

# Applying Routing Protocols

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# Overview



Examine how to implement routing in the data center using

**Routing protocols on Nexus switches**

- OSPFv2
- OSPFv3
- BGP



# Routing Protocols on Nexus Devices

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Static routing

RIP

OSPFv2 and OSPFv3

EIGRP

IS-IS

BGP

## IPv4 Routing Protocols on Nexus Switches



IPv6 Routing  
is also  
supported

**Static routes**

**OSPFv3**

**EIGRP for IPv6**

**BGP**



Used to enable  
routing protocols

When feature is  
disabled, the switch  
removes routing  
protocols  
configuration

'No feature' command  
creates rollback  
checkpoint

Feature command



# Graceful Restart Feature



**Enabled by default**

**Notifies neighbors that a restart is taking place**

**After restart, requests neighbor send info to rebuild routing table**

**Requests the neighbor relationship is not reset**

**Talks to devices and builds neighborships**

**Resynchronizes its database**



# OSPFv2

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# OSPFv2

**Enable OSPFv2 feature**

**Start the OSPFv2 process**

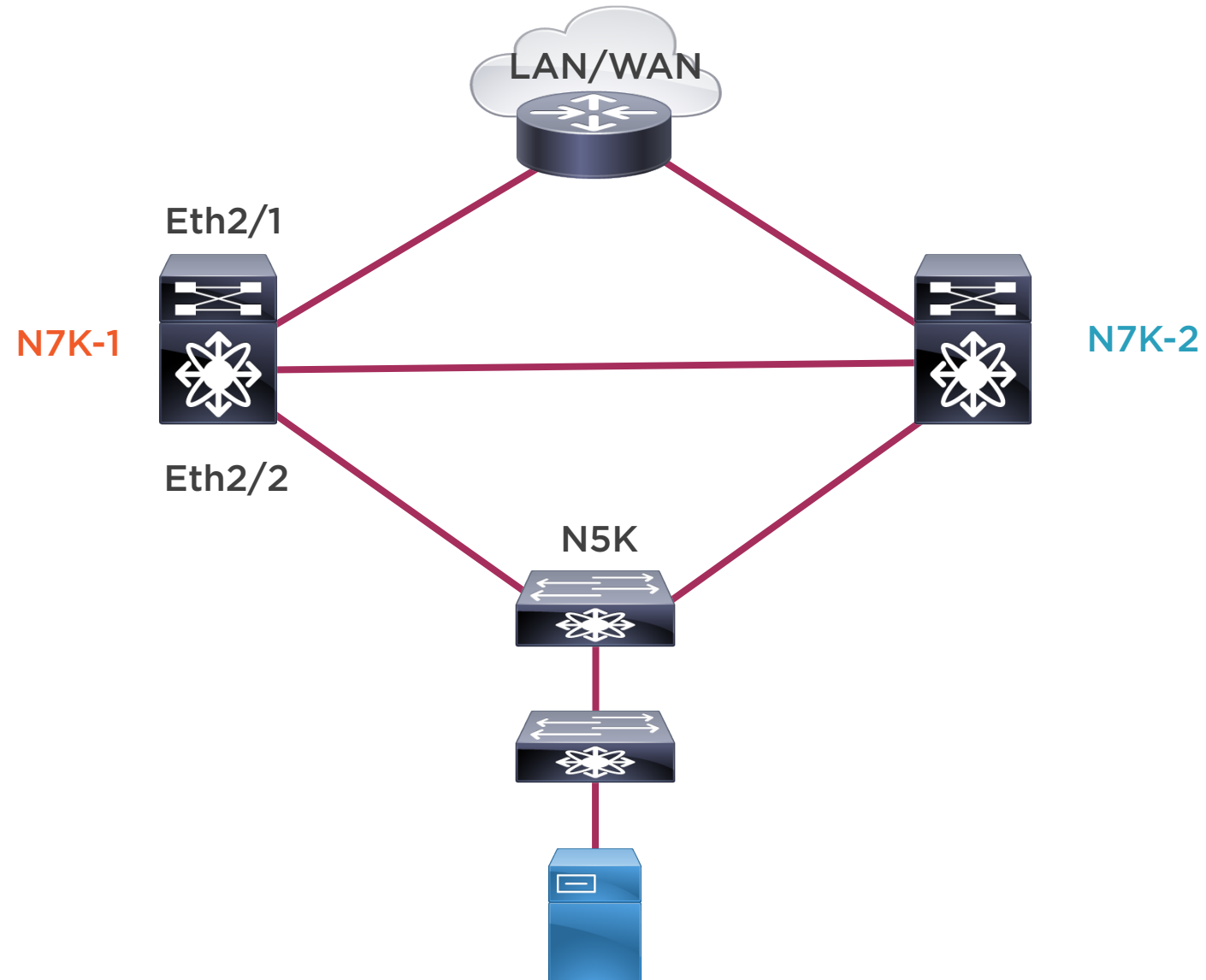
**Configure optional global parameters**

