EIGRP Capstone Project

(Instructor Version)

Instructor Note: Red font color or Gray highlights indicate text that appears in the instructor copy only.

Objectives

In this Capstone Project activity, you will demonstrate your ability to:

- Design, configure, verify, and secure EIGRP, IPv4 or IPv6 on a network
- Design a VLSM addressing scheme for the devices connected to the LANs
- Present your design using network documentation from your Capstone Project network

Instructor Note: This activity is best completed in groups of 2-3 students.

Scenario

You are a network engineer for your small- to medium-sized business. You and your team have been asked to design an IPv4 or IPv6 network that uses the EIGRP routing protocol.

The network consists of four branches that is connected to a headquarters router. The headquarters then connects to an ISP router.

Your job is to create an EIGRP-based, VLSM addressed network scheme using IPv4 or IPv6 to accommodate the number of hosts requested for this Capstone Project.

Required Resources

- Packet Tracer software
- Word processing or presentation software

Step 1: Design the network topology.

a. Network equipment:
   1) Six routers
      (a) Four branch routers
      (b) One headquarters router
      (c) One ISP router
   2) Switches to support the LANS

b. LANs:
   1) Two LANs per branch router
      (a) Two LANs with 500 hosts
      (b) One LAN serving 120 hosts
      (c) One LAN with 200 hosts
      (d) Two LANS with 80 hosts
      (e) One LAN with 60 hosts
      (f) One LAN with 30 hosts
   2) One, three-host LAN assigned to the ISP router for server connectivity (DNS, Web, and TFTP).

Step 2: Devise the network addressing scheme.

a. Use any RFC 1918 Class B address that will accommodate the specifications listed in Step 1.

b. ISPs LAN connection will use a different IPv4 network number to indicate Internet or telecommunications connectivity to the servers.

c. Use VLSM efficiently to conserve addresses and allow for scalability.

d. Apply the network address scheme to hosts and LAN and WAN interfaces.

Step 3: Implement the EIGRP routing protocol on your network

a. Requirements:

1) Advertise directly connected networks using the wildcard mask.

2) Disable automatic summarization.

3) Disable routing updates from being sent across the LAN interfaces.

4) Implement one, named extended ACL on the network.

b. Recommendations (choose two):

1) Selectively implement EIGRP summary routes.

2) Modify the EIGRP hello-timers.

3) Modify the bandwidth of the interfaces.

Step 4: Configure basic security

a. Restrict access to the console connection.

b. Configure encrypted passwords.

c. Restrict access to the VTY connections.

d. Configure a banner warning.

Step 5: Backup the configurations of each router to the TFTP server.

Step 6: Verify the network.

a. Validate connectivity by pinging all devices.

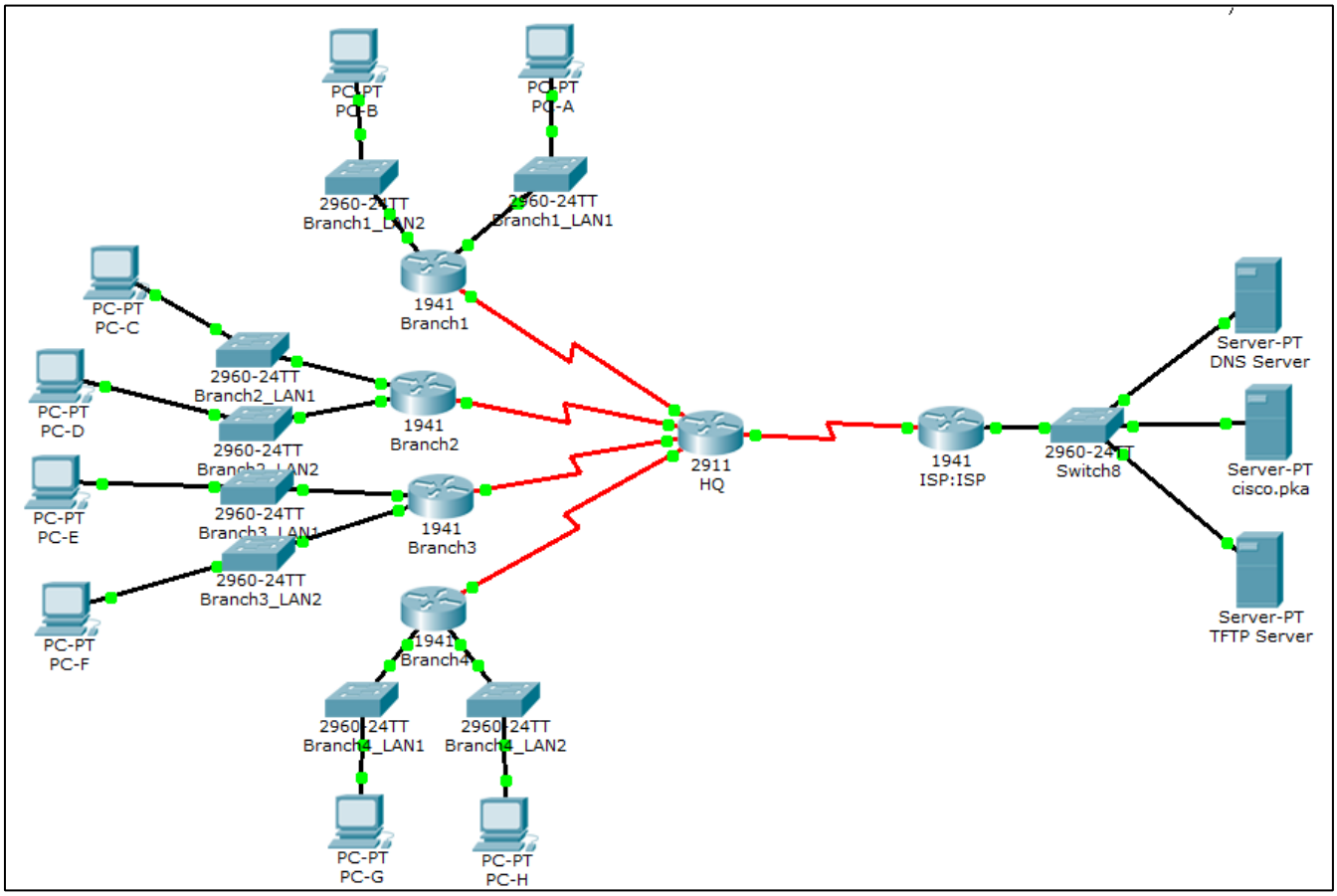
b. Use five **show** commands to verify EIGRP configuration.

