Configuring EIGRP

This chapter contains the following sections:

Finding Feature Information

Your software release might not support all the features documented in this module. For the latest caveats and feature information, see the Bug Search Tool at https://tools.cisco.com/bugsearch/ and the release notes for your software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the "New and Changed Information"chapter or the Feature History table in this chapter.

Information About EIGRP

EIGRP combines the benefits of distance vector protocols with the features of link-state protocols. EIGRP sends out periodic Hello messages for neighbor discovery. Once EIGRP learns a new neighbor, it sends a one-time update of all the local EIGRP routes and route metrics. The receiving EIGRP router calculates the route distance based on the received metrics and the locally assigned cost of the link to that neighbor. After this initial full route table update, EIGRP sends incremental updates to only those neighbors affected by the route change. This process speeds convergence and minimizes the bandwidth used by EIGRP.

EIGRP Components

EIGRP has the following basic components:

- Reliable Transport Protocol
- Neighbor Discovery and Recovery
- Diffusing Update Algorithm

Reliable Transport Protocol

The Reliable Transport Protocol guarantees ordered delivery of EIGRP packets to all neighbors. The Reliable Transport Protocol supports an intermixed transmission of multicast and unicast packets. The reliable transport can send multicast packets quickly when unacknowledged packets are pending. This provision helps to ensure that the convergence time remains low for various speed links.

The Reliable Transport Protocol includes the following message types:

- Hello—Used for neighbor discovery and recovery. By default, EIGRP sends a periodic multicast Hello message on the local network at the configured hello interval. By default, the hello interval is 5 seconds.
- Acknowledgement—Verify reliable reception of Updates, Queries, and Replies.
- Updates—Send to affected neighbors when routing information changes. Updates include the route destination, address mask, and route metrics such as delay and bandwidth. The update information is stored in the EIGRP topology table.
- Queries and Replies—Sent as part of the Diffusing Update Algorithm used by EIGRP.

Neighbor Discovery and Recovery

EIGRP uses the Hello messages from the Reliable Transport Protocol to discover neighboring EIGRP routers on directly attached networks. EIGRP adds neighbors to the neighbor table. The information in the neighbor table includes the neighbor address, the interface it was learned on, and the hold time, which indicates how long EIGRP should wait before declaring a neighbor unreachable. By default, the hold time is three times the hello interval or 15 seconds.

EIGRP sends a series of Update messages to new neighbors to share the local EIGRP routing information. This route information is stored in the EIGRP topology table. After this initial transmission of the full EIGRP route information, EIGRP sends Update messages only when a routing change occurs. These Update messages contain only the new or changed information and are sent only to the neighbors affected by the change.

EIGRP also uses the Hello messages as a keepalive to its neighbors. As long as Hello messages are received, Cisco NX-OS can determine that a neighbor is alive and functioning.

Diffusing Update Algorithm

The Diffusing Update Algorithm (DUAL) calculates the routing information based on the destination networks in the topology table. The topology table includes the following information:

- IPv4 or IPv6 address/mask—The network address and network mask for this destination.
- Successors—The IP address and local interface connection for all feasible successors or neighbors that advertise a shorter distance to the destination than the current feasible distance.

• Feasibility distance (FD)—The lowest calculated distance to the destination.

DUAL uses the distance metric to select efficient, loop-free paths. DUAL selects routes to insert into the unicast Routing Information Base (RIB) based on feasible successors. When a topology change occurs, DUAL looks for feasible successors in the topology table. If there are feasible successors, DUAL selects the feasible successor with the lowest feasible distance and inserts that into the unicast RIB, avoiding unnecessary recomputation.

When there are no feasible successors but there are neighbors advertising the destination, DUAL transitions from the passive state to the active state and triggers a recomputation to determine a new successor or next-hop router to the destination. The amount of time required to recompute the route affects the convergence time. EIGRP sends Query messages to all neighbors, searching for feasible successors. Neighbors that have a feasible successor send a Reply message with that information. Neighbors that do not have feasible successors trigger a DUAL recomputation.

EIGRP Route Updates

When a topology change occurs, EIGRP sends an Update message with only the changed routing information to affected neighbors. This Update message includes the distance information to the new or updated network destination.

The distance information in EIGRP is represented as a composite of available route metrics, including bandwidth, delay, load utilization, and link reliability. Each metric has an associated weight that determines if the metric is included in the distance calculation. You can configure these metric weights. You can fine-tune link characteristics to achieve optimal paths, but we recommend that you use the default settings for most configurable metrics.

Internal Route Metrics

Internal routes are routes that occur between neighbors within the same EIGRP autonomous system. These routes have the following metrics:

• Next hop—The IP address of the next-hop router.

• Delay—The sum of the delays configured on the interfaces that make up the route to the destination network. The delay is configured in tens of microseconds.

• Bandwidth—The calculation from the lowest configured bandwidth on an interface that is part of the route to the destination.

Note We recommend that you use the default bandwidth value. This bandwidth parameter is also used by EIGRP.

• MTU—The smallest maximum transmission unit value along the route to the destination.

• Hop count—The number of hops or routers that the route passes through to the destination. This metric is not directly used in the DUAL computation.

• Reliability—An indication of the reliability of the links to the destination.

• Load—An indication of how much traffic is on the links to the destination.

By default, EIGRP uses the bandwidth and delay metrics to calculate the distance to the destination. You can modify the metric weights to include the other metrics in the calculation.

Wide Metrics

EIGRP supports wide (64-bit) metrics to improve route selection on higher-speed interfaces or bundled interfaces. Routers supporting wide metrics can interoperate with routers that do not support wide metrics as follows:

- A router that supports wide metrics—Adds local wide metrics values to the received values and sends the information on.

- A router that does not support wide metrics— Sends any received metrics on without changing the values.

EIGRP uses the following equation to calculate path cost with wide metrics:

metric = [k1 x bandwidth + (k2 x bandwidth)/(256 – load) + k3 x delay + k6 xextended attributes] x [k5/(reliability + k4)]

Because the unicast RIB cannot support 64-bit metric values, EIGRP wide metrics use the following equation with a RIB scaling factor to convert the 64-bit metric value to a 32-bit value:

RIB Metric = (Wide Metric / RIB scale value)

where the RIB scale value is a configurable parameter.

EIGRP wide metrics introduce the following two new metric values represented as k6 in the EIGRP metrics configuration:

- Jitter—(Measured in microseconds) accumulated across all links in the route path. Routes lower jitter values are preferred for EIGRP path selection.

- Energy—(Measured in watts per kilobit) accumulated across all links in the route path. Routes lower energy values are preferred for EIGRP path selection.

EIGRP prefers a path with no jitter or energy metric values or lower jitter or metric values over a path with higher values.

Note   EIGRP wide metrics are sent with a TLV version of 2.

External Route Metrics

External routes are routes that occur between neighbors in different EIGRP autonomous systems. These routes have the following metrics:

- Next hop—The IP address of the next-hop router.

- Router ID—The router ID of the router that redistributed this route into EIGRP.

- AS number—The autonomous system number of the destination.

- Protocol ID—A code that represents the routing protocol that learned the destination route.

- Tag—An arbitrary tag that can be used for route maps.

- Metric—The route metric for this route from the external routing protocol.

EIGRP and the Unicast RIB

EIGRP adds all learned routes to the EIGRP topology table and the unicast RIB. When a topology change occurs, EIGRP uses these routes to search for a feasible successor. EIGRP also listens for notifications from the unicast RIB for changes in any routes redistributed to EIGRP from another routing protocol.