**Enable the process on the interfaces**

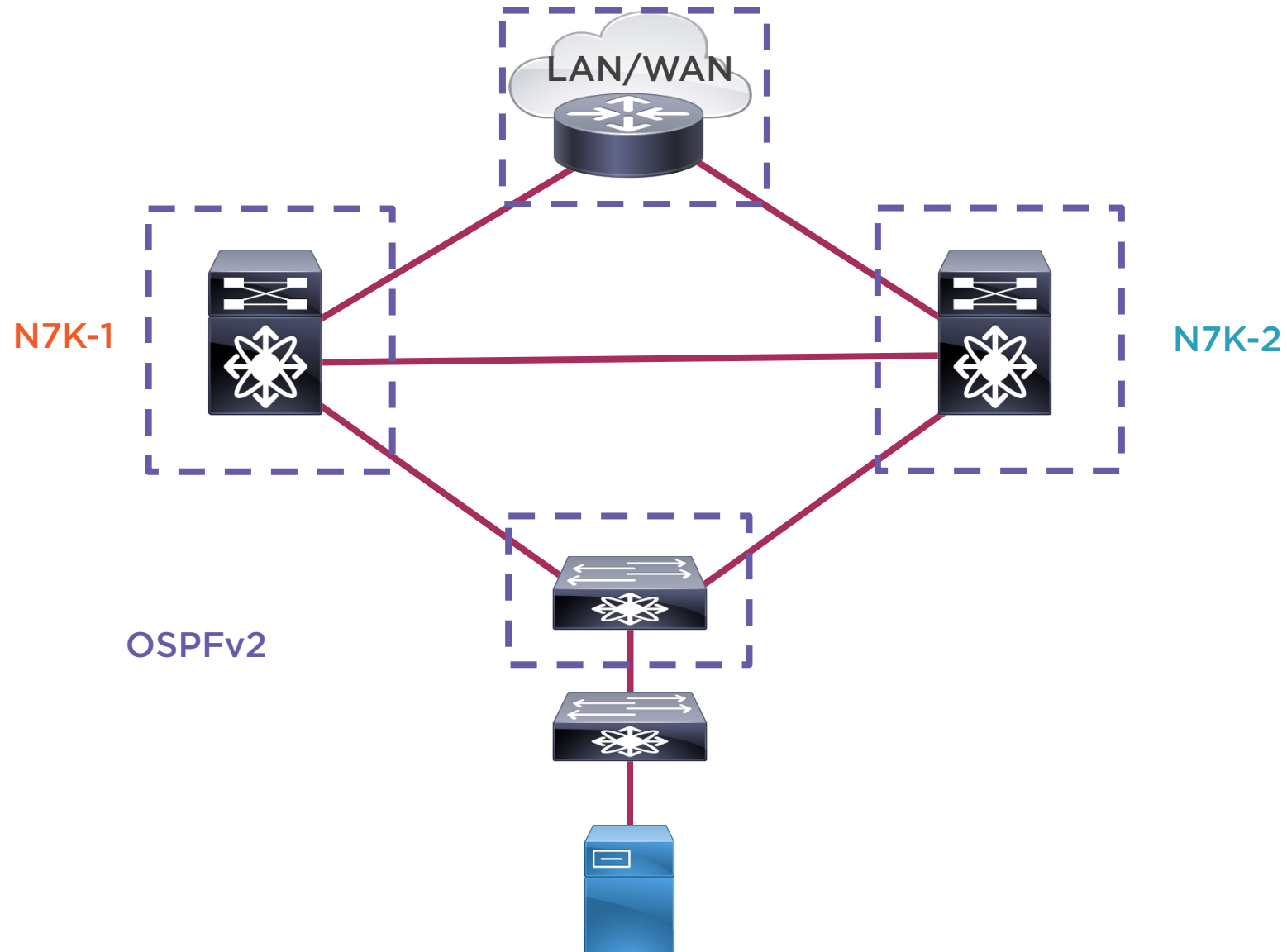
**Configure optional per-interface settings**



