Troubleshoot EIGRP on FTD Devices Managed by FMC

Contents

Introduction

This document describes how to verify and troubleshoot EIGRP configuration on FTD managed by FMC.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- Enhanced Interior Gateway Routing Protocol (EIGRP)
- Cisco Secure Firewall Management Center (FMC)
- Cisco Secure Firewall Threat Defense (FTD)

Components Used

- FTDv in version 7.4.2.
- FMCv in version 7.4.2.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

Background Information

EIGRP is an advanced distance vector routing protocol that combines features of both distance vector and link-state protocols. It offers fast convergence by maintaining routing information from neighbors, allowing quick adaptation to alternate routes. EIGRP is efficient, utilizing partial, triggered updates for route or metric changes instead of periodic full updates.

For communication, EIGRP operates directly on the IP layer (Protocol 88) and uses the Reliable Transport Protocol (RTP) for guaranteed, ordered packet delivery. It supports both multicast and unicast, with hello messages specifically using multicast addresses 224.0.0.10 or FF02::A.

EIGRP operation is fundamentally based on the information stored in three tables:

- Neighbor table: This table maintains a record of directly connected EIGRP devices with which an adjacency has been successfully established.
- Topology table: This table stores all learned routes advertised by neighbors, including all feasible paths to a specific destination and their associated metrics, allowing for an evaluation of their quality and the number of available paths.
- Routing table: This table contains the best path for each destination, known as the 'Successor.' This Successor route is the one actively used for forwarding traffic and is subsequently advertised to other EIGRP neighbors.

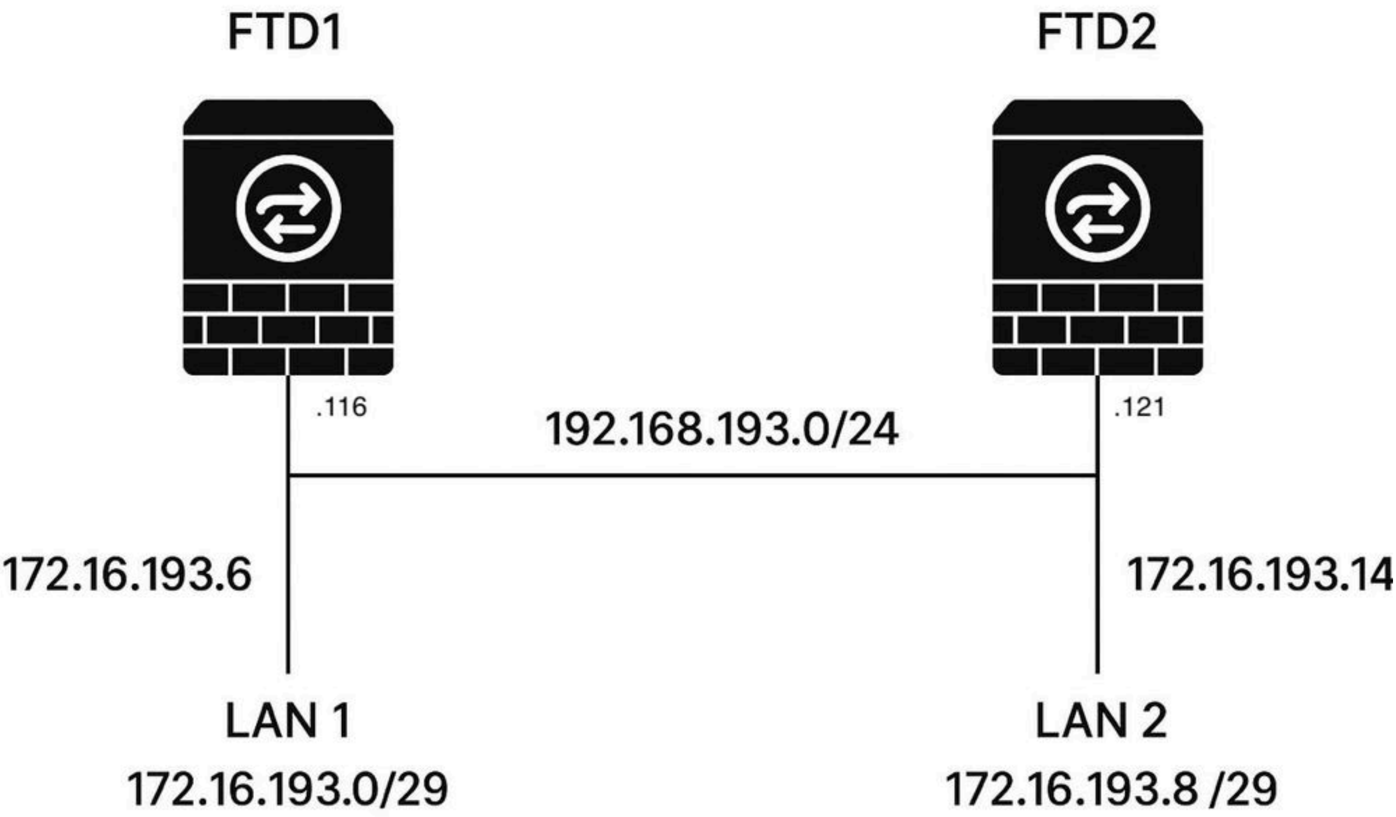
EIGRP uses metric weights, known as K values, in routing and metric computations to determine the optimal path to a destination. This metric value is derived from a formula that utilizes parameters:

