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Performance Analysis of Routing Information Protocol Version 2 and EIGRP

[1]Deepak Soni, [2]Kaushal Prasad

Abstract

A routing protocol specifies how routers communicate with each other, disseminating information that enables them to select routes between any two nodes on a computer network. Routing algorithms determine the specific choice of route. Each router has a priori knowledge only of networks attached to it directly. A routing protocol shares this information first among immediate neighbors, and then throughout the network. This way, routers gain knowledge of the topology of the network.. RIP is classified as a distance-vector routing protocol, which employs the hop count as a routing metric, the maximum number of hops allowed for RIP is 15[3]. A hop count of 16 is considered an infinite distance viewing such distance as unreachable and undesirable route in it routing process.

Keywords- Routing Protocols RIP, IGRP, EIGRP.

Introduction

The purpose of routing protocols is to learn of available routes that exist on the enterprise network, build routing tables and make routing decisions. Some of the most common routing protocols include IGRP, EIGRP, OSPF, IS-IS and BGP. There are two primary routing protocol types although many different routing protocols defined with those two types. Link state and distance vector protocols comprise the primary types. Distance vector protocols advertise their routing table to all directly connected neighbors at regular frequent intervals using a lot of bandwidth and are slow to converge. When a route becomes unavailable, all router tables must be updated with that new information. The problem is with each router having to advertise that new information to its neighbors, it takes a long time for all routers to have a current accurate view of the network. Distance vector protocols use fixed length subnet masks which aren't scalable. Link state protocols advertise routing updates only when they occur which uses bandwidth more effectively. Routers don't advertise the routing table which makes convergence faster. The routing protocol will flood the network with link state advertisements to all neighbor routers per area in an attempt to converge the network with new route information.

Types of Routing Protocols

Routing protocols can be classified according to various characteristics. This section gives an overview of the most common IP routing protocols. Most of these routing protocols will be examined in detail in other chapters. For now, this section gives a very brief overview of each protocol.

Classifying Routing Protocols

Routing protocols can be classified into different groups according to their characteristics. Specifically, routing protocols can be classified by their:

Purpose: Interior Gateway Protocol

(IGP) or Exterior Gateway Protocol (EGP)

- Operation: Distance vector protocol, link-state protocol, or path-vector protocol
- Behavior: Classful (legacy) or classless protocol

For example, IPv4 routing protocols are classified as follows:

- RIPv1 (legacy): IGP, distance vector, classful protocol

[1]Corresponding Author's Email: Deepak.soni0610@gmail.com

- IGRP (legacy): IGP, distance vector, classful protocol developed by Cisco (deprecated from 12.2 IOS and later)
- RIPv2: IGP, distance vector, classless protocol
- EIGRP: IGP, distance vector, classless protocol developed by Cisco
- OSPF: IGP, link-state, classless protocol
- IS-IS: IGP, link-state, classless protocol
- BGP: EGP, path-vector, classless protocol

The classful routing protocols, RIPv1 and IGRP, are legacy protocols and are only used in older networks. These routing protocols have evolved into the classless routing protocols, RIPv2 and EIGRP, respectively. Link-state routing protocols are classless by nature.

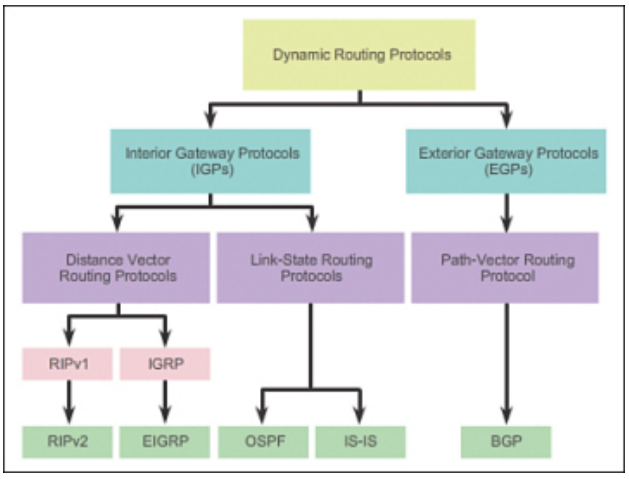

Figure 1: Routing Protocol Classification

Configuring RIP Version 2

Configuring RIPv2 is a pretty straightforward process. Only three steps are required:

1. Enabling RIP by using the *router rip* global configuration command.
2. Instructing the router to use RIPv2 by typing the *version 2* command.
3. Telling RIP which networks to advertise by using one or more *network* commands.

The first two commands are easy to comprehend, but the last command requires a little bit more thought. With the *network* command you specify which interfaces will participate in the routing process. This command takes a classful network as a parameter and enables RIP on the corresponding interfaces.

Let's configure our sample network to use RIP.