Advanced EIGRP

You can use the advanced features of EIGRP to optimize your EIGRP configuration.

Address Families

EIGRP supports both IPv4 and IPv6 address families. For backward compatibility, you can configure EIGRPv4 in route configuration mode or in IPv4 address family mode. You must configure EIGRP for IPv6 in address family mode.

Address family configuration mode includes the following EIGRP features:

- Authentication
- AS number
- Default route
- Metrics
- Distance
- Graceful restart
- Logging
- Load balancing
- Redistribution
- Router ID
- Stub router
- Timers

You cannot configure the same feature in more than one configuration mode. For example, if you configure the default metric in router configuration mode, you cannot configure the default metric in address family mode.

Authentication

You can configure authentication on EIGRP messages to prevent unauthorized or invalid routing updates in your network. EIGRP authentication supports MD5 authentication digest.

You can configure the EIGRP authentication per virtual routing and forwarding (VRF) instance or interface using key-chain management for the authentication keys. Key-chain management allows you to control changes to the authentication keys used by MD5 authentication digest. See the *Cisco Nexus 7000 Series NX-OS Security Configuration Guide*, for more details about creating key chains.

For MD5 authentication, you configure a password that is shared at the local router and all remote EIGRP neighbors. When an EIGRP message is created, Cisco NX-OS creates an MD5 one-way message digest based on the message itself and the encrypted password and sends this digest along with the EIGRP message. The receiving EIGRP neighbor validates the digest using the same encrypted password. If the message has not changed, the calculation is identical and the EIGRP message is considered valid.

MD5 authentication also includes a sequence number with each EIGRP message that is used to ensure that no message is replayed in the network.

Stub Routers

You can use the EIGRP stub routing feature to improve network stability, reduce resource usage, and simplify stub router configuration. Stub routers connect to the EIGRP network through a remote router.

When using EIGRP stub routing, you need to configure the distribution and remote routers to use EIGRP and configure only the remote router as a stub. EIGRP stub routing does not automatically enable summarization on the distribution router. In most cases, you need to configure summarization on the distribution routers.

Without EIGRP stub routing, even after the routes that are sent from the distribution router to the remote router have been filtered or summarized, a problem might occur. For example, if a route is lost somewhere in the corporate network, EIGRP could send a query to the distribution router. The distribution router could then send a query to the remote router even if routes are summarized. If a problem communicating over the WAN link between the distribution router and the remote router occurs, EIGRP could get stuck in an active condition and cause instability elsewhere in the network. EIGRP stub routing allows you to prevent queries to the remote router.

Route Summarization

You can configure a summary aggregate address for a specified interface. Route summarization simplifies route tables by replacing a number of more-specific addresses with an address that represents all the specific addresses. For example, you can replace 10.1.1.0/24, 10.1.2.0/24, and 10.1.3.0/24 with one summary address, 10.1.0.0/16.

If more specific routes are in the routing table, EIGRP advertises the summary address from the interface with a metric equal to the minimum metric of the more specific routes.

In case of process restart or system switchover, the summary address can cause traffic loss. The traffic loss will be seen on the PEER where traffic is routed using the summary address.

> **Note** EIGRP does not support automatic route summarization.

Route Redistribution

You can use EIGRP to redistribute static routes, routes learned by other EIGRP autonomous systems, or routes from other protocols. You must configure a route map with the redistribution to control which routes are passed into EIGRP. A route map allows you to filter routes based on attributes such as the destination, origination protocol, route type, route tag, and so on.

You also configure the default metric that is used for all imported routes into EIGRP.

You use distribute lists to filter routes from routing updates. These filtered routes are applied to each interface with the **ip distribute-list eigrp** command.

Load Balancing

You can use load balancing to allow a router to distribute traffic over all the router network ports that are the same distance from the destination address. Load balancing increases the usage of network segments, which increases effective network bandwidth.

Cisco NX-OS supports the Equal Cost Multiple Paths (ECMP) feature with up to 16 equal-cost paths in the EIGRP route table and the unicast RIB. You can configure EIGRP to load balance traffic across some or all of those paths.

Note EIGRP in Cisco NX-OS does not support unequal cost load balancing.

Split Horizon

You can use split horizon to ensure that EIGRP never advertises a route out of the interface where it was learned.

Split horizon is a method that controls the sending of EIGRP update and query packets. When you enable split horizon on an interface, Cisco NX-OS does not send update and query packets for destinations that were learned from this interface. Controlling update and query packets in this manner reduces the possibility of routing loops.

Split horizon with poison reverse configures EIGRP to advertise a learned route as unreachable back through that the interface that EIGRP learned the route from.

EIGRP uses split horizon or split horizon with poison reverse in the following scenarios:

• Exchanging topology tables for the first time between two routers in startup mode.

• Advertising a topology table change.

• Sending a Query message.

By default, the split horizon feature is enabled on all interfaces.

BFD

This feature supports bidirectional forwarding detection (BFD). BFD is a detection protocol designed to provide fast forwarding-path failure detection times. BFD provides subsecond failure detection between two adjacent devices and can be less CPU-intensive than protocol hello messages because some of the BFD load can be distributed onto the data plane on supported modules. See the *Cisco Nexus 7000 Series NX-OS Interfaces Configuration Guide*, for more information.

Virtualization Support for EIGRP

Cisco NX-OS supports multiple instances of EIGRP that runs on the same system. EIGRP supports Virtual Routing and Forwarding instances (VRFs). VRFs exist within virtual device contexts (VDCs). By default, Cisco NX-OS places you in the default VDC and default VRF unless you specifically configure another VDC and VRF. See the *Cisco Nexus 7000 Series NX-OS Virtual Device Context Configuration Guide*, for more information.

Graceful Restart and High Availability

Cisco NX-OS supports nonstop forwarding and graceful restart for EIGRP.

You can use nonstop forwarding for EIGRP to forward data packets along known routes in the FIB while the EIGRP routing protocol information is being restored following a failover. With nonstop forwarding (NSF), peer networking devices do not experience routing flaps. During failover, data traffic is forwarded through intelligent modules while the standby supervisor becomes active.

If a Cisco NX-OS system experiences a cold reboot, the device does not forward traffic to the system and removes the system from the network topology. In this scenario, EIGRP experiences a stateless restart, and all neighbors are removed. Cisco NX-OS applies the startup configuration, and EIGRP rediscovers the neighbors and shares the full EIGRP routing information again.

A dual supervisor platform that runs Cisco NX-OS can experience a stateful supervisor switchover. Before the switchover occurs, EIGRP uses a graceful restart to announce that EIGRP will be unavailable for some time. During a switchover, EIGRP uses nonstop forwarding to continue forwarding traffic based on the information in the FIB, and the system is not taken out of the network topology.

The graceful restart-capable router uses Hello messages to notify its neighbors that a graceful restart operation has started. When a graceful restart-aware router receives a notification from a graceful restart-capable neighbor that a graceful restart operation is in progress, both routers immediately exchange their topology tables. The graceful restart-aware router performs the following actions to assist the restarting router as follows:

- The router expires the EIGRP Hello hold timer to reduce the time interval set for Hello messages. This process allows the graceful restart-aware router to reply to the restarting router more quickly and reduces the amount of time required for the restarting router to rediscover neighbors and rebuild the topology table.

- The router starts the route-hold timer. This timer sets the period of time that the graceful restart-aware router will hold known routes for the restarting neighbor. The default time period is 240 seconds.

