IP Enhanced IGRP Commands

Use the commands in this chapter to configure and monitor IP Enhanced IGRP. For configuration information and examples, refer to the "Configuring IP Enhanced IGRP" chapter of the *Network Protocols Configuration Guide, Part 1*.

auto-summary (Enhanced IGRP)

To restore the default behavior of automatic summarization of subnet routes into network-level routes, use the **auto-summary** command in router configuration mode. To disable this function and transmit subprefix routing information across classful network boundaries, use the **no** form of this command.

auto-summary

no auto-summary

Syntax Description   This command has no arguments or keywords.

Defaults   The behavior of this command is enabled by default (the software summarizes subprefixes to the classful network boundary when crossing classful network boundaries).

Command Modes   Router configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines   Route summarization reduces the amount of routing information in the routing tables.

By default, BGP does not accept subnets redistributed from IGP. To advertise and carry subnet routes in BGP, use an explicit **network** command or the **no auto-summary** command. If you disable auto-summarization and have not entered a **network** command, you will not advertise network routes for networks with subnet routes unless they contain a summary route.

IP Enhanced IGRP summary routes are given an administrative

value of 5. You cannot configure this value.

RIP Version 1 always uses automatic summarization. If you are using RIP Version 2, you can turn off automatic summarization by specifying **no auto-summary**. Disable automatic summarization if you must perform routing between disconnected subnets. When automatic summarization is off, subnets are advertised.

Examples   The following example disables automatic summarization for process eigrp 109:

```
router eigrp 109
 no auto-summary
```

Related Commands

Command	Description
ip summary-address eigrp	Configures a summary aggregate address for a specified interface.

clear ip eigrp neighbors

To delete entries from the neighbor table, use the **clear ip eigrp neighbors** command in EXEC mode.

clear ip eigrp neighbors [*ip-address | type number*]

Syntax Description

ip-address	(Optional) Address of the neighbor.
type number	(Optional) Interface type and number. Specifying these arguments removes from the neighbor table that all entries learned via this interface.

Command Modes

EXEC

Command History

Release	Modification
10.0	This command was introduced.

Examples

The following example removes the neighbor whose address is 160.20.8.3:

```
Router# clear ip eigrp neighbors 160.20.8.3
```

Related Commands

Command	Description
show ip eigrp interfaces	Displays information about interfaces configured for IP Enhanced IGRP.

default-information

To control the candidate default routing information between IGRP or Enhanced IGRP processes, use the **default-information** command in router configuration mode. To suppress IGRP or Enhanced IGRP candidate information in incoming or outbound updates, use the **no default-information in** command.

default-information {**in** | **out**} {*access-list-number* | *name*}

no default-information {**in** | **out**}

Syntax Description		
in		Allows IGRP or Enhanced IGRP exterior or default routes to be received by an IGRP process.
out		Allows IGRP or Enhanced IGRP exterior routes to be advertised in updates.
access-list-number	*name*	Number or name of an access list. It can be a number in the range 1 to 99 or an access list name.

Defaults

Normally, exterior routes are always accepted and default information is passed between IGRP or Enhanced IGRP processes when doing redistribution.

Command Modes

Router configuration

Command History

Release	Modification
10.0	This command was introduced.
11.2	The *access-list-number* and *name* arguments were added.

Usage Guidelines

The default network of 0.0.0.0 used by RIP cannot be redistributed by IGRP or Enhanced IGRP.

Examples

The following example allows IGRP exterior or default routes to be received by the IGRP process in autonomous system 23:

```
router igrp 23
 default-information in
```

The following example allows IP Enhanced IGRP exterior or default routes to be received by the IP Enhanced IGRP process in autonomous system 23:

```
router eigrp 23
 default-information in
```

default-metric (Enhanced IGRP)

To set metrics for IGRP or Enhanced IGRP, use this form of the **default-metric** command in router configuration mode. To remove the metric value and restore the default state, use the **no** form of this command.

default-metric *bandwidth delay reliability loading mtu*

no default-metric *bandwidth delay reliability loading mtu*

Syntax Description

bandwidth	Minimum bandwidth of the route in kilobits per second. It can be 0 or any positive integer.
delay	Route delay in tens of microseconds. It can be 0 or any positive number that is a multiple of 39.1 nanoseconds.
reliability	Likelihood of successful packet transmission expressed as a number between 0 and 255. The value 255 means 100 percent reliability; 0 means no reliability.
loading	Effective bandwidth of the route expressed as a number from 0 to 255 (255 is 100 percent loading).
mtu	Minimum maximum transmission unit (MTU) size of the route in bytes. It can be 0 or any positive integer.

Defaults

Only connected routes and interface static routes can be redistributed without a default metric.

