Troubleshooting EIGRP

Session RST-309

Agenda

• Troubleshooting Common EIGRP Problems
  Neighbor Stability
  Stuck-in-Active Routes

• Troubleshooting Tools
  Event Log
  Debits
  Topology Table
Troubleshooting Neighbor Stability

- Neighbor process—review
  Multicast hellos (by default)
  224.0.0.10  (0100.5e00.000a)
  Neighbor timers
  Hello Interval—5 or 60 sec.
  Hold time—15 or 180 sec.

Neighbor Process—Review

RTRA#show ip eigrp neighbors
IP-EIGRP neighbors for process 1
H Address   Interface Hold Uptime SRTT   RTO  Q Seq
            (sec)   (ms)   Cnt Num
 2 10.1.1.1   Et0    12 6d16h 20   200 0 233
 1 10.1.4.3   Et1    13 2w2d  87  522 0 452
 0 10.1.4.2   Et1    10 2w2d  85  510 0 314
Common Neighbor Stability Problems

- Physical link state changes
- Hold timer expiring
- Exceeding the retry limit
- Manual changes
- Stuck-in-active routes

Physical Link State Changes

- Interface driver reports when a link goes down or comes up to EIGRP
- EIGRP takes neighbors down when the interface used to reach them goes down
- EIGRP (re)-initializes neighbors when a link comes up
Hold Timer Expiring

- Hold time sent to neighbors inside the hello packet
- Hold timer expires when an EIGRP packet is not seen for period of hold time
  Usually caused by missing multicast hello packets
  Typically caused by congestion or physical errors

Exceeding the Retry Limit

- Two types of packets in EIGRP—unreliable and reliable
  Hellos and Acks are unreliable
  Updates, queries, and replies are reliable
- Reliable packets require an acknowledgement
  If not acknowledged, packets are retransmitted, up to 16 times
Exceeded the Retry Limit (Cont.)

• 16 retransmits must occur AND hold time period must expire before declaring the neighbor down
  
  Retransmissions based on RTO, which is derived from SRTT
  
  16 retransmits takes between 50 seconds and 80 seconds

Retry Limit Exceeded (Cont.)

RTRA#show ip eigrp neighbors
IP-EIGRP neighbors for process 1

<table>
<thead>
<tr>
<th>H</th>
<th>Address</th>
<th>Interface</th>
<th>Hold</th>
<th>Uptime</th>
<th>SRTT</th>
<th>RTO</th>
<th>Q</th>
<th>Seq</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>10.1.1.1</td>
<td>Et0</td>
<td>12</td>
<td>6d16h</td>
<td>20</td>
<td>200</td>
<td>0</td>
<td>233</td>
</tr>
<tr>
<td>1</td>
<td>10.1.4.3</td>
<td>Et1</td>
<td>13</td>
<td>2w2d</td>
<td>87</td>
<td>522</td>
<td>0</td>
<td>452</td>
</tr>
<tr>
<td>0</td>
<td>10.1.4.2</td>
<td>Et1</td>
<td>10</td>
<td>2w2d</td>
<td>85</td>
<td>510</td>
<td>0</td>
<td>314</td>
</tr>
</tbody>
</table>
Manual Changes

- Manual changes which cause EIGRP neighbors to be reset:
  - Summary changes
  - Metric component changes
  - Route filter changes

Neighbor Stability Problems (Cont.)