# Configuring OSPFv2



# Configuring OSPFv2



```
feature ospfv2
```

## OSPFv2

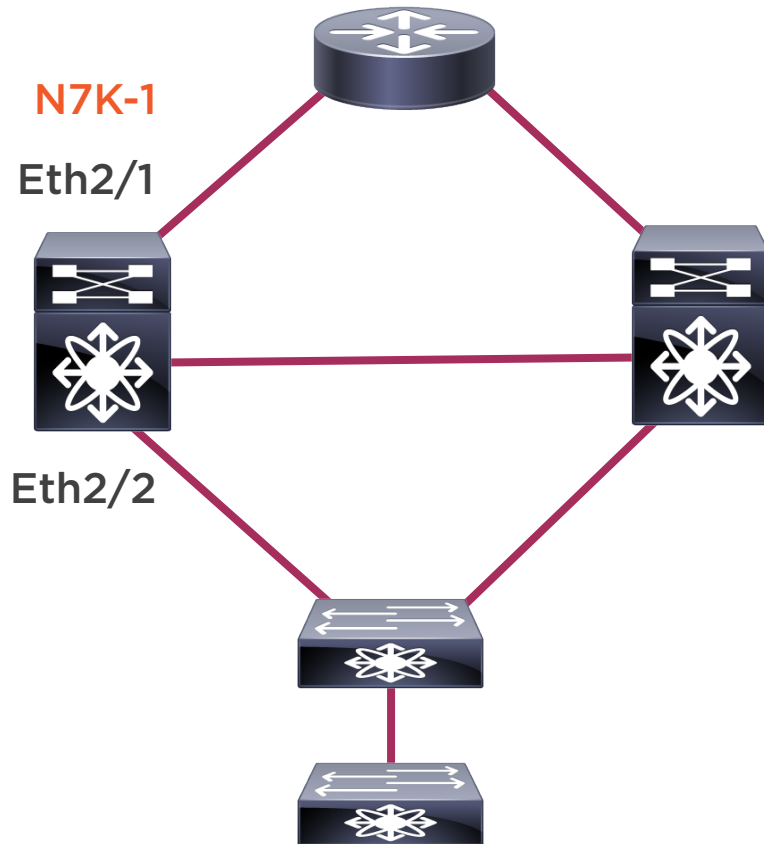
This command enables the OSPFv2 feature. This feature requires the Enterprise Services Package license



# OSPFv2 Configuration

## N7K-1 Configuration

```
!  
router ospf 1  
  router-id 1.1.1.1  
  log-adjacency-changes  
  auto-cost reference-bandwidth 100 Gbps  
!  
interface vlan 30,40  
  ip router ospf 1 area 1  
!  
interface ethernet 2/1  
  ip router ospf 1 area 0  
  ip ospf authentication message-digest  
  ip ospf message-digest-key 1 md5 cisco
```



# OSPFv3

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# OSPFv3

**Enable OSPFv3 feature**

**Start the OSPFv3 process**

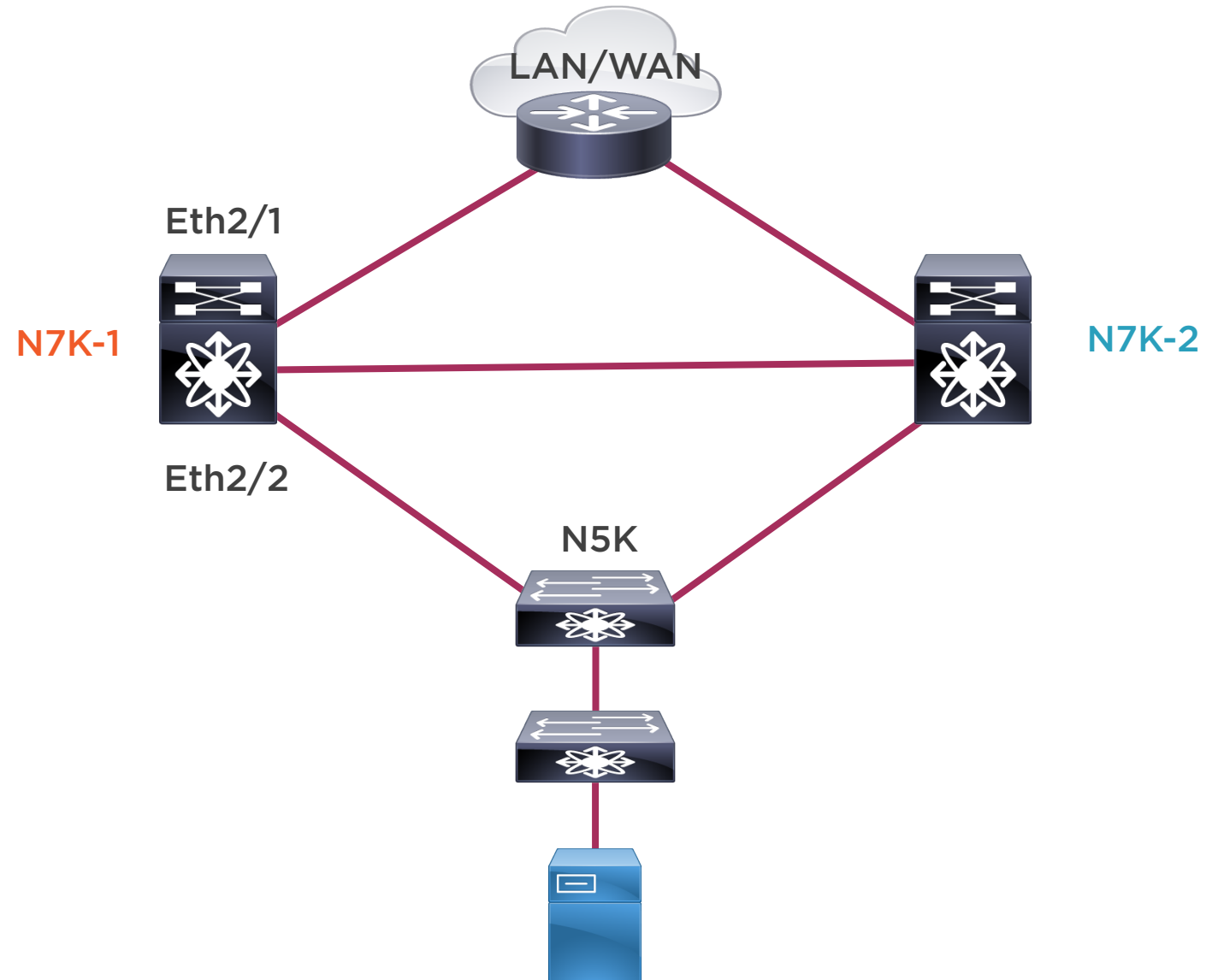
**Configure optional global parameters**

