CHAPTER 6

IP Enhanced IGRP Commands

Use the commands in this chapter to configure and monitor the Internet Protocol (IP) enhanced IGRP on IP networks. For IP enhanced IGRP routing protocol configuration information and examples, refer to the "Configuring IP Enhanced IGRP" chapter in this publication. For a description of other IP configuration commands, refer to the *Router Products Configuration Guide* and the *Router Products Command Reference* publications. For historical background and a technical overview of IP, see the *Internetworking Technology Overview* publication.

auto-summary

To configure automatic summarization of subnet routes into network level routes, use the **auto-summary** router configuration command. To disable this feature, use the **no** form of this command.

auto-summary
no auto-summary

Syntax Description

This command has no arguments or keywords.

Default

Enabled

Command Mode

Router configuration

Usage Guidelines

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

Example

The following example configures automatic summarization and sets the IP summary aggregate address for interface Ethernet 0:

```
router eigrp 109
auto-summary
```

Related Command

ip summary-address eigrp

clear ip eigrp neighbors

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

clear ip eigrp neighbors [*ip-address* | *interface*]

Syntax Description

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

Command Mode

EXEC

Example

The following example removes the neighbor whose address is 160.20.8.3:

```
clear ip eigrp neighbors 160.20.8.3
```

Related Command

show ip eigrp neighbors

default-information allowed

To control the redistribution of routing information between IP enhanced IGRP processes, use the **default-information allowed** router configuration command. To suppress IP enhanced IGRP exterior or default routes when they are received by an IP enhanced IGRP process, use the **no default-information allowed in** command. To suppress IP enhanced IGRP exterior routes in updates, use the **no default-information allowed out** command.

default-information allowed {**in** | **out**} [**route-map** *map-tag*]
no default-information allowed {**in** | **out**} [**route-map** *map-tag*]

Syntax Description

in	Allows IP enhanced IGRP exterior or default routes to be received by an IP enhanced IGRP process.
out	Allows IP enhanced IGRP exterior routes to be advertised in updates.
route-map *map-tag*	(Optional) Indicates that the route map should be interrogated to filter the importation of routes from this source routing protocol to the current routing protocol. The argument *map-tag* is the identifier of a configured route map. If you specify **route-map** without specifying *map-tag*, no routes are imported. If you omit **route-map**, all routes are redistributed.

Default

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

Command Mode

Router configuration

Usage Guidelines

The default network of 0.0.0.0 used by RIP cannot be redistributed by IP enhanced IGRP.

Example

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 allowed in
```

default-metric (BGP, EGP, Enhanced IGRP, IGRP, and RIP)

To set default metric values for the RIP, EGP, BGP, IGRP, and enhanced IGRP routing protocols, use this form of the **default-metric** router configuration command. To remove the metric value and return to the default state, use the **no** form of this command.

default-metric *number*
no default-metric *number*

Syntax Description

number	Default metric value appropriate for the specified routing protocol

Default

Built-in, automatic metric translations, as appropriate for each routing protocol

Command Mode

Router configuration

Usage Guidelines

The **default-metric** command is used in conjunction with the **redistribute** router configuration command to cause the current routing protocol to use the same metric value for all redistributed routes. A default metric helps solve the problem of redistributing routes with incompatible metrics. Whenever metrics do not convert, using a default metric provides a reasonable substitute and enables the redistribution to proceed.

Example

The following example shows a router in autonomous system 109 using both the RIP and the IGRP routing protocols. The example advertises IGRP-derived routes using the RIP protocol and assigns the IGRP-derived routes a RIP metric of 10.

```
router rip
default-metric 10
redistribute igrp 109
```

Related Command

redistribute

default-metric (Enhanced IGRP only)

To set metrics for IP enhanced IGRP, use this form of the **default-metric** router configuration command. To remove the metric value and return to 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, and the value 0 means no reliability.
loading	Effective bandwidth of the route in kilobits per second. It can be a number from 0 to 255.
mtu	Minimum maximum transmission unit (MTU) size of the route in bytes. It can be 0 or any positive integer.

Default

Disabled

Command Mode

Router configuration

Usage Guidelines

IP enhanced IGRP metric defaults have been carefully set to work for a wide variety of networks. Take great care in changing these values.

Automatic metric translations for enhanced IGRP are supported only when redistributing from IGRP, enhanced IGRP, or static routes.

Example

The following example takes redistributed RIP metrics and translates them into IP enhanced IGRP metrics with values as follows: bandwidth of 1000 kbps, delay of 100 microseconds, reliability of 250, loading of 100 kbps, and MTU of 1500 bytes.