- Bandwidth
- Delay Time
- Reliability
- Loading
- MTU

Note: In the event of a metric tie between multiple paths, the Maximum Transmission Unit (MTU) is used as a tie-breaker, with a higher MTU value being preferred.

- Successor Route**:** This is defined as the best path to a specific destination. It is the route that is ultimately installed into the routing table.
- Feasible Distance (FD): This represents the best calculated metric to reach a particular subnet from the local router perspective.
- Reported Distance (RD) / Advertised Distance (AD): This is the distance (metric) to a specific subnet as reported by a neighbor. For a path to be considered a feasible successor, the Reported Distance from the neighbor must be less than the local router Feasible Distance to that same destination.
- Feasible Successor (FS): This is a backup path to a destination, providing an alternate route in case the primary Successor Route fails. A path qualifies as a Feasible Successor if its Reported Distance (from the advertising neighbor) is strictly less than the Feasible Distance of the current Successor Route to the same destination.

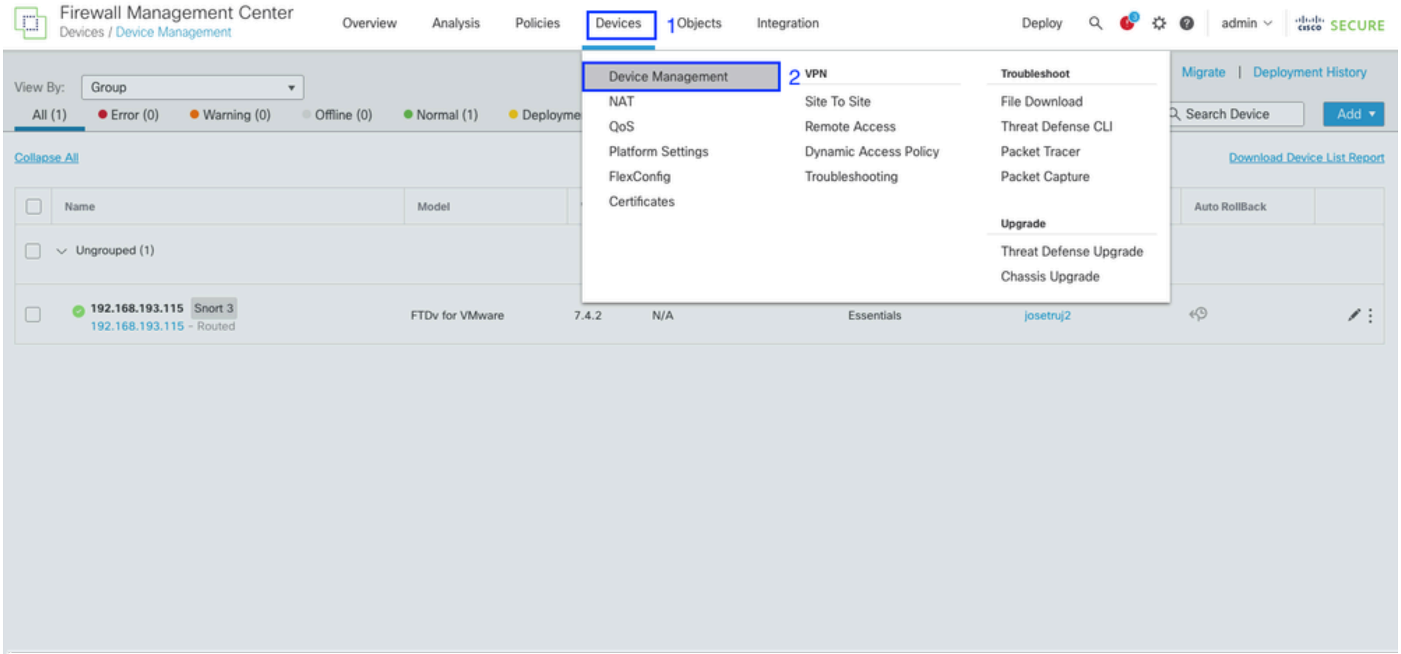
Network Diagram



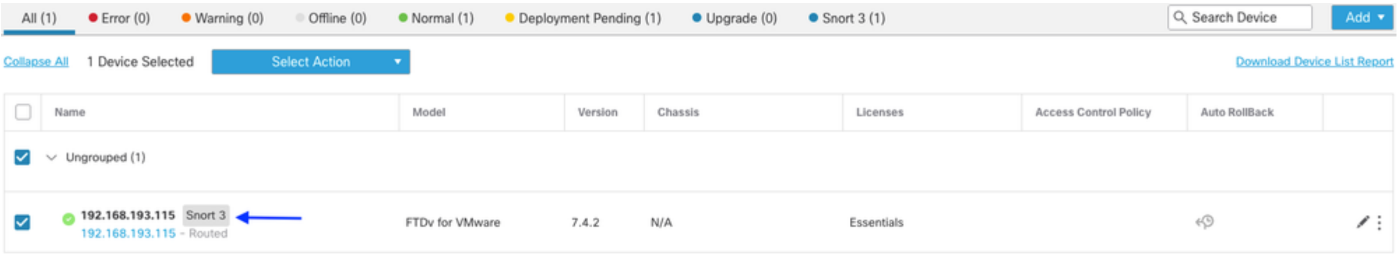
Network Diagram

Basic Configuration

Navigate to **Devices > Device Management**:

