



## VXLAN BGP EVPN Layer 2 Fabric

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### VXLAN BGP EVPN Layer 2 Fabric

#### Note:

Before proceeding, ensure that the Nexus 5600 Leaf switches are operating in Store-and-Forward mode. This is required for VXLAN encapsulation support on the Nexus 5600s. This command is not required on the 7K/9K platforms. This command requires a reload before taking effect.

```
hardware ethernet store-and-fwd-switching
Copy run start
reload
```

- Disable all East/West Connectivity between the Spines
- Disable all East/West Connectivity between the Leafs
- Enable the necessary features
  - The following functionality will be required (Spine switches only require a subset of these features, do not enable more than is necessary):
    - OSPF
    - BGP
    - PIM
    - BFD
    - EVPN Address-family
    - VXLAN encapsulation
    - VXLAN troubleshooting tools
    - Distributed Anycast Gateway
    - NXAPI
    - Mapping of VLANs to VNIDs
  - Build Underlay Topology
    - Provision Loopback0 as the Overlay Loopback
    - Provision Loopback 1 as the Underlay Loopback
    - Do not assign any IP addresses on the links between the Spine and Leaf switches
    - Leverage OSPF as the Underlay IGP; All links should be in Area 0
      - All OSPF Router-IDs should be the Underlay Loopback address
      - No Network LSAs should exist within the LSDB
    - Implement PIM in the Underlay to enable the Multicast distribution of BUM traffic within the Overlay
      - The creation of an additional loopback on the Spines is acceptable for this task
      - Ensure redundancy is in place for the RP
      - There should not be any (S,G) state on any switches in the fabric
    - Implement BFD for fast failure detection in the underlay for both OSPF and PIM
    - Once the underlay is completed, all devices should be able to ping both Underlay and Overlay Loopback interfaces
  - Create VLANs and VNIDs
    - On the appropriate switches, provision the following (VLAN and VNID values are based on Rack Number, the numbers below are based on Rack-3):
      - VLAN 103
      - VLAN 103 should map to VNID 10103
      - Server-5 should be connected to N5K5 in VLAN 103 and configured as follows:
        - IP address 10.103.103.100/24
        - MAC address: aaaa.aaaa.aa01
        - Gateway 10.103.103.1
      - Server-6 should be connected to N5K6 in VLAN 103 and configured as follows:
        - IP address: 10.103.103.200/24
        - MAC address: cccc.cccc.cc01
        - Gateway 10.103.103.1
      - Interfaces where servers are connected should immediately transition to a STP forwarding state
  - Establish Overlay BGP Peering and Configuration
    - All devices within the fabric will operate within BGP Autonomous System 65000
    - All BGP router-IDs should be the Overlay Loopback address
    - Establish BGP adjacencies in the required address-families i. Leaf switches must not peer with each other ii. All BGP adjacencies must be established using the OVERLAY Loopback iii. Bonus: Implement BGP on the Spines using no more than 10 lines of BGP configuration
    - Ensure communities are included in BGP Updates for the appropriate address families
    - Do not establish any BGP adjacencies in the IPv4 Unicast address-family
    - Configure EVPN L2VNIs on the required switches i. Route-Distinguishers and Route-Targets should be automatically generated
  - Creation of VXLAN Overlay Interface
    - On each VTEP switch, configure the interface required for VXLAN tunnel sourcing and termination
    - The Overlay Loopback IP should be used for addressing of this interface
    - BGP must be used as the control-plane for end-host advertisement and reachability
    - Add the appropriate L2VNIs to this interface
      - VNID 103 should use 239.103.103.103 for BUM traffic forwarding
  - Verify
    - Server-5 should now be able to ping Server-6