```
router eigrp 109
network 131.108.0.0
redistribute rip
default-metric 1000 10 250 100 1500
```

Related Command

redistribute

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** router configuration command. 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 IP enhanced IGRP internal routes. Internal routes are those that are learned from another entity within the same autonomous system. It can be a value from 1 to 255.
external-distance	Administrative distance for IP enhanced IGRP external routes. External routes are those for which the best path is learned from a neighbor external to the autonomous system. It can be a value from 1 to 255.

Default

internal-distance: 90
external-distance: 170

Command Mode

Router configuration

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 IP enhanced IGRP or if some internal routes should really be preferred by IP enhanced IGRP.

Table 6-1 lists the default administrative distances.

Table 6-1 Default Administrative Distances

Route Source	Default Distance
Connected interface	0
Static route	1
Enhanced IGRP summary route	5
External BGP	20
Internal enhanced IGRP	90
IGRP	100
OSPF	110
IS-IS	115
RIP	120
EGP	140
External enhanced IGRP	170
Internal BGP	200
Unknown	255

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

Example

In the following example, the **router eigrp** global configuration command sets up IP enhanced IGRP routing in autonomous system number 109. The **network** router configuration commands specify IP enhanced IGRP routing on networks 192.31.7.0 and 128.88.0.0. The first **distance** router configuration command sets the default administrative distance to 255, which instructs the router to ignore all routing updates from routers for which an explicit distance has not been set. The second **distance** router configuration command sets the administrative distance for all routers on the Class C network 192.31.7.0 to 90. The third **distance** router configuration command sets the administrative distance for the router with the address 128.88.1.3 to 120.

```
router eigrp 109
network 192.31.7.0
network 128.88.0.0
distance 255
!
! use caution when executing the next two commands!
!
distance 90 192.31.7.0 0.0.0.255
distance 120 128.88.1.3 0.0.0.0
```

Related Command

show ip protocols

distribute-list in

To filter networks received in updates, use the **distribute-list in** router configuration command. To change or cancel the filter, use the **no** form of this command.

distribute-list *access-list-number* **in** [*interface-name*]
no distribute-list *access-list-number* **in** [*interface-name*]

Syntax Description

access-list-number	Standard IP access list number. The list defines which networks are to be received and which are to be suppressed in routing updates.
in	Applies the access list to incoming routing updates.
interface-name	(Optional) Interface on which the access list should be applied to incoming updates. If no interface is specified, the access list will be applied to all incoming updates.

Default

Disabled

Command Mode

Router configuration

Example

In the following example, the IP enhanced IGRP routing process accepts only two networks—network 0.0.0.0 and network 131.108.0.0:

```
access-list 1 permit 0.0.0.0
access-list 1 permit 131.108.0.0
access-list 1 deny 0.0.0.0 255.255.255.255
router eigrp
network 131.108.0.0
distribute-list 1 in
```

Related Commands

A dagger (†) indicates that the command is documented in the *Router Products Command Reference* publication.

access-list †
distribute-list out
redistribute

distribute-list out

To suppress networks from being advertised in updates, use the **distribute-list out** router configuration command. To cancel this function, use the **no** form of this command.

distribute-list *access-list-number* **out** [*interface-name* | *routing-process* | *autonomous-system-number*]
no distribute-list *access-list-number* **out** [*interface-name* | *routing-process* | *autonomous-system-number*]

Syntax Description

access-list-number	Standard IP access list number. The list defines which networks are to be sent and which are to be suppressed in routing updates.
out	Applies the access list to outgoing routing updates.
interface-name	(Optional) Name of a particular interface.
routing-process	(Optional) Name of a particular routing process, or the keyword **static** or **connected**.
autonomous-system-number	Autonomous system number.

Default

Disabled

Command Mode

Router configuration

Usage Guidelines

When redistributing networks, you can specify a routing process name as an optional trailing argument to the **distribute-list out** command. This causes the access list to be applied only to those routes derived from the specified routing process. After the process-specific access list is applied, any access list you specify by a **distribute-list out** command without a process name argument are applied. Addresses not specified in the **distribute-list out** command are not advertised in outgoing routing updates.

Examples

In the following example, the IP enhanced IGRP routing process advertises only one network—network 131.108.0.0.

```
access-list 1 permit 131.108.0.0
access-list 1 deny 0.0.0.0 255.255.255.255
router eigrp
network 131.108.0.0
distribute-list 1 out
```

In the following example, access list 1 is applied to outgoing routing updates and IS-IS is enabled on interface Ethernet 0. Only network 131.131.101.0 will be advertised in outgoing IS-IS routing updates.

```
router isis
redistribute ospf 109
distribute-list 1 out
interface Ethernet 0
ip router isis
access-list 1 permit 131.131.101.0 0.0.0.255
```

Related Commands

A dagger (†) indicates that the command is documented in the *Router Products Command Reference* publication.

access-list †
distribute-list in
redistribute

ip hello-interval eigrp

To configure the hello interval for the IP enhanced IGRP routing process designated by an autonomous system number, use the **ip hello-interval eigrp** interface configuration command. 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

Default

5 seconds

Command Mode

Interface configuration

Example

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

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

Related Command

ip hold-time eigrp

ip hold-time eigrp

To configure the hold time for the IP enhanced IGRP routing process designated by the autonomous system number, use the **ip hold-time eigrp** interface configuration command. 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

Default

15 seconds

Command Mode

Interface configuration

Usage Guidelines

The hold time is three times the hello interval. If the current value for the hold time is less than two times the hello interval, the hold time is reset.

If a router does not receive a hello packet within the specified hold time, routes through the router are considered available.

Increasing the hold time delays route convergence across the network.

Example

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

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

Related Command

ip hello-interval eigrp

ip split-horizon eigrp

To enable IP enhanced IGRP split horizon, use the **ip split-horizon eigrp** interface configuration command. 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

Default

Enabled

Command Mode

Interface configuration

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 in any relevant multicast groups on that network.

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 in any relevant multicast groups on that network.

Example

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
```

Related Command

A dagger (†) indicates that the command is documented in the *Router Products Command Reference* publication.

ip split-horizon †
neighbor †

ip summary-address eigrp

To configure a summary aggregate address for a specified interface, use the **ip summary-address eigrp** interface configuration command. 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

Default

No summary aggregate addresses are predefined.