Command Modes

Router configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

A default metric is required to redistribute a protocol into IGRP or Enhanced IGRP, unless you use the **redistribute** command. Automatic metric translations occur between IGRP and Enhanced IGRP. You do not need default metrics to redistributed IGRP or Enhanced IGRP into itself.

Metric defaults have been carefully set to work for a wide variety of networks. Take great care when changing these values.

Keeping the same metrics is supported only when redistributing from IGRP, Enhanced IGRP, or static routes.

Examples

The following example takes redistributed RIP metrics and translates them into IGRP metrics with values as follows: bandwidth = 1000, delay = 100, reliability = 250, loading = 100, and mtu =1500.

```
router igrp 109
 network 131.108.0.0
 redistribute rip
 default-metric 1000 100 250 100 1500
```

Related Commands

Command	Description
redistribute (IP)	Redistributes routes from one routing domain into another routing domain.

distance eigrp

To allow the use of two administrative distances—internal and external—that could be a better route to a node, use the **distance eigrp** command in router configuration mode. To reset these values to their defaults, use the **no** form of this command.

distance eigrp *internal-distance external-distance*

no distance eigrp

Syntax Description

internal-distance	Administrative distance for Enhanced IGRP internal routes. Internal routes are those that are learned from another entity within the same autonomous system. The distance can be a value from 1 to 255.
external-distance	Administrative distance for Enhanced IGRP external routes. External routes are those for which the best path is learned from a neighbor external to the autonomous system. The distance can be a value from 1 to 255.

Defaults

internal-distance: 90

external-distance: 170

Command Modes

Router configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

An administrative distance is a rating of the trustworthiness of a routing information source, such as an individual router or a group of routers. Numerically, an administrative distance is an integer between 0 and 255. In general, the higher the value, the lower the trust rating. An administrative distance of 255 means the routing information source cannot be trusted at all and should be ignored.

Use the **distance eigrp** command if another protocol is known to be able to provide a better route to a node than was actually learned via external Enhanced IGRP or if some internal routes should really be preferred by Enhanced IGRP.

Table 29 lists the default administrative distances.

Table 29   Default Administrative Distances

Route Source	Default Distance
Connected interface	0
Static route	1
Enhanced IGRP summary route	5

Table 29   Default Administrative Distances (continued)

Route Source	Default Distance
External BGP	20
Internal Enhanced IGRP	90
IGRP	100
OSPF	110
IS-IS	115
RIP	120
EGP	140
EIGRP external route	170
Internal BGP	200
Unknown	255

To display the default administrative distance for a specified routing process, use the **show ip protocols** EXEC command.

Examples

In the following example, the **router eigrp** global configuration command sets up Enhanced IGRP routing in autonomous system number 109. The **network** router configuration commands specify Enhanced IGRP routing on networks 192.168.7.0 and 172.16.0.0. The **distance eigrp** command sets the administrative distance of all EIGRP internal routes to 80 and all EIGRP external routes to 130.

```
Router(config)# router eigrp 109
Router(router-config)# network 192.168.7.0
Router(router-config)# network 172.16.0.0
Router(router-config)# distance eigrp 80 130
```

Note   You cannot set the administrative distance in EIGRP against certain routes or sources, as you can with other protocols. The command does not work this way with EIGRP.

Related Commands

Command	Description
show ip protocols	Displays the parameters and current state of the active routing protocol process.

eigrp log-neighbor-changes

To enable the logging of changes in Enhanced IGRP neighbor adjacencies, use the **eigrp log-neighbor-change** command in router configuration mode. To disable the logging of changes in Enhanced IGRP neighbor adjacencies, use the **no** form of this command.

eigrp log-neighbor-changes

no eigrp log-neighbor-changes

Syntax Description This command has not arguments or keywords.

Defaults No adjacency changes are logged.

Command Modes Router configuration

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines The configuration of this command enables the logging of neighbor adjacency changes to monitor the stability of the routing system and to help detect problems.

Examples The following configuration will log neighbor changes for Enhanced IGRP process 209:

```
router eigrp 209
 eigrp log-neighbor-changes
```

ip authentication key-chain eigrp

To enable authentication of IP Enhanced IGRP packets, use the **ip authentication key-chain eigrp** command in interface configuration mode. To disable such authentication, use the **no** form of this command.

ip authentication key-chain eigrp *autonomous-system key-chain*

no ip authentication key-chain eigrp *autonomous-system key-chain*

Syntax Description

autonomous-system	Autonomous system to which the authentication applies.
key-chain	Name of the authentication key chain.

Defaults

No authentication is provided for Enhanced IGRP packets.

Command Modes

Interface configuration

Command History

Release	Modification
11.2 F	This command was introduced.

