CHAPTER 4

Configuring IPX Enhanced IGRP

This chapter describes how to configure IPX enhanced IGRP on routers and interfaces configured for Novell IPX. For a complete description of the commands mentioned in this chapter, refer to the "IPX Enhanced IGRP Commands" chapter in this manual. For a description of other IPX configuration commands, refer to the *Router Products Configuration Guide* and the *Router Products Command Reference* publications. For historical background and a technical overview of IPX, see the *Internetworking Technology Overview* publication.

Cisco's Implementation of IPX Enhanced IGRP

IPX enhanced IGRP provides the following features:

- Automatic redistribution. IPX RIP routes are automatically redistributed into enhanced IGRP, and IPX enhanced IGRP routes are automatically redistributed into RIP. If desired, you can turn off redistribution. You also can completely turn off IPX enhanced IGRP and IPX RIP on the router or on individual interfaces.
- Increased network width. With IPX RIP, the largest possible width of your network is 15 hops. When IPX enhanced IGRP is enabled, the largest possible width is 224 hops. Because the enhanced IGRP metric is large enough to support thousands of hops, the only barrier to expanding the network is the transport layer hop counter. Cisco works around this problem by incrementing the transport control field only when an IPX packet has traversed 15 routers and the next hop to the destination was learned via enhanced IGRP. When a RIP route is being used as the next hop to the destination, the transport control field is incremented as usual.
- Incremental SAP updates. Complete SAP updates are sent periodically on each interface until an IPX enhanced IGRP neighbor is found and thereafter only when there are changes to the SAP table. This procedure works by taking advantage of enhanced IGRP's reliable transport mechanism, which means that an IPX enhanced IGRP peer must be present for incremental SAPs to be sent. If no peer exists on a particular interface, periodic SAPs will be sent on that interface until a peer is found. This functionality is automatic on serial interfaces and can be configured on LAN media.

IPX Enhanced IGRP Configuration Task List

tasks in the following sectionstasks. At a minimum, you must enable IPX enhanced IGRP. The remaining tasks are optional.

- Enable IPX Enhanced IGRP
- Configure Miscellaneous Parameters
- Monitor IPX Enhanced IGRP on an IPX Network

See the end of this chapter for configuration examples.

Enable IPX Enhanced IGRP

To create an IPX enhanced IGRP routing process, perform the following tasks:

Task		Command
Step 1	Enable an IPX enhanced IGRP routing process in global configuration mode.	**ipx router eigrp** *autonomous-system-number*
Step 2	Enable enhanced IGRP on a network in IPX router configuration mode.	**network** {*network-number* | **all**}

For an example of how to enable IPX enhanced IGRP, see the section "Enabling IPX Enhanced IGRP Example" later in this chapter.

To associate multiple networks with an IPX enhanced IGRP routing process, you can repeat step 2.

Configure Miscellaneous Parameters

To configure the following miscellaneous IPX enhanced IGRP parameters, perform one or more of the following tasks:

- Redistribute Routing Information
- Adjust the Interval between Hello Packets and the Hold Time
- Disable Split Horizon
- Control SAP Updates
- Control the Advertising of Routes in Routing Updates
- Control the Processing of Routing Updates
- Query the Backup Server

Redistribute Routing Information

By default, the router redistributes IPX RIP routes into IPX enhanced IGRP, and vice versa. When routes are redistributed, a RIP route to a destination with a hop count of 1 is always preferred over an enhanced IGRP route with a hop count of 1. This ensures that the router always believes a Novell IPX server over a Cisco router for internal IPX networks. The only exception to this rule is if both the RIP and enhanced IGRP updates were received from the same router. In this case, and in the case of all other RIP metrics (2 through 15), the enhanced IGRP route always is preferred over the RIP route when the hop counts are the same.

Internal enhanced IGRP routes are always preferred over external enhanced IGRP routes. This means that if there are two enhanced IGRP paths to a destination, the path that originated within the enhanced IGRP autonomous sytem will always be preferred over the enhanced IGRP path that originated from outside of the autonomous system, regardless of the metric. Redistributed RIP routes are alwaysadvertised in enhanced IGRP as external.

To disable route redistribution, perform the following task in IPX router configuration mode:

Task	Command
Disable redistribution of RIP routes into enhanced IGRP and enhanced IGRP routes into RIP.	**no redistribute** {**rip** | **eigrp** *autonomous-system-number* | **connected** | **static**}

Adjust the Interval between Hello Packets and the Hold Time

You can adjust the interval between hello packets and the hold time.

Routers periodically send hello packets to each other to dynamically learn of other routers on their directly attached networks. Routers use this information to discover who their neighbors are and to discover when their neighbors become unreachable or inoperative. By default, hello packets are sent every 5 seconds.

You can configure the hold time, in seconds, on a specified interface for the IPX enhanced IGRP routing process designated by the autonomous system number. The hold time is advertised in hello packets and indicates to neighbors the length of time they should consider the sender valid. The default hold time is three times the hello interval, or 15 seconds.

