Troubleshooting EIGRP and RIP Mutual Redistribution: Route Propagation Beyond Immediate Neighbors

Network Configuration Report

December 7, 2025

1 Executive Summary

This report documents the troubleshooting process for implementing mutual redistribution between EIGRP Autonomous System 11 and RIP on a Cisco router. The initial configuration resulted in routes being exchanged only between immediate neighbors, failing to propagate throughout the entire network domains. The issue was successfully resolved by correcting network statements and disabling split-horizon on serial interfaces.

2 Network Topology

2.1 Redistribution Router Configuration

- **Router Role:** Redistribution point between EIGRP 11 and RIP
- **Serial0/0/0:** 114.195.112.50/30 (EIGRP side)
- **Serial0/1/0:** 114.195.112.65/30 (RIP side)
- **EIGRP Neighbor:** 114.195.112.49
- **RIP Neighbor:** 114.195.112.66

3 Problem Description

3.1 Initial Symptoms

1. Redistribution appeared to work on the redistribution router itself
2. Immediate neighbors (directly connected routers) received redistributed routes
3. **Critical Issue:** Routes failed to propagate to distant routers beyond immediate neighbors
4. EIGRP routers beyond the immediate neighbor could not see RIP networks
5. RIP routers beyond the immediate neighbor could not see EIGRP networks

3.2 Initial Configuration (Problematic)

Listing 1: Initial Flawed Configuration

```
router eigrp 11
 redistribute rip metric 10000 1 255 1 1500
 network 114.195.112.0 0.0.7.255        ! Problem 1: Too broad
 network 114.0.0.0                       ! Problem 1: Covers both
    interfaces
 network 114.195.112.48 0.0.0.3
 no auto-summary

router rip
 version 2
 redistribute eigrp 11 metric 1
 network 114.0.0.0
 no auto-summary
```

3.3 Initial Routing Table Output

From the redistribution router, routes appeared correct:

Listing 2: Initial show ip route (Redistribution Router)

```
D     114.195.64.0/20 [90/21026560] via 114.195.112.49
R     114.195.112.52/30 [120/2] via 114.195.112.66
R     114.195.112.56/30 [120/2] via 114.195.112.66
R     114.195.112.60/30 [120/1] via 114.195.112.66
```

However, on distant EIGRP routers, RIP routes appeared as internal EIGRP (D) instead of external (D EX), or were completely missing.

4 Root Cause Analysis

4.1 Problem 1: Overlapping Network Statements

The EIGRP configuration contained multiple network statements that caused EIGRP to run on both the EIGRP and RIP interfaces:

- `network 114.195.112.0 0.0.7.255` covered a range including both Serial0/0/0 and Serial0/1/0
- `network 114.0.0.0` covered all interfaces in the 114.0.0.0/8 range
- This caused EIGRP to treat RIP networks as internal EIGRP routes instead of redistributed external routes

Impact: Routes were not properly marked as external (D EX) and redistribution logic failed.

4.2 Problem 2: Split-Horizon Enabled on Serial Interfaces

Split-horizon prevents a router from advertising routes back out the same interface where they were learned.

How this affected redistribution:

1. Redistribution router learned EIGRP routes from neighbor on Serial0/0/0

2. Redistribution router redistributed RIP routes into EIGRP
3. When trying to advertise these back out Serial0/0/0 to propagate to other EIGRP routers, split-horizon blocked the advertisement
4. Same issue occurred on Serial0/1/0 for RIP

Result: Only immediate neighbors received redistributed routes; propagation stopped there.

5 Solution Implementation

5.1 Step 1: Remove Overlapping Network Statements

Listing 3: Removing Problematic Network Statements

```
Router# configure terminal
Router(config)# router eigrp 11
Router(config-router)# no network 114.195.112.0 0.0.7.255
Router(config-router)# no network 114.0.0.0
Router(config-router)# exit
```

5.2 Step 2: Configure Clean Network Statements

Listing 4: Proper Network Configuration

```
Router(config)# router eigrp 11
Router(config-router)# network 114.195.112.48 0.0.0.3
Router(config-router)# redistribute rip metric 10000 10 255 1 1500
Router(config-router)# no auto-summary
Router(config-router)# exit

Router(config)# router rip
Router(config-router)# version 2
Router(config-router)# network 114.195.112.0
Router(config-router)# redistribute eigrp 11 metric 1
Router(config-router)# no auto-summary
Router(config-router)# exit
```

5.3 Step 3: Disable Split-Horizon on Serial Interfaces

Listing 5: Disabling Split-Horizon

```
Router(config)# interface Serial0/0/0
Router(config-if)# no ip split-horizon eigrp 11
Router(config-if)# exit

Router(config)# interface Serial0/1/0
Router(config-if)# no ip split-horizon
Router(config-if)# exit

Router(config)# end
Router# write memory
```