Step 7: Present your Capstone Project to the class and be able to answer questions from your peers and Instructor.

Instructor notes: This Modeling Activity is suggested to be a graded assignment after completing Chapters 1-11. Students should be able to show how small networks are designed, configured, verified and secured. Documentation is a large factor of this project and students must be able to explain their network design and verification through the use of **show** commands.

Instructor-Sample Solutions

Topology (this example topology can be used with IPv4 or IPv6 addressing)



Instructor Rubric Example

Requirement	Points
Network Topology • Six routers • Nine LANs • Network switches, as necessary	10
Network Addressing • Class B, IPv4 with VLSM applied correctly to networks • IPv6 applied correctly to networks	20
EIGRP Configuration • Wildcard masks used • Auto-summary disabled • LAN EIGRP routing updates disabled • One extended, named ACL configured and operational	10
Network Security • Encrypted passwords • Console access secured • VTY lines secured • Warning banner present	10
Router configurations backed up to the TFTP server	5
Full network connectivity is present and verified	15
Capstone Project presentation	30

Sample Outputs (IPv4)

Show IP Route

```
HQ# show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is 0.0.0.0 to network 0.0.0.0

     172.31.0.0/16 is variably subnetted, 15 subnets, 7 masks
D       172.31.0.0/21 is a summary, 00:15:26, Null0
D       172.31.0.0/23 [90/2170112] via 172.31.7.2, 00:15:26, Serial0/0/0
```

```
D       172.31.2.0/23 [90/2170112] via 172.31.7.2, 00:15:26, Serial0/0/0
D       172.31.4.0/23 [90/2170112] via 172.31.7.10, 00:15:28, Serial0/1/0
                      [90/2170112] via 172.31.7.6, 00:15:24, Serial0/0/1
D       172.31.6.0/25 [90/2170112] via 172.31.7.10, 00:15:28, Serial0/1/0
D       172.31.6.128/26 [90/2170112] via 172.31.7.14, 00:15:25, Serial0/1/1
D       172.31.6.192/27 [90/2170112] via 172.31.7.14, 00:15:25, Serial0/1/1
C       172.31.7.0/30 is directly connected, Serial0/0/0
L       172.31.7.1/32 is directly connected, Serial0/0/0
C       172.31.7.4/30 is directly connected, Serial0/0/1
L       172.31.7.5/32 is directly connected, Serial0/0/1
C       172.31.7.8/30 is directly connected, Serial0/1/0
L       172.31.7.9/32 is directly connected, Serial0/1/0
C       172.31.7.12/30 is directly connected, Serial0/1/1
L       172.31.7.13/32 is directly connected, Serial0/1/1
     209.165.200.0/24 is variably subnetted, 2 subnets, 2 masks
C       209.165.200.0/27 is directly connected, Serial0/2/1
L       209.165.200.2/32 is directly connected, Serial0/2/1
S*   0.0.0.0/0 is directly connected, Serial0/2/1
HQ#
```

```
ISP# show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is 209.165.200.2 to network 0.0.0.0

     172.31.0.0/21 is subnetted, 1 subnets
D       172.31.0.0/21 [90/2681856] via 209.165.200.2, 00:00:25, Serial0/0/0
     192.0.2.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.0.2.0/24 is directly connected, GigabitEthernet0/0
L       192.0.2.254/32 is directly connected, GigabitEthernet0/0
     209.165.200.0/24 is variably subnetted, 2 subnets, 2 masks
C       209.165.200.0/27 is directly connected, Serial0/0/0
L       209.165.200.1/32 is directly connected, Serial0/0/0
D*EX 0.0.0.0/0 [170/7289856] via 209.165.200.2, 00:00:25, Serial0/0/0
ISP#
```

```
Branch1# show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
```

```
        * - candidate default, U - per-user static route, o - ODR
        P - periodic downloaded static route

Gateway of last resort is 172.31.7.1 to network 0.0.0.0

     172.31.0.0/16 is variably subnetted, 13 subnets, 6 masks
C       172.31.0.0/23 is directly connected, GigabitEthernet0/0
L       172.31.1.254/32 is directly connected, GigabitEthernet0/0
C       172.31.2.0/23 is directly connected, GigabitEthernet0/1
L       172.31.3.254/32 is directly connected, GigabitEthernet0/1
D       172.31.4.0/23 [90/2682112] via 172.31.7.1, 00:20:57, Serial0/0/0
D       172.31.6.0/25 [90/2682112] via 172.31.7.1, 00:20:57, Serial0/0/0
D       172.31.6.128/26 [90/2682112] via 172.31.7.1, 00:20:57, Serial0/0/0
D       172.31.6.192/27 [90/2682112] via 172.31.7.1, 00:20:57, Serial0/0/0
C       172.31.7.0/30 is directly connected, Serial0/0/0
L       172.31.7.2/32 is directly connected, Serial0/0/0
D       172.31.7.4/30 [90/2681856] via 172.31.7.1, 00:20:57, Serial0/0/0
D       172.31.7.8/30 [90/2681856] via 172.31.7.1, 00:20:57, Serial0/0/0
D       172.31.7.12/30 [90/2681856] via 172.31.7.1, 00:20:57, Serial0/0/0
D    192.0.2.0/24 [90/2682112] via 172.31.7.1, 00:01:37, Serial0/0/0
     209.165.200.0/27 is subnetted, 1 subnets
D       209.165.200.0/27 [90/2681856] via 172.31.7.1, 00:20:57, Serial0/0/0
D*EX 0.0.0.0/0 [170/7289856] via 172.31.7.1, 00:20:57, Serial0/0/0
```

Show Access Lists

```
HQ# show access-lists
Extended IP access list WEB_ACCESS
    10 permit tcp host 172.31.0.1 host 192.0.2.3 eq www
    20 permit tcp host 172.31.0.1 host 192.0.2.3 eq 443
    30 permit tcp host 172.31.4.1 host 192.0.2.3 eq www
    40 permit tcp host 172.31.4.1 host 192.0.2.3 eq 443
    50 deny tcp any host 192.0.2.3 eq www
    60 deny tcp any host 192.0.2.3 eq 443
    70 permit ip any any

Branch1# show access-lists
Standard IP access list NO_ACCESS
    10 permit host 172.31.0.1
    20 permit host 172.31.2.1
```

Show IP Protocol

```
HQ# show ip protocol

Routing Protocol is "eigrp 100"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Default networks flagged in outgoing updates
  Default networks accepted from incoming updates
```

```
    EIGRP metric weight K1=1, K2=0, K3=1, K4=0, K5=0
    EIGRP maximum hopcount 100
    EIGRP maximum metric variance 1
  Redistributing: eigrp 100, static
    Automatic network summarization is not in effect
    Maximum path: 4
    Routing for Networks:
       172.31.7.0/30
       172.31.7.4/30
       172.31.7.8/30
       172.31.7.12/30
       209.165.200.0/27
    Routing Information Sources:
      Gateway         Distance      Last Update
      172.31.7.14     90            5099
      172.31.7.10     90            6890
      172.31.7.2      90            8081
      172.31.7.6      90            9139
    Distance: internal 90 external 170

  Branch1# show ip protocol

  Routing Protocol is "eigrp 100"
    Outgoing update filter list for all interfaces is not set
    Incoming update filter list for all interfaces is not set
    Default networks flagged in outgoing updates
    Default networks accepted from incoming updates
    EIGRP metric weight K1=1, K2=0, K3=1, K4=0, K5=0
    EIGRP maximum hopcount 100
    EIGRP maximum metric variance 1
  Redistributing: eigrp 100
    Automatic network summarization is not in effect
    Maximum path: 4
    Routing for Networks:
       172.31.0.0/23
       172.31.2.0/23
       172.31.7.0/30
    Passive Interface(s):
      GigabitEthernet0/0
      GigabitEthernet0/1
    Routing Information Sources:
      Gateway         Distance      Last Update
      172.31.7.1      90            8082
    Distance: internal 90 external 170
```