- The router notes in the peer list that the neighbor is restarting, maintains adjacency, and holds known routes for the restarting neighbor until the neighbor signals that it is ready for the graceful restart-aware router to send its topology table or the route-hold timer expires. If the route-hold timer expires on the graceful restart-aware router, the graceful restart-aware router discards held routes and treats the restarting router as a new router that joins the network and reestablishes adjacency.

After the switchover, Cisco NX-OS applies the running configuration, and EIGRP informs the neighbors that it is operational again.

> **Note** You must enable graceful restart to support in-service software upgrades (ISSU) for EIGRP. If you disable graceful restart, Cisco NX-OS issues a warning that an ISSU cannot be supported with this configuration.

Multiple EIGRP Instances

Cisco NX-OS supports multiple instances of the EIGRP protocol that run on the same system. Every instance uses the same system router ID. You can optionally configure a unique router ID for each instance. For the number of supported EIGRP instances, see the *Cisco Nexus 7000 Series NX-OS Verified Scalabilty Guide*.

Prerequisites for EIGRP

You must enable EIGRP.

If you configure VDCs, you must install the Advanced Services license and enter the desired VDC (see the *Cisco Nexus 7000 Series NX-OS Virtual Device Context Configuration Guide*).

Guidelines and Limitations for EIGRP

- A system configured with EIGRP 64bit metric version and having 32bit metric version neighbors precision in delay conversion from 64bit metric to 32bit metric and from 32bit metric to 64bit metric is improved. It implies that the 32bit metric of prefixes in the 64bit EIGRP system and 64bit metric of prefixed in 32bit EIGRP system changes from previous releases. This is not applicable for the 32bit metric EIGRP system or if all neighbors are the 64bit metric version.

- When you configure a table map, administrative distance of the routes and the metric, the configuration commands make the EIGRP neighbours to flap. This is an expected behavior.

- If the filtered list is modified when redistributing routes into EIGRP and filtering prefixes with a route map or prefix list, all prefixes permitted by the filter, even those not touched, are refreshed in the EIGRP topology table. This refresh is signaled to all EIGRP routers in the query domain for this set of prefixes.

- A metric configuration (either through the default-metric configuration option or through a route map) is required for redistribution from any other protocol, connected routes, or static routes.

- For graceful restart, an NSF-aware router must be up and completely converged with the network before it can assist an NSF-capable router in a graceful restart operation.

- For graceful restart, neighboring devices participating in the graceful restart must be NSF-aware or NSF-capable.

- Cisco NX-OS EIGRP is compatible with EIGRP in the Cisco IOS software.

- Do not change the metric weights without a good reason. If you change the metric weights, you must apply the change to all EIGRP routers in the same autonomous system.

- A mix of standard metrics and wide metrics in an EIGRP network with interface speeds of 1 Gigabit or greater may result in suboptimal routing.

- Consider using stubs for larger networks.

- Avoid redistribution between different EIGRP autonomous systems because the EIGRP vector metric will not be preserved.

- The **no** {**ip** | **ipv6**} **next-hop-self** command does not guarantee reachability of the next hop.

- The {**ip** | **ipv6**} **passive-interface eigrp** command suppresses neighbors from forming.

- Cisco NX-OS does not support IGRP or connecting IGRP and EIGRP clouds.

- Autosummarization is disabled by default and cannot be enabled.

- Cisco NX-OS supports only IP.

- EIGRPv6 adjacency cannot be formed over an interface that only has IPv6 link local address.

Global IPv6 address is required on the interface for EIGRPv6 neighbour adjacency to be formed over such interface.

• High availability is not supported with EIGRP aggressive timers.

• If you are familiar with the Cisco IOS CLI, be aware that the Cisco NX-OS commands for this feature might differ from the Cisco IOS commands that you would use.

Default Settings for EIGRP Parameters

Table 1: Default Settings for EIGRP Parameters

Parameters	Default
Administrative distance	Internal routes—90 External routes—170
Bandwidth percent	50 percent
Default metric for redistributed routes	Bandwidth—100000 Kb/s Delay—100 (10 microsecond units) Reliability—255 Loading—1 MTU—1500
EIGRP feature	Disabled
Hello interval	5 seconds
Hold time	15 seconds
Equal-cost paths	8
Metric weights	1 0 1 0 0 0
Next-hop address advertised	IP address of local interface
NSF convergence time	120
NSF route-hold time	240
NSF signal time	20
Redistribution	Disabled
Split horizon	Enabled

Configuring Basic EIGRP

Enabling or Disabling the EIGRP Feature

You must enable the EIGRP feature before you can configure EIGRP.

Before you begin

Ensure that you are in the correct VDC (or use the **switchto vdc** command).

Procedure

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# [**no**] **feature eigrp**	Enables the EIGRP feature. The **no** option disables the EIGRP feature and removes all associated configuration.
Step 3	(Optional) switch(config)# **show feature**	Displays information about enabled features.
Step 4	(Optional) switch(config)# **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

The following example enables EIGRP:

```
switch# configure terminal
switch(config)# feature eigrp
switch(config)# copy running-config startup-config
```

Creating an EIGRP Instance

You can create an EIGRP instance and associate an interface with that instance. You assign a unique autonomous system number for this EIGRP process. Routes are not advertised or accepted from other autonomous systems unless you enable route redistribution.

Before you begin

- Ensure that you have enabled the EIGRP feature.

- EIGRP must be able to obtain a router ID (for example, a configured loopback address) or you must configure the router ID option.

- If you configure an instance tag that does not qualify as an AS number, you must configure the AS number explicitly or this EIGRP instance remains in the shutdown state. For IPv6, this number must be configured under address family.

• Confirm that you are in the correct VDC. To change the VDC, use the **switchto vdc** command.

Procedure

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# [**no**] **router eigrp** *instance-tag*	Creates a new EIGRP process with the configured instance tag. The instance tag can be any case-sensitive, alphanumeric string up to 20 characters.
		If you configure an instance tag that does not qualify as an AS number, you must use the **autonomous-system** command to configure the AS number explicitly or this EIGRP instance will remain in the shutdown state.
		The **no** option deletes the EIGRP process and all associated configuration. You should also remove any EIGRP commands configured in interface mode if you remove the EIGRP process.
Step 3	(Optional) switch(config-router)# **autonomous-system** *as-number*	Configures a unique AS number for this EIGRP instance.
		The range is from 1 to 65535.
Step 4	(Optional) switch(config-router)# **log-adjacency-changes**	Generates a system message whenever an adjacency changes state. This command is enabled by default.
Step 5	(Optional) switch(config-router)# **log-neighbor-warnings** [*seconds*]	Generates a system message whenever a neighbor warning occurs.
		You can configure the time between warning messages, from 1 to 65535, in seconds. The default is 10 seconds. This command is enabled by default.
Step 6	switch(config-router)# **interface** *interface-type slot/port*	Enters interface configuration mode. Use **?** to determine the slot and port ranges.
Step 7	switch(config-if)# {**ip** | **ipv6**} **router eigrp** *instance-tag*	Associates this interface with the configured EIGRP process. The instance tag can be any case-sensitive, alphanumeric string up to 20 characters.
Step 8	(Optional) switch(config-if)# **show** {**ip** | **ipv6**} **eigrp interfaces**	Displays information about EIGRP interfaces.

