



Supported Underlay Configuration Examples

This appendix provides examples of supported underlay template configuration.

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Supported Underlay Configuration Examples

| Configuration Area | Sample Configuration | Device Type | Device Role |
|---|--|-------------|-------------|
| Note Prerequisite: You should enable the following configuration for the device configuration to work. | <pre>feature telnet feature nxapi feature ospf feature bgp feature pim feature udld feature interface-vlan feature vn-segment-vlan-based feature hsrp feature lacp feature vpc feature lldp feature nv overlay feature pbr feature sla sender feature sla responder feature vrrpv3 feature bfd</pre> | | |
| UNDERLAY IGP ROUTING OSPF routing process | <pre>router ospf 10</pre> | N9K | Leaf |
| | <pre>router ospf 10</pre> | ASR9K | DCI |
| OSPF Area | <pre>interface ethernet 1/5 ip ospf router 10 area 0.0.0.0</pre> | N9K | Leaf |
| | <pre>interface ethernet 1/5 ip ospf router 10 area 0.0.0.0</pre> | N9K | Leaf |
| | <pre>router ospf 10 area 0</pre> | ASR9K | DCI |

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| OSPF router-id | router ospf 10 router-id 10.218.20.15 | N9K | Leaf |
| | router ospf 10 router-id 10.218.20.15 | ASPK | DCI |
| OSPF auto-cost reference | router ospf 10 ! auto-cost reference-bandwidth 800000 | ASPK | DCI |
| OSPF Network type | interface ethernet1/5 ip ospf network point-to-point | N9K | Leaf |
| | interface vlan10 ip ospf network point-to-point | N9K | Leaf |
| | router ospf 10 area 0 interface GigabitEthernet0/0/1/3 network point-to-point | ASPK | DCI |
| OSPF Authentication | interface Ethernet1/5 ip ospf authentication message-digest | N9K | Leaf |
| | interface Ethernet1/5 ip ospf message-digest-key 1 md5 0 xxx | N9K | Leaf |
| | router ospf 10 area 0 interface <Fabric Interface> authentication message-digest message-digest-key 1 md5 encrypted 202cb962ac59075b964b07152d234b70 | ASPK | DCI |
| OSPF Passive-interface | interface loopback3 ip router ospf 100 area 0.0.0.0 | N9K | Leaf |
| | router ospf 10 area 0 interface Loopback10 passive enable | ASPK | DCI |
| OSPF Convergence | router ospf 10 timers lsa arrival 15 timers throttle lsa 0 20 5000 timers throttle spf 50 100 5000 | N9K | Leaf |
| | router ospf 10 timers throttle lsa all 0 20 5000 timers throttle spf 50 100 5000 timers lsa min-arrival 15 | ASPK | DCI |
| OSPF BFD (per-link) | feature bfd router ospf 10 bfd | N9K | Leaf |
| | interface Ethernet1/5 no ip redirects | N9K | Leaf |

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| | <pre>router ospf 10 bfd minimum-interval 150 bfd multiplier 3 area 0 interface TenGigE0/0/2/1 bfd fast-detect</pre> | AS9K | DCI |
| | <pre>interface vlan 10 no bfd echo</pre> | N9K | Leaf |
| Multicast Routing | <pre>feature pim</pre> | N9K | Leaf |
| | <pre>interface loopback1 ip address 10.10.10.10/24 ip router ospf 10 area 0.0.0.0 ip pim sparse-mode</pre> | N9K | Spine |
| | <pre>ip pim rp-address 10.218.20.250 group-list 239.255.0.0/16 override</pre> | N9K | Spine |
| | <pre>ip pim anycast-rp 10.218.20.250 10.218.20.249 ip pim anycast-rp 10.218.20.250 10.218.20.248</pre> | N9K | Spine |
| | <pre>feature pim</pre> | N9K | Leaf |
| | <pre>ip pim rp-address 10.218.20.250 group-list 239.255.0.0/16 override</pre> | N9K | Leaf |
| | <pre>interface Vlan10 ip pim sparse-mode</pre> | N9K | Leaf |
| | <pre>interface loopback0 ip pim sparse-mode</pre> | N9K | Leaf |
| | <pre>interface Ethernet2/1 ip pim sparse-mode</pre> | N9K | Leaf |
| | <pre>interface Ethernet2/2 ip pim sparse-mode</pre> | N9K | Leaf |
| L2 Technologies | <pre>interface Ethernet 1/10 switchport mode trunk</pre> | N9K | Leaf |
| | <pre>interface Ethernet 1/10 switchport trunk allowed vlan none</pre> | N9K | Leaf |
| | <pre>interface Ethernet 1/10 spanning-tree port type edge trunk</pre> | N9K | Leaf |
| | <pre>interface Ethernet 1/10 spanning-tree bpduguard enable</pre> | N9K | Leaf |
| | <pre>interface Ethernet 1/10 spanning-tree bpdufilter enable</pre> | N9K | Leaf |
| | <pre>interface Ethernet 1/10 storm-control broadcast level 20.0</pre> | N9K | Leaf |
| | <pre>interface Ethernet 1/10 storm-control multicast level 30.0</pre> | N9K | Leaf |
| | <pre>interface Ethernet 1/10 storm-control unicast level 50.0</pre> | N9K | Leaf |

