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Study of RIP Protocol with IPV6 Network

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ABSTRACT: This paper specifies a RIPng routing protocol for an IPV6 internet. RIP is an protocols which is currently in wide use in the IPV4 Internet. This describes the future routing protocol called the Routing Information Protocol Next Generation (RIPng), the term Next Generation(NG), is used to describe protocols that support the Internet Protocol Version 6 (IPV6) this document will give information of RIP protocol and its type ,IPV6 and how the RIP protocol works on the IPV6

KEYWORDS: RIP , RIPng , Routing Protocols, RIP protocol, IPV6, Internet Protocol,ipv4.

I. INTRODUCTION

The Distance vector algorithm is a Dynamic Algorithm and RIP is one of a class of this algorithms .Routing that is done by a routing protocol is the most important process on the Internet. RIP controls the transmission of IP packet to reach destination network. Routing process includes packet forwarding and routing table updating. Routing protocol specifies that how the network routers communicate to each other also it specifies how distribution of information is done. This enables them to select routes which are in between any two nodes on a network. The purposes of these protocols development are to reduce the time delay. RIP is defined as a routing protocol which is dynamic. RIP is widely used in local and also in wide area networks. it is as an interior gateway protocol (IGP).

II. ROUTING INFORMATION PROTOCOL(RIP)

RIP is classful Protocol RIP has been extended and updated to RIPV6 which is RIPng (As RIP has been updated to IPV6 networks, which is known as a standard RIP next generation RIPng).The all RIP versions are still being used today. This versions have been technically supported by more advanced techniques such as Open Shortest Path First (OSPF) and the OSI protocol IS-IS[1]. RIP is easy to understand and easy to configure because of support of all routers for RIP , also supports load balancing and the most advantage is that RIP is free from looping. RIP is For Small networks as it is slow for larger networks due to its configuration and also the scalability of RIP is also less because of 15 hop count. RIP has AD value 120 and works on the application layer of OSI model. RIP uses port number 520. RIP uses the hop count as a routing metric which is used to find the best path between the source network and the destination network.

What is Hop Count

Hop count is the number of routers which are between the two networks i.e the source network and Destination network[7].The path with all-time low hop count is taken into account as the best route to achieve a destination network and thus placed within the routing table. RIP prevents routing infinite loops by limiting the amount of hopes allowed during a path from source and destination. The maximum hop count allowed for RIP protocol is 15 and hop count of 16 not taken in consideration.

Features

- The Updates of the RIP are exchanged at a particular period in the network.
- Always broadcast of routing information is done by RIP protocol.
- In updates the full routing table of router are sent to neighbour routers.
- Routing Information which is received from neighbour routers is the information on which the routers are dependent also known as Routing on rumours.



RIPv1

As because of RIP is an open standard protocol and also because of version 1 it works on many vendors routers. RIPv1 is an classful routing protocol and the updates are always broadcasted the administrative distance (ad) value is 120 . The protocol having less ad value the more better and reliable that protocol is.

RIPv2

As there was some deficiencies in the RIPv1 to remove that in 1993 RIPv2 was developed as previous protocol was classful, this RIPv2 is classless routing protocol. RIPv2 supports CIDR and also having ability of carrying subnet information In routing table subnet mask are included

RIPng

RIPng is an extension of RIPv2 which support IPV6. it is the next generation Internet Protocol with capibility of supporting IPV6

RIP timers

Timer	Description
Update timers	After every 30 seconds, all the routers configured with RIP does send their update to the neighbouring routers.
Hold-Down timer	After period 90 sec a route from routing table is withdrawn to prevent a loop
Timeout timer	The router which got disconnected from the Network timer waits for 180 sec if ith hears update timer gets reset else it goes to flush timer
Flush timer	After Timeout it waits for 120 sec to delete a rout

What are Advantages of using RIP

- A. RIP is an standard protocol.
- B. Configuration Of the RIP protocol is very easy.
- C. Update is not required when network topology change.
- D. Almost every router supports RIP.
- E. Triggered updates are sent when network is changed.
- F. There is no complexity in using RIP.
- G. It also supports VSLM.