	Command or Action	**Purpose**
Step 9	(Optional) switch(config-if)# **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

This example shows how to create an EIGRP process and configure an interface for EIGRP:

```
switch# configure terminal
switch(config)# router eigrp Test1
switch(config)# interface ethernet 1/2

switch(config-if)# ip router eigrp Test1
switch(config-if)# no shutdown
switch(config-if)# copy running-config startup-config
```

Restarting an EIGRP Instance

You can restart an EIGRP instance. This action clears all neighbors for the instance.

Procedure

	Command or Action	**Purpose**
Step 1	(Optional) switch(config)# **flush-routes**	Flushes all EIGRP routes in the unicast RIB when this EIGRP instance restarts.
Step 2	Required: switch(config)# **restart eigrp** *instance-tag*	Restarts the EIGRP instance and removes all neighbors. The instance tag can be any case-sensitive, alphanumeric string up to 20 characters.
Step 3	(Optional) switch(config)# **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

The following example shows how to restart an EIGRP instance:

```
switch(config)# flush-routes
switch(config)# restart eigrp Test1
switch(config)# copy running-config startup-config
```

Shutting Down an EIGRP Instance

You can gracefully shut down an EIGRP instance. This action removes all routes and adjacencies but preserves the EIGRP configuration.

Procedure

	Command or Action	**Purpose**
Step 1	switch(config-router)# **shutdown**	Disables this instance of EIGRP. The EIGRP router configuration remains.
Step 2	(Optional) switch(config-router)# **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

The following example shows how to shut down an EIGRP instance:

```
switch(config-router)# shutdown
switch(config-router)# copy running-config startup-config
```

Configuring a Passive Interface for EIGRP

You can configure a passive interface for EIGRP. A passive interface does not participate in EIGRP adjacency, but the network address for the interface remains in the EIGRP topology table.

Procedure

	Command or Action	**Purpose**
Step 1	switch(config-if)# **[default | no]{ip | ipv6} passive-interface eigrp** *instance-tag*	Suppresses EIGRP hellos, which prevents neighbors from forming and sending routing updates on an EIGRP interface. The instance tag can be any case-sensitive, alphanumeric string up to 20 characters. **Note** • To configure all EIGRP interfaces as passive by default, use the **passive-interface default** command. • To configure disabled passive interface on EIGRP, you must use **no** command with this command. • To unconfigure passive interface on EIGRP, you must use **default** with this command.
Step 2	(Optional) switch(config-if)# **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

The following example shows how to configure a passive interface for EIGRP:

```
switch(config-if)# ip passive-interface eigrp tag10
switch(config-if)# copy running-config startup-config
```

The following example shows how to configure disabled passive-interface for EIGRP:

```
switch(config-if)# no ip passive-interface eigrp tag10
switch(config-if)# copy running-config startup-config
```

The following example shows how to unconfigure passive-interface for EIGRP:

```
switch(config-if)# default ip passive-interface eigrp tag10
switch(config-if)# copy running-config startup-config
```

Shutting Down EIGRP on an Interface

You can gracefully shut down EIGRP on an interface. This action removes all adjacencies and stops EIGRP traffic on this interface but preserves the EIGRP configuration.

Procedure

	Command or Action	**Purpose**
Step 1	switch(config-if)# {**ip** | **ipv6**} **eigrp** *instance-tag* **shutdown**	Disables EIGRP on this interface. The EIGRP interface configuration remains. The instance tag can be any case-sensitive, alphanumeric string up to 20 characters.
Step 2	(Optional) switch(config-if)# **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

The following example shows how to shut down EIGRP on an interface:

```
switch(config-if)# ip eigrp Test1 shutdown
switch(config-if)# copy running-config startup-config
```

Configuring Advanced EIGRP

Configuring Authentication in EIGRP

You can configure authentication between neighbors for EIGRP. You can configure EIGRP authentication for the EIGRP process or for individual interfaces. The interface EIGRP authentication configuration overrides the EIGRP process-level authentication configuration.

Before you begin

- Ensure that you have enabled the EIGRP feature.

- Ensure that all neighbors for an EIGRP process share the same authentication configuration, including the shared authentication key.

- Create the key chain for this authentication configuration. For more information, see the *Cisco Nexus 7000 Series NX-OS Security Configuration Guide*.

- Confirm that you are in the correct VDC. To change the VDC, use the **switchto vdc** command.

Procedure

	Command or Action	**Purpose**
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# **router eigrp** *instance-tag*	Creates a new EIGRP process with the configured instance tag. The instance tag can be any case-sensitive, alphanumeric string up to 20 characters.
		If you configure an instance tag that does not qualify as an AS number, you must use the **autonomous-system** command to configure the AS number explicitly or this EIGRP instance will remain in the shutdown state.
Step 3	switch(config-router)# **address-family** {**ipv4** | **ipv6**} **unicast**	Enters the address-family configuration mode. This command is optional for IPv4.
Step 4	switch(config-router-af)# **authentication key-chain** *key-chain*	Associates a key chain with this EIGRP process for this VRF. The key chain can be any case-sensitive, alphanumeric string up to 20 characters.
Step 5	switch(config-router-af)# **authentication mode md5**	Configures MD5 message digest authentication mode for this VRF.
Step 6	switch(config-router-af)# **interface** *interface-type slot/port*	Enters interface configuration mode. Use **?** to find the supported interfaces.
Step 7	switch(config-if)# {**ip** | **ipv6**} **router eigrp** *instance-tag*	Associates this interface with the configured EIGRP process. The instance tag can be any case-sensitive, alphanumeric string up to 20 characters.
Step 8	switch(config-if)# {**ip** | **ipv6**} **authentication key-chain eigrp** *instance-tag key-chain*	Associates a key chain with this EIGRP process for this interface. This configuration overrides the authentication configuration set in the router VRF mode. The instance tag can be any case-sensitive, alphanumeric string up to 20 characters.

	Command or Action	Purpose
Step 9	switch(config-if)# {**ip** | **ipv6**} **authentication mode eigrp** *instance-tag* **md5**	Configures the MD5 message digest authentication mode for this interface. This configuration overrides the authentication configuration set in the router VRF mode. The instance tag can be any case-sensitive, alphanumeric string up to 20 characters.
Step 10	(Optional) switch(config-if)# **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

The following example shows how to configure MD5 message digest authentication for EIGRP over Ethernet interface 1/2:

```
switch# configure terminal
switch(config)# router eigrp Test1
switch(config-router)# exit
switch(config)# interface ethernet 1/2

switch(config-if)# ip router eigrp Test1
switch(config-if)# ip authentication key-chain eigrp Test1 routeKeys
switch(config-if)# ip authentication mode eigrp Test1 md5
switch(config-if)# copy running-config startup-config
```

Configuring EIGRP Stub Routing

To configure a router for EIGRP stub routing, use these commands in address-family configuration mode:

Procedure

	Command or Action	Purpose
Step 1	switch(config-router-af)# **stub** [**direct** | **receive-only** | **redistributed** [**direct**] **leak-map** *map-name*]	Configures a remote router as an EIGRP stub router. The map name can be any case-sensitive, alphanumeric string up to 20 characters.
Step 2	(Optional) switch(config-router-af)# **show ip eigrp neighbor detail**	Verifies that the router has been configured as a stub router.
Step 3	(Optional) switch(config-router-af)# **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

The following example shows how to configure a stub router to advertise directly connected and redistributed routes. The last line of the output for the **show ip eigrp neighbor detail** command shows the stub status of the remote or spoke router.

```
switch# configure terminal
switch(config)# router eigrp Test1
switch(config-router)# address-family ipv4 unicast
switch(config-router-af)# stub direct redistributed
switch(config-router-af)# show ip eigrp neighbor detail

IP-EIGRP neighbors for process 201
H   Address              Interface    Hold Uptime   SRTT   RTO  Q  Seq Type
                                      (sec)         (ms)      Cnt Num
0   10.1.1.2             Se3/1          11 00:00:59   1   4500  0  7
    Version 12.1/1.2, Retrans: 2, Retries: 0
    Stub Peer Advertising ( CONNECTED SUMMARY ) Routes

switch(config-router-af)# copy running-config startup-config
```

Configuring a Summary Address for EIGRP

You can configure a summary aggregate address for a specified interface. If any more specific routes are in the routing table, EIGRP advertises the summary address out the interface with a metric equal to the minimum of all more specific routes.

