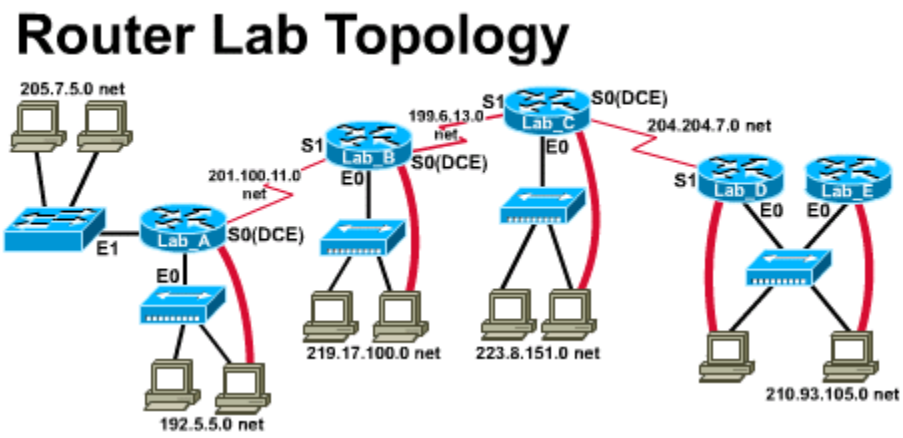
Lab 5.4.6.1 Configuring IGRP - Overview



Router Name - Lab_A Router Type - 2514 E0 = 192.5.5.1 E1 = 205.7.5.1 S0 = 201.100.11.1 SM = 255.255.255.0	Router Name - Lab_C Router Type - 2501 E0 = 223.8.151.1 S0 = 204.204.7.1 S1 = 199.6.13.2 SM = 255.255.255.0	Router Name - Lab_E Router Type - 2501 E0 = 210.93.105.2 SM = 255.255.255.0
Router Name - Lab_B Router Type - 2501 E0 = 219.17.100.1 S0 = 199.6.13.1 S1 = 201.100.11.2 SM = 255.255.255.0	Router Name - Lab_D Router Type - 2501 E0 = 210.93.105.1 S1 = 204.204.7.2 SM = 255.255.255.0	

Estimated time: 30 min.

Objectives:

- To learn how to configure IGRP as the network's routing protocol
- Adjust configurable IGRP metrics

Background:

In this lab you will work with Cisco's Interior Gateway Routing Protocol (IGRP). Routing protocols are used by routers to communicate between themselves in order to exchange information about the networks they can reach and the desirability of the routes available. Routed protocols (such as IP and IPX) are those protocols that can be routed between networks to enable packets to get from one location to another. Routers can run multiple routing and routed protocols.

IGRP is a dynamic distance-vector routing protocol developed by Cisco in the mid-1980s for routing in an autonomous system that contains large, complex networks with diverse bandwidth and delay characteristics. Your school district has decided to implement IGRP as the routing protocol. Several requests were made to InterNIC and they have issued an Autonomous System number of 100 to your District Office.

Cisco's IGRP Implementation

IGRP uses a combination of user-configurable metrics, including internetwork delay, bandwidth, reliability, and load. IGRP also advertises three types of routes: interior, system, and exterior. Interior routes are routes between subnets in the network attached to a router interface. If the network attached to a router is not subnetted, IGRP does not advertise interior routes. System routes are routes to networks within an autonomous system. The Cisco IOS software derives system routes from directly connected network interfaces and system route information provided by other IGRP-speaking routers or access servers. System routes do not include subnet information. Exterior routes are routes to networks outside the autonomous system that are considered when identifying a gateway of last resort. The IOS software chooses a gateway of last resort from the list of exterior routes that IGRP provides. The software uses the gateway (router) of last resort if it does not have a better route for a packet and the destination is not a connected network. If the autonomous system has more than one connection to an external network, different routers can choose different exterior routers as the gateway of last resort.

Tools / Preparation:

Prior to starting the lab, the teacher or lab assistant should have the standard router lab with all 5 routers set up and all dynamic protocols and static routes removed. This is done issuing the **`no router igrp xxx`** and **`no ip route xxx.xxx.xxx.xxx`** commands from the Router(config)# command level of the enable exec user level. Work individually or in teams. Before beginning this lab you may want to read the Networking Academy Second Year Companion Guide, Chapter 5 - Routing Protocols: IGRP. You should also review Semester 3 On-line Lesson 4. The following is a list of equipment required.