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| | interface Ethernet 1/10 storm-control action shutdown | N9K | Spine |
| vPC Role and Priority | vpc domain 1 role priority 100 | N9K | Leaf |
| | vpc domain 1 role priority 200 | N9K | Leaf |
| vPC Peer Keep-alive Link | vrf context management | N9K | Leaf |
| | interface mgmt 0 vrf member management | N9K | Leaf |
| | interface mgmt 0 ip address 10.10.10.10/24 no shutdown | N9K | Leaf |
| | vpc domain 1 peer-keepalive destination 172.20.118.20 | N9K | Leaf |
| vPC Peer-Link | interface Ethernet 1/1 spanning-tree port type network channel-group 1 mode active no shutdown | N9K | Leaf |
| | interface Ethernet 1/2 spanning-tree port type network channel-group 1 mode active no shutdown | N9K | Leaf |
| | interface port-channell switchport switchport mode trunk spanning-tree port type network vpc peer-link | N9K | Leaf |
| vPC Port | interface Ethernet 2/9 channel-group mode active id 51 | N9K | Leaf |
| | interface port-channel 51 switchport | N9K | Leaf |
| | interface port-channel 51 switchport vpc 51 | N9K | Spine |
| vPC Peer-Switch Option | vpc domain 1 peer-switch | N9K | Leaf |
| vPC ARP Synchronization | vpc domain 1 ip arp synchronize | N9K | Leaf |
| vPC in VXLAN environment adjustment | vpc domain 10 peer-switch system-priority 100 (could not find this option) peer-keepalive destination 172.20.118.120 delay restore 200 peer-gateway ip arp synchronize | N9K | Leaf |
| | interface port-channell description vPC peer-link | N9K | Spine |

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| | interface port-channel1 description vPC switchport mode trunk | N9K | Leaf |
| | interface port-channel 1 description vPC switchport mode trunk | N9K | |
| | interface port-channel 1 description vPC spanning-tree port type network | N9K | |
| | interface port-channel 1 vpc peer-link | N9K | |
| | interface port-channel 10 switchport trunk allowed vlan | N9K | |
| | interface port-channel 10 spanning-tree port type edge trunk | N9K | |
| | interface port-channel 10 spanning-tree bpdudfilter enable | N9K | |
| | interface port-channel 10 spanning-tree bpduguard enable | N9K | |
| | interface port-channel 10 vpc 10 | N9K | Spine |
| | interface Ethernet 1/10 switchport trunk allowed vlan none | N9K | Spine |
| | interface Ethernet 1/10 spanning-tree port type edge trunk | N9K | Leaf |
| | interface Ethernet 1/10 spanning-tree bpduguard enable | N9K | Leaf |
| | interface Ethernet 1/10 spanning-tree bpdudfilter enable | N9K | Leaf |
| | interface Ethernet 1/10 channel-group 10 mode active | N9K | Leaf |
| | interface loopback 0 ip address 10.10.10.10/24 | N9K | Leaf |
| | interface loopback 0 ip address 10.10.10.10/24 secondary | N9K | Leaf |
| | interface loopback 0 ip router ospf 100 area 0.0.0.0 | N9K | Leaf |
| | interface loopback 0 ip pim sparse-mode | N9K | Leaf |
| | interface Vlan 10 ip address 10.10.10.10/24 | N9K | Leaf |
| | interface Vlan 10 description Underlay vPC Backup link no shutdown no bfd echo | N9K | Spine |
| | interface Vlan 10 ip ospf network point-to-point | N9K | Leaf |

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| | interface Vlan 10 ip router ospf 100 area 0.0.0.0 | N9K | Leaf |
| | interface Vlan10 ip pim sparse-mode | N9K | Leaf |
| STP | interface Ethernet 1/10 switchport mode trunk | N9K | Leaf |
| | interface Ethernet 1/10 switchport mode trunk allowed vlan 10 | N9K | Leaf |
| | interface Ethernet 1/10 spanning-tree port type edge trunk | N9K | Leaf |
| | interface Ethernet 1/10 spanning-tree bpduguard enable | N9K | Leaf |
| | nx:interface Ethernet 1/10 spanning-tree bpdufilter enable | N9K | Leaf |
| | interface Ethernet 1/10 no shutdown | N9K | |
| | interface port-channel 10 switchport mode trunk | N9K | Leaf |
| | interface port-channel 10 switchport mode trunk trunk allowed vlan ids 1 | N9K | Leaf |
| | interface port-channel 10 spanning-tree port type edge | N9K | Leaf |
| | interface port-channel 10 spanning-tree bpduguard enable | N9K | Leaf |
| | interface port-channel 10 spanning-tree bpdufilter enable | N9K | Leaf |
| | interface port-channel 10 no shutdown | N9K | Leaf |
| | interface port-channel 10 vpc port-channel-number 10 | N9K | Leaf |
| | interface Ethernet 1/10 switchport mode trunk | N9K | Leaf |
| | interface Ethernet 1/10 switchport mode trunk allowed vlan 10 | N9K | Leaf |
| | interface Ethernet 1/10 spanning-tree port type edge trunk | N9K | Leaf |
| | interface Ethernet 1/10 spanning-tre guard root | N9K | Leaf |
| | interface Ethernet 1/10 no shutdown | N9K | Leaf |
| | interface ethernet <xxxx> description <leaf/Spine Fabric> ip address | N9K | Leaf |