Procedure

	Command or Action	**Purpose**
Step 1	switch(config-if)# {**ip**	**ipv6**} **summary-address eigrp** *instance-tag ip-prefix/length* [*distance*	**leak-map** *map-name*]	Configures a summary aggregate address as either an IP address and network mask or an IP prefix/length. The instance tag and map name can be any case-sensitive, alphanumeric string up to 20 characters.
		You can optionally configure the administrative distance for this aggregate address. The default administrative distance is 5 for aggregate addresses.
Step 2	(Optional) switch(config-if)# **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

The following example shows how to cause EIGRP to summarize network 192.0.2.0 out Ethernet 1/2 only:

```
switch(config)# interface ethernet 1/2
```

```
switch(config-if)# ip summary-address eigrp Test1 192.0.2.0 255.255.255.0
switch(config-if)# copy running-config startup-config
```

Redistributing Routes into EIGRP

You can redistribute routes in EIGRP from other routing protocols.

Before you begin

- Ensure that you have enabled the EIGRP feature.

- You must configure the metric (either through the default-metric configuration option or through a route map) for routes redistributed from any other protocol.

- You must create a route map to control the types of routes that are redistributed into EIGRP.

- Confirm that you are in the correct VDC. To change the VDC, use the **switchto vdc** command.

Procedure

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# **router eigrp** *instance-tag*	Creates a new EIGRP process with the configured instance tag. The instance tag can be any case-sensitive, alphanumeric string up to 20 characters.
		If you configure an instance tag that does not qualify as an AS number, you must use the **autonomous-system** command to configure the AS number explicitly or this EIGRP instance will remain in the shutdown state.
Step 3	switch(config-router)# **address-family** {**ipv4**	**ipv6**} **unicast**	Enters the address-family configuration mode. This command is optional for IPv4.
Step 4	switch(config-router-af)# **redistribute** {**bgp** *as*	{**eigrp**	**isis**	**ospf**	**ospfv3**	**rip**} *instance-tag*	**direct**	**static**} **route-map** *map-name*	Injects routes from one routing domain into EIGRP. The instance tag and map name can be any case-sensitive, alphanumeric string up to 20 characters.
Step 5	switch(config-router-af)# **default-metric** *bandwidth delay reliability loading mtu*	Sets the metrics assigned to routes learned through route redistribution. The default values are as follows: • bandwidth—100000 Kb/s • delay—100 (10 microsecond units) • reliability—255 • loading—1

	Command or Action	Purpose
		• MTU—1492
Step 6	(Optional) switch(config-router-af)# **show** {**ip** | **ipv6**} **eigrp route-map statistics redistribute**	Displays information about EIGRP route map statistics.
Step 7	(Optional) switch(config-router-af)# **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

The following example shows how to redistribute BGP into EIGRP for IPv4:

```
switch# configure terminal
switch(config)# router eigrp Test1
switch(config-router)# redistribute bgp 100 route-map BGPFilter
switch(config-router)# default-metric 500000 30 200 1 1500
switch(config-router)# copy running-config startup-config
```

Limiting the Number of Redistributed Routes

Route redistribution can add many routes to the EIGRP route table. You can configure a maximum limit to the number of routes accepted from external protocols. EIGRP provides the following options to configure redistributed route limits:

- Fixed limit—Logs a message when EIGRP reaches the configured maximum. EIGRP does not accept any more redistributed routes. You can optionally configure a threshold percentage of the maximum where EIGRP logs a warning when that threshold is passed.

- Warning only—Logs a warning only when EIGRP reaches the maximum. EIGRP continues to accept redistributed routes.

- Withdraw—Starts the timeout period when EIGRP reaches the maximum. After the timeout period, EIGRP requests all redistributed routes if the current number of redistributed routes is less than the maximum limit. If the current number of redistributed routes is at the maximum limit, EIGRP withdraws all redistributed routes. You must clear this condition before EIGRP accepts more redistributed routes. You can optionally configure the timeout period.

Before you begin

- Ensure that you have enabled the EIGRP feature.

- Confirm that you are in the correct VDC. To change the VDC, use the **switchto vdc** command.

Procedure

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.

	Command or Action	**Purpose**
Step 2	switch(config)# **router eigrp** *instance-tag*	Creates a new EIGRP process with the configured instance tag.
Step 3	switch(config-router)# **redistribute** {**bgp** *id* | **direct** | **eigrp** *id* | **isis** *id* | **ospf** *id* | **rip** *id* | **static**} **route-map** *map-name*	Redistributes the selected protocol into EIGRP through the configured route map.
Step 4	switch(config-router)# **redistribute maximum-prefix** *max* [*threshold*] [**warning-only** | **withdraw** [*num-retries timeout*]]	Specifies a maximum number of prefixes that EIGRP distributes. The range is from 0 to 65536. Optionally specifies the following: • *threshold*—Percent of maximum prefixes that triggers a warning message. • **warning-only**—Logs a warning message when the maximum number of prefixes is exceeded. • **withdraw**—Withdraws all redistributed routes. Optionally tries to retrieve the redistributed routes. The *num-retries* range is from 1 to 12. The timeout is from 60 to 600 seconds. The default is 300 seconds. Use the **clear ip eigrp redistribution** command if all routes are withdrawn.
Step 5	(Optional) switch(config-router)# **show running-config eigrp**	Displays the EIGRP configuration.
Step 6	(Optional) switch(config-router)# **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

The following example shows how to limit the number of redistributed routes into EIGRP:

```
switch# configure terminal
switch(config)# router eigrp Test1
switch(config-router)# redistribute bgp route-map FilterExternalBGP
switch(config-router)# redistribute maximum-prefix 1000 75
```

Configuring the Administrative Distance of Routes

You can set the administrative distance of routes added by EIGRP into the RIB.

Before you begin

You must enable EIGRP.

Ensure that you are in the correct VDC (or use the **switchto vdc** command).

Procedure

	Command or Action	**Purpose**
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# **router eigrp** *instance-tag*	Creates a new EIGRP instance and enters router configuration mode.
Step 3	switch(config-router)# **table-map** *route-map-name* [**filter**]	Configures a table map with route map information. You can enter up to 63 alphanumeric characters for the map name. The **filter** keyword filters routes rejected by the route map and does not download them to the RIB. **Note** When you configure a table map, administrative distance of the routes and the metric, the configuration commands make the EIGRP neighbours to flap. This is an expected behavior.
Step 4	(Optional) switch(config)# **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Configuring Route-Map Filtering

You can enable EIGRP to interoperate with other protocols to leverage additional routing functionality by filtering inbound and outbound traffic based on route-map options.

Before you begin

You must enable EIGRP.

Ensure that you are in the correct VDC (or use the **switchto vdc** command).