- Stuck-in-active routes
  - Often very complex problems
  - Will be covered in later section
Troubleshooting Tools for Neighbor Problems

RouterA#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
RouterA(config) #router eigrp 1
RouterA(config-router) #eigrp log-neighbor-changes
RouterA(config-router) #logging buffered 10000
RouterA(config) #service timestamps log datetime msec
RouterA(config) #^Z
RouterA#

Log-Neighbor-Changes Messages

Neighbor 10.1.1.1 (Ethernet0) is down: peer restarted
Neighbor 10.1.1.1 (Ethernet0) is up: new adjacency
Neighbor 10.1.1.1 (Ethernet0) is down: holding time expired
Neighbor 10.1.1.1 (Ethernet0) is down: retry limit exceeded
Neighbor 10.1.1.1 (Ethernet0) is down: route filter changed
Neighbor 10.1.1.1 (Ethernet0) is down: interface delay changed
Neighbor 10.1.1.1 (Ethernet0) is down: interface bandwidth changed
Others, but not often...
Troubleshooting Tools for Neighbor Problems (Cont.)

rp-esc-2621bd#debug eigrp packet hello
EIGRP Packets debugging is on (HELLO)
*Mar 16 19:08:38.521: EIGRP: Sending HELLO on Serial1/1
*Mar 16 19:08:38.521: AS 1, Flags 0x0, Seq 0/0 idbQ 0/0 iidbQ un/rely 0/0
*Mar 16 19:08:38.869: EIGRP: Received HELLO on Serial1/1 nbr 10.1.6.2
*Mar 16 19:08:38.869: AS 1, Flags 0x0, Seq 0/0 idbQ 0/0 iidbQ un/rely 0/0
*Mar 16 19:08:39.081: EIGRP: Sending HELLO on FastEthernet0/0
*Mar 16 19:08:39.081: AS 1, Flags 0x0, Seq 0/0 idbQ 0/0 iidbQ un/rely 0/0
*Mar 16 19:08:39.749: EIGRP: Received HELLO on Serial1/2 nbr 10.1.7.2
*Mar 16 19:08:39.749: AS 1, Flags 0x0, Seq 0/0 idbQ 0/0 iidbQ un/rely 0/0
*Mar 16 19:08:40.973: EIGRP: Sending HELLO on FastEthernet0/1
*Mar 16 19:08:40.973: AS 1, Flags 0x0, Seq 0/0 idbQ 0/0 iidbQ un/rely 0/0
*Mar 16 19:08:43.409: EIGRP: Sending HELLO on Serial1/1
*Mar 16 19:08:43.409: AS 1, Flags 0x0, Seq 0/0 idbQ 0/0 iidbQ un/rely 0/0

Unusual Neighbor Problems

- Unidirectional links
- Mismatched masks
- Mismatch of primary/secondary addresses
Unidirectional Links

RtrA # show ip eigrp neighbors
IP-EIGRP neighbors for process 1
RtrA#

PVC
Hello
Update

RtrB # show ip eigrp neighbors
IP-EIGRP neighbors for process 1
H Address Interface Hold Uptime SRTT RTO Q Seq
( sec) ( ms) Cnt Num
1 10.1.1.102.2 Et0 14 00:00:15 0 5000 4 0

RtrB # show ip eigrp neighbors
IP-EIGRP neighbors for process 1
H Address Interface Hold Uptime SRTT RTO Q Seq
( sec) ( ms) Cnt Num
1 10.1.1.102.2 Et0 14 00:00:15 0 5000 4 0

Mismatches Masks

interface serial 0
ip address 10.1.1.2 255.255.255.128
interface serial 1
ip address 10.1.3.1 255.255.255.0

Forwarding Table:
C 10.1.1.0/24 Serial 0
D 10.1.1.0/25 10.1.2.2

Router A

interface serial 0
ip address 10.1.1.1 255.255.255.0
interface ethernet 0
ip address 10.1.2.1 255.255.255.0

Router B

interface serial 0
ip address 10.1.1.1 255.255.255.0
interface ethernet 0
ip address 10.1.2.1 255.255.255.0

Router C

interface serial 0
ip address 10.1.1.1 255.255.255.0
interface ethernet 0
ip address 10.1.2.1 255.255.255.0
Primary/Secondary Mismatch

- Primary: 10.1.1.1/24
- Secondary: 50.1.1.2/24

Source = 10.1.1.1
Primary: 10.1.1.2/24
Secondary: 50.1.1.2/24

- Source = 10.1.1.2

No Sign of 10.1.1.1 or 10.1.1.2 in Neighbor Table

Only Address - 50.1.1.3/24

Not on Common Subnet!