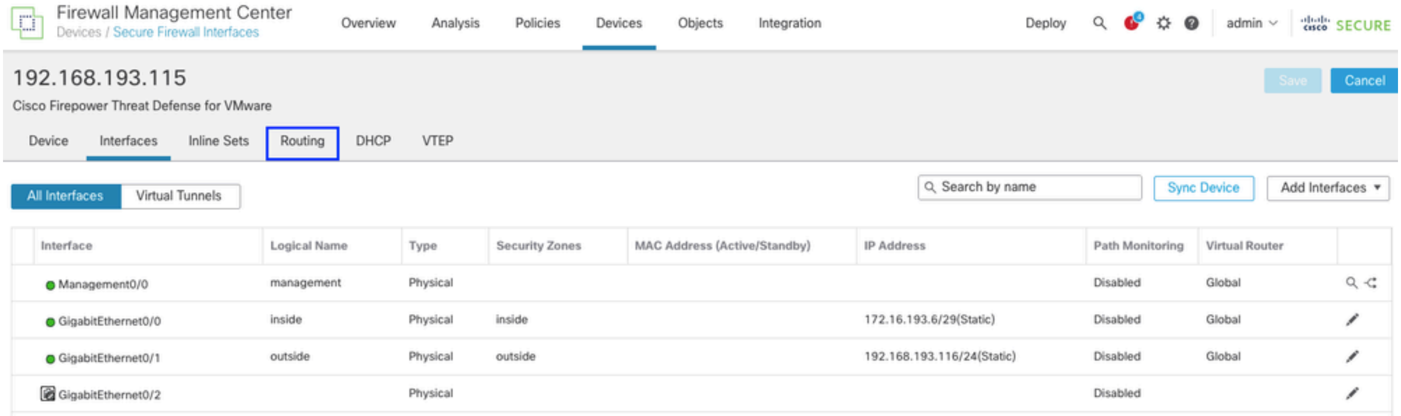


Select device:



☐	Name	Model	Version	Chassis	Licenses	Access Control Policy	Auto RollBack
☑	Ungrouped (1)						
☑	192.168.193.115 Snort 3 192.168.193.115 - Routed	FTDv for VMware	7.4.2	N/A	Essentials		

Click the **Routing** tab.



192.168.193.115

Cisco Firepower Threat Defense for VMware

Interface	Logical Name	Type	Security Zones	MAC Address (Active/Standby)	IP Address	Path Monitoring	Virtual Router