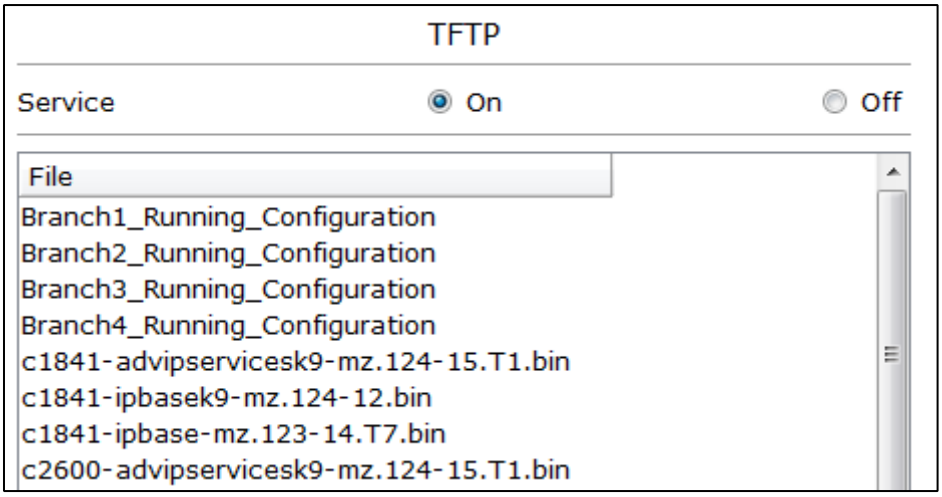
Show ip eigrp topology

```
  HQ# show ip eigrp topology
  IP-EIGRP Topology Table for AS 100
```

```
Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
       r - Reply status

P 172.31.7.12/30, 1 successors, FD is 2169856
         via Connected, Serial0/1/1
P 172.31.7.8/30, 1 successors, FD is 2169856
         via Connected, Serial0/1/0
P 172.31.7.0/30, 1 successors, FD is 2169856
         via Connected, Serial0/0/0
P 172.31.7.4/30, 1 successors, FD is 2169856
         via Connected, Serial0/0/1
P 172.31.6.128/26, 1 successors, FD is 2170112
         via 172.31.7.14 (2170112/2816), Serial0/1/1
P 172.31.6.192/27, 1 successors, FD is 2170112
         via 172.31.7.14 (2170112/2816), Serial0/1/1
P 172.31.6.0/25, 1 successors, FD is 2170112
         via 172.31.7.10 (2170112/2816), Serial0/1/0
P 172.31.4.0/23, 2 successors, FD is 2170112
         via 172.31.7.10 (2170112/2816), Serial0/1/0
         via 172.31.7.6 (2170112/2816), Serial0/0/1
P 172.31.0.0/23, 1 successors, FD is 2170112
         via 172.31.7.2 (2170112/2816), Serial0/0/0
P 172.31.2.0/23, 1 successors, FD is 2170112
         via 172.31.7.2 (2170112/2816), Serial0/0/0
P 0.0.0.0/0, 1 successors, FD is 6777856
         via Rstatic (6777856/0)
P 209.165.200.0/27, 1 successors, FD is 2169856
         via Connected, Serial0/2/1
P 172.31.0.0/21, 1 successors, FD is 2169856
         via Summary (2169856/0), Null0

Branch1# show ip eigrp topology
IP-EIGRP Topology Table for AS 100

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
       r - Reply status

P 172.31.0.0/23, 1 successors, FD is 2816
         via Connected, GigabitEthernet0/0
P 172.31.2.0/23, 1 successors, FD is 2816
         via Connected, GigabitEthernet0/1
P 172.31.7.0/30, 1 successors, FD is 1340928
         via Connected, Serial0/0/0
P 172.31.7.12/30, 1 successors, FD is 2681856
         via 172.31.7.1 (2681856/2169856), Serial0/0/0
P 172.31.7.8/30, 1 successors, FD is 2681856
         via 172.31.7.1 (2681856/2169856), Serial0/0/0
P 172.31.7.4/30, 1 successors, FD is 2681856
         via 172.31.7.1 (2681856/2169856), Serial0/0/0
```

```
P 172.31.6.128/26, 1 successors, FD is 2682112
         via 172.31.7.1 (2682112/2170112), Serial0/0/0
P 172.31.6.192/27, 1 successors, FD is 2682112
         via 172.31.7.1 (2682112/2170112), Serial0/0/0
P 172.31.6.0/25, 1 successors, FD is 2682112
         via 172.31.7.1 (2682112/2170112), Serial0/0/0
P 172.31.4.0/23, 1 successors, FD is 2682112
         via 172.31.7.1 (2682112/2170112), Serial0/0/0
P 0.0.0.0/0, 1 successors, FD is 7289856
         via 172.31.7.1 (7289856/6777856), Serial0/0/0
P 209.165.200.0/27, 1 successors, FD is 2681856
         via 172.31.7.1 (2681856/2169856), Serial0/0/0
```

