

## AppleTalk Enhanced IGRP Commands

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Use the commands in this chapter to configure and monitor AppleTalk enhanced IGRP on AppleTalk networks. For AppleTalk enhanced IGRP configuration information and examples, refer to the “Configuring AppleTalk Enhanced IGRP” chapter in this manual. For a description of other AppleTalk configuration commands, refer to the *Router Products Configuration Guide* and the *Router Products Command Reference* publications. For historical background and a technical overview of AppleTalk, see the *Internetworking Technology Overview* publication.

## appletalk eigrp-splithorizon

To configure split horizon, use the **appletalk eigrp-splithorizon** interface configuration command. To disable split horizon, use the **no** form of this command.

```
appletalk eigrp-splithorizon  
no appletalk eigrp-splithorizon
```

### Syntax Description

This command has no arguments or keywords.

### Default

Enabled

### Command Mode

Interface configuration

### Usage Guidelines

If you enable split horizon on an interface, AppleTalk enhanced IGRP update and query packets are not sent if this interface is the next hop to that destination. This reduces the number of enhanced IGRP packets of the network.

Split horizon blocks information about routes from being advertised by a router out any interface from which that information originated. This behavior usually optimizes communication among multiple routers, particularly when links are broken. However, with nonbroadcast networks, such as Frame Relay and SMDS, situations can arise for which this behavior is less than ideal. For these situations, you may wish to disable split horizon.

### Example

The following example disables split horizon on serial interface 0:

```
interface serial 0  
no appletalk eigrp-splithorizon
```

## appletalk eigrp-timers

To configure the AppleTalk enhanced IGRP hello packet interval and the route hold time, use the **appletalk eigrp-timers** interface configuration command. To return to the default values for these timers, use the **no** form of this command.

```
appletalk eigrp-timers hello-interval hold-time  
no appletalk eigrp-timers hello-interval hold-time
```

### Syntax Description

<i>hello-interval</i>	Interval between hello packets, in seconds. The default interval is 5 seconds. It can be a maximum of 30 seconds.
<i>hold-time</i>	Hold time, in seconds. The hold time is advertised in hello packets and indicates to neighbors the length of time they should consider the sender valid. The hold time can be in the range of 15 to 90 seconds. The default is 45 seconds.

### Default

```
hello-interval: 5 seconds  
hold-time: 45 seconds
```

### Command Mode

Interface configuration

### Usage Guidelines

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

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.

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**Note** Do not adjust the hold time without advising technical support.

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### Example

The following example changes the hello interval to 10 seconds:

```
interface ethernet 0  
  appletalk eigrp-timers 10 45
```

## appletalk protocol

To specify the routing protocol to use on an interface, use the **appletalk protocol** interface configuration command. To disable a routing protocol, use the **no** form of this command.

```
appletalk protocol { rtmp | eigrp }
no appletalk protocol { rtmp | eigrp }
```

### Syntax Description

<b>rtmp</b>	Specifies that the routing protocol to use is RTMP. RTMP is enabled by default.
<b>eigrp</b>	Specifies that the routing protocol to use is enhanced IGRP.

### Default

RTMP

### Command Mode

Interface configuration

### Usage Guidelines

You can configure an interface to use both RTMP and enhanced IGRP. If you do so, route information learned from enhanced IGRP will take precedence over information learned from RTMP. The router will, however, continue to send out RTMP routing updates.

### Examples

The following example enables AppleTalk enhanced IGRP on serial interface 0:

```
interface serial 0
 appletalk protocol eigrp
```

The following example disables RTMP on serial interface 0:

```
interface serial 0
 no appletalk protocol rtmp
```

### Related Command

**appletalk routing**

## appletalk route-redistribution

To redistribute RTMP routes into AppleTalk enhanced IGRP and vice versa, use the **appletalk route-redistribution** global configuration command. To keep enhanced IGRP and RTMP routes separate, use the **no** form of this command.

```
appletalk route-redistribution  
no appletalk route-redistribution
```

### Syntax Description

This command has no arguments or keywords.

### Default

Enabled when enhanced IGRP is enabled

### Command Mode

Global configuration

### Usage Guidelines

Redistribution allows routing information generated by one protocol to be advertised in another.