● Management0/0	management	Physical				Disabled	Global
● GigabitEthernet0/0	inside	Physical	inside		172.16.193.6/29(Static)	Disabled	Global
● GigabitEthernet0/1	outside	Physical	outside		192.168.193.116/24(Static)	Disabled	Global
GigabitEthernet0/2		Physical				Disabled	

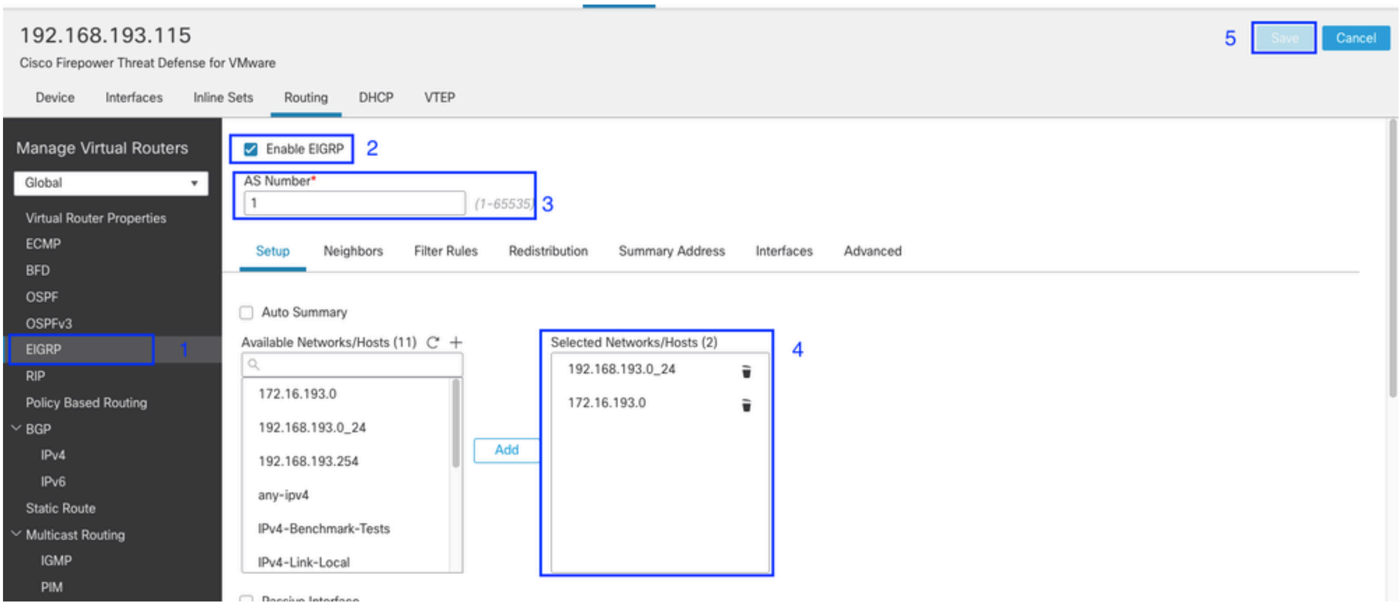
Click **EIGRP** in the left menu.

