IGRP Commands

Use the commands in this chapter to configure and monitor Internet Gateway Routing Protocol (IGRP). For IGRP configuration information and examples, refer to the "Configuring IGRP" chapter of the *Network Protocols Configuration Guide, Part 1*.

default-information

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

Default

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

Command Mode

Router configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0. The *access-list-number* and *name* arguments first appeared in Cisco IOS Release 11.2.

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 (IGRP and Enhanced IGRP only)

To set metrics for IGRP or Enhanced IGRP, use this form of the **default-metric** router configuration command. 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.

Default

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

Command Mode

Router configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

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 in changing these values.

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

Example

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

You can use the master indexes or search online to find documentation of related commands.

redistribute

ip split-horizon

To enable the split horizon mechanism, use the **ip split-horizon** interface configuration command. To disable the split horizon mechanism, use the **no** form of this command.

ip split-horizon
no ip split-horizon

Syntax Description

This command has no arguments or keywords.

Default

Varies with media

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

For all interfaces except those for which either Frame Relay or SMDS encapsulation is enabled, the default condition for this command is **ip split-horizon**; in other words, the split horizon feature is active. If the interface configuration includes either the **encapsulation frame-relay** or **encapsulation smds** commands, then the default is for split horizon to be disabled. Split horizon is not disabled by default for interfaces using any of the X.25 encapsulations.

Note For networks that include links over X.25 PSNs, the **neighbor** router configuration command can be used to defeat the split horizon feature. You can as an alternative *explicitly* specify the **no ip split-horizon** 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.

If split horizon has been disabled on an interface and you wish to enable it, use the **ip split-horizon** command to restore the split horizon mechanism.

Note In general, changing the state of the default for the **ip split-horizon** command is not recommended, unless you are certain that your application requires a change in order to properly advertise routes. 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.

Example

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

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

Related Commands

You can use the master indexes or search online to find documentation of related commands.

neighbor

metric holddown

To keep new IGRP routing information from being used for a certain period of time, use the **metric holddown** router configuration command. To disable this feature, use the **no** form of this command.

metric holddown
no metric holddown

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Router configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

Holddown keeps new routing information from being used for a certain period of time. This can prevent routing loops caused by slow convergence. It is sometimes advantageous to disable holddown to increase the network's ability to quickly respond to topology changes; this command provides this function.

Use the **metric holddown** command if other routers or access servers within the IGRP autonomous system are not configured with **no metric holddown**. If all routers are not configured the same way, you increase the possibility of routing loops.

Example

The following example disables metric holddown:

```
router igrp 15
 network 131.108.0.0
 network 192.31.7.0
 no metric holddown
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

metric maximum-hops
metric weights
timers basic

metric maximum-hops

To have the IP routing software to advertise as unreachable those routes with a hop count higher than is specified by the command (IGRP only), use the **metric maximum-hops** router configuration command. To reset the value to the default, use the **no** form of this command.

metric maximum-hops *hops*
no metric maximum-hops *hops*

Syntax Description

hops	Maximum hop count (in decimal). The default value is 100 hops; the maximum number of hops that can be specified is 255.

Default

100 hops

Command Mode

Router configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

This command provides a safety mechanism that breaks any potential *count-to-infinity* problems. It causes the IP routing software to advertise as unreachable routes with a hop count greater than the value assigned to the *hops* argument.

Example

In the following example, a router in autonomous system 71 attached to network 15.0.0.0 wants a maximum hop count of 200, doubling the default. The network administrators decided to do this because they have a complex WAN that can generate a large hop count under normal (nonlooping) operations.

```
router igrp 71
 network 15.0.0.0
 metric maximum-hops 200
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

metric holddown
metric weights

metric weights

To allow the tuning of the IGRP or Enhanced IGRP metric calculations, use the **metric weights** router configuration command. 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. Currently, it must always be zero.
k1–k5	Constants that convert an IGRP or Enhanced IGRP metric vector into a scalar quantity.

Defaults

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

Command Mode

Router configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

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 22 lists the default values used for several common media.

Table 22 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 igrp 109
 network 131.108.0.0
 metric weights 0 2 0 2 0 0
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

bandwidth
delay
metric holddown
metric maximum-hops

neighbor (IGRP and RIP)

To define a neighboring router with which to exchange routing information, use this form of the **neighbor** router configuration command. To remove an entry, use the **no** form of this command.

neighbor *ip-address*
no neighbor *ip-address*

Syntax Description

ip-address	IP address of a peer router with which routing information will be exchanged.

Default

No neighboring routers are defined.

Command Mode

Router configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

This command permits the point-to-point (nonbroadcast) exchange of routing information. When used in combination with the **passive-interface** router configuration command, routing information can be exchanged between a subset of routers and access servers on a LAN.

Multiple **neighbor** commands can be used to specify additional neighbors or peers.