In the automatic redistribution of routes between enhanced IGRP and RTMP, an RTMP hop is treated as having a slightly worse metric than an equivalent enhanced IGRP hop on a 9.6-kilobit link. This allows enhanced IGRP to be preferred over RTMP except in the most extreme of circumstances. Typically, you will see this only when using tunnels. If you want an enhanced IGRP path in a tunnel to be preferred over an alternate RTMP path, you should set the interface delay and bandwidth parameters on the tunnel to bring the metric of the tunnel down to being better than a 9.6-kilobit link.

### Example

In the following example, RTMP routing information is not redistributed:

```
appletalk routing eigrp 23  
no appletalk route-redistribution
```

## appletalk routing

To enable AppleTalk enhanced IGRP routing, use the **appletalk routing** global configuration command. To disable AppleTalk enhanced IGRP routing, use the **no** form of this command.

```
appletalk routing [eigrp router-number]  
no appletalk routing [eigrp router-number]
```

### Syntax Description

no argument	Enables AppleTalk routing without enabling enhanced IGRP. In this case, the routing protocol used is RTMP.
<b>eigrp</b> <i>router-number</i>	(Optional) Specifies the enhanced IGRP routing protocol. The argument <i>router-number</i> can be a decimal integer from 1 to 65535. It must be unique in your AppleTalk enhanced IGRP internetwork.

### Default

Disabled

### Command Mode

Global configuration

### Usage Guidelines

This command is an extension of the existing **appletalk routing** command, which you use to enable AppleTalk routing on the router.

You can configure multiple AppleTalk enhanced IGRP processes on a router. To do so, assign each a different autonomous system number.

If you configure a router with a router number that is the same as that of a neighboring router, the router will refuse to start AppleTalk enhanced IGRP on interfaces that connect with that neighboring router.

### Example

The following example enables AppleTalk enhanced IGRP routing on router number 22:

```
appletalk routing eigrp 22
```

### Related Command

**appletalk protocol**

## show appletalk eigrp neighbors

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

```
show appletalk eigrp neighbors [interface unit]
```

### Syntax Description

*interface unit* (Optional) Displays information about the specified neighbor router.

### Command Mode

EXEC

### Usage Guidelines

The **show appletalk eigrp neighbors** command lists only the neighbors running AppleTalk enhanced IGRP. To list all neighboring AppleTalk routers, use the **show appletalk neighbors** command.

### Sample Display

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

```
Router# show appletalk eigrp neighbors
AT/EIGRP Neighbors for process 1, router id 83
Address          Interface      Holdtime  Uptime    Q      Seq  SRTT  RTO
                (secs)        (h:m:s)  Count    Num   (ms)  (ms)
warp.Ethernet1   Ethernet2      41        0:02:48  0      282  4     20
master.Ethernet2 Ethernet2      40        1:16:46  0      333  4     20
```

Table 5-1 explains the fields in the output.

**Table 5-1 Show AppleTalk EIGRP Neighbors Field Descriptions**

Field	Description
process 1	Number of the enhanced IGRP routing process.
router id 83	Autonomous system number specified in the <b>appletalk routing</b> global configuration command.
Address	AppleTalk address of the AppleTalk 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 AppleTalk 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 AppleTalk 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.

### Related Commands

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

**appletalk routing**  
**show appletalk neighbors**<sup>†</sup>



## show appletalk eigrp topology

To display the AppleTalk enhanced IGRP topology table, use the **show appletalk eigrp topology** EXEC command.

```
show appletalk eigrp topology [network-number | active | zero-successors]
```

### Syntax Description

<i>network-number</i>	(Optional) Number of the AppleTalk network whose topology table entry to display.
<b>active</b>	(Optional) Displays the entries for all active routes.
<b>zero-successors</b>	(Optional) Displays the entries for destinations for which no successors exist. These are destinations that the router currently does not know how to reach via enhanced IGRP. This option is useful for debugging network problems.

### Command Mode

EXEC

### Usage Guidelines

All enhanced IGRP routes that are received for a destination, regardless of metric, are placed in the topology table. The route to a destination that is currently in use is the first route listed. Routes that are listed as “connected” take precedence over any routes learned from any other source.