To change the interval between hello packets, perform the following task in interface configuration mode:

Task	Command
Set the interval between hello packets.	**ipx hello-interval eigrp** *autonomous-system-number seconds*

On very congested and large networks, 15 seconds may not be sufficient time for all routers to receive hello packets from their neighbors. In this case, you may want to increase the hold time. To do this, perform the following task in interface configuration mode:

Task	Command
Set the hold time.	**ipx hold-time eigrp** *autonomous-system-number seconds*

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

Disable Split Horizon

Split horizon controls the sending of IPX enhanced IGRP update and query packets. If split horizon is enabled on an interface, these packets are not sent for destinations if this interface is the next hop to that destination.

By default, split horizon is enabled on all interfaces.

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.

To disable split horizon, perform the following task in interface configuration mode:

Task	Command
Disable split horizon.	**no ipx split-horizon eigrp** *autonomous-system-number*

Control SAP Updates

If IPX enhanced IGRP peers are found on an interface, you can configure the router to send SAP updates either periodically or when a change occurs in the SAP table. When no IPX enhanced IGRP peer is present on the interface, periodic SAPs are always sent.

On serial lines, by default, if an enhanced IGRP neighbor is present, the router sends SAP updates only when the SAP table changes. On Ethernet, Token Ring, and FDDI interfaces, by default, the router sends SAP updates periodically. To reduce the amount of bandwidth required to send SAP updates, you might want to disable the periodic sending of SAP updates on LAN interfaces. Do this only when all nodes out this interface are enhanced IGRP peers; otherwise, loss of SAP information on the other nodes will result.

To send SAP updates only when a change occurs in the SAP table, perform the following task in interface configuration mode:

Task	Command
Send SAP updates only when a change in the SAP table occurs.	**ipx sap-incremental eigrp** *autonomous-system-number*
Send SAP updates only when a change in the SAP table occurs, and send SAP changes only.	**ipx sap-incremental eigrp** *autonomous-system-number* **rsup-only**

To send periodic SAP updates, perform the following task in interface configuration mode:

Task	Command
Send SAP updates periodically.	**no ipx sap-incremental eigrp** *autonomous-system-number*

For an example of how to configure SAP updates, see the section “SAP Update Examples” later in this chapter.

Control the Advertising of Routes in Routing Updates

To control which routers learn about routes, you can control the advertising of routesin routing updates. To do this, perform the following task in router configuration mode:

Task	Command
Control the advertising of routes in routing updates.	**distribute-list** *access-list-number* **out** [*interface-name* | *routing-process*]

Control the Processing of Routing Updates

To control the processing of routes listed in incoming updates, perform the following task in router configuration mode:

Task	Command
Control which incoming route updates are processes.	**distribute-list** *access-list-number* **in** [*interface-name*]

Query the Backup Server

The backup server table is a table kept for each IPX enhanced IGRP peer. It lists the IPX servers that have been advertised by that peer. If a server is removed from the main server table at any time and for any reason, the router examines the backup server table to see if this just-removed server is known by any of the IPX enhanced IGRP peers. If it is, the information from that peer is advertised back into the main server table just as if that peer had readvertised the server information to this router. Using this method to allow the router to keep the backup server table consistent with what is advertised by each peer means that only changes to the table need to be advertised between IPX enhanced IGRP routers; full periodic updates do not need to be sent.

By default, the router queries its own copy of each IPX enhanced IGRP neighbor's backup server table every 15 seconds. To change this interval, perform the following global configuration task:

Task	Command
Specify the minimum period of time between successive queries of a neighbor's backup server table.	**ipx backup-server-query-interval** *interval*

Monitor IPX Enhanced IGRP on an IPX Network

To monitor IPX enhanced IGRP on an IPX network, perform one or more of the following tasks at the EXEC prompt:

Task	Command
List the neighbors discovered by IPX enhanced IGRP.	**show ipx eigrp neighbors** [**servers**] [*autonomous-system-number* | *type unit*]
Display the contents of the IPX enhanced IGRP topology table.	**show ipx eigrp topology** [*network-number*]
Display the contents of the IPX routing table, including enhanced IGRP entries.	**show ipx route** [*network-number*]
Display information about IPX traffic, including enhanced IGRP traffic.	**show ipx traffic**

Configuration Examples

This section provides configuration examples for the following IPX enhanced IGRP configuration situations:

- Enabling IPX Enhanced IGRP Example
- SAP Update Examples

Enabling IPX Enhanced IGRP Example

The following example configures two interfaces for IPX enhanced IGRP routing in autonomous system 1:

```
ipx routing
!
interface ethernet 0
ipx network 10
!
interface serial 0
ipx network 20
!
ipx router eigrp 1
network 10
network 20
```

SAP Update Examples

If an Ethernet interface has neighbors that are all configured for IPX enhanced IGRP, you might want to reduce the bandwidth used by SAP packets by sending SAP updates incrementally. To do this, you would configure the interface as follows:

```
ipx routing
!
interface ethernet 0
ipx network 10
ipx sap-incremental eigrp 1
!
interface serial 0
ipx network 20
!
ipx router eigrp 1
network 10
network 20
```

If you want to send periodic SAP updates on a serial line that is configured for IPX enhanced IGRP and that has an IPX enhanced IGRP peer on the other sides, use the following commands:

```
ipx routing
!
interface ethernet 0
ipx network 10
!
interface serial 0
ipx network 20
no ipx sap-incremental eigrp 1
!
ipx router eigrp 1
network 10
network 20
```