Command Mode

Interface configuration

Usage Guidelines

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

Example

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 Command

auto-summary

match interface

To distribute any routes that have their next hop out one of the interfaces specified, use the **match interface** route-map configuration command. To remove the **match interface** entry, use the **no** form of this command.

match interface *type unit...type unit*
no match interface *type unit...type unit*

Syntax Description

name unit	Interface name and number

Default

No match interfaces are defined.

Command Mode

Route-map configuration

Usage Guidelines

Use the **route-map** global configuration command and the route-map configuration commands **match** and **set** 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**. 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 **match** route-map configuration command has multiple formats. The **match** commands may be given in any order, and all **match** commands must "pass" to cause the route to be redistributed according to the set actions given with the **set** commands. The **no** forms of the **match** commands remove the specified match criteria.

A route map can have several parts. Any route that does not match at least one **match** clause relating to a **route-map** command will be ignored; that is, the route will not be advertised for outbound route maps and will not be accepted for inbound route maps. If you want o modify only some data, you must configure second route-map section with an explicit match specified.

Example

In the following example, routes that have their next hop out Ethernet interface 0 are distributed:

```
route-map name
match interface ethernet 0
```

Related Commands

route-map
set

match ip address

To distribute any routes that have a destination network number address that is permitted by a standard access list, use the **match ip address** route-map configuration command. To remove the **match ip address** entry, use the **no** form of this command.

match ip address *access-list-number...access-list-number*
no match ip address *access-list-number...access-list-number*

Syntax Description

access-list-number	Number of an access list. It can be an integer from 1 through 99.

Default

No access list numbers are specified.

Command Mode

Route-map configuration

Usage Guidelines

Use the **route-map** global configuration command and the route-map configuration commands **match** and **set** 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**. 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 **match** route-map configuration command has multiple formats. The **match** commands may be given in any order, and all **match** commands must “pass” to cause the route to be redistributed according to the set actions given with the **set** commands. The **no** forms of the **match** commands remove the specified match criteria.

A route map can have several parts. Any route that does not match at least one **match** clause relating to a **route-map** command will be ignored; that is, the route will not be advertised for outbound route maps and will not be accepted for inbound route maps. If you want o modify only some data, you must configure second route-map section with an explicit match specified.

Example

In the following example, routes that have addresses specified by access list numbers 5 and 80 are distributed:

```
route-map name
match ip address 5 80
```

Related Commands

route-map
set

match ip next-hop

To redistribute any routes that have a next-hop router address passed by one of the access lists specified, use the **match ip next-hop** route-map configuration command. To remove the next-hop entry, use the **no** form of this command.

match ip next-hop *access-list-number...access-list-number*
no match ip next-hop *access-list-number...access-list-number*

Syntax Description

access-list-number	Number of an access list. It can be an integer from 1 through 99.

Default

Routes are distributed freely, without being required to match a next-hop address.

Command Mode

Route-map configuration

Usage Guidelines

Use the **route-map** global configuration command and the route-map configuration commands **match** and **set** 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**. 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 **match** route-map configuration command has multiple formats. The **match** commands may be given in any order, and all **match** commands must "pass" to cause the route to be redistributed according to the set actions given with the **set** commands. The **no** forms of the **match** commands remove the specified match criteria.

A route map can have several parts. Any route that does not match at least one **match** clause relating to a **route-map** command will be ignored; that is, the route will not be advertised for outbound route maps and will not be accepted for inbound route maps. If you want o modify only some data, you must configure second route-map section with an explicit match specified.

Example

In the following example, routes that have a next-hop router address passed by access list 5 or 80 are distributed:

```
route-map name
match ip next-hop 5 80
```

Related Commands

route-map
set

match ip route-source

To redistribute routes that have been advertised by routers at the address specified by the access lists, use the **match ip route-source** route-map configuration command. To remove the route-source entry, use the **no** form of this command.

match ip route-source *access-list-number...access-list-number*
no match ip route-source *access-list-number...access-list-number*

Syntax Description

access-list-number	Number of an access list. It can be an integer from 1 through 99.

Default

No filtering on route source.

Command Mode

Route-map configuration

Usage Guidelines

Use the **route-map** global configuration command and the route-map configuration commands **match** and **set** 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**. 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 **match** route-map configuration command has multiple formats. The **match** commands may be given in any order, and all **match** commands must “pass” to cause the route to be redistributed according to the set actions given with the **set** commands. The **no** forms of the **match** commands remove the specified match criteria.