Examples

The following example applies authentication to autonomous system 2 and identifies a key chain named SPORTS:

```
ip authentication key-chain eigrp 2 SPORTS
```

Related Commands

Command	Description
accept-lifetime	Sets the time period during which the authentication key on a key chain is received as valid.
ip authentication mode eigrp	Specifies the type of authentication used in IP Enhanced IGRP packets.
key	Identifies an authentication key on a key chain.
key chain	Enables authentication of routing protocols.
key-string (authentication)	Specifies the authentication string for a key.
send-lifetime	Sets the time period during which an authentication key on a key chain is valid to be sent.

ip authentication mode eigrp

To specify the type of authentication used in IP Enhanced IGRP packets, use the **ip authentication mode eigrp** command in interface configuration mode. To disable that type of authentication, use the **no** form of this command.

> **ip authentication mode eigrp** *autonomous-system* **md5**

> **no ip authentication mode eigrp** *autonomous-system* **md5**

Syntax Description

autonomous-system	Autonomous system number.
md5	Keyed MD5 authentication.

Defaults

No authentication is provided for IP Enhanced IGRP packets.

Command Modes

Interface configuration

Command History

Release	Modification
11.2 F	This command was introduced.

Usage Guidelines

Configure authentication to prevent unapproved sources from introducing unauthorized or false routing messages. When authentication is configured, an MD5 keyed digest is added to each Enhanced IGRP packet in the specified autonomous system.

Examples

The following example configures the interface to use MD5 authentication in Enhanced IGRP packets in autonomous system 10:

```
ip authentication mode eigrp 10 md5
```

Related Commands

Command	Description
accept-lifetime	Sets the time period during which the authentication key on a key chain is received as valid.
ip authentication key-chain eigrp	Enables authentication of IP Enhanced IGRP packets.
key	Identifies an authentication key on a key chain.
key chain	Enables authentication of routing protocols.
key-string (authentication)	Specifies the authentication string for a key.
send-lifetime	Sets the time period during which an authentication key on a key chain is valid to be sent.

ip bandwidth-percent eigrp

To configure the percentage of bandwidth that may be used by Enhanced IGRP on an interface, use the **ip bandwidth-percent eigrp** command in interface configuration mode. To restore the default value, use the **no** form of this command.

ip bandwidth-percent eigrp *as-number percent*

no ip bandwidth-percent eigrp *as-number percent*

Syntax Description

as-number	Autonomous system number.
percent	Percent of bandwidth that Enhanced IGRP may use.

Defaults

50 percent

Command Modes

Interface configuration

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

Enhanced IGRP will use up to 50 percent of the bandwidth of a link, as defined by the **bandwidth** interface configuration command. This command may be used if some other fraction of the bandwidth is desired. Note that values greater than 100 percent may be configured; this may be useful if the bandwidth is set artificially low for other reasons.

Examples

The following example allows Enhanced IGRP to use up to 75 percent (42 kbps) of a 56-kbps serial link in autonomous system 209:

```
interface serial 0
 bandwidth 56
 ip bandwidth-percent eigrp 209 75
```

Related Commands

Command	Description
bandwidth	Sets a bandwidth value for an interface.

ip hello-interval eigrp

To configure the hello interval for the Enhanced IGRP routing process designated by an autonomous system number, use the **ip hello-interval eigrp** command in interface configuration mode. To restore the default value, use the **no** form of this command.

ip hello-interval eigrp *autonomous-system-number seconds*

no ip hello-interval eigrp *autonomous-system-number seconds*

Syntax Description

autonomous-system-number	Autonomous system number.
seconds	Hello interval, in seconds.

Defaults

For low-speed, NBMA networks: 60 seconds

For all other networks: 5 seconds

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

The default of 60 seconds applies only to low-speed, nonbroadcast, multiaccess (NBMA) media. Low speed is considered to be a rate of T1 or slower, as specified with the **bandwidth** interface configuration command. Note that for the purposes of Enhanced IGRP, Frame Relay and SMDS networks may or may not be considered to be NBMA. These networks are considered NBMA if the interface has not been configured to use physical multicasting; otherwise, they are considered not to be NBMA.

Examples

The following example sets the hello interval for Ethernet interface 0 to 10 seconds:

```
interface ethernet 0
 ip hello-interval eigrp 109 10
```

Related Commands

Command	Description
bandwidth	Sets a bandwidth value for an interface.
ip hold-time eigrp	Configures the hold time for a particular IP Enhanced IGRP routing process designated by the autonomous system number.

ip hold-time eigrp

To configure the hold time for a particular Enhanced IGRP routing process designated by the autonomous system number, use the **ip hold-time eigrp** command in interface configuration mode. To restore the default value, use the **no** form of this command.

ip hold-time eigrp *autonomous-system-number seconds*

no ip hold-time eigrp *autonomous-system-number seconds*

Syntax Description

autonomous-system-number	Autonomous system number.
seconds	Hold time, in seconds.