TFTP Configuration (may be used with IPv4 and IPv6 projects)



Sample Outputs (IPv6)

Show IPv6 Interface

```
HQ# show ipv6 interface
Serial0/0/0 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::260:3EFF:FE77:E701
  No Virtual link-local address(es):
  Global unicast address(es):
    2001:DB8:ACAD:9::, subnet is 2001:DB8:ACAD:9::/127
  Joined group address(es):
    FF02::1
    FF02::2
    FF02::A
    FF02::1:FF00:0
    FF02::1:FF77:E701
  MTU is 1500 bytes
  ICMP error messages limited to one every 100 milliseconds
  ICMP redirects are enabled
  ICMP unreachables are sent
```

```
  ND DAD is enabled, number of DAD attempts: 1
  ND reachable time is 30000 milliseconds
  Hosts use stateless autoconfig for addresses.
Serial0/0/1 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::260:3EFF:FE77:E702
  No Virtual link-local address(es):
  Global unicast address(es):
    2001:DB8:ACAD:9::2, subnet is 2001:DB8:ACAD:9::2/127
  Joined group address(es):
    FF02::1
    FF02::2
    FF02::A
    FF02::1:FF00:2
    FF02::1:FF77:E702
  MTU is 1500 bytes
  ICMP error messages limited to one every 100 milliseconds
  ICMP redirects are enabled
  ICMP unreachables are sent
  ND DAD is enabled, number of DAD attempts: 1
  ND reachable time is 30000 milliseconds
  Hosts use stateless autoconfig for addresses.
Serial0/1/0 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::2D0:BCFF:FE0E:5201
  No Virtual link-local address(es):
  Global unicast address(es):
    2001:DB8:ACAD:9::4, subnet is 2001:DB8:ACAD:9::4/127
  Joined group address(es):
    FF02::1
    FF02::2
    FF02::A
    FF02::1:FF00:4
    FF02::1:FF0E:5201
  MTU is 1500 bytes
  ICMP error messages limited to one every 100 milliseconds
  ICMP redirects are enabled
  ICMP unreachables are sent
  ND DAD is enabled, number of DAD attempts: 1
  ND reachable time is 30000 milliseconds
  Hosts use stateless autoconfig for addresses.
Serial0/1/1 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::2D0:BCFF:FE0E:5202
  No Virtual link-local address(es):
  Global unicast address(es):
    2001:DB8:ACAD:9::6, subnet is 2001:DB8:ACAD:9::6/127
  Joined group address(es):
    FF02::1
    FF02::2
    FF02::A
    FF02::1:FF00:6
```

```
    FF02::1:FF0E:5202
  MTU is 1500 bytes
  ICMP error messages limited to one every 100 milliseconds
  ICMP redirects are enabled
  ICMP unreachables are sent
  ND DAD is enabled, number of DAD attempts: 1
  ND reachable time is 30000 milliseconds
  Hosts use stateless autoconfig for addresses.
Serial0/2/1 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::202:4AFF:FE35:602
  No Virtual link-local address(es):
  Global unicast address(es):
    2001:DB8:ABCD::, subnet is 2001:DB8:ABCD::/127
  Joined group address(es):
    FF02::1
    FF02::2
    FF02::A
    FF02::1:FF00:0
    FF02::1:FF35:602
  MTU is 1500 bytes
  ICMP error messages limited to one every 100 milliseconds
  ICMP redirects are enabled
  ICMP unreachables are sent
  ND DAD is enabled, number of DAD attempts: 1
  ND reachable time is 30000 milliseconds
  Hosts use stateless autoconfig for addresses.
Vlan1 is administratively down, line protocol is down
  Internet protocol processing disabled

ISP# show ipv6 interface
GigabitEthernet0/0 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::260:2FFF:FE66:401
  No Virtual link-local address(es):
  Global unicast address(es):
    2001:DB8:CAFE:1::, subnet is 2001:DB8:CAFE:1::/64
  Joined group address(es):
    FF02::1
    FF02::2
    FF02::1:FF00:0
    FF02::1:FF66:401
  MTU is 1500 bytes
  ICMP error messages limited to one every 100 milliseconds