**Enable the process on the interfaces**

**Configure optional per-interface settings**

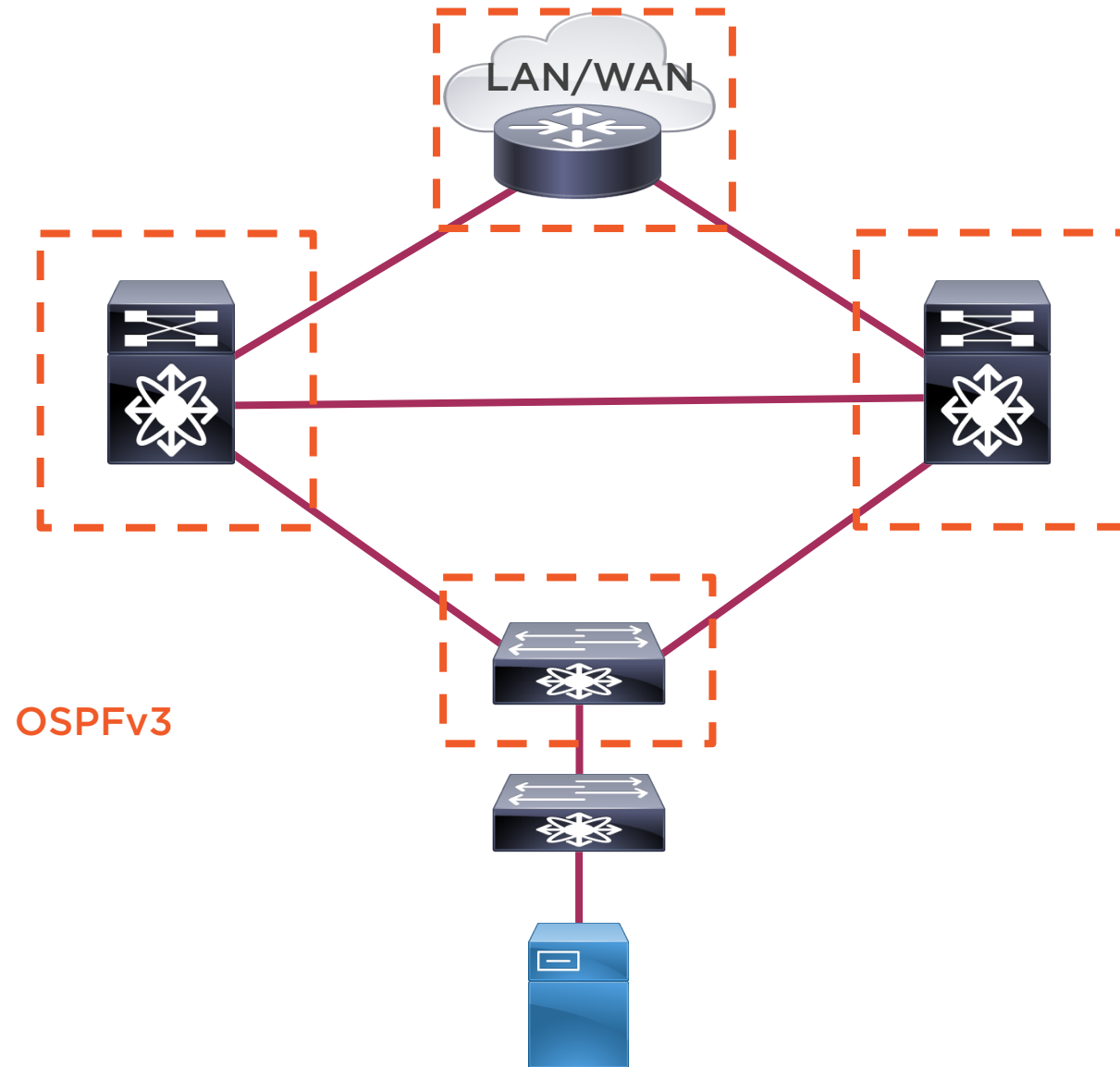


# Configuring OSPFv3





# Configuring OSPFv3



```
feature ospfv3
!
router ospfv3 1
router-id 1.1.1.1
log-adjacency-changes
auto-cost ref-bandwidth 100 Gbps
!
interface vlan 30, 40
ip router ospfv3 1 area 1
!
interface ethernet 2/1
ip router ospfv3 1 area 0
```

- ◀ Enables OSPFv3 feature
- ◀ OSPFv3 process 1
- ◀ Sets router ID
- ◀ Generates a system message whenever a neighbor state changes
- ◀ Sets value used to calculate the default metrics
- ◀ Enables OSPFv3 area 1 on interface
- ◀ Enables OSPFv3 area 0 on interface



# OSPF and BFD

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# OSPF with BFD



Sometimes you can't rely upon Layer 1 mechanisms to accurately detect the loss of a link or neighboring device



Maybe you have a WAN or switch between peering devices



Layer 3 control protocols use a hello mechanism to detect the loss of a neighbor achieve fast convergence



BFD provides a sub second failure detection between two adjacent devices



# BFD Detects Link Failures



# BDF Neighbor Session



OSPF discovers a neighbor



OSPF sends a request to the local BFD process to initiate a BFD neighbor session with the OSPF neighbor router



The BFD neighbor session with the OSPF neighbor router is established



# BFD OSPF Convergence



A failure occurs in the network



The BFD neighbor session with the OSPF neighbor router is torn down



BFD notifies the local OSPF process that the BFD neighbor is no longer reachable



The local OSPF process tears down the OSPF neighbor relationship



# Four Steps Configure BFD

**Disable address identical IDS  
check**

**Enable the BFD feature**

**Disable ICMP redirects on any  
interfaces that use BFD**

**Enable BFD for the required  
Layer 3 protocol**





```
no hardware ip verify address
!
feature bfd
!
interface ethernet 1/2-4
    no ip redirects
!
router ospf 1
    bfd
!
interface vlan 10
    no ip redirects
    no ipv6 redirects

    hsrp bfd
```

- ◀ Disable the IDS check
- ◀ Enable bfd
- ◀ Disable ICMP redirects
- ◀ Use bdf within the routing protocol configuration
- ◀ Disable ICMP redirects
- ◀ Enables BFD for all HSRP groups



```
show bfd neighbors detail
```

# BFD Neighbors

**Verify BFD neighborships**



# BGP

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# BGP Configuration



EBGP connects BGP peers from different autonomous systems. IBGP to connects BGP peers from the same autonomous system



