise Network Function Virtualization Infrastructure Software [pdf] User Manual NFVIS 4.4.1, NFVIS 3.10.1, NFVIS 4.4.1 Enterprise Network Function Virtualization Infrastructure Software, NFVIS 4.4.1, Enterprise Network Function Virtualization Infrastructure Software, Network Function Virtualization Infrastructure Software, Virtualization Infrastructure Software, Infrastructure Software, Software

References

- Cisco IOS Multiprotocol Label Switching Command Reference - mpls traffic-eng lsp attributes through route-target [Support] - Cisco
- User Manual