What are disadvantages

- A. In RIP slow convergence is there because a lot of time are wasted on the network path finding
- B. Bandwidth utilization of the RIP Protocol is very high because it broadcast after every 30 seconds.
- C. RIP cannot be Scalable because of only 15 hop count .no more routers can join the network if required, which can create a problem.
- D. RIP only works on the hop count metric
- E. The Entire routing Table is shared with the joined neighbouring router every 30 seconds



III. RIPng WITH IPV6

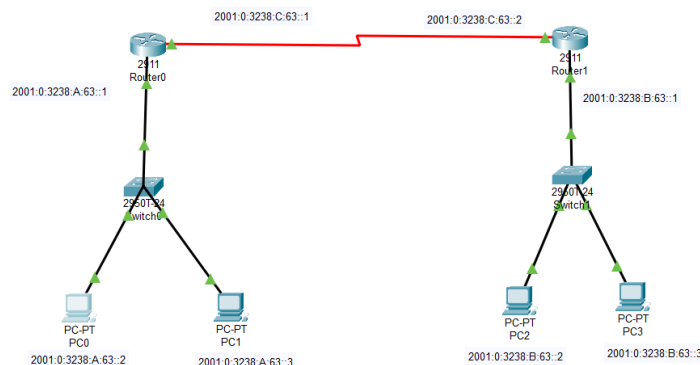
IPV6

The latest version of the Internet Protocol is IPV6, this protocol identifies devices across the internet so the location can be Identified. Every device which uses internet always identified from its own IP address. This IP addresses are used for communication work on the internet. AS day by day there is an increase in devices, Ipv4 Addresses quantity are less because the pool bit is 32 i.e. 2^{32} so for this problem IPV6 was created .IPV6 has space of addresses of 128-bits (2^{128}) which contains 340,282,366,920,938,463,463,374,607,431,768,211,456 IPV6 addresses this is more than sufficient devices[5]. However, because of growth of internet, increase in personal computers, smart phones and now Internet of Things devices for which world need more addresses.

RIPng with IPV6

While IPv4 protocol which is almost depleted, IPV6 is fast emerging standard for device addressing[3]. IPV6 architecture and IPv4 architecture are different thus on devices which only supports IPv4 should have to migrate to device supporting IPV6 and also Routing protocol should also be supported. As the RIPv2 only supports IPv4 so for that development of the RIPng was led. As RIPng is based on RIPv2 but we can say that it is completely different Protocol as it doesn't support IPv4 . RIPng and RIPv2 uses same timers and all procedures.

IV. CONFIGURATIONS



Router0 configuration

```

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0
Router(config-if)#ipv6 address 2001:0:3238:A:63::1/64
Router(config-if)#no shutdown
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

Router(config-if)#interface Serial0/0/0
Router(config-if)#ipv6 address 2001:0:3238:C:63::1/64
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
    
```



```

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ipv6 unicast-routing
Router(config)#ipv6 router rip test
Router(config-rtr)#interface GigabitEthernet0/0
Router(config-if)#ipv6 rip test enable
Router(config-if)#interface Serial0/0/0
Router(config-if)#ipv6 rip test enable
Router(config-if)#exit
Router(config)#exit
Router#show ipv6 protocols
IPv6 Routing Protocol is "connected"
IPv6 Routing Protocol is "ND"
IPv6 Routing Protocol is "rip test"
Interfaces:
  GigabitEthernet0/0
  Serial0/0/0
Redistribution:
  None

```

```

Router#show ipv6 int brief
GigabitEthernet0/0    [up/up]
  FE80::201:42FF:FE3A:EC01
  2001:0:3238:A:63::1
GigabitEthernet0/1    [administratively down/down]
  unassigned
GigabitEthernet0/2    [administratively down/down]
  unassigned
Serial0/0/0           [up/up]
  FE80::201:42FF:FE3A:EC01
  2001:0:3238:C:63::1
Serial0/0/1           [administratively down/down]
  unassigned
Vlan1                 [administratively down/down]
  unassigned

```

```

Router#show ipv6 route
IPv6 Routing Table - 6 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
       U - Per-user Static route, M - MIPv6
       I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
       ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
       O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
       ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
       D - EIGRP, EX - EIGRP external
C 2001:0:3238:A::/64 [0/0]
  via GigabitEthernet0/0, directly connected
L 2001:0:3238:A:63::1/128 [0/0]
  via GigabitEthernet0/0, receive
R 2001:0:3238:B::/64 [120/2]
  via FE80::260:5CFF:FE60:A401, Serial0/0/0
C 2001:0:3238:C::/64 [0/0]
  via Serial0/0/0, directly connected
L 2001:0:3238:C:63::1/128 [0/0]
  via Serial0/0/0, receive

```




```
L FF00:::8 [0/0]
  via Null0, receive
```

Router1 configuration

```
Router>enable
```

```
Router#configure terminal
```

```
Enter configuration commands, one per line. End with CNTL/Z.
```

```
Router(config)#
```

```
Router(config)#interface GigabitEthernet0/0
```

```
Router(config-if)#ipv6 address 2001:0:3238:B:63::1/64
```

```
Router(config-if)#no shutdown
```

```
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up
```