### Sample Display

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

```
Router# show appletalk eigrp topology
IPX EIGRP Topology Table for process 1, router id 1

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

P 3165-0, 1 successors, FD is 0
   via Redistributed (25601/0),
   via 100.1 (2198016/2195456), Fddi0
   via 4080.67 (2198016/53760), Serial4
P 3161-0, 1 successors, FD is 307200
   via Redistributed (1025850/0),
   via 100.1 (2198016/2195456), Fddi0
   via 4080.67 (2198016/1028410), Serial4
P 100-100, 1 successors, FD is 0
   via Connected, Fddi0
   via 4080.67 (2198016/28160), Serial4
P 4080-4080, 1 successors, FD is 0
   via Connected, Serial4
   via 100.1 (2172416/2169856), Fddi0
```

Table 5-2 explains the fields that may be displayed in the output.

**Table 5-2 Show AppleTalk 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; and 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.
Q – Query	Indicates that a query packet was sent to this destination.
R – Reply	Indicates that a reply packet was sent to this destination.
r – Reply status	Flag that is set after the router has sent a query and is waiting for a reply.
3165, 3161, and so on	Destination AppleTalk network number.
successors	Number of successors. This number corresponds to the number of next hops in the AppleTalk 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 the 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	AppleTalk address of the peer who told the router about this destination. The first <i>n</i> of these entries, where <i>n</i> is the number of successors, are the current successors. The remaining entries on the list are feasible successors.
(345088/319488)	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 to us.
Ethernet0	Interface from which this information was learned.

The following is sample output from the **show appletalk eigrp topology** command when you specify an AppleTalk network number:

```

router# show appletalk eigrp topology 3165
AT-EIGRP topology entry for 3165-0
State is Passive, Query origin flag is 1, 1 Successor(s)
Routing Descriptor Blocks:
0.0, from 0.0
  Composite metric is (25601/0), Send flag is 0x0, Route is Internal
  Vector metric:
    Minimum bandwidth is 2560000000 Kbit
    Total delay is 1000000 nanoseconds
    Reliability is 255/255
    Load is 1/255
    Minimum MTU is 1500
    Hop count is 0
100.1 (Fddi0), from 100.1
  Composite metric is (2198016/2195456), Send flag is 0x0, Route is External
  Vector metric:
    Minimum bandwidth is 1544 Kbit
    Total delay is 21100000 nanoseconds
    Reliability is 255/255
    Load is 1/255
    Minimum MTU is 1500
    Hop count is 2
4080.83 (Serial4), from 4080.83
  Composite metric is (2198016/53760), Send flag is 0x0, Route is Internal
  Vector metric:
    Minimum bandwidth is 1544 Kbit
    Total delay is 21100000 nanoseconds
    Reliability is 255/255
    Load is 1/255
    Minimum MTU is 1500
    Hop count is 2

```

Table 5-3 explains the fields that may be in the output.

**Table 5-3 Show AppleTalk EIGRP Topology Field Descriptions for a Specified Network**

Field	Description
3165	AppleTalk network number of the destination.
State is ...	State of this entry. It can be either Passive or Active. Passive means that no enhanced IGRP computations are being performed for this destination, and Active means that they are being performed.
Query origin flag	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.
Successors	Number of successors. This number corresponds to the number of next hops in the IPX routing table.
Next hop is ...	Indicates how this destination was learned. It can be one of the following: <ul style="list-style-type: none"> <li>• Connected—The destination is on a network directly connected to this router.</li> <li>• Redistributed—The destination was learned via RTMP or another routing protocol.</li> <li>• AppleTalk host address—The destination was learned from that peer via this enhanced IGRP process.</li> </ul>
Ethernet0	Interface from which this information was learned.

Field	Description
from	Peer from whom the information was learned. For connected and redistributed routers, this is 0.0. For information learned via enhanced IGRP, this is the peer's address. Currently, for information learned via enhanced IGRP, the peer's AppleTalk address always matches the address in the "Next hop is" field.
Composite metric is	enhanced IGRP composite metric. The first number is this router's metric to the destination, and the second is the peer's metric to the destination.
Send flag	Numeric representation of the "flags" field. It is 0 when nothing is being sent, 1 when an Update is being sent, 3 when a Query is being sent, and 4 when a Reply is being sent. Currently, 2 is not used.
Route is ...	Type of router. It can be either internal or external. Internal routes are those that originated in an enhanced IGRP autonomous system, and external routes are those that did not. Routes learned via RTMP are always external.
Vector metric:	This section describes the components of the enhanced IGRP metric.
Minimum bandwidth	Minimum bandwidth of the network used to reach the next hop.
Total delay	Delay time to reach the next hop.
Reliability	Reliability value used to reach the next hop.
Load	Load value used to reach the next hop.
Minimum MTU	Minimum MTU size of the network used to reach the next hop.
Hop count	Number of hops to the next hop.
External data	This section describes the original protocol from which this route was redistributed. It appears only for external routes.
Originating router	Network address of the router that first distributed this route into AppleTalk enhanced IGRP.
External protocol..metric..delay	External protocol from which this route was learned. The metric will match the external hop count displayed by the <b>show appletalk route</b> command for this destination. The delay is the external delay.
Administrator tag	Currently not used.
Flag	Currently not used.