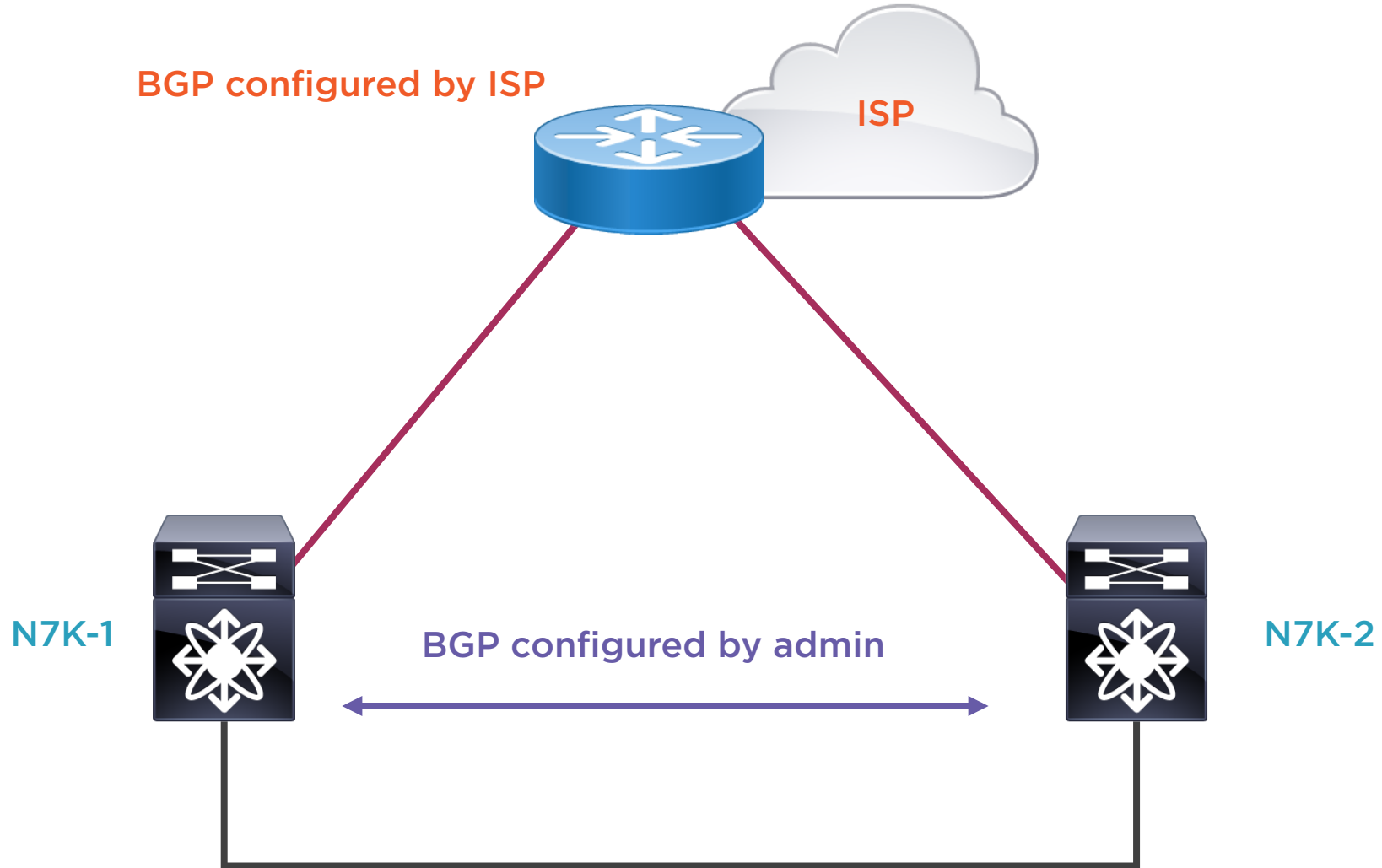
MP-BGP carries routing information for multicast and IP protocol routes