Click **Enable EIGRP**.

Assign the **AS number** (1-65535).

Select one **network/host**. You can either select a previously created object from the 'Available Network/Host' list, or you can create a new object by clicking the plus (**+**) button.

Click **Save**.



192.168.193.115

Cisco Firepower Threat Defense for VMware

☑ Enable EIGRP

AS Number* 1 (1-65535)

☐ Auto Summary

Available Networks/Hosts (11)
- 172.16.193.0
- 192.168.193.0_24
- 192.168.193.254
- any-ipv4
- IPv4-Benchmark-Tests
- IPv4-Link-Local

Selected Networks/Hosts (2)
- 192.168.193.0_24
- 172.16.193.0

Validation

Here are the minimum requirements for EIGRP neighbor adjacency:

- AS number must match.
- The interface must be active and reachable.
- As a best practice, Hello and Hold timers must match.
- K-values must match.
- No Access Lists must be blocking EIGRP traffic.

Validation Using CLI

- **show run router eigrp**
- **show eigrp neighbors**
- **show eigrp topology**
- **show eigrp interfaces**
- **show route eigrp**
- **show eigrp traffic**
- **debug ip eigrp neighbor**
- **debug eigrp packets**

```
firepower# show run router eigrp

router eigrp 1

 no default-information in

 no default-information out

 no eigrp log-neighbor-warnings

 no eigrp log-neighbor-changes

 network 192.168.193.0 255.255.255.0

 network 172.16.193.8 255.255.255.248

firepower#

firepower# show eigrp neighbors

EIGRP-IPv4 Neighbors for AS(1)

H   Address                 Interface       Hold Uptime   SRTT   RTO   Q  Seq

                                    (sec)         (ms)       Cnt Num

0   192.168.193.121         outside          14  21:45:04 40     240  0    30

firepower# show eigrp topology

EIGRP-IPv4 Topology Table for AS(1)/ID(192.168.193.121)

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

       r - reply Status, s - sia Status

P 192.168.193.0 255.255.255.0, 1 successors, FD is 512

        via Connected, outside

P 172.16.193.0 255.255.255.248, 1 successors, FD is 768

        via 192.168.193.116 (768/512), outside

P 172.16.193.8 255.255.255.248, 1 successors, FD is 512

        via Connected, inside

firepower# show eigrp interfaces
```

```
EIGRP-IPv4 Interfaces for AS(1)
                        Xmit Queue   Mean   Pacing Time   Multicast    Pending
Interface        Peers  Un/Reliable  SRTT   Un/Reliable   Flow Timer   Routes
outside          1        0  /  0   10       0   /   1      50         0
inside           0        0  /  0   0        0   /   1      0          0
firepower#

firepower# show route eigrp
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, V - VPN
       i - IS-IS, su - IS-IS summary, 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, + - replicated route
       SI - Static InterVRF, BI - BGP InterVRF
Gateway of last resort is 192.168.193.254 to network 0.0.0.0
D        172.16.193.0 255.255.255.248
           [90/768] via 192.168.193.116, 02:32:58, outside
firepower# show 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, V - VPN
       i - IS-IS, su - IS-IS summary, 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, + - replicated route
       SI - Static InterVRF, BI - BGP InterVRF
Gateway of last resort is 192.168.193.254 to network 0.0.0.0
```

```
S*       0.0.0.0 0.0.0.0 [1/0] via 192.168.193.254, outside

D        172.16.193.0 255.255.255.248

         [90/768] via 192.168.193.116, 02:33:41, outside

C        172.16.193.8 255.255.255.248 is directly connected, inside

L        172.16.193.14 255.255.255.255 is directly connected, inside

C        192.168.193.0 255.255.255.0 is directly connected, outside

L        192.168.193.121 255.255.255.255 is directly connected, outside

firepower#

firepower# show eigrp traffic

EIGRP-IPv4 Traffic Statistics for AS(1)

  Hellos sent/received: 4006/4001

  Updates sent/received: 4/4

  Queries sent/received: 0/0

  Replies sent/received: 0/0

  Acks sent/received: 3/2

  SIA-Queries sent/received: 0/0

  SIA-Replies sent/received: 0/0

  Hello Process ID: 2503149568

  PDM Process ID: 2503150496

  Socket Queue:

  Input Queue: 0/2000/2/0 (current/max/highest/drops)

firepower#
```

