LAB #11

Routing Protocols

To Configuring EIGRP (Enhanced Interior Gateway Routing Protocol)

Theory:

Enhanced Interior Gateway Routing Protocol:

Enhanced Interior Gateway Routing Protocol (EIGRP) or Enhanced IGRP is a Cisco proprietary routing protocol utilizing the Diffusing Update Algorithm (DUAL). The DUAL algorithm was invented by Dr. J.J. Garcia-Luna Aceves of SRI International as an improvement to the IGRP routing protocol. EIGRP was designed to be interoperable with standard IGRP. EIGRP is a hybrid protocol as it incorporates features of a Distance Vector routing protocol and features of a Link State routing protocol. EIGRP is often used in Cisco-based networks running multiple network-layer protocols.

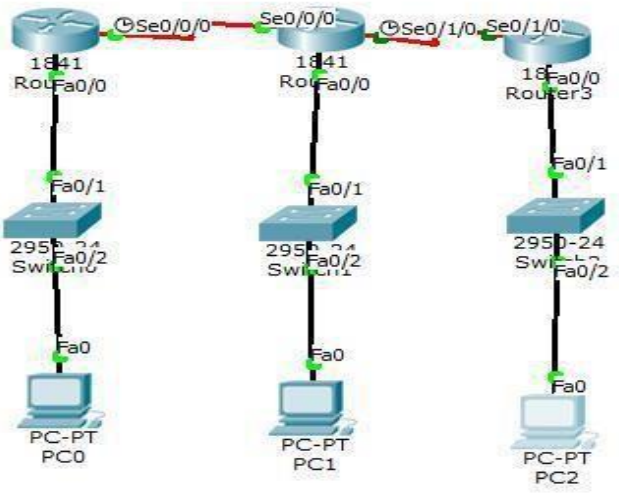
EIGRP can redistribute its routes (and metrics) into other routing protocols and accepts redistribution from other routing protocols as well.

Diffusing Update Algorithm (DUAL)

All route computations in EIGRP are handled by DUAL. One of DUAL's tasks is maintaining a table of loop-free paths to every destination. This table is referred to as the *topology table*. Unlike traditional DV protocols that save only the best (least-cost) path for every destination, DUAL saves all paths in the topology table. The least-cost path(s) is copied from the topology table to the routing table. In the event of a failure, the topology table allows for very quick convergence if another loop-free path is available. If a loop-free path is not found in the topology table, a route re-computation must occur, during which DUAL queries its neighbors, who, in turn, may query their neighbors, and so on... hence the name "Diffusing" Update Algorithm.

EIGRP Features:

- Hybrid Distance Vector/Link State algorithm
- Supports VLSM (subnets/supernets)
- Integrates seamlessly with IGRP
- Automatic Redistribution of Routes (IGRP <-> EIGRP)
- EIGRP metrics are 256 times the IGRP metric and therefore 'directly translatable'
- Fast convergence
- Performs Partial Updates as needed
- Consumes less bandwidth (no broadcasts, no periodic updates, updates contain only changes).
- Supports multiple network layer protocols
- Apple talk
- Internet Protocol (IP)
- Novell Netware (IPX/SPX)



Procedure:

Step1:

The topology consists of 3 Cisco routers which are connected with each other and also with 3 switches and switches are connected with 3PCs **Step 2:**

A WIC-1T card is placed in the slots in each router. Switch off the router and place the card in the slots and turn it on again. One end of the cable is DTE and the other is automatically DCE. **Step 3:**

We have total 5 networks , now assign ip to each network, assign first three ip in pc using default gateways: 192.168.1.1, 192.168.2.1, 192.168.3.1and remaining two on the serial interface of router. **Step 4:**

Now configure fast Ethernet and serial interface of router by using CLI. Configuration of R0 are as follow:

```
Router#conf t
Router#conf terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int fa 0/0
Router(config-if)#ip add
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#no shutdown
Router(config-if)#exit
```

```
Router(config)#int s 0/0/0
Router(config-if)#ip add
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#clock r
Router(config-if)#clock rate 64000
Router(config-if)#no shut down
Router(config-if)#exit
Router(config)#
```

Step 5:

Enabling EIGRP :

By using following Syntax:

- Router Eigrp Process id□□
- Network ip address□□

Enable a EIGRP routing process, which places you in router configuration mode. And associate the networks with a EIGRP routing process. Then enter the command **show ip route** on Ro, R1 and R2 to verify that the new route is now in the routing table.

Exercises:

Q1. What is EIGRP what is the use of EIGRP?

Enhanced Interior Gateway Routing Protocol (EIGRP) is an advanced distance-vector routing protocol that is used on a computer network for automating routing decisions and configuration. The protocol was designed by Cisco Systems as a proprietary protocol, available only on Cisco routers.

Q2. How do we configure EIGRP?

1. **Set the bandwidth on your interfaces using the bandwidth command. ...**
2. **Start the EIGRP routing process and specify your AS number. ...**
3. **Once you are through this stage, next step is to instruct the router in order to advertise the networks that are directly linked to it.**

Q3 On which basis EIGRP decides the best path (routing metric)?

However, each routing protocol may decide on a different path to reach the destination based on that routing protocol's metrics. RIP chooses a path based on hop count, whereas EIGRP chooses a path based on its composite metric

Q.4 What is the maximum hop count in EIGRP?

224

EIGRP supports a variety of network protocols. It can provide routing support for IPv4, IPv6, Internetwork Packet Exchange (IPX), and AppleTalk. Similar to its predecessor IGRP, EIGRP has a maximum hop count of 224 and a default maximum hop count of 100. EIGRP has administrative distance of 90.

Q.5 Which algorithm EIGRP use for finding best path?

EIGRP chooses the route through Router Three as the best path, and uses the metric through Router Three as the feasible distance

Q.6 In which routing protocol did EIGRP lie ?

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Q.7 What do you understand by the term Autonomous system?

An Autonomous System (AS) is a collection of routers whose prefixes and routing policies are under common administrative control. This could be a network service provider, a large company, a university, a division of a company, or a group of companies.

Q.8 If a router receives two updates listing the same remote network, the first thing the router checks is the AD? State true or false with reason.

When a router has two or more paths to a destination with equal cost metrics, then the router forwards the packets using both paths equally. This is called equal cost load balancing. The routing table contains the single destination network but has multiple exit interfaces, one for each equal cost path.

Q.9 What is Diffusing Update Algorithm (DUAL)?

The diffusing update algorithm (DUAL) is the algorithm used by Cisco's EIGRP routing protocol to ensure that a given route is recalculated globally whenever it might cause a routing loop. It was developed by J.J. Garcia-Luna-Aceves at SRI International.