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| | interface Ethernet 1/10 description leaf mtu 9216 | N9K | Leaf |
| | interface Vlan 1 description <attachment/border facing intf> | N9K | Leaf |
| | interface Vlan 1 description ip address <addr> | N9K | Leaf |
| | interface Vlan 1 description ip address mtu 1500 | N9K | Leaf |
| | interface <To Spine> mtu 9214 | N9K | Leaf |
| | interface <To Border Leaf> mtu 1518 | N9K | Leaf |
| | interface GigabitEthernet0/0/1/5 mtu 9214 | AS9K | DCI |
| Nexus 9500 QoS | system qos service-policy type queuing output default-out-policy | N9K | Leaf |
| | policy-map type network-qos Jumbo-nq-policy class type network-qos c-nq3 | N9K | Leaf |
| | policy-map type network-qos Jumbo-nq-policy class type network-qos c-nq3 match qos-group 3 | N9K | Leaf |
| | policy-map type network-qos Jumbo-nq-policy class type network-qos c-nq3 mtu 9216 | N9K | Leaf |
| | class type network-qos c-nq3 match qos-group 3 mtu 9216 class type network-qos c-nq2 match qos-group 2 mtu 9216 class type network-qos c-nq1 match qos-group 1 mtu 9216 class type network-qos c-nq-default match qos-group 0 mtu 9216 | N9K | Leaf |
| | system qos service-policy type network-qos Jumbo-nq-policy | N9K | Leaf |
| QoS Hardware resources configuration | "hardware access-list tcam region racl 0 hardware access-list tcam region e-racl 0 hardware access-list tcam region span 0 hardware access-list tcam region vqos 256 hardware access-list tcam region e-qos 256 hardware access-list tcam region arp-ether 256" | N9K | Leaf |
| N 9500 QoS | system qos service-policy type queuing output default-out-policy | N9K | Leaf |

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| | system qos service-policy type network-qos Jumbo-nq-policy | N9K | Leaf |
| N 9500 QoS Queuing policy | policy-map type queuing default-out-policy class type queuing c-out-q3 priority level 1 class type queuing c-out-q2 bandwidth remaining percent 0 class type queuing c-out-q1 bandwidth remaining percent 0 class type queuing c-out-q-default bandwidth remaining percent 100 | N9K | Leaf |
| | System qos Service-policy type queuing out default-out-policy | N9K | Leaf |
| N 9500 QoS Queuing Policy | policy-map type queuing default-out-policy class type queuing c-out-q3 priority level 1 class type queuing c-out-q2 bandwidth remaining percent 0 class type queuing c-out-q1 bandwidth remaining percent 0 class type queuing c-out-q-default bandwidth remaining percent 100 | N9K | Leaf |
| | System qos Service-policy type queuing out default-out-policy | N9K | Leaf |
| Network Management Ethernet (Mgmt0) | interface mgmt0 ip address 10.10.10.10/24 | N9K | Leaf |
| | vrf context management ip route 0.0.0.0/0 10.218.23.254 | N9K | Leaf |
| Configuring Hostname on Nexus 9000 | hostname nw_lf_cnx9_001.4lgebz_o01_s01 | N9K | Leaf |
| Time Zone and day-light saving | clock timezone EET 2 0 clock summer-time EEST 4 Sunday March 02:00 4 Sunday October 03:00 60 | N9K | Leaf |
| DNS | ip domain-name <cust_name> no ip domain-lookup | N9K | Leaf |
| SNMP | snmp-server contact <contact_name> snmp-server location <location_name> | N9K | Leaf |
| | snmp-server host 85.29.26.36 traps version 2c <SNMP_Community_1> snmp-server host 85.29.56.136 traps version 2c <SNMP_Community_1> snmp-server host 85.29.60.191 traps version 2c <SNMP_Community_1> snmp-server host 85.29.60.235 traps version 2c <SNMP_Community_1> snmp-server host 213.74.189.232 traps version 2c <SNMP_Community_1> snmp-server host 213.74.189.233 traps version 2c <SNMP_Community_1> | N9K | Leaf |

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| | <pre>snmp-server host 85.29.26.36 use-vrf management snmp-server host 85.29.56.136 use-vrf management snmp-server host 85.29.60.191 use-vrf management snmp-server host 85.29.60.235 use-vrf management snmp-server host 213.74.189.232 use-vrf management snmp-server host 213.74.189.233 use-vrf management</pre> | N9K | Leaf |
| | <pre>snmp-server source-interface trap mgmt0</pre> | N9K | Leaf |
| | <pre>snmp-server community <community> group network-admin</pre> | N9K | Leaf |
| | <pre>15 permit ip host 213.74.197.43 any ... 390 permit ip host 176.43.250.25 any</pre> | N9K | Leaf |
| LLDP on Nexus 9000 | <pre>feature lldp</pre> | N9K | Leaf |
| Network Security Disable IP Redirects | <pre>interface Ethernet slot#/port# no ip redirects no ipv6 redirects</pre> | N9K | Leaf |
| Device Access Security | <pre>NX-OS(config)#no ssh server enable NX-OS(config)#ssh key {dsa [force] rsa [bits [force]]} NX-OS(config)#ssh server enable NX-OS#show ssh key ***** rsa Keys generated:Fri Apr 10 20:13:21 2010 <clipped> !</pre> | N9K | Leaf |
| AAA-N | <pre>NX-OS(config)#feature tacacs+ NX-OS(config)#tacacs-server host {ipv4-address ipv6-address host-name} NX-OS(config)#tacacs-server key [0 7] key-value NX-OS(config)#aaa group server tacacs+ group-name server {ipv4-address ipv6-address host-name} deadtime minutes use-vrf <demo_name> NX-OS(config)#tacacs-server timeout seconds NX-OS(config)#tacacs-server host {ipv4-address ipv6-address host-name} port tcp-port NX-OS(config)#tacacs-server deadtime minutes</pre> | N9K | Leaf |
| | <pre>feature tacacs+ aaa group server tacacs+ TacacsGroup use-vrf management server 10.35.175.1 aaa authentication login console group TacacsGroup aaa authentication login default group TacacsGroup aaa authentication login error-enable ! tacacs-server host 10.35.175.1 key <shared-key> port 49 tacacs-server directed-request ip tacacs source-interface mgmt 0 ! ! Device Login Authorisation with AAA !</pre> | N9K | Leaf |