  ICMP redirects are enabled
  ICMP unreachables are sent
  ND DAD is enabled, number of DAD attempts: 1
  ND reachable time is 30000 milliseconds
  ND advertised reachable time is 0 milliseconds
  ND advertised retransmit interval is 0 milliseconds
  ND router advertisements are sent every 200 seconds
```

```
  ND router advertisements live for 1800 seconds
  ND advertised default router preference is Medium
  Hosts use stateless autoconfig for addresses.
Serial0/0/0 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::260:3EFF:FE10:B901
  No Virtual link-local address(es):
  Global unicast address(es):
    2001:DB8:ABCD::1, subnet is 2001:DB8:ABCD::/127
  Joined group address(es):
    FF02::1
    FF02::2
    FF02::1:FF00:1
    FF02::1:FF10:B901
  MTU is 1500 bytes
  ICMP error messages limited to one every 100 milliseconds
  ICMP redirects are enabled
  ICMP unreachables are sent
  ND DAD is enabled, number of DAD attempts: 1
  ND reachable time is 30000 milliseconds
  Hosts use stateless autoconfig for addresses.
Vlan1 is administratively down, line protocol is down
  Internet protocol processing disabled

Branch1# show ipv6 interface
GigabitEthernet0/0 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::201:C9FF:FE85:3A01
  No Virtual link-local address(es):
  Global unicast address(es):
    2001:DB8:ACAD:1:FFFF:FFFF:FFFF:FFFF, subnet is 2001:DB8:ACAD:1::/64
  Joined group address(es):
    FF02::1
    FF02::2
    FF02::A
    FF02::1:FF85:3A01
    FF02::1:FFFF:FFFF
  MTU is 1500 bytes
  ICMP error messages limited to one every 100 milliseconds
  ICMP redirects are enabled
  ICMP unreachables are sent
  ND DAD is enabled, number of DAD attempts: 1
  ND reachable time is 30000 milliseconds
  ND advertised reachable time is 0 milliseconds
  ND advertised retransmit interval is 0 milliseconds
  ND router advertisements are sent every 200 seconds
  ND router advertisements live for 1800 seconds
  ND advertised default router preference is Medium
  Hosts use stateless autoconfig for addresses.
GigabitEthernet0/1 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::201:C9FF:FE85:3A02
```

```
  No Virtual link-local address(es):
  Global unicast address(es):
    2001:DB8:ACAD:2:FFFF:FFFF:FFFF:FFFF, subnet is 2001:DB8:ACAD:2::/64
  Joined group address(es):
    FF02::1
    FF02::2
    FF02::A
    FF02::1:FF85:3A02
    FF02::1:FFFF:FFFF
  MTU is 1500 bytes
  ICMP error messages limited to one every 100 milliseconds
  ICMP redirects are enabled
  ICMP unreachables are sent
  ND DAD is enabled, number of DAD attempts: 1
  ND reachable time is 30000 milliseconds
  ND advertised reachable time is 0 milliseconds
  ND advertised retransmit interval is 0 milliseconds
  ND router advertisements are sent every 200 seconds
  ND router advertisements live for 1800 seconds
  ND advertised default router preference is Medium
  Hosts use stateless autoconfig for addresses.
Serial0/0/0 is up, line protocol is up
  IPv6 is enabled, link-local address is FE80::202:17FF:FEE2:A401
  No Virtual link-local address(es):
  Global unicast address(es):
    2001:DB8:ACAD:9::1, subnet is 2001:DB8:ACAD:9::/127
  Joined group address(es):
    FF02::1
    FF02::2
    FF02::A
    FF02::1:FF00:1
    FF02::1:FFE2:A401
  MTU is 1500 bytes
  ICMP error messages limited to one every 100 milliseconds
  ICMP redirects are enabled
  ICMP unreachables are sent
  ND DAD is enabled, number of DAD attempts: 1
  ND reachable time is 30000 milliseconds
  Hosts use stateless autoconfig for addresses.
Vlan1 is administratively down, line protocol is down
  Internet protocol processing disabled
```