A route map can have several parts. Any route that does not match at least one **match** clause relating to a **route-map** command will be ignored; that is, the route will not be advertised for outbound route maps and will not be accepted for inbound route maps. If you want o modify only some data, you must configure second route-map section with an explicit match specified.

There are situations in which a route’s next hop and source router address are not the same.

Example

In the following example, routes that have been advertised by routers at the addresses specified by access lists 5 and 80 are distributed:

```
route-map name
match ip route-source 5 80
```

Related Commands

route-map
set

match metric

To redistribute routes with the metric specified, use the **match metric** route-map configuration command. To remove the entry, use the **no** form of this command.

match metric *metric-value*
no match metric *metric-value*

Syntax Description

metric-value	Route metric, which can be an IGRP five-part metric. It is a metric value from 0 through 4294967295.

Default

No filtering on a metric value.

Command Mode

Route-map configuration

Usage Guidelines

Use the **route-map** global configuration command and the route-map configuration commands **match** and **set** 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**. 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 **match** route-map configuration command has multiple formats. The **match** commands may be given in any order, and all **match** commands must "pass" to cause the route to be redistributed according to the set actions given with the **set** commands. The **no** forms of the **match** commands remove the specified match criteria.

A route map can have several parts. Any route that does not match at least one **match** clause relating to a **route-map** command will be ignored; that is, the route will not be advertised for outbound route maps and will not be accepted for inbound route maps. If you want o modify only some data, you must configure second route-map section with an explicit match specified.

Example

In the following example, routes with the metric 5 are redistributed:

```
route-map name
match metric 5
```

Related Commands

route-map
set

match route-type

To redistribute routes of the specified type, use the **match route-type** route-map configuration command. To remove the route-type entry, use the **no** form of this command.

match route-type {**internal** | **external** | **level-1** | **level-2**}
no match route-type {**internal** | **external** | **level-1** | **level-2**}

Syntax Description

internal	OSPF intra-area and interarea routes or enhanced IGRP internal routes
external	OSPF external type-1 or type-2 routes, or enhanced IGRP external routes
level-1	IS-IS Level 1 routes
level-2	IS-IS Level 2 routes

Default

Disabled

Command Mode

Route-map configuration

Usage Guidelines

Use the **route-map** global configuration command and the route-map configuration commands **match** and **set** 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**. 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 **match** route-map configuration command has multiple formats. The **match** commands may be given in any order, and all **match** commands must “pass” to cause the route to be redistributed according to the set actions given with the **set** commands. The **no** forms of the **match** commands remove the specified match criteria.

A route map can have several parts. Any route that does not match at least one **match** clause relating to a **route-map** command will be ignored; that is, the route will not be advertised for outbound route maps and will not be accepted for inbound route maps. If you want o modify only some data, you must configure second route-map section with an explicit match specified.

Example

In the following example, internal routes are redistributed:

```
route-map name
match route-type internal
```

Related Commands

route-map
set

match tag

To redistribute routes in the routing table that match the specified tags, use the **match tag** command. To remove the tag entry, use the **no** form of this command.

match tag *tag-value...tag-value*
no match tag *tag-value...tag-value*

Syntax Description

tag-value	List of one or more route tag values. Each can be an integer from 0 through 4294967295.

Default

No match tag values are defined.

Command Mode

Route-map configuration

Usage Guidelines

Use the **route-map** global configuration command and the route-map configuration commands **match** and **set** 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**. 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 **match** route-map configuration command has multiple formats. The **match** commands may be given in any order, and all **match** commands must "pass" to cause the route to be redistributed according to the set actions given with the **set** commands. The **no** forms of the **match** commands remove the specified match criteria.

A route map can have several parts. Any route that does not match at least one **match** clause relating to a **route-map** command will be ignored; that is, the route will not be advertised for outbound route maps and will not be accepted for inbound route maps. If you want o modify only some data, you must configure second route-map section with an explicit match specified.

Example

In the following example, routes stored in the routing table with tag 5 are redistributed:

```
route-map name
match tag 5
```

Related Commands

route-map
set

metric weights

To allow the tuning of the IP enhanced IGRP metric calculations, use the **metric weights** router configuration command. Use the **no metric weights** command to reset the values to their defaults.

metric weights *tos k1 k2 k3 k4 k5*
no metric weights

Syntax Description

tos	Type of Service. Currently, it must always be 0.
k1, k2, k3, k4, k5	Constants that convert an IP enhanced IGRP metric vector into a scalar quantity.

Defaults

k1: 1
k2: 0
k3: 1
k4: 0
k5: 0

Command Mode

Router configuration

Usage Guidelines

Use the **metric weights** command to alter the default behavior of IP enhanced IGRP routing and metric computation and allow the tuning of the IP enhanced IGRP metric calculation for a particular Type of Service (TOS).

If *k5* equals 0, the composite IP 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.

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 6-2 lists the default values used for several common media.

Table 6-2 Bandwidth Values by Media Type

Media Type	Delay	Bandwidth
Satellite	5120 (2 seconds)	5120 (500 Mbits)
Ethernet	25600 (1 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.