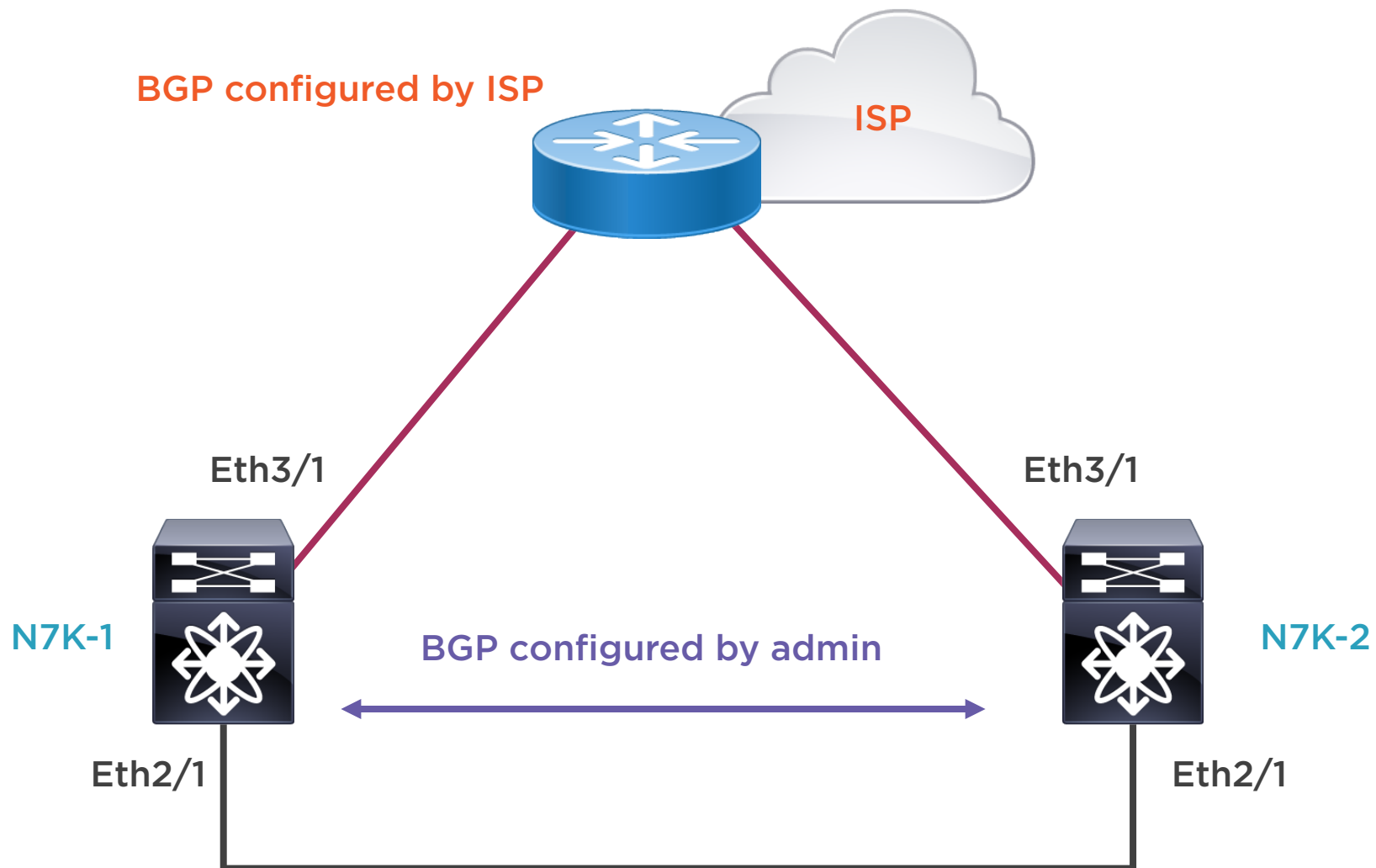
Enable the BGP feature. Start the BGP process with the AS number. Configure peers