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|--|--|-----|------|
| | <pre> aaa authorization config-commands default group TacacsGroup local aaa authorization commands default group TacacsGroup local ! ! Device Login Accounting with AAA ! aaa accounting default group TacacsGroup ! ! Local User Configuration ! username admin Pword <Pword> role network-admin </pre> | N9K | Leaf |
| Device Hardening 3.9.9.4 COPP policy and class maps | <pre> policy-map type control-plane copp-system-p-policy-strict class copp-system-p-class-l3uc-data set cos 1 police cir 250 pps bc 32 packets conform transmit violate drop </pre> | N9K | Leaf |
| | <pre> class copp-system-p-class-critical set cos 7 police cir 19000 pps bc 128 packets conform transmit violate drop </pre> | N9K | Leaf |
| | <pre> class copp-system-p-class-important set cos 6 police cir 3000 pps bc 128 packets conform transmit violate drop </pre> | N9K | Leaf |
| | <pre> class copp-system-p-class-multicast-router set cos 6 police cir 3000 pps bc 128 packets conform transmit violate drop </pre> | N9K | Leaf |
| | <pre> class copp-system-p-class-management set cos 2 police cir 3000 pps bc 32 packets conform transmit violate drop </pre> | N9K | Leaf |
| | <pre> class copp-system-p-class-multicast-host set cos 1 police cir 2000 pps bc 128 packets conform transmit violate drop </pre> | N9K | Leaf |
| | <pre> class copp-system-p-class-l3mc-data set cos 1 police cir 3000 pps bc 32 packets conform transmit violate drop </pre> | N9K | Leaf |
| | <pre> class copp-system-p-class-normal set cos 1 police cir 1500 pps bc 32 packets conform transmit violate drop </pre> | N9K | Leaf |
| | <pre> class copp-system-p-class-ndp set cos 6 police cir 1500 pps bc 32 packets conform transmit violate drop </pre> | N9K | Leaf |
| | <pre> class copp-system-p-class-normal-dhcp set cos 1 police cir 300 pps bc 32 packets conform transmit violate drop </pre> | N9K | Leaf |

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| | <pre>class copp-system-p-class-normal-dhcp-relay-response set cos 1 police cir 400 pps bc 64 packets conform transmit violate drop</pre> | N9K | Leaf |
| | <pre>class copp-system-p-class-normal-igmp set cos 3 police cir 6000 pps bc 64 packets conform transmit violate drop</pre> | N9K | Leaf |
| | <pre>class copp-system-p-class-redirect set cos 1 police cir 1500 pps bc 32 packets conform transmit violate drop</pre> | N9K | Leaf |
| | <pre>class copp-system-p-class-exception set cos 1 police cir 50 pps bc 32 packets conform transmit violate drop</pre> | N9K | Leaf |
| | <pre>class copp-system-p-class-exception-diag set cos 1 police cir 50 pps bc 32 packets conform transmit violate drop</pre> | N9K | Leaf |
| | <pre>class copp-system-p-class-monitoring set cos 1 police cir 300 pps bc 128 packets conform transmit violate drop</pre> | N9K | Leaf |
| | <pre>class copp-system-p-class-12-unpoliced set cos 7 police cir 20000 pps bc 8192 packets conform transmit violate drop</pre> | N9K | Leaf |
| | <pre>class copp-system-p-class-undesirable set cos 0 police cir 15 pps bc 32 packets conform transmit violate drop</pre> | N9K | Leaf |
| | <pre>class copp-system-p-class-fcoe set cos 6 police cir 1500 pps bc 128 packets conform transmit violate drop</pre> | N9K | Leaf |
| | <pre>class copp-system-p-class-nat-flow set cos 7 police cir 100 pps bc 64 packets conform transmit violate drop</pre> | N9K | Leaf |
| | <pre>class copp-system-p-class-12-default set cos 0 police cir 50 pps bc 32 packets conform transmit violate drop</pre> | N9K | Leaf |
| | <pre>class class-default set cos 0 police cir 50 pps bc 32 packets conform transmit violate drop</pre> | N9K | Leaf |