Agenda

- Troubleshooting Common EIGRP Problems
  - Neighbor Stability
  - Stuck-in-Active Routes

- Troubleshooting Tools
  - Event Log
  - Debugs
  - Topology Table
Stuck-in-Active Routes (SIA)

%DUAL-3-SIA: Route 10.64.5.0 255.255.255.192 stuck-in-active state in IP-EIGRP 100. Cleaning up

• Indicates at least two problems
  A route went active
  It got stuck

Review of Active Process

• Going “active” is the normal process for resolving network topology changes
• Normal (stable) state of a route is passive
• Route becomes “active” if it is lost and no other successor or feasible successor exists
Active Process (Cont.)

- Query process stops when:
  - All queries are answered
  - End of network is reached
  - End of the autonomous system is reached (sort of)
  - The lost component is unknown
When the Active Process Fails!

- When a route goes active, timer started
  Approximately 3 to 3-1/2 minutes
- If timer expires without all queries being answered, “stuck” in the active process

Stuck-in-Active (Cont.)

- On the router where timer expires:
  Reinitializes neighbor(s) who didn’t answer
  Goes active on all routes known through bounced neighbor(s)
  Re-advertises to bounced neighbor all routes that we were advertising
Likely Causes for Stuck-in-Active

- Bad or congested links
- Query range is too long
- Excessive redundancy
- Overloaded router (high CPU)
- Router memory shortage
- Software defects (very seldom)

Troubleshooting SIAs

- Two (probably) unrelated causes of the problem—stuck and active
- Need to troubleshoot both parts
  Cause of active often easier to find
  Cause of stuck more important to find
Troubleshooting the Active Part of SIAs

- Determine what is common to routes going active
  - Flapping link(s)?
  - From the same region of the network?
  - /32s from dial-in PPP?

Troubleshooting the Stuck Part of SIAs

- *Show ip eigrp topology active*
  - Useful only while the problem is occurring
  - If problem isn’t occurring at the time, it is difficult to find the source of route getting stuck
Why Is RTRA Reporting SIA Routes?
Let’s Look at a Problem in Progress…

```
RTRA#show ip eigrp topology active
IP-EIGRP Topology Table for AS(1)/ID(20.2.1.1)
A 20.2.1.0/24, 1 successors, FD is Inaccessible
  1 replies, active 00:01:12, query -origin: Local origin
  via Connected (Infinity/Infinity), Ethernet0
Remaining replies:
  via 10.1.1.2, r, Serial0
```

Chasing Active Routes (Cont.)

```
RTRB#show ip eigrp topology active
IP-EIGRP Topology Table for AS(1)/ID(10.1.3.1)
A 20.2.1.0/24, 1 successors, FD is Inaccessible
  1 replies, active 00:01:23, query -origin: Successor Origin
  via 10.1.1.1 (Infinity/Infinity), Serial1/0
Remaining replies:
  via 10.1.3.2, r, Serial1/2
```
Chasing Active Routes (Cont.)

RTRD#show ip eigrp topology active
IP-EIGRP Topology Table for AS(1)/ID(10.1.4.2)
A 20.2.1.0/24, 1 successors, FD is Inaccessible, Q
1 replies, active 00:01:43, query -origin: Successor Origin
via 10.1.3.1 (Infinity/Infinity), Serial1/0
via 10.1.4.1 (Infinity/Infinity), Serial1/1, serno 146
Remaining replies:
via 10.1.5.2, r, Serial1/2

RTRE#show ip eigrp topology active
IP-EIGRP Topology Table for AS(1)/ID(10.1.5.2)
Chasing Active Routes (Cont.)

```
RTRD#show ip eigrp topology active
IP-EIGRP Topology Table for AS(1)/ID(10.1.4.2)
A 20.2.1.0/24, 1 successors, FD is Inaccessible, Q
1 replies, active 00:02:11, query -origin: Successor Origin
via 10.1.3.1 (Infinity/Infinity), Serial1/0
via 10.1.4.1 (Infinity/Infinity), Serial1/1, serno 146
Remaining replies:
via 10.1.5.2, r, Serial1/2
```