Procedure

	Command or Action	**Purpose**
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# **route-map** *map-tag* [**permit** | **deny**] [*sequence-number*]	Enters route-map configuration mode.
Step 3	switch(config-route-map)# **match metric** *metric-value* [**+-** *deviation-number*] [... *metric-value* [**+-** *deviation-number*]]	Specifies a match clause that filters inbound updates that match an internal or external protocol metric. The *metric-value* argument is an internal protocol metric that can be an EIGRP five-part metric. The range is from 1 to 4294967295.

	Command or Action	Purpose
		The **+- deviation-number** argument represents a standard deviation, which can be any number. When you specify a metric deviation with the **+** and **-** keywords, the router matches any metric that falls inclusively in that range.
Step 4	switch(config-route-map)# **match source-protocol** *source-protocol* [*as-number*]	Specifies a match clause that matches external routes from sources that match the source protocol.
		The *source-protocol* argument is the protocol to match. The valid options are **bgp**, **connected**, **eigrp**, **isis**, **ospf**, **rip**, and **static**.
		The *as-number* argument does not apply to the **connected**, **rip**, and **static** options. The range is from 1 to 65535.
Step 5	switch(config-route-map)# **set tag** *tag-value*	Sets a tag value on the route in the destination routing protocol when all the match criteria of a route map are met.
Step 6	switch(config-route-map)# **exit**	Exits route-map configuration mode.
Step 7	switch(config)# **router eigrp** *instance-tag*	Creates a new EIGRP instance and enters router configuration mode.
Step 8	switch(config-router)# **exit**	Exits router configuration mode.
Step 9	switch(config)# **interface** *interface-type slot/port*	Enters interface configuration mode. Use ? to determine the slot and port ranges.
Step 10	switch(config-if)# **ip address** *ip-address*	Specifies an IP address for the EIGRP routing process.
Step 11	switch(config-if)# **ip router eigrp** *as-number*	Configures the EIGRP routing process and enters the router configuration mode.
Step 12	switch(config-if)# **ip distribute-list eigrp** *as-number* **route-map** *map-tag* **in**	Filters networks received in updates.
Step 13	(Optional) switch(config)# **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Configuring Load Balancing in EIGRP

You can configure the number of Equal Cost Multiple Path (ECMP) routes using the **maximum-paths** option.

Before you begin

- Ensure that you have enabled the EIGRP feature.

• Confirm that you are in the correct VDC. To change the VDC, use the **switchto vdc** command.

Procedure

	Command or Action	Purpose
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# **router eigrp** *instance-tag*	Creates a new EIGRP process with the configured instance tag. The instance tag can be any case-sensitive, alphanumeric string up to 20 characters.
		If you configure an instance tag that does not qualify as an AS number, you must use the **autonomous-system** command to configure the AS number explicitly or this EIGRP instance remains in the shutdown state.
Step 3	switch(config-router)# **address-family** {**ipv4** | **ipv6**} **unicast**	Enters the address-family configuration mode. This command is optional for IPv4.
Step 4	switch(config-router-af)# **maximum-paths** *num-paths*	Sets the number of equal cost paths that EIGRP accepts in the route table. The range is from 1 to 16. The default is 8.
Step 5	(Optional) switch(config-router-af)# **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

The following example shows how to configure equal cost load balancing for EIGRP over IPv4 with a maximum of six equal cost paths:

```
switch# configure terminal
switch(config)# router eigrp Test1
switch(config-router)# address-family ipv4 unicast
switch(config-router-af)# maximum-paths 6
switch(config-router-af)# copy running-config startup-config
```

Configuring Graceful Restart for EIGRP

You can configure graceful restart or nonstop forwarding for EIGRP.

Note   Graceful restart is enabled by default.

Before you begin

- Ensure that you have enabled the EIGRP feature.

- An NSF-aware router must be up and completely converged with the network before it can assist an NSF-capable router in a graceful restart operation.

- Neighboring devices participating in the graceful restart must be NSF aware or NSF capable.

- Confirm that you are in the correct VDC. To change the VDC, use the **switchto vdc** command.

Procedure

	Command or Action	**Purpose**
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# **router eigrp** *instance-tag*	Creates a new EIGRP process with the configured instance tag. The instance tag can be any case-sensitive, alphanumeric string up to 20 characters.
		If you configure an instance tag that does not qualify as an AS number, you must use the **autonomous-system** command to configure the AS number explicitly or this EIGRP instance remains in the shutdown state.
Step 3	switch(config-router)# **address-family** {**ipv4** | **ipv6**} **unicast**	Enters the address-family configuration mode. This command is optional for IPv4.
Step 4	switch(config-router-af)# **graceful-restart**	Enables graceful restart. This feature is enabled by default.
Step 5	switch(config-router-af)# **timers nsf converge** *seconds*	Sets the time limit for the convergence after a switchover. The range is from 60 to 180 seconds. The default is 120.
Step 6	switch(config-router-af)# **timers nsf route-hold** *seconds*	Sets the hold time for routes learned from the graceful restart-aware peer. The range is from 20 to 300 seconds. The default is 240.
Step 7	switch(config-router-af)# **timers nsf signal** *seconds*	Sets the time limit for signaling a graceful restart. The range is from 10 to 30 seconds. The default is 20.
Step 8	(Optional) switch(config-router-af)# **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

This example shows how to configure graceful restart for EIGRP over IPv6 using the default timer values:

```
switch# configure terminal
switch(config)# router eigrp Test1
switch(config-router)# address-family ipv6 unicast
switch(config-router-af)# graceful-restart
switch(config-router-af)# copy running-config startup-config
```

Adjusting the Interval Between Hello Packets and the Hold Time

You can adjust the interval between Hello messages and the hold time.

By default, Hello messages are sent every 5 seconds. The hold time is advertised in Hello messages and indicates to neighbors the length of time that they should consider the sender valid. The default hold time is three times the hello interval, or 15 seconds.

On very congested and large networks, the default hold time might not be sufficient time for all routers to receive hello packets from their neighbors. In this case, you might want to increase the hold time.

Procedure

	Command or Action	**Purpose**
Step 1	switch(config-if)# {**ip** | **ipv6**} **hello-interval eigrp** *instance-tag seconds*	Configures the hello interval for an EIGRP routing process. The instance tag can be any case-sensitive, alphanumeric string up to 20 characters. The range is from 1 to 65535 seconds. The default is 5.
Step 2	switch(config-if)# {**ip** | **ipv6**} **hold-time eigrp** *instance-tag seconds*	Configures the hold time for an EIGRP routing process. The instance tag can be any case-sensitive, alphanumeric string up to 20 characters. The range is from 1 to 65535 seconds.
Step 3	(Optional) switch(config-if)# **show ip eigrp interface detail**	Verifies the timer configuration.
Step 4	(Optional) switch(config-if)# **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

The following example shows how to change the interval between Hello packets and the hold time:

```
switch(config)# interface ethernet 1/2
switch(config-if)# ip hello-interval eigrp Test1 30
switch(config-if)# ip hold-time eigrp Test1 30
switch(config-if)# show ip eigrp interface detail
switch(config-if)# copy running-config startup-config
```

Disabling Split Horizon

You can use split horizon to block route information from being advertised by a router out of any interface from which that information originated. Split horizon usually optimizes communications among multiple routing devices, particularly when links are broken.

By default, split horizon is enabled on all interfaces.