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
```

```
Router(config-if)#interface Serial0/0/0
```

```
Router(config-if)#ipv6 address 2001:0:3238:C:63::2/64
```

```
Router(config-if)#no shutdown
```

```
Router(config-if)#
```

```
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
```

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up
```

```
Router#show ipv6 protocols
```

```
IPv6 Routing Protocol is "connected"
```

```
IPv6 Routing Protocol is "ND"
```

```
IPv6 Routing Protocol is "rip test"
```

```
  Interfaces:
```

```
    GigabitEthernet0/0
```

```
    Serial0/0/0
```

```
  Redistribution:
```

```
    None
```

```
Router#show ipv6 int brief
```

```
GigabitEthernet0/0    [up/up]
```

```
  FE80::260:5CFF:FE60:A401
```

```
  2001:0:3238:B:63::1
```

```
GigabitEthernet0/1    [administratively down/down]
```

```
  unassigned
```

```
GigabitEthernet0/2    [administratively down/down]
```

```
  unassigned
```

```
Serial0/0/0           [up/up]
```

```
  FE80::260:5CFF:FE60:A401
```

```
  2001:0:3238:C:63::2
```

```
Serial0/0/1           [administratively down/down]
```

```
  unassigned
```

```
Vlan1                 [administratively down/down]
```

```
  unassigned
```

```
Router#show ipv6 route
```

```
IPv6 Routing Table - 6 entries
```

```
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
```

```
       U - Per-user Static route, M - MIPv6
```

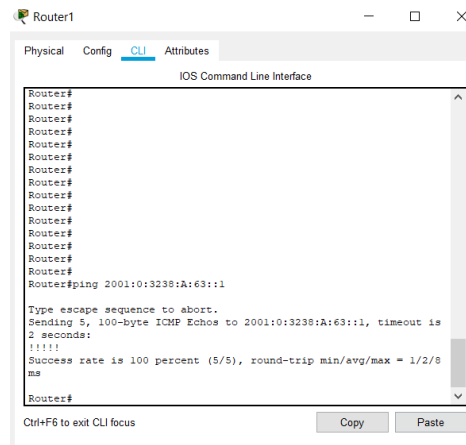
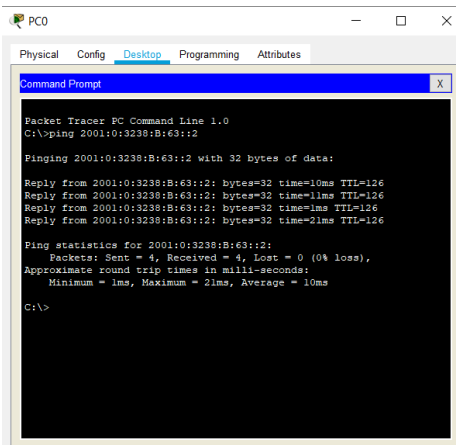
```
       I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary
```

```
       ND - ND Default, NDp - ND Prefix, DCE - Destination, NDr - Redirect
```

```
       O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2
```



- ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
- D - EIGRP, EX - EIGRP external
- R 2001:0:3238:A::/64 [120/2]
via FE80::201:42FF:FE3A:EC01, Serial0/0/0
- C 2001:0:3238:B::/64 [0/0]
via GigabitEthernet0/0, directly connected
- L 2001:0:3238:B:63::1/128 [0/0]
via GigabitEthernet0/0, receive
- C 2001:0:3238:C::/64 [0/0]
via Serial0/0/0, directly connected
- L 2001:0:3238:C:63::2/128 [0/0]
via Serial0/0/0, receive
- L FF00::/8 [0/0]
via Null0, receive



Explanation

Commands	Description
configure terminal	This command makes the router to enter in configuration mode
IPV6 unicast-routing	This enables the IPV6 routing on the cisco routers
IPV6 router RIP <process_name>	This declares the string for RIPng process name which is going to be configured on the router
Interface <type_of_interface_with_id>	This defines the interfaces to the router for RIP
IPV6 RIP < process_name > enable	This enable the RIP protocol on the router



V. COMPARISON OF RIPv2 AND RIPng

RIPv2	RIPng
Only runs on IPv4	Only runs on IPV6
Uses UDP port 520	Uses UDP port 521
Uses 32 bit address	Uses 128 bit addresses
Uses multicast IP address 224.0. 0.9	Uses the multicast address FF02::9
Maximum number of RTEs is restricted to 25	Maximum number of RTEs in RIPng is not restricted to 25 It is depends on the MTU of the IPV6 network

VI. CONCLUSION

This paper deals with the all aspects of routing protocol RIPng with IPV6.This paper shows all the aspects of RIPng, as what we have examined in this paper, we can clear that a good and established well-defined network can be created by RIPng (IPV6) protocols rather than ipv4. Interior routing protocols like RIPng are widely being used in the computer networking

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