Behavior of RIP and IGRP When Sending and Receiving Updates

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Introduction

This document explains the series of actions taken by both Routing Information Protocol (RIP) and Interior Gateway Routing Protocol (IGRP) when they send or receive the routing updates.

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

The information in this document applies to these software and hardware versions:

- Cisco IOS Software Release 12.2(27)
- Cisco 2500 Series Routers

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Conventions

For more information on document conventions, refer to the Cisco Technical Tips Conventions.

General Behavior

Send Updates

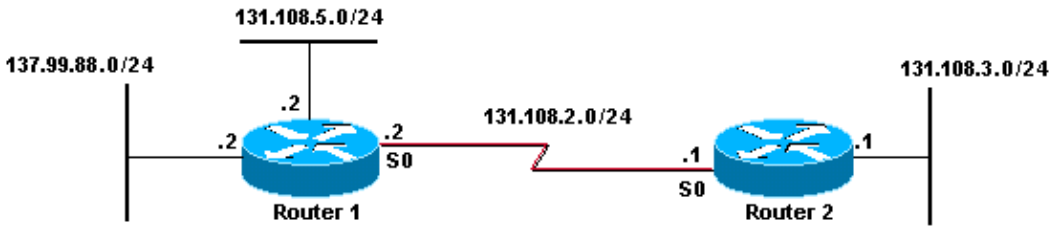
When RIP or IGRP send an update, they perform certain checks before they advertise the update. This list shows the sequence of events that occurs before Router 1 sends updates to Router 2. The network diagram allows you to examine the sequence of events more closely.

- Is the subnet information part of the same major net as the interface that sources the update?
  - ♦ **No:** Router 1 summarizes at the major net boundary and advertises the network.
  - ♦ **Yes:** Does the network have the same subnet mask as the interface that sources the update?
    - ◊ **Yes:** Router 1 advertises the subnet.
    - ◊ **No:** Does the network have a /32 mask ?
      - · **Yes:** If it is RIP, then the network is advertised. If it is IGRP, then Router 1 drops the network.
      - · **No:** Router 1 drops the network.

Receive Updates

When RIP or IGRP receive an update, they perform certain checks before they accept the update and apply the subnet mask. This is the sequence of events that occurs before Router 2 accepts an update from Router 1:

- Is the subnet received in the update on the same major net as the interface that received the update?
  - ♦ **Yes:** Router 2 applies the mask of the interface that received the update. If the advertised network has a host bit set in the host portion of the update, Router 2 applies the host mask (/32). In the case of RIP, it continues to advertise the /32 route to the subsequent router, but IGRP does not.
  - ♦ **No:** Do any subnets of this major net already exist in the routing table, known from interfaces other than the one that received the update? The network in this update should be a major net unless the link between the two routers is an unnumbered link, in which case it is possible for the update to contain subnet information.
    - ◊ **Yes:** Router 2 ignores the update.
    - ◊ **No:** Router 2 applies a classful mask. If the update came across an unnumbered link and contains subnet information (bits in subnet portion of network are set), then Router 2 applies a host mask. Refer to Understanding and Configuring the ip unnumbered Command for unnumbered case examples.



Specific Case

Send Updates

When Router 1 sends an update to Router 2, it performs these checks:

- Is 131.108.5.0/24 part of the same major net as 131.108.2.0/24, which sources the update?
    - ♦ **Yes:** Does 131.108.5.0/24 have the same subnet mask as 131.108.2.0/24, which sources the update?
        - ◊ **Yes:** Router 1 advertises the network.
- Is 137.99.88.0/24 part of the same major net as 131.108.2.0/24, which sources the update?
    - ♦ **No:** Router 1 summarizes 137.99.88.0/24 at the major net boundary and advertises the route as 137.99.0.0.

This process results in Router 1 including 131.108.5.0 and 137.99.0.0 in its update to Router 2. You can see this in the **debug ip rip** command output shown on Router 1:

```
*Mar 25 00:22:46.177: RIP: sending v1 update to 255.255.255.255 via Serial0 (131.108.2.2)
*Mar 25 00:22:46.178: RIP: build update entries
*Mar 25 00:22:46.182: subnet 131.108.5.0, metric 1
*Mar 25 00:22:46.185: network 137.99.0.0, metric 1
```

Receive Updates

When you issue the **debug ip rip** command, you can see the routing update received on Router 2 from Router 1:

```
*Mar 25 00:22:46.201: RIP: received v1 update from 131.108.2.2 on Serial0
*Mar 25 00:22:46.203:131.108.5.0 in 1 hops
*Mar 25 00:22:46.205:137.99.0.0 in 1 hops
```

Look at the checks Router 2 performs in order to determine what mask to apply on a received network.

- Is the received major net 137.99.0.0 the same as 131.108.2.0, which is the address assigned to the interface that received the update?
    - ♦ **No:** Do any subnets of this major net already exist in the routing table known from other interfaces?
        - ◊ **No:** Router 2 applies the natural mask (/16) because 137.99.0.0 is a class B address.
- Does subnet 131.108.5.0 belong to the same major net as subnet 131.108.2.0, which is the interface that received the update?
    - ♦ **Yes:** Router 2 applies the mask /24, which is the mask of the interface that received the update.

This process results in these networks and masks in the routing table of Router 2, displayed with the **show ip route** command:

```
R    137.99.0.0/16 [120/1] via 131.108.2.2, 00:00:07, Serial0
     131.108.0.0/24 is subnetted, 3 subnets
R    131.108.5.0 [120/1] via 131.108.2.2, 00:00:08, Serial0
C    131.108.2.0 is directly connected, Serial0
C    131.108.3.0 is directly connected, Ethernet0
```

Related Information

- **Why Don't RIPv1 and IGRP Support Variable−Length Subnet Mask?**
- **Why Doesn't RIP or IGRP Support Discontiguous Networks?**
- **IGRP Technology Support Page**
- **RIP Technology Support Page**
- **IP Routing Protocols Technology Support Page**
- **Technical Support & Documentation − Cisco Systems**

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