- Standard Cisco 5-router lab setup with hubs and switches
- Workstation connected to the router's console port
- Console Cable (roll-over)

Web Resources:

Routing basics
General information on routers
2500 series routers
1600 series routers
Terms and acronyms
IP routing protocol IOS command summary

Notes:

Perform the following steps using one of the 5 lab routers. The router prompt shown here is the default prompt of "Router" assuming no host name has been assigned to the router. The actual prompt will vary (eg: LAB-A or LAB-B etc.)

Step 1 - Enter the user exec mode.

Step 2 - Ping all IP interfaces on your router and all interfaces on the directly connected neighboring routers.

Document in your Lab Engineering Journal what the responses were from ICMP Ping command.
Which router interfaces respond with a successful ping?

Step 3 - Display the current routing protocols in use with the following command:

Router> **`show ip protocols`**
Are there any routing protocols defined?

(If there are they should be removed and then repeat steps 1 and 2 - refer to lab 5.4.3 for removal)

Step 4 - Enter privileged exec mode with the class password using the following command:

Router> **`enable`**
Password: **`class`**

Step 5 - Display the current running configuration in RAM with the following command:

Router# **`show running-config`**
Are static routes defined?

(If there are they should be removed - refer to lab 5.4.3)

Step 6 - Enter configure mode with the following command:

Router# **`config term`**

Step 7 - Enable IGRP on this router with the following command:

Router **`(config)#router igrp 100`**
What changed on the router prompt:

Step 8 - Define which networks are to use IGRP by entering the following command:

Router(config-router) **`#network xxx.xxx.xxx.xxx`**
(Where xxx.xxx.xxx.xxx is the IP address of one of the networks directly connected to the router.)

1. What was the router response?

Step 9 - Repeat step 8 for all of the networks directly connected to the router.

Step 10 - Enter Exit.

Step 11 - Enter CNTL-Z.

Step 12 - Display the current router configuration file in RAM with the following command:

Router **`#show running-config`**
Is the router IGRP protocol turned on and advertising the networks you defined?

Step 13 - Enter the following command at the privileged mode prompt:

Router# **`copy run start`**
What does this command do?

Step 14 - Display the current routing protocols in use with the following command:

Router **`#show ip protocols`**
Enter in your Lab Engineering Journal any important information you have received from issuing this command. What routing protocol was shown?

Step 15 - Display the IP routing table to show what networks are known to this router.

Router **`#show ip route`**
Enter in your Lab Engineering Journal any important information you have received from issuing this command. What networks were listed?

Step 16 - Display the router interfaces and their statistics.

Router **#show ip interface**
Enter in your Lab Engineering Journal any important information you have received from issuing this command. What interfaces are in use?

Step 17 - Enable IGRP debugging with the following command:

Router **#debug ip igrp transactions**
Enter in your Lab Engineering Journal any important information you have received from issuing this command. What was the effect of this command?

Step 18 - Check the current default basic settings for the timers with the following command:

Router **#show ip protocol**

What is the current setting for the four basic timers?

Update:

Invalid:

Hold Down:

Flushed:

Step 19 - Reset the IGRP network timers with the following series of commands:

Router **#config term**
Router(config) **#router igrp 100**

Router(config-router) **#no timers basic**
What is the purpose of this command?

Step 20 - Check to see that the router is no longer receiving routes with the following command:

Router **#show ip route**

Step 21 - Adjust the network timers using the following command.

All devices in an IGRP autonomous system must be consistent in their use of timers. Consistency is important with regard to how often they send updates and the length of the hold down. Use the following series of commands to adjust the timers to different settings than the default ones in step 18:

Router **#config term**
Router(config) **#router igrp 100**
Router(config-router) **#timers basic *update invalid holddown flush [sleeptime]*** (replace each of the italicized words with a number in seconds)

Enter in your Lab Engineering Journal any important information you have received from issuing this command and the significance of issuing this command.

Step 22 - Enforce a maximum network diameter of 2 hops with the following series of commands:

Router **#config term**
Router(config) **#router igrp 100**
Router(config-router) **#metric maximum-hops 2**

Step 23 - Turn off IP protocol debugging with the following command:

Router **#no debug ip igrp transactions**

Enter in your Lab Engineering Journal any important information you have received from issuing this command.