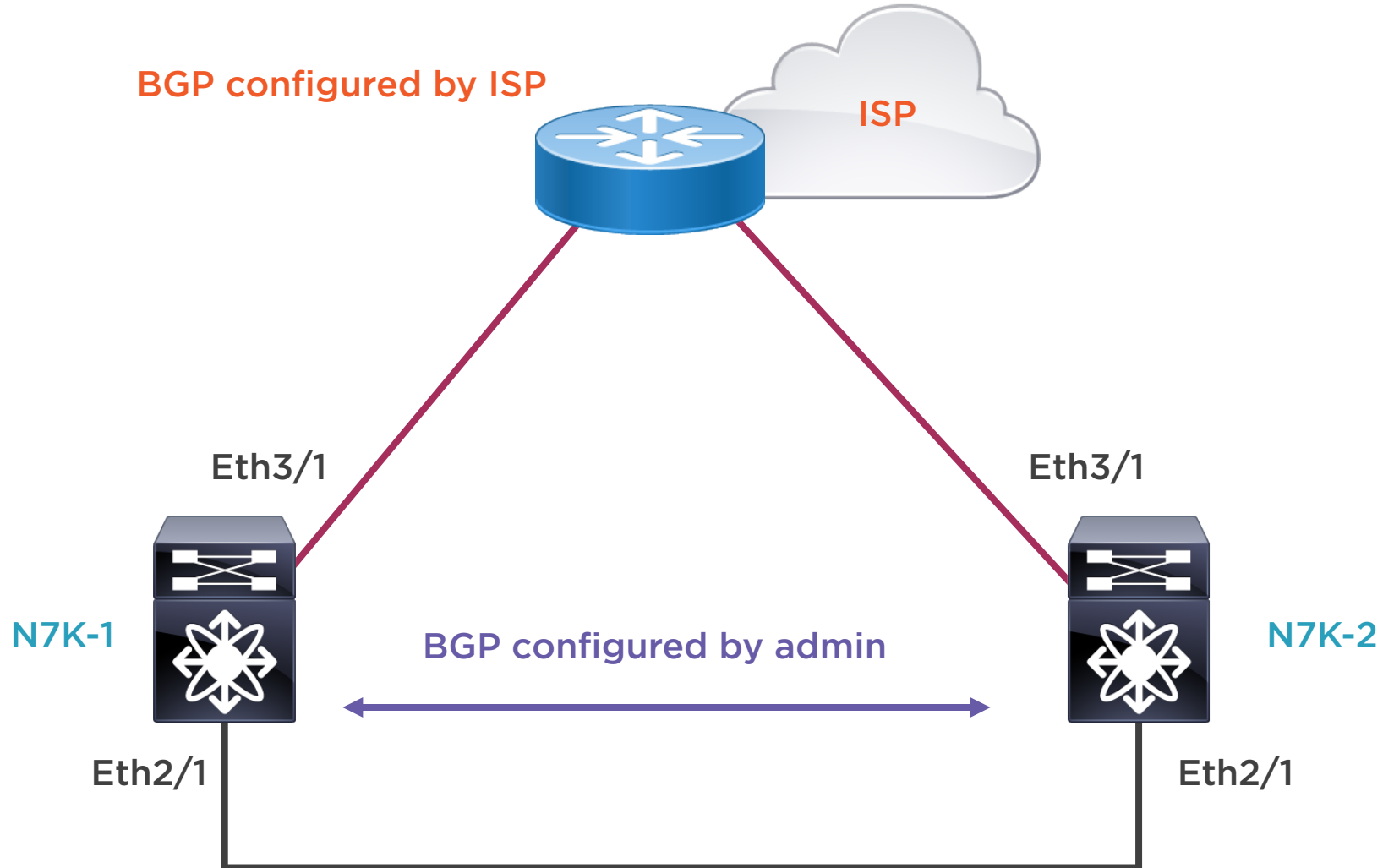
# BGP Configuration



# BGP Configuration



# BGP Configuration

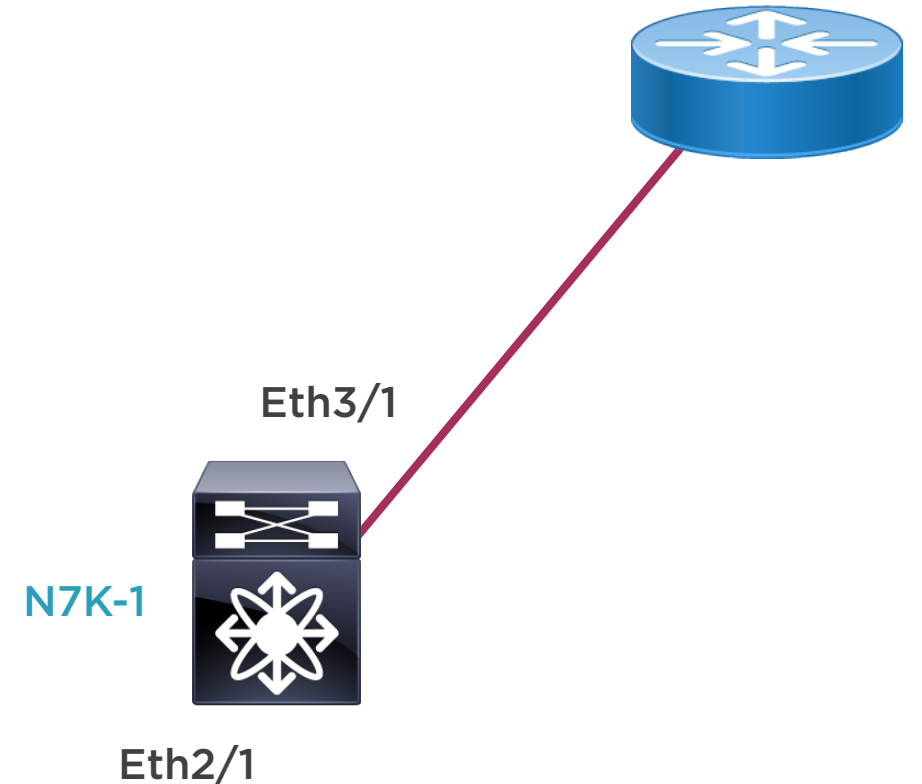


# BGP Configuration

```
feature bgp
!
router bgp 62000
  router-id 1.1.1.1
  address-family ipv4 unicast
    network 200.100.50.0/21

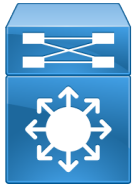
  neighbor 200.100.50.2 remote-as 62001
    description ISP
    address-family ipv4 unicast
    next-hop-self

  neighbor 192.168.1.2 remote-as 62000
    description internal peer N7K-2
    update-source Loopback 0
    address-family ipv4 unicast
```





# MP-BGP



MP-BGP supports multiple address families carrying different sets of routes



BGP can carry one set of routes for a variety of protocols



MP-BGP maintains separate Routing Information Base (RIB) for each configured address family



# MP-BGP Configuration

```
interface ethernet 1/6
    ipv6 address 2001:00B2::1
!
router bgp 62000
    neighbor 192.168.1.2 remote-as 22003
    address-family ipv4 multicast
    address-family ipv6 multicast
```



# MP-BGP Configuration

```
router bgp 61000
  template peer-policy BasePolicy
    maximum-prefix 20
!
neighbor 192.168.1.1 remote-as 61001
  address-family ipv4 unicast
    inherit peer-policy BasePolicy
```



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# OSPFv3 Configuration

```
router ospfv3 1
```

```
router-id 1.1.1.1
```

```
auto-cost reference-bandwidth 100 Gbps
```

```
!
```

```
interface vlan 30, 40
```

```
ip router ospfv3 1 area 1
```

```
!
```

```
interface ethernet 2/1
```

```
ip router ospfv3 1 area 0
```