Chasing Active Routes (Cont.)

```
RTRD#show ip eigrp neighbors
IP-EIGRP neighbors for process 1
H   Address      Interface   Hold  Uptime   SRTT   RTO   Q  Seq
   (sec)                 (ms)             Cnt Num
2   10.1.5.2           Se1/2       13   00:00:14         0   500 0   1 0
1   10.1.3.1           Se1/0       13   01:22:54     227   1362 0   385
0   10.1.4.1           Se1/1       10   01:24:08     182   1140 0   171
```
Chasing Active Routes (Cont.)

RTRD#ping 10.1.5.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.5.2, timeout is 2 seconds:
....
Success rate is 0 percent (0/5)

Troubleshooting the Stuck Part of SIAs (Cont.)

• It’s not always this easy to find the cause

• Sometimes you chase the waiting neighbors in a circle

If so, summarize and simplify
EIGRP SIAs—Enhancement on Handling Active Event

- EIGRP active process enhancement bug: CSCdp33034
- Integrated in IOS 12.1 release
  Recommended version to run is 12.1.7 or higher

EIGRP SIAs—Enhancement on Handling Active Event (Cont.)

- Enhancements to the EIGRP active process:
  Would retransmit queries once, if no reply
  Retransmit time = active timer / 2
  Give the neighbor a chance to say “I’m still working on it!”
  Should push failure point closer to where the problem actually exists
Minimizing SIA Routes

- Decrease query scope (involve fewer routers in the query process)
  - Summarization (manual or auto)
  - Distribute-lists
  - Define remote routers as stubs

Decreasing Query Scope—Example
Decreasing Query Scope—A Little Better

IP Summary-Address eigrp 1 10.0.0.0 255.0.0.0 on All Outbound Interfaces Toward Remote Routers

Decreasing Query Scope—Stub Remotes

Remote Routers (Router C, Router D, and Router E) Are All Defined as Stub Routers by the command “EIGRP stub connected”
Decreasing Query Scope Stub Routers

Router eigrp 1
eigrp stub [connected][static][summary][receive-only]

- Defined on remote routers
- Restricts route advertisement to connected, static, summary, or none
- Queries are not propagated to stub routers

Minimizing SIA Routes (Cont.)

- Maintain reasonable redundancy
  Don’t make EIGRP’s job too difficult
  Use passive-interface
  Use hierarchy
Removing Excessive Redundancy

Minimizing SIA Routes (Cont.)

- Multiple EIGRP AS’ are NOT the answer to minimizing query scope
  Terminates original query, but new one starts
  Adds redistribution complexity
  Requires distribute-lists to stop routing loops
Multiple EIGRP AS’

Impact of Low-Speed Non-Broadcast Multiple Access (NBMA) Links

- Retry limit = hold time
- Hold time = 180 seconds
- Active timer = 180 seconds
- One broken link can cause SIAs
Workarounds for Low-Speed NBMA

- Use point-to-point subinterfaces instead of multipoint
- Change the active timer to 4–5 minutes (NOT recommended)
- Change the hello/hold timers to 30/90
- Use IOS that has new EIGRP SIA process enhancement
Low-Speed NBMA with New SIA Enhancement IOS

Queries
Replies

Router A
Need to know status

Router B
I am still waiting

Router C

Router D

Agenda

• Troubleshooting Common EIGRP Problems
  Neighbor Stability
  Stuck-in-Active Routes
• Troubleshooting Tools
  Event Log
  Deblogs
  Topology Table
EIGRP Troubleshooting Tools

- Debugs versus the EIGRP event log
  - On a busy, unstable network debugs can be hazardous to your health
  - Event log is non-disruptive—already running
  - Not for support personnel to interpret

Event Log

- Always running (unless manually disabled)
- Default 500 lines (configurable)
- Most recent events at top of log
Event Log (Cont.)