### Related Command

**show appletalk route**

## show appletalk route

To display the entries in the AppleTalk routing table, use the **show appletalk route** EXEC command.

```
show appletalk route [network | interface unit]
```

### Syntax Description

no argument	Displays all entries in the routing table.
<i>network</i>	(Optional) Number of the network whose routing table entry you want to display.
<i>interface unit</i>	(Optional) Displays the routing table entries for networks that can be reached via the specified interface.

### Command Mode

EXEC

### Sample Displays

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

```
Router# show appletalk route
Codes: R - RTMP derived, E - EIGRP derived, C - connected, P - proxy
3 routes in internet
C Net 258 directly connected, 1431 uses, Ethernet0, zone Twilight
R Net 6 [1/G] via 258.179, 8 sec, 0 uses, Ethernet0, zone No Parking
E Net 2003 [4/G] via 80.129, 6 sec, Ethernet4, zone Estates
```

The first zone listed for each entry is its default (primary) zone.

Table 5-4 describes the fields shown in the display as well as some fields not shown but that may also be displayed. Depending on the configuration of the global configuration commands **appletalk lookup-type** and **appletalk name-lookup-interval**, a node name may appear in this display instead of a node address.

**Table 5-4 Show AppleTalk Route Field Descriptions**

Field	Description
Codes:	Codes defining how the route was learned.
R	Route learned from an RTMP update.
E	Route learned from an enhanced IGRP update.
C	Directly connected network.
P	Statically defined route. AppleTalk routes cannot be statically defined; therefore you should never see this code.
3 routes	Number of routes in the table.
Net 258	Network to which the route goes.
Net 999-999	Cable range to which the route goes.
directly connected	Indicates that the network is directly connected to the router.

Field	Description
1431 uses	Fair estimate of the number of times a route gets used. It actually indicates the number of times the route has been selected for use prior to operations such as access list filtering.
Ethernet0	Possible interface through which updates to the remote network will be sent.
zone Twilight	Name of zone of which the destination network is a member.
[1/G]	<p>Number of hops to this network, followed by the state of the link to that network. The state can be one of the following letters:</p> <ul style="list-style-type: none"> <li>• G—Link is good.</li> <li>• S—Link is suspect.</li> <li>• B—Link is bad.</li> </ul> <p>The state is determined from the routing updates that occur at 10-second intervals. A separate and nonsynchronized event occurs at 20-second intervals, checking and flushing the ratings for particular routes that have not been updated. For each 20-second period that passes with no new routing information, a rating changes from G to S and then from S to B. After 1 minute with no updates, that route is flushed. Every time the router receives a useful update, the status of the route in question is reset to G. Useful updates are those advertising a route that is as good or better than the one currently in the table.</p> <p>When an AppleTalk route is poisoned by another router, its metric gets changed to poisoned (that is, 31 hops). The router then will age this route normally during a hold time period, during which the route will still be visible in the routing table.</p>
via 258.179	Address of a router that is the next hop to the remote network.
via gatekeeper	Node name of a router that is the next hop to the remote network.
8 sec	Number of seconds that have elapsed since an RMTP update about this network was last received.