Defaults

For low-speed, NBMA networks: 180 seconds

For all other networks: 15 seconds

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

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

We recommend that the hold time be at least three times the hello interval. If a router does not receive a hello packet within the specified hold time, routes through this router are considered unavailable.

Increasing the hold time delays route convergence across the network.

The default of 180 seconds hold time and 60 seconds hello interval apply only to low-speed, nonbroadcast, multiaccess (NBMA) media. Low speed is considered to be a rate of T1 or slower, as specified with the **bandwidth** interface configuration command.

Examples

The following example sets the hold time for Ethernet interface 0 to 40 seconds:

```
interface ethernet 0
 ip hold-time eigrp 109 40
```

Related Commands

Command	Description
bandwidth	Sets a bandwidth value for an interface.
ip hello-interval eigrp	Configures the hello interval for the IP Enhanced IGRP routing process designated by an autonomous system number.

ip split-horizon eigrp

To enable Enhanced IGRP split horizon, use the **ip split-horizon eigrp** command in interface configuration mode. To disable split horizon, use the **no** form of this command.

ip split-horizon eigrp *autonomous-system-number*

no ip split-horizon eigrp *autonomous-system-number*

Syntax Description

autonomous-system-number	Autonomous system number.

Defaults

The behavior of this command is enabled by default.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

For networks that include links over X.25 PSNs, you can use the **neighbor** router configuration command to defeat the split horizon feature. As an alternative, you can explicitly specify the **no ip split-horizon eigrp** command in your configuration. However, if you do so, you must similarly disable split horizon for all routers and access servers in any relevant multicast groups on that network.

Note   In general, it is recommended that you not change the default state of split horizon unless you are certain that your application requires the change in order to properly advertise routes. Remember that if split horizon is disabled on a serial interface and that interface is attached to a packet-switched network, you must disable split horizon for all routers and access servers in any relevant multicast groups on that network.

Examples

The following example disables split horizon on a serial link connected to an X.25 network:

```
interface serial 0
 encapsulation x25
 no ip split-horizon eigrp 101
```

Related Commands

Command	Description
ip split-horizon (IGRP)	Enables the split horizon mechanism.
neighbor (IGRP)	Defines a neighboring router with which to exchange routing information.

ip summary-address eigrp

To configure a summary aggregate address for a specified interface, use the **ip summary-address eigrp** command in interface configuration mode. To disable a configuration, use the **no** form of this command.

ip summary-address eigrp *autonomous-system-number address mask*

no ip summary-address eigrp *autonomous-system-number address mask*

Syntax Description

autonomous-system-number	Autonomous system number.
address	IP summary aggregate address to apply to an interface.
mask	Subnet mask.

Defaults

No summary aggregate addresses are predefined.

Command Modes

Interface configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

Enhanced IGRP summary routes are given an administrative distance value of 5. You cannot configure this value.

Examples

The following example sets the IP summary aggregate address for Ethernet interface 0:

```
interface ethernet 0
 ip summary-address eigrp 109 192.1.0.0 255.255.0.0
```

Related Commands

Command	Description
auto-summary (Enhanced IGRP)	Restores the default behavior of automatic summarization of subnet routes into network-level routes.

metric weights (Enhanced IGRP)

To allow the tuning of the IGRP or Enhanced IGRP metric calculations, use the **metric weights** command in router configuration mode. To reset the values to their defaults, use the **no** form of this command.

metric weights *tos k1 k2 k3 k4 k5*

no metric weights

Syntax Description

tos	Type of service must always be zero.
k1k2 k3 k4 k5	Constants that convert an IGRP or EIGRP metric vector into a scalar quantity.

Defaults

tos: 0

k1: 1

k2: 0

k3: 1

k4: 0

k5: 0

Command Modes

Router configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

Use this command to alter the default behavior of IGRP routing and metric computation and allow the tuning of the IGRP metric calculation for a particular type of service (TOS).

If k5 equals 0, the composite IGRP or Enhanced IGRP metric is computed according to the following formula:

```
metric = [k1 * bandwidth + (k2 * bandwidth)/(256 - load) + k3 * delay]
```

If k5 does not equal zero, an additional operation is done:

```
metric = metric * [k5 / (reliability + k4)]
```

Bandwidth is inverse minimum bandwidth of the path in bits per second scaled by a factor of 2.56×10^{12}. The range is from a 1200-bps line to 10 terabits per second.

Delay is in units of 10 microseconds. This gives a range of 10 microseconds to 168 seconds. A delay of all ones indicates that the network is unreachable.

The delay parameter is stored in a 32-bit field, in increments of 39.1 nanoseconds. This gives a range of 1 (39.1 nanoseconds) to hexadecimal FFFFFFFF (decimal 4,294,967,040 nanoseconds). A delay of all ones (that is, a delay of hexadecimal FFFFFFFF) indicates that the network is unreachable.