Troubleshoot

Scenario 1 - Debug IP EIGRP Neighbor

Debug commands can be utilized to observe any changes in neighbor states.

```
firepower# debug ip eigrp neighbor

firepower#

EIGRP: Holdtime expired
```

```
Going down: Peer 192.168.193.121 total=0 stub 0, iidb-stub=0 iid-all=0

EIGRP: Handle deallocation failure [0]

EIGRP: Neighbor 192.168.193.121 went down on outside
```

Run the **show eigrp neighbors** command to validate the neighbor status between the FTDs.

```
firepower# show eigrp neighbors

EIGRP-IPv4 Neighbors for AS(1)
```

Verify the status of the interfaces using the **show interface ip brief** command. You can observe that the GigabitEthernet0/1 interface is administratively down.

```
firepower# show interface ip brief

Interface              IP-Address      OK? Method Status              Protocol

GigabitEthernet0/0        172.16.193.14   YES CONFIG up                  up

GigabitEthernet0/1        192.168.193.121 YES CONFIG administratively down up

GigabitEthernet0/2        192.168.194.24  YES manual up                  up

Internal-Control0/0       127.0.1.1       YES unset  up                  up

Internal-Control0/1       unassigned      YES unset  up                  up

Internal-Data0/0         unassigned      YES unset  down                 up

Internal-Data0/0         unassigned      YES unset  up                   up

Internal-Data0/1         169.254.1.1     YES unset  up                   up

Internal-Data0/2         unassigned      YES unset  up                   up

Management0/0             203.0.113.130   YES unset  up                  up
```

Scenario 2 - Authentication

The FTD supports the MD5 hash Algorithm to authenticate EIGRP packets. By default, this authentication is disabled.

To enable the MD5 hash algorithm, mark the 'MD5 Authentication' checkbox. It is crucial that authentication settings match on both devices; if enabled on one device but not the other, neighbor adjacency can not form between them.

Verify this configuration using **debug eigrp packets**.

```
firepower# debug eigrp packets

    (UPDATE, REQUEST, QUERY, REPLY, HELLO, IPXSAP, PROBE, ACK, STUB, SIAQUERY,
SIAREPLY)EIGRP Packet debugging is on

firepower#
```

```
EIGRP: outside: ignored packet from 192.168.193.121, opcode = 5 (authentication off or key-chain missing)

EIGRP: Received HELLO on outside nbr 172.16.193.14

  AS 1, Flags 0x0:(NULL), Seq 0/0 interfaceQ 0/0

EIGRP: Sending HELLO on outside

  AS 1, Flags 0x0:(NULL), Seq 0/0 interfaceQ 0/0 iidbQ un/rely 0/0

EIGRP: Sending HELLO on inside

  AS 1, Flags 0x0:(NULL), Seq 0/0 interfaceQ 0/0 iidbQ un/rely 0/0

EIGRP: outside: ignored packet from 192.168.193.121, opcode = 5 (authentication off or key-chain missing)

EIGRP: Received HELLO on outside nbr 172.16.193.14

  AS 1, Flags 0x0:(NULL), Seq 0/0 interfaceQ 0/0

EIGRP: Sending HELLO on inside

  AS 1, Flags 0x0:(NULL), Seq 0/0 interfaceQ 0/0 iidbQ un/rely 0/0

EIGRP: Sending HELLO on outside

  AS 1, Flags 0x0:(NULL), Seq 0/0 interfaceQ 0/0 iidbQ un/rely 0/0

EIGRP: outside: ignored packet from 192.168.193.121, opcode = 5 (authentication off or key-chain missing).
```