Show IPv6 Route

```
HQ# show ipv6 route
IPv6 Routing Table - 17 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
       U - Per-user Static route, M - MIPv6
       I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
```

```
       O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
       D - EIGRP, EX - EIGRP external
S   ::/0 [1/0]
     via ::, Serial0/2/1
C   2001:DB8:ABCD::/127 [0/0]
     via ::, Serial0/2/1
L   2001:DB8:ABCD::/128 [0/0]
     via ::, Serial0/2/1
D   2001:DB8:ACAD::/60 [5/2169856]
     via ::, Null0
D   2001:DB8:ACAD::/61 [90/2170112]
     via FE80::2D0:FFFF:FE73:E101, Serial0/0/1
D   2001:DB8:ACAD::/62 [90/2170112]
     via FE80::202:17FF:FEE2:A401, Serial0/0/0
D   2001:DB8:ACAD:5::/64 [90/2170112]
     via FE80::20D:BDFF:FE23:9801, Serial0/1/0
D   2001:DB8:ACAD:6::/64 [90/2170112]
     via FE80::20D:BDFF:FE23:9801, Serial0/1/0
C   2001:DB8:ACAD:9::/127 [0/0]
     via ::, Serial0/0/0
L   2001:DB8:ACAD:9::/128 [0/0]
     via ::, Serial0/0/0
C   2001:DB8:ACAD:9::2/127 [0/0]
     via ::, Serial0/0/1
L   2001:DB8:ACAD:9::2/128 [0/0]
     via ::, Serial0/0/1
C   2001:DB8:ACAD:9::4/127 [0/0]
     via ::, Serial0/1/0
L   2001:DB8:ACAD:9::4/128 [0/0]
     via ::, Serial0/1/0
C   2001:DB8:ACAD:9::6/127 [0/0]
     via ::, Serial0/1/1
L   2001:DB8:ACAD:9::6/128 [0/0]
     via ::, Serial0/1/1
L   FF00::/8 [0/0]
     via ::, Null0

Branch1# show ipv6 route
IPv6 Routing Table - 17 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
       U - Per-user Static route, M - MIPv6
       I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
       O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
       D - EIGRP, EX - EIGRP external
EX  ::/0 [170/7289856]
     via FE80::260:3EFF:FE77:E701, Serial0/0/0
D   2001:DB8:ABCD::/127 [90/2681856]
```

```
     via FE80::260:3EFF:FE77:E701, Serial0/0/0
D    2001:DB8:ACAD::/60 [90/2682112]
     via FE80::260:3EFF:FE77:E701, Serial0/0/0
D    2001:DB8:ACAD::/61 [90/2682112]
     via FE80::260:3EFF:FE77:E701, Serial0/0/0
D    2001:DB8:ACAD::/62 [5/2816]
     via ::, Null0
C    2001:DB8:ACAD:1::/64 [0/0]
     via ::, GigabitEthernet0/0
L    2001:DB8:ACAD:1:FFFF:FFFF:FFFF:FFFF/128 [0/0]
     via ::, GigabitEthernet0/0
C    2001:DB8:ACAD:2::/64 [0/0]
     via ::, GigabitEthernet0/1
L    2001:DB8:ACAD:2:FFFF:FFFF:FFFF:FFFF/128 [0/0]
     via ::, GigabitEthernet0/1
D    2001:DB8:ACAD:5::/64 [90/2682112]
     via FE80::260:3EFF:FE77:E701, Serial0/0/0
D    2001:DB8:ACAD:6::/64 [90/2682112]
     via FE80::260:3EFF:FE77:E701, Serial0/0/0
C    2001:DB8:ACAD:9::/127 [0/0]
     via ::, Serial0/0/0
L    2001:DB8:ACAD:9::1/128 [0/0]
     via ::, Serial0/0/0
D    2001:DB8:ACAD:9::2/127 [90/2681856]
     via FE80::260:3EFF:FE77:E701, Serial0/0/0
D    2001:DB8:ACAD:9::4/127 [90/2681856]
     via FE80::260:3EFF:FE77:E701, Serial0/0/0
D    2001:DB8:ACAD:9::6/127 [90/2681856]
     via FE80::260:3EFF:FE77:E701, Serial0/0/0
L    FF00::/8 [0/0]
     via ::, Null0
```