**NSK5:**

```
install feature-set fabric
feature-set fabric
!
hostname NSK5
!
feature fabric forwarding
nv overlay evpn
feature ospf
feature bgp
feature pim
feature bfd
feature nv overlay
feature nxapi
feature vn-segment-vlan-based
!
feature ngoam
!
hardware ethernet store-and-fwd-switching
!
ip pim rp-address 7.7.7.7 group-list 224.0.0.0/4 bidir
ip pim ssm range 232.0.0.0/8
ip pim bfd
!
vlan 103
  vn-segment 10103
!
interface nve1
  no shutdown
  source-interface loopback0
  host-reachability protocol bgp
  member vni 10103
  suppress-arp
  mcast-group 239.103.103.103
!
interface Ethernet1/1
  description SRV5
  switchport access vlan 103
  spanning-tree port type edge
!
interface Ethernet1/5
  no switchport
  medium p2p
  bfd interval 250 min_rx 250 multiplier 4
  no ip redirects
  ip unnumbered loopback1
  ip ospf network point-to-point
  ip router ospf UNDERLAY area 0.0.0.0
  ip pim sparse-mode
!
interface Ethernet1/6
  no switchport
  medium p2p
  bfd interval 250 min_rx 250 multiplier 4
  no ip redirects
  ip unnumbered loopback1
  ip ospf network point-to-point
  ip router ospf UNDERLAY area 0.0.0.0
  ip pim sparse-mode
!
interface loopback0
  description OVERLAY LOOPBACK
  ip address 2.2.2.55/32
  ip router ospf UNDERLAY area 0.0.0.0
  ip pim sparse-mode
!
interface loopback1
  description UNDERLAY LOOPBACK
  ip address 1.1.1.55/32
  ip router ospf UNDERLAY area 0.0.0.0
  ip pim sparse-mode
!
router ospf UNDERLAY
  bfd
  router-id 1.1.1.55
!
router bgp 65000
  router-id 2.2.2.55
  address-family 12vpn evpn
  template peer SPINE_PEERS
    update-source loopback0
  address-family 12vpn evpn
    send-community both
  neighbor 2.2.2.75 remote-as 65000
  inherit peer SPINE_PEERS
  description 7K5
  neighbor 2.2.2.76 remote-as 65000
  inherit peer SPINE_PEERS
  description 7K6
evpn
  vni 10103 12
  rd auto
  route-target import auto
  route-target export auto
!
ngoam install acl
```

**NSK6:**

```
install feature-set fabric
feature-set fabric
!
```

```

hostname N5K6
!
feature fabric forwarding
nv overlay evpn
feature ospf
feature bgp
feature pim
feature lldp
feature bfd
feature nv overlay
feature nxapi
feature vn-segment-vlan-based
!
feature ngoam
!
hardware ethernet store-and-fwd-switching
!
ip pim rp-address 7.7.7.7 group-list 224.0.0.0/4 bidir
ip pim ssm range 232.0.0.0/8
ip pim bfd
!
vlan 103
    vn-segment 10103
!
interface nve1
    no shutdown
    source-interface loopback0
    host-reachability protocol bgp
    member vni 10103
        suppress-arp
        mcast-group 239.103.103.103
!
interface Ethernet1/2
    description SRV6
    switchport access vlan 103
    spanning-tree port type edge
!
interface Ethernet1/5
    no switchport
    medium p2p
    bfd interval 250 min_rx 250 multiplier 4
    no ip redirects
    ip unnumbered loopback1
    ip ospf network point-to-point
    ip router ospf UNDERLAY area 0.0.0.0
    ip pim sparse-mode
!
interface Ethernet1/6
    no switchport
    medium p2p
    bfd interval 250 min_rx 250 multiplier 4
    no ip redirects
    ip unnumbered loopback1
    ip ospf network point-to-point
    ip router ospf UNDERLAY area 0.0.0.0
    ip pim sparse-mode
!
interface loopback0
    description OVERLAY LOOPBACK
    ip address 2.2.2.56/32
    ip router ospf UNDERLAY area 0.0.0.0
    ip pim sparse-mode
!
interface loopback1
    description UNDERLAY LOOPBACK
    ip address 1.1.1.56/32
    ip router ospf UNDERLAY area 0.0.0.0
    ip pim sparse-mode
!
router ospf UNDERLAY
    bfd
    router-id 1.1.1.56
!
router bgp 65000
    router-id 2.2.2.56
    address-family 12vpn evpn
        template peer SPINE_PEERS
            update-source loopback0
        address-family 12vpn evpn
            send-community both
    neighbor 2.2.2.75 remote-as 65000
        inherit peer SPINE_PEERS
        description 7K5
    neighbor 2.2.2.76 remote-as 65000
        inherit peer SPINE_PEERS
        description 7K6
evpn
    vni 10103 12
        rd auto
        route-target import auto
        route-target export auto
!
ngoam install acl