• Three different event types can be logged
  
  EIGRP log-event-type
  [dual][xmit][transport]
  
  Default is dual—most useful
  
  Any combination of the three can be on at the same time

RtrA#show ip eigrp events

Event information for AS 1:
  1 01:52:51.223 NDB delete: 30.1.1.0/24 1
  2 01:52:51.223 RDB delete: 30.1.1.0/24 10.1.3.2
  3 01:52:51.191 Metric set: 30.1.1.0/24 4294967295
  4 01:52:51.191 Poison squashed: 30.1.1.0/24 lost if
  5 01:52:51.191 Poison squashed: 30.1.1.0/24 metric chg
  6 01:52:51.191 Send reply: 30.1.1.0/24 10.1.3.2
  7 01:52:51.187 Not active net/1=SH: 30.1.1.0/24 1
  8 01:52:51.187 FC not sat Dmin/met: 4294967295 46738176
  9 01:52:51.187 Find FS: 30.1.1.0/24 46738176
 10 01:52:51.187 Rcv query met/succ met: 4294967295 4294967295
 11 01:52:51.187 Rcv query dest/nh: 30.1.1.0/24 10.1.3.2
 12 01:52:36.771 Change queue emptied, entries: 1
 13 01:52:36.771 Metric set: 30.1.1.0/24 46738176
 14 01:52:36.771 Update reason, delay: new if 4294967295
 15 01:52:36.771 Update sent, RD: 30.1.1.0/24 4294967295
 16 01:52:36.771 Update reason, delay: metric chg 4294967295
 17 01:52:36.771 Update sent, RD: 30.1.1.0/24 4294967295
 18 01:52:36.771 Route install: 30.1.1.0/24 10.1.3.2
 19 01:52:36.767 Find FS: 30.1.1.0/24 4294967295
 20 01:52:36.767 Rcv update met/succmet: 46738176 46226176
 21 01:52:36.767 Rcv update dest/nh: 30.1.1.0/24 10.1.3.2
 22 01:52:36.767 Metric set: 30.1.1.0/24 4294967295
Debugs

• Remember—can be dangerous
  Use only in the lab or if advised by the TAC

• To make a little safer:
  
  * logging buffered <size>
  * no logging console

Debugs (Cont.)

• Use modifiers to limit scope of route events or packet debugs

  Limit to a particular neighbor
  
  * debug ip eigrp neighbor AS address

  Limit to a particular route
  
  * debug ip eigrp AS network mask
Debug IP EIGRP (Route Events)

RTRA# debug ip eigrp
IP-EIGRP Route Events debugging is on
RTRA# debug ip eigrp neighbor 1 10.1.6.2
IP Neighbor target enabled on AS 1 for 10.1.6.2
IP-EIGRP Neighbor Target Events debugging is on
RTRA# clear ip eigrp neighbor
RTRA#
*Mar 17 15:50:53.244: IP-EIGRP: 10.1.6.0/24 - do advertise out Serial1/2
*Mar 17 15:50:53.244: IP-EIGRP: Int 10.1.6.0/24 metric 20512000 - 20000000 512000
*Mar 17 15:50:53.244: IP-EIGRP: 10.1.8.0/24 - do advertise out Serial1/2
*Mar 17 15:50:53.244: IP-EIGRP: Int 10.1.8.0/24 metric 28160 - 266002560
*Mar 17 15:50:53.244: IP-EIGRP: 10.1.7.0/24 - do advertise out Serial1/2
*Mar 17 15:50:53.244: IP-EIGRP: 10.1.1.0/24 - do advertise out Serial1/2
*Mar 17 15:50:53.244: IP-EIGRP: Int 10.1.1.0/24 metric 26160 - 26600256
*Mar 17 15:50:54.444: IP-EIGRP: 10.1.6.0/24 - do advertise out Serial1/1