The following is a sample display of the **show appletalk route** command output when you specify a network number:

```

Router# show appletalk route 3165
Codes: R - RTMP derived, I - EIGRP derived C - connected P - proxy
       S - static
4 routes in internet

I Net 3165 [1/G] via boojum.Fddi0, 928 sec, Fddi0, zone Twilight
Route installed 0:15:34, updated 928 secs ago
Next hop: boojum.Fddi0, 0 hops away
Zone list provided by matter.Serial4
Valid zones: "Twilight"
There are 2 paths for this route
* EIGRP path, to neighbor boojum.Fddi0, installed 0:15:28 via Fddi0
Composite metric is 53760, 1 hops
Delay is 28160 microseconds, minimum bandwidth is 25600 Kbit
Reliability 255/255, minimum MTU 1500 bytes
Loading 1/255, 1 EIGRP hops
EIGRP path, to neighbor boojum.Serial4, installed 0:15:35 via Serial1
Composite metric is 2195456, 1 hops
Delay is 537600 microseconds, minimum bandwidth is 1657856 Kbit
Reliability 255/255, minimum MTU 1500 bytes
Loading 1/255, 1 EIGRP hops
    
```

Table 5-5 describes the fields shown in the display.

**Table 5-5 Show Appletalk Route Field Descriptions for a Specified Network**

Field	Description
Codes:	Codes defining how the route was learned.
R – RTMP derived	Route learned from an RTMP update.
I – EIGRP derived	Route learned from enhanced IGRP.
C – connected	Directly connected network.
P – proxy	Route is a proxy route, as defined by the <b>appletalk proxy-nbp</b> command. Typically, proxy routes are used only by RTMP.
S – static	Route is a static route. (Currently, you cannot define static routes.)
4 routes in internet	Number of routes in the AppleTalk internet.
Net 3165	Cable range to which the route goes. This is the number of the network you specified on the <b>show appletalk route</b> command line.
[1/G]	<p>Number of hops to this network, followed by the state of the link to that network. The state can be one of the following letters:</p> <ul style="list-style-type: none"> <li>• G—Link is good.</li> <li>• S—Link is suspect.</li> <li>• B—Link is bad.</li> </ul> <p>The state is determined from the routing updates that occur at 10-second intervals. A separate and nonsynchronized event occurs at 20-second intervals, checking and flushing the ratings for particular routes that have not been updated. For each 20-second period that passes with no new routing information, a rating changes from G to S and then from S to B. After 1 minute with no updates, that route is flushed. Every time the router receives a useful update, the status of the route in question is reset to G. Useful updates are those advertising a route that is as good or better than the one currently in the table.</p> <p>When an AppleTalk route is poisoned by another router, its metric gets changed to poisoned (that is, 31 hops). The router then will age this route normally during a hold time period, during which the route will still be visible in the routing table.</p>
via boojum.Fddi0	Address or node name of a router that is the next hop to the remote network and the interface used to reach that router.
928 sec	Number of seconds that have elapsed since an update about this network was last received.
Fddi0	Possible interface through which updates to the remote network will be sent.
zone Twilight	Name of zone of which the destination network is a member.
Route installed 0:15:34	Length of time, in hours, minutes, and seconds, since this route was first learned about.
updated 928 secs ago	Time, in seconds, since the router received an update for this route.
Next hop: boojum.Fddi0	Address or node name of the router that is one hop away and the interface used to reach that router.
0 hops away	Number of hops to the network specified in the <b>show appletalk route</b> command line.
Zone list provided by matter.Serial4	Address or node name of the router that provided the zone list included with the update.
Valid zones: "Twilight"	Zone names that are valid for this network.

Field	Description
There are 2 paths for this route	Number of paths for this route. The path that is currently in use is marked with an asterisk (*) to the left of the words "EIGRP path" or "RTMP path." Note that there is no load distribution across multiple parallel paths.
Composite metric	Metric for the route as determined by the DUAL algorithm. If the number of hops to a destination is equal, the route with the lowest composite metric is used.
hops	Number of hops to the destination via this route.
Delay	Enhanced IGRP delay factor for the interface.
minimum bandwidth	Smallest bandwidth of a network segment between the local router and the destination router.
Reliability	Measure of the route's reliability, based on factors such as number of packet drops and interface resets.
minimum MTU	Smallest MTU size used by a network segment between the local router and the destination router. For AppleTalk, this is normally 599 bytes all the time, even though the route might describe a series of FDDI hops that have an MTU of 4474 bytes for the route.
Loading	Route's current load.
1 EIGRP hops	Number of AppleTalk enhanced IGRP hops to the destination router.

### Related Commands

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

**appletalk lookup-type** †

**appletalk name-lookup-interval** †