```

#### N7K5:

```

hostname N7K5
!
nv overlay evpn
feature ospf
feature bgp
feature pim
feature lldp

```

```

feature udld
feature bfd
feature nxapi
!
feature ngoam
!
ip pim rp-address 7.7.7.7 group-list 224.0.0.0/4 bidir
ip pim ssm range 232.0.0.0/8
ip pim bfd
!
interface Ethernet1/19
  medium p2p
  bfd interval 250 min_rx 250 multiplier 4
  no ip redirects
  ip unnumbered loopback1
  ip ospf network point-to-point
  ip router ospf UNDERLAY area 0.0.0.0
  ip pim sparse-mode
  no shutdown
!
interface Ethernet1/20
  medium p2p
  bfd interval 250 min_rx 250 multiplier 4
  no ip redirects
  ip unnumbered loopback1
  ip ospf network point-to-point
  ip router ospf UNDERLAY area 0.0.0.0
  ip pim sparse-mode
  no shutdown
!
interface loopback0
  description OVERLAY LOOPBACK
  ip address 2.2.2.75/32
  ip router ospf UNDERLAY area 0.0.0.0
  ip pim sparse-mode
!
interface loopback1
  description UNDERLAY LOOPBACK
  ip address 1.1.1.75/32
  ip router ospf UNDERLAY area 0.0.0.0
  ip pim sparse-mode
!
interface loopback7
  description Anycast RP Address
  ip address 7.7.7.6/31
  ip ospf network point-to-point
  ip router ospf UNDERLAY area 0.0.0.0
  ip pim sparse-mode
!
router ospf UNDERLAY
  bfd
  router-id 1.1.1.75
!
router bgp 65000
  router-id 2.2.2.75
  address-family l2vpn evpn
  template peer LEAF_PEERS
    update-source loopback0
    address-family l2vpn evpn
    send-community both
    route-reflector-client
  neighbor 2.2.2.0/24 remote-as 65000
  inherit peer LEAF_PEERS

```

#### N7K6:

```

hostname N7K6
!
feature telnet
nv overlay evpn
feature ospf
feature bgp
feature pim
feature udld
feature bfd
feature nxapi
!
feature ngoam
!
ip pim rp-address 7.7.7.7 group-list 224.0.0.0/4 bidir
ip pim ssm range 232.0.0.0/8
ip pim bfd
!
interface Ethernet1/19
  medium p2p
  bfd interval 250 min_rx 250 multiplier 4
  no ip redirects
  ip unnumbered loopback1
  ip ospf network point-to-point
  ip router ospf UNDERLAY area 0.0.0.0
  ip pim sparse-mode
  no shutdown
!
interface Ethernet1/20
  medium p2p
  bfd interval 250 min_rx 250 multiplier 4
  no ip redirects
  ip unnumbered loopback1
  ip ospf network point-to-point
  ip router ospf UNDERLAY area 0.0.0.0
  ip pim sparse-mode
  no shutdown

```

```
!
interface loopback0
  description OVERLAY LOOPBACK
  ip address 2.2.2.76/32
  ip router ospf UNDERLAY area 0.0.0.0
  ip pim sparse-mode
!
interface loopback1
  description UNDERLAY LOOPBACK
  ip address 1.1.1.76/32
  ip router ospf UNDERLAY area 0.0.0.0
  ip pim sparse-mode
!
interface loopback7
  description Anycast RP Address
  ip address 7.7.7.5/30
  ip ospf network point-to-point
  ip router ospf UNDERLAY area 0.0.0.0
  ip pim sparse-mode
!
router ospf UNDERLAY
  bfd
  router-id 1.1.1.76
!
router bgp 65000
  router-id 2.2.2.76
  address-family 12vpn evpn
  template peer LEAF_PEERS
    update-source loopback0
  address-family 12vpn evpn
    send-community both
    route-reflector-client
  neighbor 2.2.2.0/24 remote-as 65000
  inherit peer LEAF_PEERS
```

## Verification

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