Procedure

	Command or Action	**Purpose**
Step 1	switch(config-if)# **no** {**ip**	**ipv6**} **split-horizon eigrp** *instance-tag*	Disables split horizon.
Step 2	(Optional) switch(config-if)# **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

The following example shows how to disable split horizon on a particular interface:

```
switch(config)# interface ethernet 1/2
switch(config-if)# no ip split-horizon eigrp Test1
switch(config-if)# copy running-config startup-config
```

Enabling Wide Metrics

You can enable wide metrics in router or address family configuration mode.

Procedure

	Command or Action	**Purpose**
Step 1	switch(config-router)# **metrics version 64bit**	Enables 64-bit metric values.
Step 2	switch(config-router)# **metrics rib-scale** *value*	(Optional) Configures the scaling factor used to convert the 64-bit metric values to 32 bit in the RIB. The range is from 1 to 255. The default value is 128.
Step 3	(Optional) switch(config-router)# **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

This example shows how to enable wide metrics in router configuration mode:

```
switch# configure terminal
switch(config)# router eigrp Test1
```

```
switch(config-router)# metrics version 64bit
switch(config-router)# metrics rib-scale 128
switch(config-router)# copy running-config startup-config
```

Tuning EIGRP

You can configure optional parameters to tune EIGRP for your network. Some of the parameters can be configured in address-family configuration mode, and others can be configured in interface configuration mode.

Procedure

	Command or Action	**Purpose**
Step 1	(Optional) switch(config-router-af)# **default-information originate** [**always** | **route-map** *map-name*]	Originates or accepts the default route with prefix 0.0.0.0/0. When a route-map is supplied, the default route is originated only when the route map yields a true condition. The route-map name can be any case-sensitive, alphanumeric string up to 20 characters.
Step 2	(Optional) switch(config-router-af)# **distance** *internal external*	Configures the administrative distance for this EIGRP process. The range is from 1 to 255. The internal value sets the distance for routes learned from within the same autonomous system (the default value is 90). The external value sets the distance for routes learned from an external autonomous system (the default value is 170).
Step 3	(Optional) switch(config-router-af)# **metric max-hops** *hop-count*	Sets the maximum allowed hops for an advertised route. Routes over this maximum are advertised as unreachable. The range is from 1 to 255. The default is 100.
Step 4	(Optional) switch(config-router-af)# **metric weights** *tos k1 k2 k3 k4 k5 k6*	Adjusts the EIGRP metric or K value. EIGRP uses the following formula to determine the total metric to the network: metric = [k1 x bandwidth + (k2 x bandwidth)/(256 – load) + k3 x delay + k6 x extended attributes] x [k5/(reliability + k4)] Default values and ranges are as follows: • TOS—0. The range is from 0 to 8. • k1—1. The range is from 0 to 255. • k2—0. The range is from 0 to 255. • k3—1. The range is from 0 to 255. • k4—0. The range is from 0 to 255.

	Command or Action	**Purpose**
		• k5—0. The range is from 0 to 255.
		• k6—0. The range is from 0 to 255.
Step 5	(Optional) switch(config-router-af)# **timers active-time** {*time-limit* | **disabled**}	Sets the time the router waits in minutes (after sending a query) before declaring the route to be stuck in the active (SIA) state. The range is from 1 to 65535. The default is 3.
Step 6	switch(config-router-af)# **exit**	Exits address-family configuration mode.
Step 7	switch(config-router)# **exit**	Exits router configuration mode.
Step 8	switch(config)# **interface ethernet** *slot//port*	Enters interface configuration mode.
Step 9	(Optional) switch(config-if)# {**ip** | **ipv6**} **bandwidth eigrp** *instance-tag bandwidth*	Configures the bandwidth metric for EIGRP on an interface. The instance tag can be any case-sensitive, alphanumeric string up to 20 characters. The bandwidth range is from 1 to 2,560,000,000 Kb/s.
Step 10	(Optional) switch(config-if)# {**ip** | **ipv6**} **bandwidth-percent eigrp** *instance-tag percent*	Configures the percentage of bandwidth that EIGRP might use on an interface. The instance tag can be any case-sensitive, alphanumeric string up to 20 characters. The percent range is from 0 to 100. The default is 50.
Step 11	(Optional) switch(config-if)# **no** {**ip** | **ipv6**} **delay eigrp** *instance-tag delay*	Configures the delay metric for EIGRP on an interface. The instance tag can be any case-sensitive, alphanumeric string up to 20 characters. The delay range is from 1 to 16777215 (in tens of microseconds).
Step 12	(Optional) switch(config-if)# {**ip** | **ipv6**} **distribute-list eigrp** *instance-tag* {**prefix-list** *name* | **route-map** *map-name*} {**in** | **out**}	Configures the route filtering policy for EIGRP on this interface. The instance tag, prefix list name, and route-map name can be any case-sensitive, alphanumeric string up to 20 characters.
Step 13	(Optional) switch(config-if)# **no** {**ip** | **ipv6**} **next-hop-self eigrp** *instance-tag*	Configures EIGRP to use the received next-hop address rather than the address for this interface. The default is to use the IP address of this interface for the next-hop address. The instance tag can be any case-sensitive, alphanumeric string up to 20 characters.
Step 14	(Optional) switch(config-if)# {**ip** | **ipv6**} **offset-list eigrp** *instance-tag* {**prefix-list** *name* | **route-map** *map-name*} {**in** | **out**} *offset*	Adds an offset to incoming and outgoing metrics to routes learned by EIGRP. The instance tag, prefix list name, and route-map name can be any case-sensitive, alphanumeric string up to 20 characters.

	Command or Action	Purpose
Step 15	(Optional) switch(config-if)# {**ip** | **ipv6**} **passive-interface eigrp** *instance-tag*	Suppresses EIGRP hellos, which prevents neighbors from forming and sending routing updates on an EIGRP interface. The instance tag can be any case-sensitive, alphanumeric string up to 20 characters.
Step 16	(Optional) switch(config-if)# **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

The following example shows how to configure optional parameters in address-family configuration mode to tune EIGRP for your network:

```
switch# configure terminal
switch(config)# router eigrp Test1
switch(config-router)# address-family ipv4 unicast
switch(config-router-af)# default-information originate always
switch(config-router-af)# distance 25 100
switch(config-router-af)# metric max-hops 70
switch(config-router-af)# metric weights 0 1 3 2 1 0
switch(config-router-af)# timers active-time 200
switch(config-router-af)# copy running-config startup-config
```

The following example shows how to configure optional parameters in interface configuration mode to tune EIGRP for your network:

```
switch# configure terminal
switch(config)# interface ethernet 1/2
switch(config-if)# ip bandwidth eigrp Test1 30000
switch(config-if)# ip bandwidth-percent eigrp Test1 30
switch(config-if)# ip delay eigrp Test1 100
switch(config-if)# ip distribute-list eigrp Test1 route-map EigrpTest in
switch(config-if)# ip next-hop-self eigrp Test1
switch(config-if)# ip offset-list eigrp Test1 prefix-list EigrpList in
switch(config-if)# ip passive-interface eigrp Test1
switch(config-if)# copy running-config startup-config
```

Configuring Virtualization for EIGRP

You can configure multiple EIGRP processes in each VDC. You can also create multiple VRFs within each VDC and use the same or multiple EIGRP processes in each VRF. You assign an interface to a VRF.

Note Configure all other parameters for an interface after you configure the VRF for an interface. Configuring a VRF for an interface deletes all other configuration for that interface.

Before you begin

- Ensure that you have enabled the EIGRP feature.