You can observe a message indicating that authentication is off or that the key chain is missing. In this scenario, this typically occurs when authentication is enabled on one peer but not on the other.

```
EIGRP: outside: ignored packet from 192.168.193.121, opcode = 5 (authentication off or key-chain missing).
```

Verify with **show run interface <EIGRP interface>**.

```
Firepower1# show run interface GigabitEthernet0/1

!

interface GigabitEthernet0/1

 nameif outside

 security-level 0

 ip address 192.168.193.121 255.255.255.0

 authentication key eigrp 1 ***** key-id 10

 authentication mode eigrp 1 md5

Firepower2# show run interface GigabitEthernet0/1
```

```
!

interface GigabitEthernet0/1

 nameif outside

 security-level 0

 ip address 192.168.193.116 255.255.255.0
```

Scenario 3 - Passive Interfaces

When EIGRP is configured, EIGRP hello packets are typically sent and received on interfaces where the network is enabled.

However, if an interface is configured as passive, EIGRP suppresses the exchange of hello packets between two routers on that interface, which results in the loss of neighbor adjacency. Consequently, this action not only prevents the router from advertising routing updates out of that interface but also stops it from receiving routing updates from that interface.

Run the **show eigrp neighbors** command to validate the neighbor status between the FTDs.

```
firepower# show eigrp neighbors

EIGRP-IPv4 Neighbors for AS(1)
```

You can verify the EIGRP packets being sent and the interfaces they are sent through using the **debug eigrp packets** command.

FTD 1

```
Firepower1#

    (UPDATE, REQUEST, QUERY, REPLY, HELLO, IPXSAP, PROBE, ACK, STUB, SIAQUERY, SIAREPLY)EIGRP Packet debugging is on

firepower#

EIGRP: Sending HELLO on outside

  AS 1, Flags 0x0:(NULL), Seq 0/0 interfaceQ 0/0 iidbQ un/rely 0/0

EIGRP: Sending HELLO on inside

  AS 1, Flags 0x0:(NULL), Seq 0/0 interfaceQ 0/0 iidbQ un/rely 0/0

EIGRP: Sending HELLO on outside

  AS 1, Flags 0x0:(NULL), Seq 0/0 interfaceQ 0/0 iidbQ un/rely 0/0

EIGRP: Sending HELLO on inside

  AS 1, Flags 0x0:(NULL), Seq 0/0 interfaceQ 0/0 iidbQ un/rely 0/0

EIGRP: Sending HELLO on outside
```

FTD 2

```
Firepower2# debug eigrp packets

    (UPDATE, REQUEST, QUERY, REPLY, HELLO, IPXSAP, PROBE, ACK, STUB, SIAQUERY, SIAREPLY)EIGRP Packet debugging is on

Firepower2#
```

In this scenario, FTD 2 is not sending EIGRP hello messages because its inside and outside interfaces are configured as passive. Verify this with the **show run router eigrp** command.

```
Firepower2# show run router eigrp

router eigrp 1

 no default-information in

 no default-information out

 no eigrp log-neighbor-warnings

 no eigrp log-neighbor-changes

 network 192.168.193.0 255.255.255.0

 network 172.16.193.8 255.255.255.248

 passive-interface outside

 passive-interface inside
```

Note: In order to stop all configured debug processes, please use the **undebug all** command.

Related Information

- EIGRP on FTD Devices
- Configure EIGRP on FTD
- EIGRP Composite Cost Metrics