Table 30 lists the default values used for several common media.

Table 30   Bandwidth Values by Media Type

Media Type	Delay	Bandwidth
Satellite	5120 (2 seconds)	5120 (500 Mbits)
Ethernet	25600 (1 milliseconds [ms])	256000 (10 Mbits)
1.544 Mbps	512000 (20,000 ms)	1,657,856 bits
64 kbps	512000 (20,000 ms)	40,000,000 bits
56 kbps	512000 (20,000 ms)	45,714,176 bits
10 kbps	512000 (20,000 ms)	256,000,000 bits
1 kbps	512000 (20,000 ms)	2,560,000,000 bits

Reliability is given as a fraction of 255. That is, 255 is 100 percent reliability or a perfectly stable link.

Load is given as a fraction of 255. A load of 255 indicates a completely saturated link.

Examples   The following example sets the metric weights to slightly different values than the defaults:

```
router igrp 109
 network 131.108.0.0
 metric weights 0 2 0 2 0 0
```

Related Commands

Command	Description
bandwidth	Sets a bandwidth value for an interface.
delay	Sets a delay value for an interface.
metric holddown	Keeps new IGRP routing information from being used for a certain period of time.
metric maximum-hops	Causes the IP routing software to advertise as unreachable those routes with a hop count higher than is specified by the command (IGRP only).

network (Enhanced IGRP)

To specify a list of networks for the Enhanced IGRP routing process, use this form of the **network** command in router configuration mode. To remove an entry, use the **no** form of this command.

> **network** *network-number*

> **no network** *network-number*

Syntax Description

network-number	IP address of the directly connected networks.

Defaults

No networks are specified.

Command Modes

Router configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

The network number specified must not contain any subnet information. There is no limit to the number of **network** commands you can use on the router.

IGRP or Enhanced IGRP sends updates to the interfaces in the specified network(s). Also, if an interface's network is not specified, it will not be advertised in any IGRP or Enhanced IGRP update.

The network mask can be as specific as the interface mask.

Examples

The following example configures a router for IGRP and assigns autonomous system 109. The **network** commands indicate the networks directly connected to the router.

```
router igrp 109
 network 131.108.0.0
 network 192.31.7.0
```

Related Commands

Command	Description
router eigrp	Configures the IP Enhanced IGRP routing process.
router igrp	Configures the IGRP routing process.

offset-list (Enhanced IGRP)

To add an offset to incoming and outgoing metrics to routes learned via Enhanced IGRP, use the **offset-list** command in router configuration mode. To remove an offset list, use the **no** form of this command.

offset-list {*access-list-number* | *name*} {**in** | **out**} *offset* [*type number*]

no offset-list {*access-list-number* | *name*} {**in** | **out**} *offset* [*type number*]

Syntax Description

access-list-number | *name*	Standard access list number or name to be applied. Access list number 0 indicates all access lists. If *offset* is 0, no action is taken. For IGRP, the offset is added to the delay component only.
in	Applies the access list to incoming metrics.
out	Applies the access list to outgoing metrics.
offset	Positive offset to be applied to metrics for networks matching the access list. If the offset is 0, no action is taken.
type	(Optional) Interface type to which the offset-list is applied.
number	(Optional) Interface number to which the offset-list is applied.

Defaults

This command is disabled by default.

Command Modes

Router configuration

Command History

Release	Modification
10.0	This command was introduced.
10.3	The *type* and *number* arguments were added.
11.2	The *name* argument was added.

Usage Guidelines

The offset value is added to the routing metric. An offset-list with an interface type and interface number is considered extended and takes precedence over an offset-list that is not extended. Therefore, if an entry passes the extended offset-list and the normal offset-list, the extended offset-list's offset is added to the metric.

Examples

In the following example, the router applies an offset of 10 to the router's delay component only to access list 21:

```
offset-list 21 out 10
```

In the following example, the router applies an offset of 10 to routes learned from Ethernet interface 0:

```
offset-list 21 in 10 ethernet 0
```

router eigrp

To configure the Enhanced IGRP routing process, use the **router eigrp** command in global configuration mode. To shut down a routing process, use the **no** form of this command.

router eigrp *autonomous-system*

no router eigrp *autonomous-system*

Syntax Description

autonomous-system	Autonomous system number that identifies the routes to the other Enhanced IGRP routers. It is also used to tag the routing information.

Defaults

This command is disabled by default.

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.