RTRA# debug ip eigrp
IP-EIGRP Route Events debugging is on
RTRA# debug ip eigrp 1 10.1.7.0 255.255.255.0
IP Target enabled on AS 1 for 10.1.7.0/24
IP-EIGRP AS Target Events debugging is on
RTRA# clear ip eigrp neighbor

*Mar 17 15:52:20.940: IP-EIGRP: 10.1.7.0/24 - do advertise out Serial1/2
*Mar 17 15:52:22.684: IP-EIGRP: Int 10.1.7.0/24 metric 20512000 20000000 512000
*Mar 17 15:52:22.940: IP-EIGRP: 10.1.7.0/24 - do advertise out Serial1/2
*Mar 17 15:52:24.684: IP-EIGRP: 10.1.7.0/24 - do advertise out Serial1/1
*Mar 17 15:52:24.684: IP-EIGRP: Int 10.1.7.0/24 metric 20512000 20000000 512000
*Mar 17 15:52:25.940: IP-EIGRP: 10.1.7.0/24 - do advertise out Serial1/2

Debug IP EIGRP (Cont.)

RTRA# debug ip eigrp
IP-EIGRP Route Events debugging is on
RTRA# debug ip eigrp 1 10.1.7.0 255.255.255.0
IP Target enabled on AS 1 for 10.1.7.0/24
IP-EIGRP AS Target Events debugging is on
RTRA# clear ip eigrp neighbor
*RMar 17 15:52:20.940: IP-EIGRP: 10.1.7.0/24 - do advertise out Serial1/2
*Mar 17 15:52:22.684: IP-EIGRP: Int 10.1.7.0/24 metric 20512000 20000000 512000
*Mar 17 15:52:22.940: IP-EIGRP: 10.1.7.0/24 - do advertise out Serial1/2
*Mar 17 15:52:24.684: IP-EIGRP: 10.1.7.0/24 - do advertise out Serial1/1
*Mar 17 15:52:24.684: IP-EIGRP: Int 10.1.7.0/24 metric 20512000 20000000 512000
*Mar 17 15:52:25.940: IP-EIGRP: 10.1.7.0/24 - do advertise out Serial1/2
RTRA#debug eigrp packet ?

ack       EIGRP ack packets
hello     EIGRP hello packets
ipxsap    EIGRP ipxsap packets
probe     EIGRP probe packets
query     EIGRP query packets
reply     EIGRP reply packets
request   EIGRP request packets
stub      EIGRP stub packets
retry     EIGRP retransmissions
terse     Display all EIGRP packets except Hellos
update    EIGRP update packets
verbose   Display all EIGRP packets

Debug EIGRP Packet <type>

Debug EIGRP Packet Terse
Debug IP EIGRP Notifications

```
rp-esc-2621b#debug ip eigrp notifications
IP-EIGRP Event notification debugging is on
rp-esc-2621b#clear ip route *
rp-esc-2621b#
*Mar 17 15:58:07.144: IP-EIGRP: Callback: reload_ip_table
*Mar 17 15:58:08.148: IP-EIGRP: iptable_redistribute into eigrp AS 1
*Mar 17 15:58:12.144: IP-EIGRP: Callback: redist frm static AS 0 100.100.100.0/24
*Mar 17 15:58:12.144: into: eigrp AS 1 event: 1
*Mar 17 15:58:12.144: into: eigrp AS 1 event: 1
```