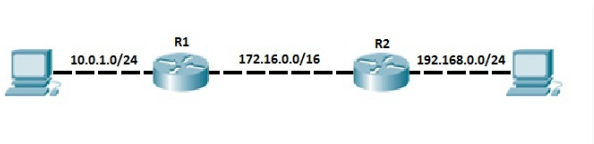

Figure 2: Configuring Rip version 2

Configuration on R1

```
R1(config)#router rip
R1(config-router)#version 2
R1(config-router)#network 10.0.0.0
R1(config-router)#network 172.16.0.0
R1(config-router)#
```

Configuration on R2

```
R2(config)#router rip
R2(config-router)#version 2
R2(config-router)#network 192.168.0.0
R2(config-router)#network 172.16.0.0
R2(config-router)#
```

We can verify that router R1 have a route to the R2's directly connected subnet by typing the *show ip route* command:

```
R1#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/24 is subnetted, 1 subnets
C       10.0.1.0 is directly connected, FastEthernet0/0
C    172.16.0.0/16 is directly connected, FastEthernet0/1
R    192.168.0.0/24 [120/1] via 172.16.0.2, 00:00:25, FastEthernet0/1
R1#
```

Figure 3: Route from R1 TO R2

EIGRP Fundamentals

Enhanced Interior Gateway Protocol (EIGRP) is a proprietary hybrid routing protocol developed by Cisco Systems. EIGRP uses the same distance vector algorithm and distance information as IGRP. However, as its name implies, EIGRP has been enhanced in convergence properties and operating efficiency over IGRP. Principally, EIGRP has been enhanced to use more advanced features to avoid

routing loops and to speed convergence time. In addition, EIGRP transmits the subnet mask for each routing entry, enabling EIGRP to support features such as VLSM and route summarization.

Configuring EIGRP

In this section, we will learn how to configure EIGRP by accomplishing the following lab objectives, based on the network topology in Figure

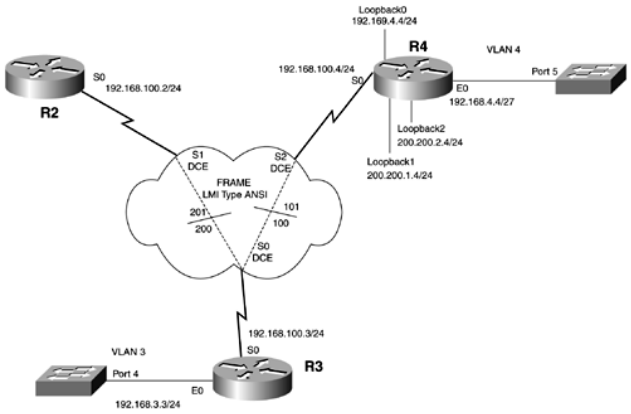

Figure 4: IP routers

- Place R3's S0, R2's S0, R4's S0, and R4's Loopback0 networks into EIGRP autonomous system (AS) 100.
- Place R3's E0 and R4's E0 networks into EIGRP 100.
- Create two loopback interfaces on R4 with the following addresses: loopback1=200.200.1.4/24 and loopback2=200.200.2.4/24
- Add these two networks into the EIGRP routing domain, and configure R4 so that all other routers see only one route to these two addresses.

Steps for Configuring EIGRP

- Enable the EIGRP routing process in global configuration mode.
- Associate networks with an EIGRP routing process in router configuration mode.

EIGRP will send updates only to the interfaces in the networks specified. If you do not specify an interface's network, it will not be advertised in any IP EIGRP update.

Commands

- Router(config)#**router eigrp** [*autonomous-system*]
- Router(config-router)#**network** [*network-number*]

Conclusion

RIP Stands for Routing Information protocol. It Is an Industry standard Dynamic Routing Protocol. It Is not a More Intelligent Dynamic Routing Protocol. It Is Basically Use for Smaller Size Organization. It Support Maximum 15 Routers in the Network. 16 Router Is Unreachable it is denoted By R in Routing Table. It's Administrative Distance Is 120.In RIP routing protocol We Cannot create A Separate Administrative boundary in The Network. It Calculate the Metric In Terms Of Hop Count From source Network to destination Network. Lower the Hop count that is the Best route For That Particular Network .It works on Bellman Ford algorithmRIPV.1 Do Not Support VLSM RIPV.2 Support VLSM

EIGRP Stands For Enhanced Interior Gateway Routing protocol .It Is a Cisco standard routing protocol .It Is a More Intelligent routing protocol Than RIP And IGRP .It Is Basically Use For Medium to Lager Size Organization in the network. It supports Maximum 255 Routers in The Network. Its Administrative distance is 90.It calculates the Metric In Terms Of Bandwidth and delay .EIGRP Works on DUAL (Diffusing Update Algorithm) Algorithm. EIGRP is denoted by D in Routing Table. EIGRP Supports VLSM. EIGRP Creates three table In the Router.

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Author's details

[1, 2]Department of Electronics & Communication, SR Group of Institution, Jhansi, Uttar Pradesh, INDIA, Email Id- Deepak.soni0610@gmail.com