Examples

The following example configures an Enhanced IGRP routing process and assigns process number 109:

```
router eigrp 109
```

Related Commands

Command	Description
network (Enhanced IGRP)	Specifies a list of networks for the IP Enhanced IGRP routing process.

set metric (IP Enhanced IGRP)

To set the metric value for IP Enhanced IGRP in a route-map, use the **set metric** route-map configuration command. To return to the default metric value, use the **no** form of this command.

set metric *bandwidth delay reliability loading mtu*

no set metric *bandwidth delay reliability loading mtu*

Syntax Description

bandwidth	Metric value or IGRP bandwidth of the route in kilobits per second. It can be in the range 0 to 4294967295.
delay	Route delay in tens of microseconds. It can be in the range from 0 to 4294967295.
reliability	Likelihood of successful packet transmission expressed as a number between 0 and 255. The value 255 means 100 percent reliability; 0 means no reliability.
loading	Effective bandwidth of the route expressed as a number from 0 to 255 (255 is 100 percent loading).
mtu	Minimum maximum transmission unit (MTU) size of the route in bytes. It can be in the range 0 to 4294967295.

Defaults

No metric will be set in the route-map.

Command Modes

Route-map configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

We recommend you consult your Cisco technical support representative before changing the default value.

Use the **route-map** global configuration command, and the **match** and **set** route-map configuration commands, to define the conditions for redistributing routes from one routing protocol into another. Each **route-map** command has a list of **match** and **set** commands associated with it. The **match** commands specify the *match criteria*—the conditions under which redistribution is allowed for the current **route-map command**. The **set** commands specify the *set actions*—the particular redistribution actions to perform if the criteria enforced by the **match** commands are met. The **no route-map** command deletes the route map.

The **set** route-map configuration commands specify the redistribution *set actions* to be performed when all of a route map's match criteria are met. When all match criteria are met, all set actions are performed.

Examples   The following example sets the bandwidth to 10,000, the delay to 10, the reliability to 255, the loading to 1, and the MTU to 1500:

```
set metric 10000 10 255 1 1500
```

show ip eigrp interfaces

To display information about interfaces configured for Enhanced IGRP, use the **show ip eigrp interfaces** command in EXEC mode.

show ip eigrp interfaces [*type number*] [*as-number*]

Syntax Description

type	(Optional) Interface type.
number	(Optional) Interface number.
as-number	(Optional) Autonomous system number.

Command Modes

EXEC

Command History

Release	Modification
11.2	This command was introduced.

Usage Guidelines

Use the **show ip eigrp interfaces** command to determine on which interfaces Enhanced IGRP is active, and to find out information about Enhanced IGRP relating to those interfaces.

If an interface is specified, only that interface is displayed. Otherwise, all interfaces on which Enhanced IGRP is running are displayed.

If an autonomous system is specified, only the routing process for the specified autonomous system is displayed. Otherwise, all Enhanced IGRP processes are displayed.

Examples

The following is sample output from the **show ip eigrp interfaces** command:

```
Router# show ip eigrp interfaces

IP EIGRP interfaces for process 109

                    Xmit Queue    Mean    Pacing Time   Multicast    Pending
Interface   Peers   Un/Reliable   SRTT    Un/Reliable   Flow Timer   Routes
Di0         0       0/0           0       11/434        0            0
Et0         1       0/0           337     0/10          0            0
SE0:1.16    1       0/0           10      1/63          103          0
Tu0         1       0/0           330     0/16          0            0
```

Table 31 describes the fields in the display.

Table 31   showip eigrp interfaces Field Descriptions

Field	Description
Interface	Interface over which Enhanced IGRP is configured.
Peers	Number of directly connected Enhanced IGRP neighbors.
Xmit Queue Un/Reliable	Number of packets remaining in the Unreliable and Reliable transmit queues.
Mean SRTT	Mean SRTT in seconds.
Pacing Time Un/Reliable	Pacing time used to determine when Enhanced IGRP packets should be sent out the interface (Unreliable and Reliable packets).
Multicast Flow Timer	Maximum number of seconds in which router will send multicast Enhanced IGRP packets.
Pending Routes	Number of routes in the packets sitting in the transmit queue waiting to be sent.

Related Commands	Command	Description
	show ip eigrp neighbors	Displays the neighbors discovered by IP Enhanced IGRP.

show ip eigrp neighbors

To display the neighbors discovered by Enhanced IGRP, use the **show ip eigrp neighbors** command in EXEC mode.

show ip eigrp neighbors [*type number*]

Syntax Description

type	(Optional) Interface type.
number	(Optional) Interface number.

Command Modes

EXEC

Command History

Release	Modification
10.3	This command was introduced.

Usage Guidelines

Use the **show ip eigrp neighbors** command to determine when neighbors become active and inactive. It is also useful for debugging certain types of transport problems.