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| | N9k-ST-Leaf-01# sh copp status Last Config Operation: None Last Config Operation Timestamp: None Last Config Operation Status: None Policy-map attached to the control-plane: copp-system-p-policy-strict | N9K | Leaf |
| | N9k-ST-Leaf-01# sh copp profile ? dense Display dense profile lenient Display lenient profile moderate Display moderate profile strict Display strict profile | N9K | Leaf |
| BFD | feature bfd bfd interval 50 min_rx 50 multiplier 3 | N9K | Leaf |
| | router ospf UNDERLAY bfd | N9K | Leaf |
| | router bgp 65539 vrf <demo_name> address-family ipv4 unicast | N9K | Leaf |
| | router bgp 65539 vrf <demo_name> local-as 65539 | N9K | Leaf |
| | router bgp 65539 vrf <demo_name> neighbor 10.23.65.0 remote-as 65541 bfd | N9K | Leaf |
| OSPF Routing Process | feature ospf ! router ospf UNDERLAY log-adjacency-changes detail bfd | N9K | Leaf |
| OSPF Router ID | router ospf UNDERLAY log-adjacency-changes detail bfd router-id <loopback17-ip-address> | N9K | Leaf |
| Enabling OSPF on interfaces | router ospf UNDERLAY passive-interface default | N9K | Leaf |
| | continue from the above... interface Ethernet1/5 ip router ospf UNDERLAY area 0.0.0.1 ip ospf bfd ip ospf network point-to-point no ip ospf passive-interface | N9K | Leaf |
| | interface loopback<id> ip router ospf UNDERLAY area 0.0.0.1 | N9K | Leaf |
| OSPF Authentication | interface eth <slot>/<port> ip ospf authentication message-digest ip ospf message-digest-key <key-id> md5 0 <clear-text-key> | N9K | Leaf |
| OSPF Reference-Bandwidth | router ospf UNDERLAY auto-cost reference bandwidth 100Gbps | N9K | Leaf |

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|---|---|-----|----------------|
| Underlay OSPF Configuration on Leaf Underlay OSPF Configuration on Spine | interface loopback17 ip router ospf UNDERLAY area 0.0.0.1 | N9K | Leaf |
| | interface eth<slot>/<port> ip router ospf UNDERLAY area 0.0.0.1 ip ospf network point-to-point no ip ospf passive-interface ip ospf bfd ip ospf authentication message-digest ip ospf message-digest-key <key-id> md5 0 <clear-text-key> | N9K | Leaf/ Spine |
| Enabling Multicast Routing - PIM | feature pim | N9K | Leaf |
| | ip pim long-neighbor-changes | N9K | Spine |
| | interface ethernet 1/10 ip pim sparse-mode | N9K | Spine |
| | interface ethernet 1/10 ip pim bfd-instance | N9K | Spine |
| | interface loopback<id> ip pim sparse-mode | N9K | Leaf |
| Mapping Layer 2 VNI VXLAN segment to ASM group | interface nve<id> member vni <L2-VNID> mcast-group 239.239.0.1 member vni <L2-VNID> mcast-group 239.239.0.2 | N9K | Leaf |
| PIM Anycast RP (RFC 4610) | interface loopback18 ip pim sparse-mode | N9K | Leaf |
| | interface loopback17 ip pim sparse-mode | N9K | Leaf |
| | ip pim rp-address <loopback18> group-list 239.239.0.0/16 | N9K | Leaf |
| Multicast configuration for Leaf | ip pim rp-address <anycast-loopback> group-list 239.239.0.0/16 | N9K | Leaf |
| | feature pim ip pim log-neighbor-changes | N9K | Leaf |
| | interface loopback17 ip pim sparse-mode | N9K | Leaf |
| | interface ethernet<slot>/<port> ip pim sparse-mode ip pim bfd-instance | N9K | Leaf |
| | interface nve1 member vni <L2-VNID> mcast-group 239.64.64.1 member vni <L2-VNID> mcast-group 239.64.64.2 | N9K | Leaf |

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|--|---|-----|-------|
| | <code>ip pim rp-address <anycast-loopback> group-list 239.239.0.0/16</code> | N9K | Leaf |
| Multicast configuration for Spine | <code>feature pim ip pim log-neighbor-changes</code> | N9K | Spine |
| | <code>interface ethernet 1/10 ip pim sparse-mode</code> | N9K | Spine |
| | <code>interface ethernet 1/10 ip pim bfd-instance</code> | N9K | Spine |
| | <code>interface loopback17 ip pim sparse-mode</code> | N9K | Spine |
| | <code>interface loopback18 ip pim sparse-mode</code> | N9K | Spine |
| | <code>ip pim rp-address <loopback18> group-list 239.239.0.0/16</code> | N9K | Spine |
| | <code>ip pim anycast-rp <loopback18> <loopback17></code> | N9K | Spine |
| Service Extensions for OSPF routing | <code>vlan 17 vn-segment 10019</code> | N9K | |
| | <code>interface Vlan17 mtu 9216 vrf member <demo_name> ip ospf cost 10 ip ospf passive-interface ip router ospf 1 area 0.0.0.0</code> | N9K | |
| Service Extensions for Static routing | <code>vrf context <demo_name> ip route 0.0.0.0/0 Vlan1605 11.0.23.30</code> | N9K | |
| Service Extension for default route injection on N9K BL/redistribute mode. | <code>router bgp 65542 vrf <demo_name> address-family ipv4 unicast network 0.0.0.0/0</code> | N9K | |
| route-map | <code>route-map RM-IN-S2 permit 10 match tag 1000 route-map RM-IN-S3 permit 10 match tag 1000</code> | N9K | |
| | <code>route-map RM-S-to-O permit 10 match tag 131 132 133 139 134 135 set metric-type type-1</code> | N9K | |
| vrf context <demo_name> | <code>vrf context <demo_name> ip route 9.59.207.0/24 Vlan1603 11.0.34.30 name <test_name> tag 1000 50</code> | N9K | |
| | <code>vrf context <demo_name> ip route 9.59.207.0/24 Ethernet1/46.2 11.0.40.142 name <test_name> tag 1000 10</code> | N9K | |
| | <code>vrf context <demo_name> ip route 10.0.0.0/12 Vlan1603 11.0.34.30 tag 1000 50</code> | N9K | |