Show IPv6 Protocols

```
HQ# show ipv6 protocol
IPv6 Routing Protocol is "connected"
IPv6 Routing Protocol is "static
IPv6 Routing Protocol is "eigrp 100"
  EIGRP metric weight K1=1, K2=0, K3=1, K4=0, K5=0
  EIGRP maximum hopcount 100
  EIGRP maximum metric variance 1
  Interfaces:
    Serial0/0/0
    Serial0/0/1
    Serial0/1/0
    Serial0/1/1
    Serial0/2/1
Redistributing: eigrp 100, static
  Address Summarization:
  2001:DB8:ACAD::/60 for Serial0/2/1
```

```
  Maximum path: 16
  Distance: internal 90 external 170

Branch1#show ipv6 protocol
IPv6 Routing Protocol is "connected"
IPv6 Routing Protocol is "static
IPv6 Routing Protocol is "eigrp 100"
  EIGRP metric weight K1=1, K2=0, K3=1, K4=0, K5=0
  EIGRP maximum hopcount 100
  EIGRP maximum metric variance 1
  Interfaces:
    GigabitEthernet0/0
    GigabitEthernet0/1
    Serial0/0/0
Redistributing: eigrp 100
  Address Summarization:
  2001:DB8:ACAD::/62 for Serial0/0/0
  Maximum path: 16
  Distance: internal 90 external 170
```