Example

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

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

Related Commands

A dagger (†) indicates that the command is documented in the *Router Products Command Reference* publication.

bandwidth †
delay †

network

To specify a list of networks for the IP enhanced IGRP routing process, use the **network** router configuration command. To remove a network from the list, use the **no** form of this command.

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

Syntax Description

network-number	IP address of the directly connected network

Default

Disabled

Command Mode

Router configuration

Usage Guidelines

The network number must not contain any subnet information. You can specify multiple **network** commands.

IP enhanced IGRP sends updates to the interfaces in the specified network(s). Also, if you do not specify an interface's network, it will not be advertised in any IP enhanced IGRP updates.

Example

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

```
router eigrp 109
network 131.108.0.0
network 192.31.7.0
```

Related Command

router eigrp

offset-list

To add or remove a positive offset to incoming and outgoing metrics for networks matching a specified access list, use the **offset-list** router configuration command. To remove an offset list, use the **no** form of this command.

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

Syntax Description

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 zero, no action is taken.
access-list-number	(Optional) Access list to be applied. If omitted, the value of *offset* is applied to all metrics. If *offset* is zero, no action is taken.

Default

Disabled

Command Mode

Router configuration

Usage Guidelines

The offset value is added to the routing metric.

Examples

The following example applies an offset of 10 to the router's delay component for all outgoing metrics:

```
offset-list out 10
```

In the following example, the router applies the same offset in the previous example only to access list 121:

```
offset-list out 10 121
```

passive-interface

To disable sending routing updates on an interface, use the **passive-interface** router configuration command. To reenable the sending of routing updates, use the **no** form of this command.

passive-interface *type unit*
no passive-interface *type unit*

Syntax Description

type unit	Interface type and number

Default

Disabled

Command Mode

Router configuration

Usage Guidelines

If you disable the sending of routing updates on an interface, the particular subnet will continue to be advertised to other interfaces, and updates from other routers on that interface continue to be received and processed.

IP enhanced IGRP is disabled on an interface that is configured as passive although it advertises the route.

Example

The following example sends IP enhanced IGRP updates to all interfaces on network 131.108.0.0 except Ethernet interface 1:

```
router eigrp 109
network 131.108.0.0
passive-interface ethernet 1
```

redistribute

To redistribute routes from one routing domain into another, use the **redistribute** router configuration command. To disable this feature, use the **no** form of this command.

redistribute *protocol autonomous-system-number* [**route-map** *map-tag*]
no redistribute *protocol autonomous-system-number* [**route-map** *map-tag*]

Syntax Description

protocol	Source protocol from which routes are being redistributed. It can be one of the following keywords: **bgp**, **egp**, **igrp**, **eigrp, isis**, **ospf**, **static** [**ip**], **connected**, or **rip**. Use the keyword **static** [**ip**] to redistribute IP static routes when redistributing into IS-IS. The keyword **connected** refers to routes that are established automatically by virtue of having an IP interface. For routing protocols such as OSPF and IS-IS, these routes are redistributed as external to the autonomous system.
autonomous-system-number	For **bgp**, **egp**, **igrp** or **eigrp**, this is a 16-bit, decimal autonomous system number. For **isis**, this is an optional tag that names a routing process. You can specify only one IS-IS process per router. You then use the name when configuring routing. For **ospf**, this is an OSPF process ID from which routes are to be redistributed. This identifies the routing process. It is a nonzero decimal number. For **rip**, *autonomous-system-number* is not needed.
route-map *map-tag*	(Optional) Identifies a route map to use to filter the importing of routes from this source routing protocol to the current routing protocol. The argument *map-tag* is the identifier of a configured route map. If you specify **route-map** with no map tags, no routes are imported. If you omit **route-map**, all routes are redistributed.

Default

See “Syntax Description” for the various defaults.

Command Mode

Router configuration

Usage Guidelines

Changing or disabling one keyword will not affect the state of other keywords.

A router receiving a link-state protocol (LSP) with an internal metric will consider the cost of the route from itself to the redistributing router plus the advertised cost to reach the destination. An external metric considers only the advertised metric to reach the destination.

Redistributed routing information should always be filtered by the **distribute-list out** router configuration command. This ensures that only those routes intended by the administrator are passed along to the receiving routing protocol.

Whenever you use the **redistribute** or the **default-information allowed** router configuration commands to redistribute routes into an OSPF routing domain, the router automatically becomes an autonomous system boundary router. However, an autonomous system boundary router does not, by default, generate a default route into the OSPF routing domain.

The only connected routes affected by this **redistribute** command are the routes not specified by the **network** command.

You cannot use the **default-metric** router configuration command to affect the metric used to advertise connected routes.