Examples

The following is sample output from the **show ip eigrp neighbors** command:

```
Router# show ip eigrp neighbors

IP-EIGRP Neighbors for process 77
Address            Interface       Holdtime Uptime    Q      Seq  SRTT  RTO
                                   (secs)   (h:m:s)   Count  Num  (ms)  (ms)
160.89.81.28       Ethernet1       13       0:00:41   0      11   4     20
160.89.80.28       Ethernet0       14       0:02:01   0      10   12    24
160.89.80.31       Ethernet0       12       0:02:02   0      4    5     20
```

Table 32 explains the fields in the output.

Table 32   show ip eigrp neighbors Field Descriptions

Field	Description
process 77	Autonomous system number specified in the **router** configuration command.
Address	IP address of the enhanced IGRP peer.
Interface	Interface on which the router is receiving hello packets from the peer.
Holdtime	Length of time, in seconds, that the Cisco IOS software will wait to hear from the peer before declaring it down. If the peer is using the default hold time, this number will be less than 15. If the peer configures a nondefault hold time, it will be reflected here.
Uptime	Elapsed time (in hours:minutes: seconds) since the local router first heard from this neighbor.

Table 32   show ip eigrp neighbors Field Descriptions (continued)

Field	Description
Q Count	Number of Enhanced IGRP packets (update, query, and reply) that the software is waiting to send.
Seq Num	Sequence number of the last update, query, or reply packet that was received from this neighbor.
SRTT	Smooth round-trip time. This is the number of milliseconds it takes for an Enhanced IGRP packet to be sent to this neighbor and for the local router to receive an acknowledgment of that packet.
RTO	Retransmission timeout, in milliseconds. This is the amount of time the software waits before retransmitting a packet from the retransmission queue to a neighbor.

show ip eigrp topology

To display entries in the Enhanced IGRP (EIGRP) topology table, use the **show ip eigrp topology** command in EXEC mode.

> **show ip eigrp topology** [*as-number* | [[*ip-address*] *mask*]] [**active** | **all-links** | **pending** | **summary** | **zero-successors**]

Syntax Description

as-number	(Optional) Autonomous system number.
ip-address	(Optional) IP address. When specified with a mask, a detailed description of the entry is provided.
mask	(Optional) Subnet mask.
active	(Optional) Displays only active entries in the EIGRP topology table.
all-links	(Optional) Displays all entries in the EIGRP topology table.
pending	(Optional) Displays all entries in the EIGRP topology table that are waiting for an update from a neighbor or are waiting to reply to a neighbor.
summary	(Optional) Displays a summary of the EIGRP topology table.
zero-successors	(Optional) Displays available routes in the EIGRP topology table.

Command Modes

EXEC

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

The **show ip eigrp topology** command can be used without any keywords or arguments. If this command is used without any keywords or arguments, then only routes that are feasible successors are displayed. The **show ip eigrp topology** command can be used to determine Diffusing Update Algorithm (DUAL) states and to debug possible DUAL problems.

Examples

The following is sample output from the **show ip eigrp topology** command:

```
Router# show ip eigrp topology

IP-EIGRP Topology Table for process 77

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

P 172.16.90.0 255.255.255.0, 2 successors, FD is 0
        via 172.16.80.28 (46251776/46226176), Ethernet0
        via 172.16.81.28 (46251776/46226176), Ethernet1
        via 172.16.80.31 (46277376/46251776), Serial0
P 172.16.81.0 255.255.255.0, 1 successors, FD is 307200
        via Connected, Ethernet1
```

```
          via 172.16.81.28 (307200/281600), Ethernet1
          via 172.16.80.28 (307200/281600), Ethernet0
          via 172.16.80.31 (332800/307200), Serial0
```

Table 33 describes the significant fields shown in the display.

Table 33   show ip eigrp topology Field Descriptions

Field	Description
Codes	State of this topology table entry. Passive and Active refer to the EIGRP state with respect to this destination; Update, Query, and Reply refer to the type of packet that is being sent.
P – Passive	No EIGRP computations are being performed for this destination.
A – Active	EIGRP computations are being performed for this destination.
U – Update	Indicates that an update packet was sent to this destination.
Q – Query	Indicates that a query packet was sent to this destination.
R – Reply	Indicates that a reply packet was sent to this destination.
r – Reply status	Flag that is set after the software has sent a query and is waiting for a reply.
172.16.90.0	Destination IP network number.
255.255.255.0	Destination subnet mask.
successors	Number of successors. This number corresponds to the number of next hops in the IP routing table. If "successors" is capitalized, then the route or next hop is in a transition state.
FD	Feasible distance. The feasible distance is the best metric to reach the destination or the best metric that was known when the route went active. This value is used in the feasibility condition check. If the reported distance of the router (the metric after the slash) is less than the feasible distance, the feasibility condition is met and that path is a feasible successor. Once the software determines it has a feasible successor, it need not send a query for that destination.
replies	Number of replies that are still outstanding (have not been received) with respect to this destination. This information appears only when the destination is in Active state.
state	Exact EIGRP state that this destination is in. It can be the number 0, 1, 2, or 3. This information appears only when the destination is in the Active state.
via	IP address of the peer that told the software about this destination. The first N of these entries, where *n* is the number of successors, are the current successors. The remaining entries on the list are feasible successors.
(46251776/46226176)	The first number is the EIGRP metric that represents the cost to the destination. The second number is the EIGRP metric that this peer advertised.
Ethernet0	Interface from which this information was learned.
Serial0	Interface from which this information was learned.

show ip eigrp traffic

To display the number of Enhanced IGRP packets sent and received, use the **show ip eigrp traffic** command in EXEC mode.