Debug EIGRP FSM (Finite State Machine)

```
RTRA#debug eigrp fsm
EIGRP FSM Events/Actions debugging is on
RTRA#clear ip route *
RTRA#
*Mar 17 15:59:04.972: DUAL: Find FS for dest 10.1.8.0/24. FD is 28160, RD is 28160
*Mar 17 15:59:04.972: DUAL: 0.0.0.0 metric 28160/0 found Dmin is 28160
*Mar 17 15:59:04.976: DUAL: Find FS for dest 10.1.3.0/24. FD is 21024000, RD is 21024000
*Mar 17 15:59:04.976: DUAL: 10.1.6.2 metric 21024000/2169856 found Dmin is 21024000
*Mar 17 15:59:04.976: DUAL: RT installed 10.1.3.0/24 via 10.1.6.2
*Mar 17 15:59:04.976: DUAL: Find FS for dest 10.1.2.0/24. FD is 21536000, RD is 21536000
```
Topology Table

- The topology table is probably the most critical structure in EIGRP
  - Contains building blocks used by DUAL
  - Used to create updates for neighbors/populate routing table
- Understanding topology table contents is very important to understanding EIGRP and help EIGRP troubleshooting

Show IP EIGRP Topology

```
RtrA#show ip eigrp topology
IP-EIGRP Topology Table for AS(1)/ID(10.1.6.1)

P 10.200.1.0/24, 1 successors, FD is 21026560
via 10.1.1.2 (21026560/20514560), Serial1/0
via 10.1.2.2 (46740736/20514560), Serial1/1

RtrB
RtrC
RtrD
RtrE

FD Thru RD
This Neighbor
Feasible Distance
Successor
Feasible Successor

RtrA#show ip eigrp topology
IP-EIGRP Topology Table for AS(1)/ID(10.1.6.1)

.....snip.....
```

Show ip eigrp topology Provides List of Successors and Feasible Successors For All Destinations Known by EIGRP

RD
Successor
Feasible Distance
This Neighbor
Feasible Successor
**Show IP EIGRP Topology All-Links**

Show ip eigrp topology all-links Provides a list of all neighbors who have provided us with an alternative path to our destinations.

RtrA#show ip eigrp topology all-links

IP-EIGRP Topology Table for AS(1)/ID(10.1.6.1)

P 10.200.1.0/24, 1 successors, FD is 21026560
via 10.1.1.2 (21026560/20514560), Serial1/0
via 10.1.2.2 (46740736/20514560), Serial1/1
via 10.1.3.2 (46740736/46228736), Serial1/2

Successor
Feasible Successor
Possible Successor

---

**Show IP EIGRP Topology**

Show ip eigrp topology 10.200.1.0 255.255.255.0
IP-EIGRP topology entry for 10.200.1.0/24
State is Passive, Query origin flag is 1, 1 Successor(s), FD is 21026560
Routing Descriptor Blocks:
10.1.1.2 (Serial1/0), from 10.1.1.2, Send flag is 0x0
Composite metric is (21026560/20514560), Route is Internal
Vector metric:
Minimum bandwidth is 128 Kbit
Total delay is 40100 microseconds
Reliability is 255/255
Load is 1/255
Minimum MTU is 1500
Hop count is 2

10.1.2.2 (Serial1/1), from 10.1.2.2, Send flag is 0x0
Composite metric is (46740736/20514560), Route is Internal
Vector metric:
Minimum bandwidth is 56 Kbit
Total delay is 40100 microseconds
Reliability is 255/255
Load is 1/255
Minimum MTU is 1500
Hop count is 2

10.1.3.2 (Serial1/2), from 10.1.3.2, Send flag is 0x0
Composite metric is (46740736/46228736), Route is Internal
Vector metric:
Minimum bandwidth is 56 Kbit
Total delay is 40100 microseconds
Reliability is 255/255
Load is 1/255
Minimum MTU is 1500
Hop count is 2

Showing the Topology Table Entry for a Single Route by Supplying the Network and Mask Gives Detailed Information For All Alternative Paths Received for That Destination (Similar to All-Links)
**Show IP EIGRP Topology**

<network><mask>

**Showing the Topology Table Entry for an External Route Shows Even More Information About the Route**

RtrA#show ip eigrp topology 30.1.1.0 255.255.255.0
IP-EIGRP topology entry for 30.1.1.0/24
State is Passive, Query origin flag is 1, 1 Successor(s), FD is 46738176
Routing Descriptor Blocks:
10.1.3.2 (Serial1/2), from 10.1.3.2, Send flag is 0x0
Composite metric is (46738176/46226176), Route is External