Example

In the following example, IGRP updates are sent to all interfaces on network 131.108.0.0 except interface Ethernet 1. However, in this case a **neighbor** router configuration command is included. This command permits the sending of routing updates to specific neighbors. One copy of the routing update is generated per neighbor.

```
router igrp 109
 network 131.108.0.0
 passive-interface ethernet 1
 neighbor 131.108.20.4
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

passive-interface

network (IGRP and Enhanced IGRP)

To specify a list of networks for the Enhanced IGRP routing process, use this form of the **network** router configuration command. 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.

Default

No networks are specified.

Command Mode

Router configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

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

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.

Example

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

You can use the master indexes or search online to find documentation of related commands.

router igrp

offset-list

To add an offset to incoming and outgoing metrics to routes learned via IGRP, use the **offset-list** router configuration command. 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.

Default

Disabled

Command Mode

Router configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0. The *type* and *number* arguments first appeared in Cisco IOS Release 10.3. The *name* argument first appeared in Cisco IOS Release 11.2.

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 121:

```
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 igrp

To configure the Interior Gateway Routing Protocol (IGRP) routing process, use the **router igrp** global configuration command. To shut down an IGRP routing process, use the **no** form of this command.

router igrp *autonomous-system*
no router igrp *autonomous-system*

Syntax Description

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

Default

No IGRP routing process is defined.

Command Mode

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

It is not necessary to have a registered autonomous system number to use IGRP. If you do not have a registered number, you are free to create your own. We recommend that if you do have a registered number, you use it to identify the IGRP process.

Example

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

```
router igrp 109
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

network (IGRP and Enhanced IGRP)

set metric

To set the metric value for 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 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.

Default

No metric will be set in the route-map.

Command Mode

Route-map configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

Note 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.

Example

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
```

timers basic

To adjust IGRP network timers, use the **timers basic** router configuration command. To restore the default timers, use the **no** form of this command.

timers basic *update invalid holddown flush* [*sleeptime*]
no timers basic

Syntax Description

update	Rate in seconds at which updates are sent. This is the fundamental timing parameter of the routing protocol.
invalid	Interval of time in seconds after which a route is declared invalid; it should be at least three times the value of *update*. A route becomes invalid when there is an absence of updates that refresh the route. The route then enters holddown. The route is marked inaccessible and advertised as unreachable. However, the route is still used for forwarding packets.
holddown	Interval in seconds during which routing information regarding better paths is suppressed. It should be at least three times the value of *update*. A route enters into a holddown state when an update packet is received that indicates the route is unreachable. The route is marked inaccessible and advertised as unreachable. However, the route is still used for forwarding packets. When holddown expires, routes advertised by other sources are accepted and the route is no longer inaccessible.
flush	Amount of time in seconds that must pass before the route is removed from the routing table; the interval specified must be at least the sum of *invalid* and *holddown*. If it is less than this sum, the proper holddown interval cannot elapse, which results in a new route being accepted before the holddown interval expires.
sleeptime	(Optional) Interval in milliseconds for postponing routing updates in the event of a flash update. The *sleeptime* value should be less than the *update* time. If the *sleeptime* is greater than the *update* time, routing tables will become unsynchronized.

Defaults

update is 90 seconds
invalid is 270 seconds
holddown is 280 seconds
flush is 630 seconds
sleeptime is 0 milliseconds

Command Mode

Router configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

The basic timing parameters for IGRP are adjustable. Since this routing protocol is executing a distributed, asynchronous routing algorithm, it is important that these timers be the same for all routers and access servers in the network.

Note The current and default timer values can be seen by inspecting the output of the **show ip protocols** EXEC command. The relationships of the various timers should be preserved as described previously.

Example

The following example sets updates to be broadcast every 5 seconds. If a router is not heard from in 15 seconds, the route is declared unusable. Further information is suppressed for an additional 15 seconds. At the end of the suppression period, the route is flushed from the routing table.

```
router igrp 109
 timers basic 5  15  15  30
```

Note that by setting a short update period, you run the risk of congesting slow-speed serial lines; however, this is not a big concern on faster-speed Ethernets and T1-rate serial lines. Also, if you have many routes in your updates, you can cause the routers to spend an excessive amount of time processing updates.

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** router configuration command. 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.

Default

Traffic is distributed proportionately to the ratios of the metrics.

Command Mode

Router configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

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.

Example

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

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

validate-update-source

To have the Cisco IOS software validate the source IP address of incoming routing updates for RIP and IGRP routing protocols, use the **validate-update-source** router configuration command. To disable this function, use the **no** form of this command.

validate-update-source
no validate-update-source

Syntax Description

This command has no arguments or keywords.

Default

Enabled

Command Mode

Router configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

This command is only applicable to RIP and IGRP. The software ensures that the source IP address of incoming routing updates is on the same IP network as one of the addresses defined for the receiving interface.

Disabling split horizon on the incoming interface will also cause the system to perform this validation check.

For unnumbered IP interfaces (interfaces configured as **ip unnumbered**), no checking is performed.

Example

The following example configures a router not to perform validation checks on the source IP address of incoming RIP updates:

```
router rip
 network 128.105.0.0
 no validate-update-source
```