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|---------------------------------------|---|-----|--|
| | <pre>vrf context <demo_name> ip route 10.0.0.0/12 Ethernet1/46.2 11.0.40.142 tag 1000 10</pre> | N9K | |
| | <pre>vrf context <demo_name> ip route 10.2.52.0/24 Vlan6 10.2.42.3 tag 1000</pre> | N9K | |
| | <pre>vrf context <demo_name> ip route 192.168.0.0/16 Vlan1603 11.0.34.30 name <test_name> tag 1000 rd auto address-family ipv4 unicast route-target both auto route-target both auto evpn</pre> | N9K | |
| vrf context <demo_name> | <pre>vrf context <demo_name> ip route 10.2.0.0/19 Vlan1607 11.0.34.14 tag 131 50</pre> | N9K | |
| | <pre>vrf context <demo_name> ip route 10.2.0.0/19 Ethernet1/45.1 11.0.40.145 tag 131 10</pre> | N9K | |
| | <pre>vrf context <demo_name> ip route 10.2.96.0/19 Vlan3203 11.0.39.14 tag 134</pre> | N9K | |
| interface Vlan1601 | <pre>interface Vlan1601 no shutdown vrf member <demo_name> no ip redirects ip address 10.10.10.10/24 no ipv6 redirects hsrp version 2 hsrp 1601 preempt priority 110 ip 11.0.34.33</pre> | N9K | |
| interface Vlanxx | <pre>interface Vlan1602 no shutdown vrf member <demo_name> no ip redirects no ipv6 redirects ip ospf cost 10 ip ospf passive-interface ip router ospf 100 area 0.0.0.0</pre> | N9K | |
| interface Ethernet (IPv4 and IPv6) | <pre>interface ex/y mac aaa.bbbb.cccc vrf member <demo_name> ip address x.x.x.x/31 ipv6 address x:x:x::x ip policy route-map TO_VPER_OR_FW ipv6 policy route-map TO_VPER_OR_FW_v6 no shut</pre> | N7K | |
| interface Ethernet1/46.1 | <pre>interface Ethernet1/36.1 mtu 1500</pre> | N9K | |

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| | <pre>interface Ethernet1/36.1 encapsulation dot1q 1602 mac-address 0000.0000.2222 vrf member <demo_name> no ip redirects ip address 10.10.10.10/24</pre> | N9K | |
| interface Ethernet1/47.1 | <pre>interface Ethernet1/37.1 mtu 1500 encapsulation dot1q 1608 vrf member <demo_name> no ip redirects ip address 10.10.10.10/24 ip ospf dead-interval 20 ip ospf hello-interval 5 ip ospf network point-to-point ip router ospf 100 area 0.0.0.0</pre> | N9K | |
| router ospf 1 | <pre>router ospf 1 vrf <demo_name> router-id 55.2.32.5 vrf <demo_name> router-id 55.2.32.5 vrf <demo_name> router-id 55.2.32.5 redistribute static route-map RM-S-to-O</pre> | N9K | |
| router bgp 65543 | <pre>router bgp 65543 vrf <demo_name> address-family ipv4 unicast advertise l2vpn evpn redistribute direct route-map vts-subnet-policy redistribute static route-map RM-IN-S2</pre> | N9K | |
| | nv overlay evpn | N9K | |
| | clock protocol ntp vdc 1 | N9K | |
| role name nsdcheck | <pre>role name nsdcheck rule 4 permit command show * rule 3 permit command terminal length * rule 2 permit command ping * rule 1 permit read</pre> | N9K | |
| | <pre>role name devcheck rule 8 permit command tac-pac * rule 7 permit command dir * rule 6 permit command ssh * rule 5 permit command traceroute * rule 4 permit command ping *</pre> | N9K | |
| | <pre>role name devopera rule 1 permit read-write</pre> | N9K | |
| ip name-server 55.6.8.73 55.22.8.3 | ip name-server 55.6.8.73 55.22.8.3 | N9K | |
| username | <pre>username user password 5 \$1\$lDuqR.60\$eNzZ5I22WxJT58gdEm88N0 role network-operator</pre> | N9K | |