5.4 Final Working Configuration

Listing 6: Complete Corrected Configuration

```
router eigrp 11
 redistribute rip metric 10000 10 255 1 1500
 network 114.195.112.48 0.0.0.3
 no auto-summary

router rip
 version 2
 redistribute eigrp 11 metric 1
 network 114.0.0.0
 no auto-summary

interface Serial0/0/0
 ip address 114.195.112.50 255.255.255.252
 no ip split-horizon eigrp 11

interface Serial0/1/0
 ip address 114.195.112.65 255.255.255.252
 no ip split-horizon
```

6 Verification and Results

6.1 Verification Commands

Listing 7: Commands Used for Verification

```
show ip protocols
show ip route
show ip route eigrp
show ip route rip
show ip route | include EX
show ip eigrp neighbors
show running-config | section router
```

6.2 Results from Distant EIGRP Router

After implementing the fix, distant EIGRP routers correctly showed redistributed RIP routes marked as "D EX" (EIGRP External):

Listing 8: Distant EIGRP Router - show ip route — include EX

```
D EX 14.195.112.68/30 [170/21026560] via 114.195.112.42
D EX 114.195.96.0/22 [170/21026560] via 114.195.112.42
D EX 114.195.112.52/30 [170/21026560] via 114.195.112.42
D EX 114.195.112.56/30 [170/21026560] via 114.195.112.42
D EX 114.195.112.60/30 [170/21026560] via 114.195.112.42
D EX 114.195.112.72/30 [170/21026560] via 114.195.112.42
D EX 114.195.112.160/29 [170/21026560] via 114.195.112.42
D EX 114.195.112.168/29 [170/21026560] via 114.195.112.42
D EX 114.195.112.176/29 [170/21026560] via 114.195.112.42
```

Key Observations:

- Administrative Distance: 170 (correct for EIGRP external routes)

- Routes marked as "D EX" instead of "D"
- Multiple RIP networks visible throughout EIGRP domain

6.3 Results from Distant RIP Router

RIP routers successfully received redistributed EIGRP networks:

Listing 9: Distant RIP Router - show ip route (partial)

```
R 114.192.0.0/15 [120/3] via 208.69.76.201
R 114.195.32.0/19 [120/3] via 208.69.76.201
R 114.195.64.0/22 [120/3] via 208.69.76.201
R 114.195.140/30 [120/3] via 208.69.76.201
R 114.195.164/30 [120/3] via 208.69.76.201
R 114.195.168/30 [120/3] via 208.69.76.201
```

Key Observations:

- EIGRP networks appearing as RIP routes (marked "R")
- Administrative Distance: 120 (correct for RIP)
- Hop count incremented properly ([120/3] shows 3 hops)
- Full propagation throughout RIP domain

7 Technical Explanation

7.1 Why Split-Horizon Needed to be Disabled

In hub-and-spoke or redistribution scenarios on serial interfaces:

1. Router learns routes from Neighbor A on Serial0/0/0
2. Router redistributes routes from another protocol
3. To propagate these redistributed routes to Neighbor B (also on Serial0/0/0), the router must advertise out the same interface
4. Split-horizon blocks this by default
5. Disabling split-horizon allows the router to advertise redistributed routes back out the interface, enabling full propagation

7.2 Why Network Statement Cleanup Was Critical

- EIGRP network statements define which interfaces participate in EIGRP
- Overlapping statements caused both EIGRP and RIP interfaces to run EIGRP
- When EIGRP ran on the RIP interface, it treated learned routes as internal instead of external
- Clean, specific network statements ensure proper protocol boundaries
- Only the EIGRP interface should be in EIGRP's network statement

8 Conclusion

8.1 Problem Summary

The mutual redistribution between EIGRP 11 and RIP failed to propagate routes beyond immediate neighbors due to:

1. Overlapping EIGRP network statements causing protocol boundary confusion
2. Split-horizon enabled on serial interfaces blocking route propagation

8.2 Solution Summary

The issue was resolved by:

1. Removing overlapping network statements from EIGRP configuration
2. Keeping only the specific EIGRP interface in EIGRP network statements
3. Disabling split-horizon on both serial interfaces (Serial0/0/0 and Serial0/1/0)

8.3 Final Status

Success Criteria Met:

RIP routes appear as "D EX" on all EIGRP routers

EIGRP routes appear as "R" on all RIP routers

Routes propagate to distant routers (3+ hops away)

No routing loops detected

Proper administrative distances maintained (EIGRP: 90/170, RIP: 120)

8.4 Best Practices Learned

1. Always use specific network statements in redistribution scenarios
2. Disable split-horizon on serial interfaces when redistribution is required
3. Verify routes propagate beyond immediate neighbors, not just to adjacent routers
4. Use `show ip route | include EX` to verify external route marking
5. Always include `no auto-summary` for both EIGRP and RIP in modern networks