Examples

The following example configuration causes IP enhanced IGRP routes to be redistributed into an OSPF domain:

```
router ospf 110
redistribute eigrp...
```

The following example illustrates the use of this form of the **redistribute** command, with the **match** keyword and its options enabled:

```
router igrp 108
redistribute ospf 109 match internal external 1 external 2
```

The following example causes the specified IP enhanced IGRP process routes to be redistributed into an OSPF domain. The IP enhanced IGRP-derived metric will be remapped to 100 and RIP routes to 200.

```
router ospf 109
redistribute eigrp 108 metric 100 subnets
redistribute rip metric 200 subnets
```

Related Commands

A dagger (†) indicates that the command is documented in the *Router Products Command Reference* publication.

default-information allowed †
default-metric
distribute-list out
network †
route-map

route-map

To define the conditions for redistributing routes from one routing protocol into another, use the **route-map** global configuration command and the route-map configuration commands **match** and **set**. To delete an entry, use the **no route-map** command.

route-map *map-tag* [[**permit** | **deny**] | [*sequence-number*]]
no route-map *map-tag* [[**permit** | **deny**] | [*sequence-number*]]

Syntax Description

map-tag	Defines a meaningful name for the route map. The **redistribute** router configuration command uses this name to reference this route map. Multiple route maps can share the same map tag name.
permit	(Optional) If the match criteria are met for this route map, and **permit** is specified, the route is redistributed as controlled by the set actions. If the match criteria are not met, and **permit** is specified, the next route map with the same map-tag is tested. If a route passes none of the match criteria for the set of route maps sharing the same name, it is not redistributed by that set.
deny	(Optional) If the match criteria are met for the route map, and **deny** is specified, the route is not redistributed, and no further route maps sharing the same map tag name will be examined.
sequence-number	(Optional) Number that indicates the position a new route map is to have in the list of route maps already configured with the same name. If given with the **no** form of this command, it specifies the position of the route map that should be deleted.

Default

No default available.

Command Mode

Global configuration

Usage Guidelines

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**. 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.

Use route maps when you wish to have detailed control over how routes are redistributed between routing processes. The destination routing protocol is the one you specify with the **router** global configuration command. The source routing protocol is the one you specify with the **redistribute** router configuration command. See the following example as an illustration of how route maps are configured.

Example

The following example redistributes all OSPF routes into IGRP:

```
router igrp 109
redistribute ospf 110
default metric 1000 100 255 1 1500
```

Related Commands

A dagger (†) indicates that the command is documented in the *Router Products Command Reference* publication.

match
redistribute
set
show route-map †

router eigrp

To configure the IP enhanced IGRP routing process, use the **router eigrp** global configuration command. To shut down the routing process on the specified autonomous system, use the **no** form of this command.

router eigrp *autonomous-system-number*
no router eigrp *autonomous-system-number*

Syntax Description

autonomous-system-number	Number of the autonomous system. It identifies the routes to the other IP enhanced IGRP routers and is used to tag the routing information.

Default

Disabled

Command Mode

Global configuration

Example

The following example shows how to configure an IP enhanced IGRP routing process and assign autonomous system number 109:

```
router eigrp 109
```

Related Command

network

set level

To indicate where to import routes, use the **set level** route-map configuration command. To delete an entry, use the **no** form of this command.

set level {**level-1** | **level-2** | **level-1-2** | **stub-area** | **backbone**}
no set level {**level-1** | **level-2** | **level-1-2** | **stub-area** | **backbone**}

Syntax Description

level-1	Import into a Level-1 area
level-2	Import into Level-2 sub-domain
level-1-2	Import into Level-1 and Level-2
stub-area	Import into OSPF NSSA area
backbone	Import into OSPF backbone area

Default

Disabled

Command Mode

Route-map configuration

Usage Guidelines

Use the **route-map** global configuration command and the route-map configuration commands **match** and **set** 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**. 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.

Example

In the following example, routes are imported into the Level 1 area:

```
route-map name
set level level-l
```

Related Commands

route-map
match

set metric

To set the metric value for the destination routing protocol, use the **set metric** route-map configuration command. To return to the default metric value, use the **no** form of this command.

set metric *metric-value*
no set metric *metric-value*

Syntax Description

metric-value	Metric value or IGRP bandwidth in kilobits per second. It can be an integer from 0 through 294967295.

Default

Default metric value.

Command Mode

Route-map configuration

Usage Guidelines

Use the **route-map** global configuration command and the route-map configuration commands **match** and **set** 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**. 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.

Example

In the following example, the metric value for the destination routing protocol is set to 100:

```
route-map set-metric
set metric 100
```

Related Commands

match
route-map

set metric-type

To set the metric type for the destination routing protocol, use the **set metric-type** route-map command. To return to the default, use the **no** form of this command.

set metric-type {**internal** | **external** | **type-1** | **type-2**}
no set metric-type {**internal** | **external** | **type-1** | **type-2**}

Syntax Description

internal	IS-IS internal metric
external	IS-IS external metric
type-1	OSPF external type 1 metric
type-2	OSPF external type 2 metric

Default

Disabled

Command Mode

Route-map configuration

Usage Guidelines

Use the **route-map** global configuration command and the route-map configuration commands **match** and **set** 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**. 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.