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| | username vtsadmin password 5 \$5\$MmpswImI\$vbZhP/52dNjHY5KWj4yBvmiDvuOZZ9gd2vo2oZc61b4 role network-admin | N9K | |
| | username nsdcheck password 5 \$5\$dpIXMjZs\$jDIZVf6grMulyq79vTts2mcgPlt0QWp5z3tDnw3N5W8 role nsdcheck | N9K | |
| snmp-server | snmp-server source-interface trap loopback1 | N9K | |
| | snmp-server user user network-operator auth md5 0x3eaa4221f6bbf8722cbdea7ea6bf2f11 priv 0x3eaa4221f6bbf8722cbdea7ea6bf2f11 localizedkey | N9K | |
| | snmp-server host 55.6.8.1 traps version 2c COMMUNITY1 snmp-server host 55.6.8.1 use-vrf default | N9K | |
| | snmp-server enable traps bgp snmp-server enable traps ospf snmp-server enable traps callhome event-notify snmp-server enable traps callhome smtp-send-fail snmp-server enable traps cfs state-change-notif snmp-server enable traps lldp lldpRemTablesChange snmp-server enable traps aaa server-state-change snmp-server enable traps hsrp state-change snmp-server enable traps feature-control FeatureOpStatusChange snmp-server enable traps sysmgr cseFailSwCoreNotifyExtended snmp-server enable traps config ccmCLIRunningConfigChanged snmp-server enable traps snmp authentication snmp-server enable traps link cisco-xcvr-mon-status-chg snmp-server enable traps vtp notifs snmp-server enable traps vtp vlancreate snmp-server enable traps vtp vlandelete snmp-server enable traps bridge newroot snmp-server enable traps bridge topologychange snmp-server enable traps stpx inconsistency snmp-server enable traps stpx root-inconsistency snmp-server enable traps system Clock-change-notification snmp-server enable traps feature-control ciscoFeatOpStatusChange | N9K | |
| | snmp-server community COMMUNITY1 group network-operator | N9K | |
| ntp | ntp source-interface loopback0 ntp logging | N9K | |
| ip pim | ip pim ssm range 232.0.0.0/8 | N9K | |
| spanning-tree | spanning-tree pathcost method long spanning-tree mst 1 priority 4096 spanning-tree mst configuration name CFG01 revision 1 instance 1 vlan 1-4094 | N9K | |
| hardware | hardware access-list tcam region qos 0 | N9K | |

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| vpc domain | vpc domain 151 peer-keepalive destination 55.2.34.2 source 55.2.34.1 vrf default | N9K | |
| | vpc domain 151 auto-recovery | N9K | |
| interface vlan | interface Vlan1602 no shutdown vrf member <demo_name> no ip redirects fabric forwarding mode anycast-gateway | N9K | |
| interface port-channel | interface port-channel101 no switchport mtu 9216 no ip redirects ip address 10.10.10.10/24 ip ospf cost 10 ip ospf dead-interval 20 ip ospf hello-interval 5 ip ospf network point-to-point ip router ospf 1 area 0.0.0.0 ip pim sparse-mode | N9K | |
| interface Ethernet | interface Ethernet1/45 no switchport mtu 9216 mac-address 0000.0000.1111 | N9K | |
| | interface Ethernet1/47 no switchport mtu 9216 udld enable | N9K | |
| | interface Ethernet2/5 switchport mode trunk switchport trunk allowed vlan 2-4094 channel-group 21 mode active | N9K | |
| interface mgmt0 | interface mgmt0 no lldp transmit no lldp receive | N9K | |
| clock timezone | clock timezone PRC 8 0 | N9K | |
| ip route | ip route 0.0.0.0/0 Ethernet1/46.452 55.6.34.198 tag 1000 10 ip route 0.0.0.0/0 Vlan3903 55.6.40.14 tag 1000 50 | N9K | |
| router ospf | router ospf 1 redistribute static route-map RM-S-to-O | N9K | |
| router bgp | router bgp 65543 router-id 55.2.32.5 address-family ipv4 unicast address-family l2vpn evpn neighbor 55.2.32.1 remote-as 65543 update-source loopback1 address-family ipv4 unicast address-family l2vpn evpn send-community extended | N9K | |

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| <p>router bgp (IPv4 only)</p> | <pre>router bgp 65539 router-id 192.168.0.25 log-neighbor-changes address-family ipv4 unicast maximum-paths 32 maximum-paths ibgp 32 address-family ipv6 unicast maximum-paths 32 maximum-paths ibgp 32 address-family l2vpn evpn neighbor 192.168.0.3 remote-as 65539 password 3 2b7cf4643b66b222 update-source loopback17 address-family l2vpn evpn send-community send-community extended</pre> | <p>N9K and N7K</p> | |
| <p>Event manager config (IPv4 and IPv6)</p> | <pre>event manager applet TRACK-PING-FOR-BGP-DOWN event track 1 state down action 1.0 syslog msg CANNOT PING FW. GOING TO SHUTDOWN BGP PEER action 2.0 cli config term action 3.0 cli router bgp 65539 action 4.0 cli vrf <demo_name> action 5.0 cli neighbor 175.175.175.175 action 6.0 cli shutdown event manager applet TRACK-PING-FOR-BGP-UP event track 1 state up action 1.0 syslog msg CAN PING FW. GOING TO NO SHUTDOWN BGP PEER action 2.0 cli config term action 3.0 cli router bgp 65539 action 4.0 cli vrf <demo_name> action 5.0 cli neighbor 175.175.175.175 action 6.0 cli no shutdown</pre> | <p>N9K</p> | |
| <p>IP sla config (IPv4 only for N9K) (IPv4 and IPv6 for N7K)</p> | <pre>!On BL-1 Track the local VPER-1 ip sla 1 icmp-echo 69.83.32.36 source-interface vlan 2400 vrf <demo_name> □ forward reference to VRF threshold 500 timeout 500 frequency 1 ! Start the SLAs ip sla schedule 1 life forever start-time now ! Setup a track object for sla 1 track 1 ip sla 1 reachability delay up 180 down 3 ! Set up a track open that returns a DOWN only if both objects 1 and 2 are down. track 111 list boolean or object 1</pre> | <p>N9K and N7K</p> | |
| <p>Track config (IPv4 and IPv6)</p> | <pre>track 10 ip route 0.0.0.0/0 reachability vrf member <demo_name></pre> | <p>N9K and N7K</p> | |