Vector metric:
- Minimum bandwidth is 56 Kbit
- Total delay is 40000 microseconds
- Reliability is 255/255
- Load is 1/255
- Minimum MTU is 1500
- Hop count is 1
- External data:
  - Originating router is 64.1.4.14
  - AS number of route is 0
  - External protocol is Static, external metric is 0
  - Administrator tag is 0 (0x00000000)

Static Route to 30.1.1.0/24 is
Redistributed into EIGRP

**Show IP EIGRP Topology Pending**

Using Show IP EIGRP Topology Pending, We Can See If We Have Anything Pending to Send to Our Neighbors

Pending Updates Queued to Send to Neighbors
Show IP EIGRP Topology Zero

Static Route to 10.200.1.0/24 through RtrB

RtrA 10.1.1.0 128k
    10.1.2.0 2 56k
    10.1.4.0 2 128k
10.200.1.0

RtrC

RtrD

RtrE

RtrA# show ip eigrp topology zero
IP-EIGRP Topology Table for AS(1)/ID(10.1.6.1)
P 10.200.1.0/24, 0 successors, FD is Inaccessible
via 10.1.1.2 (21026560/20514560), Serial1/0
via 10.1.2.2 (46740736/20514560), Serial1/1
via 10.1.3.2 (46740736/46228736), Serial1/2

RtrA# show ip route 10.200.1.0 255.255.255.0
Routing entry for 10.200.1.0/24
Known via "static", distance 1, metric 0
Routing Descriptor Blocks:
* 10.1.1.2
Route metric is 0, traffic share count is 1

RtrB# show ip eigrp topology zero
IP-EIGRP Topology Table for AS(1)/ID(10.1.6.1)
P 10.200.1.0/24, 0 successors, FD is Inaccessible
via 10.1.1.2 (21026560/20514560), Serial1/0
via 10.1.2.2 (46740736/20514560), Serial1/1
via 10.1.3.2 (46740736/46228736), Serial1/2

RtrB# show ip route 10.200.1.0 255.255.255.0
Routing entry for 10.200.1.0/24
Known via "static", distance 1, metric 0
Routing Descriptor Blocks:
* 10.1.1.2
Route metric is 0, traffic share count is 1

Routes That Fail to Get Installed in the Routing Table By EIGRP Because There Is a Route With a Better Administrative Distance Already in the Routing Table Appear in the Topology Table As “Zero Successor” Routes

EIGRP Not Installing External Routes (Case Study)

Network Cloud X

128k

Router EIGRP 1
Redistribute static
IP route 150.150.0.0 255.255.0.0 e0

RTR_A# show ip route 150.150.0.0
Routing Entry for 150.150.0.0/16
Known via "EIGRP 1", distance 170, metric 3757056, type external

RTR_B# show ip route 150.150.0.0
Routing Entry for 150.150.0.0/16
Known via "EIGRP 1", distance 170, metric 3757056, type external

%Network Not in Table

Net Cloud X
EIGRP Not Installing External Routes (Case Study) (Cont.)

The problem is the duplicate router ID for EIGRP between router X and router A

RTR_A ignores the update because of same router ID as router X
EIGRP Troubleshooting Summary

• Most problems seen in EIGRP networks are caused by factors outside of EIGRP, itself (congestion, lack of summarization, etc.)
• There are many tools and techniques available for troubleshooting problems in EIGRP networks

Further Reading on Troubleshooting EIGRP

• Routing TCP/IP Volume I
  By Jeff Doyle
• EIGRP Network Design Solutions
  By Ivan Pepelnjak
• Troubleshooting IP Routing Protocols (coming soon)
Questions?

Troubleshooting EIGRP

Session RST-309
Please Complete Your Evaluation Form

Session RST-309