Example

In the following example, the metric type of the destination protocol is set to OSPF external type 1:

```
route-map map-type
set metric-type type-1
```

Related Commands

match
route-map

set tag

To set a tag value of the destination routing protocol, use the **set tag** route-map configuration command. To delete the entry, use the **no** form of this command.

set tag *tag-value*
no set tag *tag-value*

Syntax Description

tag-value	Name for the tag. Integer from 0 through 4294967295.

Default

If not specified, the default action is to forward the tag in the source routing protocol onto the new destination protocol.

Command Mode

Route-map configuration

Usage Guidelines

Use the **route-map** global configuration command and the route-map configuration commands **match** and **set** 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**. 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.

Example

In the following example, the tag value of the destination routing protocol is set to 5:

```
route-map tag
set tag 5
```

Related Commands

match
route-map

show ip eigrp neighbors

To display the neighbors discovered by IP enhanced IGRP, use the **show ip eigrp neighbors** EXEC command.

show ip eigrp neighbors [*type unit*]

Syntax Description

interface unit	(Optional) Interface name and number

Command Mode

EXEC

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.

Sample Display

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 6-3 explains the fields in the output.

Table 6-3 Show IP EIGRP Neighbors Field Descriptions

Field	Description
process 77	Autonomous system number specified in the **ipx 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 router 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, and seconds, since the local router first heard from this neighbor.
Q Count	Number of IP enhanced IGRP packets (Update, Query, and Reply) that the router is waiting to send.

Field	Description
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 IP 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 router waits before retransmitting a packet from the retransmission queue to a neighbor.

show ip eigrp topology

To display the IP enhanced IGRP topology table, use the **show ip eigrp topology** EXEC command.

show ip eigrp topology [*autonomous-system-number* | [[*ip-address*]*mask*]]

Syntax Description

autonomous-system-number	(Optional) Autonomous system number.
ip-address	(Optional) When specified with a mask, a detailed description of the entry is provided.
mask	(Optional) Subnet mask.

Command Mode

EXEC

Usage Guidelines

Use the **show ip eigrp topology** command to determine DUAL states and to debug possible DUAL problems.

Sample Display

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 160.89.90.0 255.255.255.0, 2 successors, FD is 0
          via 160.89.80.28 (46251776/46226176), Ethernet0
          via 160.89.81.28 (46251776/46226176), Ethernet1
          via 160.89.80.31 (46277376/46251776), Ethernet0
P 160.89.81.0 255.255.255.0, 1 successors, FD is 307200
          via Connected, Ethernet1
          via 160.89.81.28 (307200/281600), Ethernet1
          via 160.89.80.28 (307200/281600), Ethernet0
          via 160.89.80.31 (332800/307200), Ethernet0
```

Table 6-4 explains the fields in the output.

Table 6-4 Show IP EIGRP Topology Field Descriptions

Field	Description
Codes	State of this topology table entry. Passive and Active refer to the enhanced IGRP state with respect to this destination; Update, Query, and Reply refer to the type of packet that is being sent.
P – Passive	No enhanced IGRP computations are being performed for this destination.
A – Active	Enhanced IGRP computations are being performed for this destination.
U – Update	Indicates that an update packet was sent to this destination.

Field	Description
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 when after the router has sent a query and is waiting for a reply.
160.89.90.0 and so on	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.
FD	Feasible distance. This value is used in the feasibility condition check. If the neighbor's reported distance (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 router determines it has a feasible successor, it does not have to 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 enhanced IGRP state that this destination is in. It can be the number 0, 1, 2, or 3. This information appears only when the destination is Active.
via	IP address of the peer who told the router 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 enhanced IGRP metric that represents the cost to the destination. The second number is the enhanced IGRP metric that this peer advertised.
Ethernet0	Interface from which this information was learned.

show ip eigrp traffic

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

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

Syntax Description

autonomous-system-number	(Optional) Autonomous system number

Command Mode

EXEC

Sample Display

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 6-5 describes the fields that might be shown in the display.

Table 6-5 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.

show ip protocols

To display the parameters and current state of the active routing protocol process, use the **show ip protocols** EXEC command.

show ip protocols

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Usage Guidelines

The **show ip protocols** command displays information that is useful in debugging routing operations. Information in the Routing Information Sources field of the **show ip protocols** output can help you identify a router suspected of delivering bad routing information.

Sample Display

The following is sample output from the **show ip protocols** command, showing IP enhanced IGRP processes:

```
Router# show ip protocols
Routing Protocol is "eigrp 77"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: eigrp 77
  Automatic network summarization is in effect
  Routing for Networks:
    160.89.0.0
  Routing Information Sources:
    Gateway         Distance      Last Update
    160.89.81.28          90      0:02:36
    160.89.80.28          90      0:03:04
    160.89.80.31          90      0:03:04
  Distance: internal 90 external 170
```

Table 6-6 describes the fields that might be shown in the display.

Table 6-6 Show IP Protocols Field Descriptions

Field	Description
Routing Protocol is “eigrp 77”	Name and autonomous system number of the currently running routing protocol.
Outgoing update filter list for all interfaces...	Indicates whether a filter for outgoing routing updates has been specified with the **distribute-list out** command.
Outgoing update filter list for all interfaces...	Indicates whether a filter for outgoing routing updates has been specified with the **distribute-list in** command.
Redistributing: eigrp 77	Indicates whether route redistribution has been enabled with the **redistribute** command.
Automatic network summarization...	Indicates whether route summarization has been enabled with the **auto-summary** command.
Routing for Networks:	Networks that the routing process is currently injecting routes for.
Routing Information Sources:	Lists all the routing sources that the router is using to build its routing table. The following is displayed for each source: IP address, administrative distance, and time the last update was received from this source.
Distance: internal 90 external 170	Internal and external distances of the router. Internal distance is the degree of preference given to IP enhanced IGRP internal routes. External distance is the degree of preference given to IP enhanced IGRP external routes.

show ip route

To display the current state of the routing table, use the **show ip route** EXEC command.

show ip route [*ip-address* [*mask*] | *protocol* [*process-id*]]

Syntax Description

address	(Optional) Address about which to display routing information
mask	(Optional) Subnet mask of the subnet about which to display routing information
protocol	(Optional) Particular routing protocol, or the keyword **static** or **connected**
process-id	(Optional) Identifier of the particular routing protocol process

Command Mode

EXEC

Sample Display

The following is a sample display from the **show ip route** command when entered without an address:

```
Router# show ip route
Codes: I - IGRP derived, R - RIP derived, O - OSPF derived
       C - connected, S - static, E - EGP derived, B - BGP derived
       i - IS-IS derived, D - EIGRP derived
       * - candidate default route, IA - OSPF inter area route
       E1 - OSPF external type 1 route, E2 - OSPF external type 2 route
       L1 - IS-IS level-1 route, L2 - IS-IS level-2 route
       EX - EIGRP external route

Gateway of last resort is not set

     160.89.0.0 is variably subnetted, 6 subnets, 2 masks
D       160.89.90.0 255.255.255.0
           [90/46251776] via 160.89.80.28, 0:04:18, Ethernet0
           [90/46251776] via 160.89.81.28, 0:04:18, Ethernet1
C       160.89.81.0 255.255.255.0 is directly connected, Ethernet1
C       160.89.80.0 255.255.255.0 is directly connected, Ethernet0
D       160.89.82.0 255.255.255.0
           [90/307200] via 160.89.80.31, 0:04:18, Ethernet0
C       160.89.62.0 255.255.255.0 is directly connected, Serial0
S       160.89.0.0 255.255.0.0 [1/0] via 160.89.80.240
```

Table 6-7 describes the fields shown in the display.

Table 6-7 Show IP Route Field Descriptions

Field	Description
Codes	Codes defining how the route was learned and the type of route.
I	Route learned via IGRP.
R	Route learned from a RIP update.
O	Route learned from an OSPF update.
C	Directly connected network.
S	Statically defined route via the **ip route** command.
E	Route learned from EGP.
B	Route learned from BGP.
i	Router learned from IS-IS.
D	Route leaved via IP enhanced IGRP.
*	Candidate default route.
IA	OSPF interarea route.
E1	OSPF external type 1 route.
E2	OSPF external type 2 route.
L1	IS-IS Level 1 route.
L2	IS-IS Level 2 route.
EX	External enhanced IGRP route.
Gateway of last resort not set	Indicates whether a gateway of last resort has been specified.
160.89.0.0	Address of the remote network.
[90/46251776]	The first number is the administrative distance of the information source. The second number is the metric for the route.
via 160.89.80.28	Address of the next router to the remote network.
0:04:18	Last time in hours:minutes:seconds that the route was updated.
Ethernet0	Interface through which the network can be reached.

Related Commands

A dagger (†) indicates that the command is documented in the *Router Products Command Reference* publication.

show interfaces tunnel †
show ip route summary

show ip route summary

To display the current state of the routing table, use the **show ip route summary** EXEC command.

show ip route summary

Syntax Description

This command has no arguments or keywords.

Command Mode

EXEC

Sample Display

The following is sample output from the **show ip route summary** command:

```
Router# show ip route summary
Route Source    Networks    Subnets     Overhead    Memory (bytes)
connected       0           3           126         360
static          1           2           126         360
igrp 109        747         12          31878       91080
internal        3                                   360
Total           751         17          32130       92160
router#
```

Table 6-8 describes the fields shown in the display.

Table 6-8 Show IP Route Summary Field Descriptions

Field	Description
Route Source	Routing protocol name, or the keyword **connected**, **static** or **internal**. Internal indicates those routes that are in the routing table that are not owned by any routing protocol.
Networks	Number of Class A, B, or C networks that are present in the routing table for each route source.
Subnets	Number of subnets that are present in the routing table for each route source, including host routes.
Overhead	Any additional memory involved in allocating the routes for the particular route source other than the memory specified in the Memory field.
Memory	Number of bytes allocated to maintain all the routes for the particular route source.

Related Command

show ip route

variance

To control load balancing in an IP enhanced IGRP-based internetwork, use the **variance** router configuration command. 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.

Default

1 (equal-cost load balancing)

Command Mode

Router configuration

Usage Guidelines

Setting a variance value lets the router 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.

Example

The following example sets a variance value of 4:

```
router eigrp 109
variance 4
```