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| Interface port channel (IPv4 and IPv6) | <pre>interface port-channel 110.2511 encapsulation dot1q 2511 vrf member <demo_name> ip address 10.10.10.10/24 no shut interface port-channel 110.2575 encapsulation dot1q 2575 vrf member <demo_name> ipv6 address 10:10:10:10:10:10:10:10/64</pre> | N9K and N7K | |
| | <pre>interface port-channel 110.2577 ip policy route-map FROM_VPER interface port-channel 110.2577 ipv6 policy route-map FROM_VPERv6 ! EEM to track both VPERs, when one is up restore traffic event manager applet VPER_TRACK_UP event track l1l state up action 1.0 syslog msg "BOTH VPERs ARE UP. REMOVING BYPASS!" action 2.0 cli command "config t" action 3.0 cli command "route-map TO_VPER_OR_FW permit 20" action 4.0 cli command "no continue 30" action 5.0 cli command "exit" action 6.0 cli command "route-map TO_VPER_OR_FWv6 permit 20" action 7.0 cli command "no continue 30" action 8.0 cli command "exit" action 9.0 cli command "route-map FROM_FW_TO_VPER_OR_MOBILE permit 10" action 10.0 cli command "no continue 20" action 11.0 cli command "end" action 12.0 cli command "route-map FROM_FW_TO_VPER_OR_MOBILEv6 permit 10" action 13.0 cli command "no continue 20" action 14.0 cli command "end" action 15.0 syslog msg "TRAFFIC HAS BEEN RESTORED TO VPER"</pre> | N7K | |

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| | <pre>! EEM to track both VPERs, when one is up restore traffic event manager applet VPER_TRACK_UP event track 111 state up action 1.0 syslog msg BOTH VPERs ARE UP. REMOVING BYPASS action 2.0 cli command "config t" action 3.0 cli command "route-map TO_VPER_OR_FW permit 20" action 4.0 cli command "no continue 30" action 5.0 cli command "exit" action 6.0 cli command "route-map TO_VPER_OR_FWv6 permit 20" action 7.0 cli command "no continue 30" action 8.0 cli command "exit" action 9.0 cli command "route-map FROM_FW_TO_VPER_OR_MOBILE permit 10" action 10.0 cli command "no continue 20" action 11.0 cli command "end" action 12.0 cli command "route-map FROM_FW_TO_VPER_OR_MOBILEv6 permit 10" action 13.0 cli command "no continue 20" action 14.0 cli command "end" action 15.0 syslog msg TRAFFIC HAS BEEN RESTORED TO VPER</pre> | N9K | |
| IP access list (IPv4 and IPv6) | <pre>ip access-list ALL_POOLS 10 permit ip 1.0.0.0/8 any 20 permit ip any 1.0.0.0/8 30 permit ip 2.0.0.0/8 any 40 permit ip any 2.0.0.0/8 ! Need to configure a ACL for all All POOLS ipv6 access-list ALL_POOLSv6 10 permit ipv6 2001:1::/32 any 20 permit ipv6 any 2001:1::/32 30 permit ipv6 2001:2::/32 any 40 permit ipv6 any 2001:2::/32</pre> | N9K and N7K | |
| Route-map (IPv4 and IPv6) | <pre>set ip next-hop verify-availability 69.83.32.35 track 2 route-map TO_VPER_OR_FW permit 30 match ip address ALL_POOLS ! Set the ip next-hop to the FW VIP set ip next-hop 69.83.136.129 route-map TO_VPER_OR_FW_v6 permit 10 ! Leave room here for the pilot packets route-map TO_VPER_OR_FW_v6 permit 20 match ipv6 address VPER_POOLSv6 set ipv6 next-hop verify-availability 2001:4888:16:2078:1e1:210:: track 1 set ipv6 next-hop verify-availability 2001:4888:16:207a:1e1:210:: track 2 route-map TO_VPER_OR_FW_v6 permit 30 match ipv6 address ALL_POOLSv6 ! Set the ipv6 next-hop to the FW VIP set ipv6 next-hop 2001:4888:39:3080:308:25::</pre> | N9K and N7K | |
| | <pre>route-map FROM_FW_TO_VPER_OR_MOBILE permit 10 match ip address VPER_POOLS set vrf <demo_name>_VPER</pre> | N7K | |

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| Monitor erspan | <pre>monitor session 1 type erspan-source erspan-id 5 vrf <demo_name> ip ttl 25 ip dscp 42 monitor erspan origin ip-address 10.0.0.1 global</pre> | N9K and N7K | |
| QOS- class-map | <pre>class-map type qos match-any TEST1 match packet length 5</pre> | N9K and N7K | |
| QOS class-map policy-map | <pre>class-map type control-plane match-any cust1-copp-system-p-class-exception match exception ip option match exception ip icmp unreachable match exception ipv6 option match exception ipv6 icmp unreachable class-map type control-plane match-any cust1-copp-system-p-class-fcoe match access-group name cust1-copp-system-p-acl-mac-fcoe policy-map type control-plane cust1-copp-system-p-policy-strict class cust1-copp-system-p-class-exception set cos 1 police cir 360 kbps bc 250 ms conform transmit violate drop class cust1-copp-system-p-class-fcoe set cos 6 police cir 1060 kbps bc 1000 ms conform transmit violate drop</pre> | | |
| Tunnel Interface | <pre>interface Tunnel1 vrf member <demo_name> ip address 10.10.10.10/24 tunnel source 1.1.1.201 tunnel destination 1.1.1.200 no shutdown</pre> | N9K and N7K | |