> **show ip eigrp traffic** [*autonomous-system-number*]

Syntax Description

autonomous-system-number	(Optional) Autonomous system number.

Command Modes

EXEC

Command History

Release	Modification
10.0	This command was introduced.

Examples

The following is sample output from the **show ip eigrp traffic** command:

```
Router# show ip eigrp traffic

IP-EIGRP Traffic Statistics for process 77
  Hellos sent/received: 218/205
  Updates sent/received: 7/23
  Queries sent/received: 2/0
  Replies sent/received: 0/2
  Acks sent/received: 21/14
```

Table 34 describes the fields that might be shown in the display.

Table 34   show ip eigrp traffic Field Descriptions

Field	Description
process 77	Autonomous system number specified in the **ip router** command.
Hellos sent/received	Number of hello packets that were sent and received.
Updates sent/received	Number of update packets that were sent and received.
Queries sent/received	Number of query packets that were sent and received.
Replies sent/received	Number of reply packets that were sent and received.
Acks sent/received	Number of acknowledgment packets that were sent and received.

timers active-time

To adjust routing wait time, use the **timers active-time** command in router configuration mode. To disable this function, use the **no** form of the command.

timers active-time [*time-limit* | **disabled**]

no timers active-time

Syntax Description

time-limit	EIGRP active-time limit (in minutes). The time range is from 1to 4294967295 minutes.
disabled	Disables the timers and permits the routing wait time to remain active indefinitely.

Defaults

This command is disabled by default.

Command Modes

Router configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

In EIGRP, there are timers that control the time the router waits (after sending a query) before declaring the route stuck in active (SIA).

Examples

In the following example, the routing wait time is 200 minutes on the specified route:

```
router igrp 5
 timers active-time 200
```

In the following example, the routing wait time is indefinite on the specified route:

```
router igrp 5
 timers active-time disabled
```

Related Commands

Command	Description
show ip eigrp topology	Displays the Enhanced IGRP topology table.

traffic-share

To control how traffic is distributed among routes when there are multiple routes for the same destination network that have different costs, use the **traffic-share** command in router configuration mode. To disable this function, use the **no** form of the command.

traffic-share {**balanced** | **min**}

no traffic-share {**balanced** | **min**}

Syntax Description

balanced	Distributes traffic proportionately to the ratios of the metrics.
min	Uses routes that have minimum costs.

Defaults

Traffic is distributed proportionately to the ratios of the metrics.

Command Modes

Router configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

This command applies to IGRP and Enhanced IGRP routing protocols only. With the default setting, routes that have higher metrics represent less-preferable routes and get less traffic. Configuring **traffic-share min** causes the Cisco IOS software to only divide traffic among the routes with the best metric. Other routes will remain in the routing table, but will receive no traffic.

Examples

In the following example, only routes of minimum cost will be used:

```
router igrp 5
 traffic-share min
 variance 1
```

Related Commands

Command	Description
variance (Enhanced IGRP)	Controls load balancing in an EIGRP and IGRP internetwork.

variance (Enhanced IGRP)

To control load balancing in an Enhanced IGRP-based internetwork, use the **variance** command in router configuration mode. To reset the variance to the default value, use the **no** form of this command.

variance *multiplier*

no variance

Syntax Description

multiplier	Metric value used for load balancing. It can be a value from 1 to 128. The default is 1, which means equal-cost load balancing.

Defaults

1 (equal-cost load balancing)

Command Modes

Router configuration

Command History

Release	Modification
10.0	This command was introduced.

Usage Guidelines

Setting a variance value lets the Cisco IOS software determine the feasibility of a potential route. A route is feasible if the next router in the path is closer to the destination than the current router and if the metric for the entire path is within the variance. Only paths that are feasible can be used for load balancing and included in the routing table.

If the following two conditions are met, the route is deemed feasible and can be added to the routing table:

1. The local best metric must be greater than the metric learned from the next router.

2. The multiplier times the local best metric for the destination must be greater than or equal to the metric through the next router.

Examples

The following example sets a variance value of 4:

```
router igrp 109
 variance 4
```

■ variance (Enhanced IGRP)