11. Routing Protocol Troubleshooting

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ENABLED INTERFACES

Isolate the problem—check interfaces, then neighborships.

- From design, which interfaces should run protocol
- Verify protocol enabled on each of those interfaces
- Verify router has all expected neighborships

Interfaces matched by a network statement

- Advertise the subnet on that interface
- Attempt to form neighbor relationships out that interface—unless the interface is passive

Problems Specific to EIGRP and OSPF

- EIGRP—ASNs must match (router eigrp ##)
- OSPF—Process IDs (router ospf ##) do not have to match. All interfaces in same subnet must be in same area. A router from a different area sharing a link will cause an error message "Received invalid packet: mismatched area ID."

NEIGHBORS

First, check if any expected routers are missing from your neighbors list. If one's missing, try ping. Both EIGRP and OSPF neighbor commands only show routers that successfully passed all checks.

```
R3# show ip eigrp neighbors
                Only shows neighbors that have passed all checks
EIGRP-IPv4 Neighbors for AS(10)
H   Address                 Interface       Hold Uptime   SRTT   RTO  Q  Seq
                                            (sec)         (ms)      Cnt Num
1   10.13.0.1               Gi0/0             13 00:08:43 1596   5000 0  6
0   10.23.0.2               Gi0/1             11 00:08:43 1593   5000 0  6

R3# show ip ospf neighbor
                The left column is just a router-id, the (remote) interface address is in column 5
Neighbor ID     Pri   State           Dead Time   Address         Interface
0.0.0.2         1     FULL/BDR        00:00:38    10.23.0.2       GigabitEthernet0/1
0.0.0.1         1     FULL/DR         00:00:38    10.13.0.1       GigabitEthernet0/0
```

Command	Shows
# show ip eigrp interfaces	All *non-passive* EIGRP interfaces
# show ip protocols	List of network statements under "Routing for networks" with wildcard & OSPF area List of passive interfaces
# show ip ospf interface brief	Shows area of each interface
# show ip ospf interface [gi0/0]	Shows timers

EIGRP	OSPF	Neighborship Requirement				
•	•	Interface up/up	•			
•	•	Interfaces in Same Subnet	•	•		
•	•	Network Statement Enables Interface	•	•	•	•
•	•	Interface Not Passive (show ip protocols | begin Routing for Networks)	•		•	•
•		ASNs Match (Autonomous System Numbers)			•	•
	•	Hello & Dead Timers Match (set on each interface)	•			
½	•	Router IDs Unique (can cause problems for EIGRP external routes)	•		•	
•		K-Values Match			•	
	•	Same Area—Hellos will still work, just no neighborship	•	•		

Passive Interface Details

Which commands show passive interfaces and which label them as passive (or "no hellos")

COMMAND	Non-Passives	Passives
show ip eigrp interfaces	•	Missing
show ip protocols	Missing	Labeled
show ip ospf interface brief	•	•
show ip ospf interface	•	Labeled

With ospf, when a passive interface prevents communication between two routers, the interfaces on both ends of their link will show as DR on "show ip ospf brief," something that would be impossible if they were actually communicating with each other and able to hold an election.

PROBLEM	SHOW COMMAND
Mismatched Routing Protocol Authentication	`debug eigrp packets; debug ip ospf adj`
ACL Filtering Protocol Messages	
IP Address, Mask (no brief) , Interface Status	`show ip interface [br]; show interfaces`
Mismatched Areas	`debug ip ospf adj`
Routing Protocol Shut Down	look for enabled interfaces but no neighbors

O S P F   S P E C I F I C S

Timer Mismatches—these are set on the interface. With EIGRP, the timers are part of the hello packet and don't have to match ("Hello, I'm R3. If you don't hear from me in 5 minutes, I'm dead.") With OSPF, each router applies its own timers to it neighbors.

```
R5(config-if)# ip ospf hello-interval 20
```
Other options include dead-interval, etc. Dead will auto-adjust to 4x hello.
```
# show ip ospf interface
```
Tells how the timers are set for each interface. Default Hello 10, Dead 40, Wait 40
```
# debug ip ospf hello

*Jun 30 18:35:09.395: OSPF: Send hello to 224.0.0.5 area 0 on FastEthernet0/0 from
              10.0.0.2
*Jun 30 18:35:16.195: OSPF: Rcv hello from 10.0.0.1 area 0 from FastEthernet0/0
              10.0.0.1
*Jun 30 18:35:16.195: OSPF: Mismatched hello parameters from 10.0.0.1
*Jun 30 18:35:16.195: OSPF: Dead R 80 C 40, Hello R 20 C 10  Mask R 255.255.255.0 C
              255.0.0.0
```
The R is the timer value(s) received, the C is what's locally configured. They must match.

Contradictory Areas on Overlapping Network Statements

- Network statements are processed in order. If more than one network statement matches a given interface and they contradict each other on which area the interface belongs to, the first in the list wins

- If an interface is enabled by both a matching network statement and an explicit interface statement, the interface configuration wins

Mismatched MTU Settings—default 1500. If mismatched, the routers will become neighbors but not exchange LSDBs. The neighborship will later fail as well. More detail in OSPFv3 for IPv6. These commands are how you cause the problem:

```
R1(config-if)# ip mtu 1300
R1(config-if)# ipv6 mtu 1200
```

Protocol Shutdown—Look for enabled interfaces but no neighbors.

```
R3(config)# router ospf 2
R3(config-router)# shutdown
                This allows you to kill the routing protocol without removing your configuration
R3# show ip ospf neighbor
                There are none
R3# show ip ospf interface brief
Interface   PID   Area            IP Address/Mask   Cost   State Nbrs F/C
Gi0/0       2     0               10.13.0.3/24      1      DOWN  0/0
Gi0/1       2     0               10.23.0.3/24      1      DOWN  0/0
                "DOWN" refers to the routing protocol on that interface, but could also be a side effect of an
                administratively down interface.
```

Not Mentioned by Mr. Odom

This may have been omitted because we haven't really talked about serial line encapsulations yet or they may no longer be as important for the CCNA as they once were.

Mismatched OSPF Network Type—Routers will still become neighbors, but won't exchange LSDBs. Interfaces are broadcast or point-to-point. Tells OSPF

- Whether it can dynamically discover neighbors—yes on both Ethernet and HDLC/PPP, no on NBMA, like some frame-relay.

- Whether to elect a DR and BDR—broadcast only

```
R1# show ip ospf interface fa0/0
FastEthernet0/0 is up, line protocol is up
  Internet Address 10.0.0.2/24, Area 0
  Process ID 1, Router ID 10.0.0.2, Network Type BROADCAST, Cost: 1
                …rest omitted
```