- Create the VDCs and VRFs.

- Confirm that you are in the correct VDC. To change the VDC, use the **switchto vdc** command.

Procedure

	Command or Action	**Purpose**
Step 1	switch# **configure terminal**	Enters global configuration mode.
Step 2	switch(config)# **vrf context** *vrf-name*	Creates a new VRF and enters VRF configuration mode. The VRF name can be any case-sensitive, alphanumeric string up to 20 characters.
Step 3	switch(config-vrf)# **router eigrp** *instance-tag*	Creates a new EIGRP process with the configured instance tag. The instance tag can be any case-sensitive, alphanumeric string up to 20 characters.
		If you configure an instance tag that does not qualify as an AS number, you must use the **autonomous-system** command to configure the AS number explicitly or this EIGRP instance remains in the shutdown state.
Step 4	switch(config-router)# **interface ethernet** *slot//port*	Enters interface configuration mode. Use **?** to find the slot and port ranges.
Step 5	switch(config-if)# **vrf member** *vrf-name*	Adds this interface to a VRF. The VRF name can be any case-sensitive, alphanumeric string up to 20 characters.
Step 6	switch(config-if)# {**ip** | **ipv6**} **router eigrp** *instance-tag*	Adds this interface to the EIGRP process. The instance tag can be any case-sensitive, alphanumeric string up to 20 characters.
Step 7	(Optional) switch(config-if)# **copy running-config startup-config**	Saves the change persistently through reboots and restarts by copying the running configuration to the startup configuration.

Example

This example shows how to create a VRF and add an interface to the VRF:

```
switch# configure terminal
switch(config)# vrf context NewVRF
switch(config-vrf)# router eigrp Test1
switch(config-router)# interface ethernet 1/2

switch(config-if)# ip router eigrp Test1
```

```
switch(config-if)# vrf member NewVRF
switch(config-if)# copy running-config startup-config
```

Verifying the EIGRP Configuration

Use one of the following commands to verify the configuration:

Command	Purpose
show {**ip** | **ipv6**} **eigrp** [*instance-tag*]	Displays a summary of the configured EIGRP processes.
show {**ip** | **ipv6**} **eigrp** [*instance-tag*] **interfaces** [*type number*] [**brief**] [**detail**]	Displays information about all configured EIGRP interfaces.
show {**ip** | **ipv6**} **eigrp** *instance-tag* **neighbors** [*type number*] [**detail**]	Displays information about all the EIGRP neighbors. Use this command to verify the EIGRP neighbor configuration.
show {**ip** | **ipv6**} **eigrp** [*instance-tag*] **route** [*ip-prefix/length*] [**active**] [**all-links**] [**detail-links**] [**pending**] [**summary**] [**zero-successors**] [**vrf** *vrf-name*]	Displays information about all the EIGRP routes.
show {**ip** | **ipv6**} **eigrp** [*instance-tag*] **topology** [*ip-prefix/length*] [**active**] [**all-links**] [**detail-links**] [**pending**] [**summary**] [**zero-successors**] [**vrf** *vrf-name*]	Displays information about the EIGRP topology table.
show running-configuration eigrp	Displays the current running EIGRP configuration.

Displaying EIGRP Statistics

Use one of the following commands to display EIGRP statistics:

Command	Purpose
show {**ip** | **ipv6**} **eigrp** [*instance-tag*] **accounting** [**vrf** *vrf-name*]	Displays accounting statistics for EIGRP.
show {**ip** | **ipv6**} **eigrp** [*instance-tag*] **route-map statistics redistribute**	Displays redistribution statistics for EIGRP.
show {**ip** | **ipv6**} **eigrp** [*instance-tag*] **traffic** [**vrf** *vrf-name*]	Displays traffic statistics for EIGRP.

Configuration Example for EIGRP

```
switch# configure terminal
switch(config)# feature eigrp
switch(config)# interface ethernet 1/2
```

```
switch(config-if)# ip address 192.0.2.55/24
switch(config-if)# ip router eigrp Test1
switch(config)# exit
switch(config)# no shutdown
switch(config)# router eigrp Test1
switch(config-router)# router-id 192.0.2.1
```

The following example shows how to use a route map with the distribute-list command to filter routes that are dynamically received from (or advertised to) EIGRP peers. The example configures a route table with a metric of 50, a source protocol of BGP, and an autonomous system number of 45000. When the match clauses is true, the tag value of the destination routing protocol is set to 5. The route map is used to distribute incoming packets for an EIGRP process

```
switch(config)# route-map metric-range
switch(config-route-map)# match metric 50
switch(config-route-map)# match source-protocol bgp 45000
switch(config-route-map)# set tag 5
switch(config-route-map)# exit
switch(config)# router eigrp 1
switch(config-router)# exit
switch(config)# interface ethernet 1/2
switch(config-if)# ip address 172.16.0.0
switch(config-if)# ip router eigrp 1
switch(config-if)# ip distribute-list eigrp 1 route-map metric-range in
```

The following example shows how to use a route map with the redistribute command to allow routes that are redistributed from the routing table to be filtered with a route map before being admitted into an EIGRP topology table. The example shows how to configure a route map to match EIGRP routes with a metric of 110, 200, or an inclusive range of 700 to 800. When the match clause is true, the tag value of the destination routing protocol is set to 10. The route map is used to redistribute EIGRP packets.

```
switch(config)# route-map metric-eigrp
switch(config-route-map)# match metric 110 200 750 +- 50
switch(config-route-map)# set tag 10
switch(config-route-map)# exit
switch(config)# router eigrp 1
switch(config-router)# redistribute eigrp route-map metric-eigrp
switch(config-router)# exit
switch(config)# interface ethernet 1/2
switch(config-if)# ip address 172.16.0.0
switch(config-if)# ip router eigrp 1
```

Related Documents for EIGRP

Related Topic	Document Title
EIGRP CLI commands	*Cisco Nexus 7000 Series NX-OS Unicast Routing Command Reference*
VDCs and VRFs	*Cisco Nexus 7000 Series NX-OS Virtual Device Context Configuration Guide*
EIGRP overview	Introduction to EIGRP Tech Note
EIGRP FAQs	EIGRP Frequently Asked Questions

MIBs

MIBs	MIBs Link
CISCO-EIGRP-MIB	To locate and download MIBs, go to the following URL: https://cfnng.cisco.com/mibs.

Feature History for EIGRP

This table includes only the updates for those releases that have resulted in additions or changes to the feature.

Table 2: Feature History for EIGRP

Feature Name	Release	Feature Information
EIGRP	6.2(2)	Added support for route-map filtering.
EIGRP	6.2(2)	Added support for configuring the administrative distance of routes.
EIGRP	6.2(2)	Added the ability to configure all EIGRP interfaces as passive by default.
Wide metrics	5.2(1)	Added support for EIGRP wide metrics.
BFD	5.0(2)	Added support for BFD. See the *Cisco Nexus 7000 Series NX-OS Interfaces Configuration Guide* for more information.
Graceful shutdown	4.2(1)	Added support to gracefully shut down an EIGRP instance or EIGRP on an interface but preserve the EIGRP configuration.
EIGRP instance tag	4.2(1)	Changed the length to 20 characters.
Limits on redistributed routes	4.2(1)	Added support for limiting the number of redistributed routes.
EIGRP IPv6 support	4.1(2)	Added support for IPv6.
Authentication	4.0(3)	Added the ability to configure authentication within a VRF for EIGRP.
EIGRP	4.0(1)	This feature was introduced.