Show IPv6 EIGRP Topology

```
HQ# show ipv6 eigrp topology
IPv6-EIGRP Topology Table for AS 100/ID(1.1.1.1)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
       r - Reply status

P 2001:DB8:ACAD:9::4/127, 1 successors, FD is 2169856
         via Connected, Serial0/1/0
P 2001:DB8:ACAD:9::6/127, 1 successors, FD is 2169856
         via Connected, Serial0/1/1
P 2001:DB8:ACAD:9::/127, 1 successors, FD is 2169856
         via Connected, Serial0/0/0
P 2001:DB8:ACAD:5::/64, 1 successors, FD is 2170112
         via FE80::20D:BDFF:FE23:9801 (2170112/2816), Serial0/1/0
P 2001:DB8:ACAD:6::/64, 1 successors, FD is 2170112
         via FE80::20D:BDFF:FE23:9801 (2170112/2816), Serial0/1/0
P 2001:DB8:ACAD:9::2/127, 1 successors, FD is 2169856
         via Connected, Serial0/0/1
P 2001:DB8:ACAD::/61, 1 successors, FD is 2170112
         via FE80::2D0:FFFF:FE73:E101 (2170112/2816), Serial0/0/1
P 2001:DB8:ACAD::/62, 1 successors, FD is 2170112
         via FE80::202:17FF:FEE2:A401 (2170112/2816), Serial0/0/0
P 2001:DB8:ACAD::/60, 1 successors, FD is 2169856
         via Summary (2169856/0), Null0
P ::/0, 1 successors, FD is 6777856
         via Rstatic (6777856/0)
P 2001:DB8:ABCD::/127, 1 successors, FD is 2169856
         via Connected, Serial0/2/1
```

```
Branch1# show ipv6 eigrp topology
IPv6-EIGRP Topology Table for AS 100/ID(2.2.2.2)

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
       r - Reply status

P 2001:DB8:ACAD:1::/64, 1 successors, FD is 2816
         via Connected, GigabitEthernet0/0
P 2001:DB8:ACAD:2::/64, 1 successors, FD is 2816
         via Connected, GigabitEthernet0/1
P 2001:DB8:ACAD:9::/127, 1 successors, FD is 1340928
         via Connected, Serial0/0/0
P 2001:DB8:ACAD::/62, 1 successors, FD is 2816
         via Summary (2816/0), Null0
P 2001:DB8:ACAD:9::4/127, 1 successors, FD is 2681856
         via FE80::260:3EFF:FE77:E701 (2681856/2169856), Serial0/0/0
P 2001:DB8:ACAD:9::6/127, 1 successors, FD is 2681856
         via FE80::260:3EFF:FE77:E701 (2681856/2169856), Serial0/0/0
P 2001:DB8:ACAD:5::/64, 1 successors, FD is 2682112
         via FE80::260:3EFF:FE77:E701 (2682112/2170112), Serial0/0/0
P 2001:DB8:ACAD:6::/64, 1 successors, FD is 2682112
         via FE80::260:3EFF:FE77:E701 (2682112/2170112), Serial0/0/0
P 2001:DB8:ACAD:9::2/127, 1 successors, FD is 2681856
         via FE80::260:3EFF:FE77:E701 (2681856/2169856), Serial0/0/0
P 2001:DB8:ACAD::/61, 1 successors, FD is 2682112
         via FE80::260:3EFF:FE77:E701 (2682112/2170112), Serial0/0/0
P 2001:DB8:ACAD::/60, 1 successors, FD is 2682112
         via FE80::260:3EFF:FE77:E701 (2682112/2170112), Serial0/0/0
P ::/0, 1 successors, FD is 7289856
         via FE80::260:3EFF:FE77:E701 (7289856/6777856), Serial0/0/0
P 2001:DB8:ABCD::/127, 1 successors, FD is 2681856
         via FE80::260:3EFF:FE77:E701 (2681856/2169856), Serial0/0/0
```

Show IPv6 Access Lists

```
HQ# show ipv6 access-list
IPv6 access list WEB_ACCESS
    permit tcp host 2001:DB8:ACAD::1 host 2001:DB8:CAFE:1::3 eq www
    permit tcp host 2001:DB8:ACAD::1 host 2001:DB8:CAFE:1::3 eq 443
    permit tcp host 2001:DB8:ACAD::3 host 2001:DB8:CAFE:1::3 eq www
    permit tcp host 2001:DB8:ACAD::3 host 2001:DB8:CAFE:1::3 eq 443
    permit tcp host 2001:DB8:ACAD::5 host 2001:DB8:CAFE:1::3 eq www
    permit tcp host 2001:DB8:ACAD::5 host 2001:DB8:CAFE:1::3 eq 443
    permit tcp host 2001:DB8:ACAD::7 host 2001:DB8:CAFE:1::3 eq www
    permit tcp host 2001:DB8:ACAD::7 host 2001:DB8:CAFE:1::3 eq 443
    deny tcp any host 2001:DB8:CAFE:1::3 eq www
    deny tcp any host 2001:DB8:CAFE:1::3 eq 443
    permit ipv6 any any
```

```
Branch1# show ipv6 access-list
IPv6 access list NO_ACCESS
    permit tcp host 2001:DB8:ACAD::1 host 2001:DB8:ACAD:1:FFFF:FFFF:FFFF:FFFF eq
telnet
    permit tcp host 2001:DB8:ACAD::2 host 2001:DB8:ACAD:2:FFFF:FFFF:FFFF:FFFF eq
telnet
    deny tcp any host 2001:DB8:ACAD:2:FFFF:FFFF:FFFF:FFFF eq telnet
    deny tcp any host 2001:DB8:ACAD:1:FFFF:FFFF:FFFF:FFFF eq telnet
```