Volume 6, Issue 9, September 2016 ISSN: 2277 128X
International Journal of Advanced Research in Computer Science and Software Engineering
Research Paper
Available online at: www.ijarcsse.com

Comparative Study of EIRGPv6 with OSPFv3 in Internet Routing Protocols

Nisha Devi
Department of Electronics Communication Engineering
Shoolini University, Solan, Himachal Pradesh, India

Er. Brijbhushan Sharma
Department of Eelectronics & Communication Engineering
Shoolini University, Solan, Himachal Pradesh, India

R. K Saini
Department of Electrical Engineering
Shoolini University, Solan, Himachal Pradesh, India

Abstract— The modern era of the networking through internet mainly depend upon the protocol which are used in the routing. These routing protocol act as gateway which are used to transfer the data in the form of packet. These are different types of protocol which are to better communication. The routing protocol such as Ripng, OSPFv3 and many other protocol. In a computer network, the transferring of data is based on the routing protocol which selects the best routes between any two nodes. Different types of routing protocols are applied to definite network environment. Three typical types of routing protocol are chosen as the simulation samples: OSPF, RIP, and EIGRP. RIP (Routing Information Protocol) is one of the oldest routing protocols still in service. These routing protocol depends upon the IPv6.Router play a significant role for providing the dynamic routing in the network. Routers take part in the network and transfer the packet from source to destination. Mainly routing is a process which is used for the transferring data from source to the destination. Routing protocol provide the facility to interchange routing table information between the network device. Each routing protocol have different structure and different configuration Network layer is also known as a internet protocol layer (IP). Internet protocol layer is responsible for the receiving and sending the packet in a network.

Keywords— OSPFv3; IPv6; IPv4; EIGRPv6; IPsec; ROUTING PROTOCOL

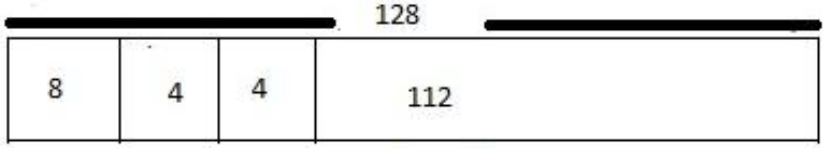
I. INTRODUCTION

Routing protocol plays an important role in the communication network. Internet protocol version 4 was introduced in 1981. IPv4 provide 32bit addressing space in which 4.3 billion internet protocol address **(Hinds, Atojoko et al. 2013)**. Routing protocol provide techniques and information from one end to other end. Several Internet devices require an individual I.P address from the address space, however the fast growth of the internet has resulted in these addresses being deformed; with the last of the address space applicable in February 2012 (**McKelvey 2013)**. Internet protocol version 6 is construct to address the problem of limited address space by accommodate 128bit of addressing space by furnish 2^128 IP address**(Fall and Stevens 2011**) . IPv6 carry a number of development over IPv4 in addition to upgrade addressing space IPv4 consist no security mechanism: IPv4 relies upon higher level protocol to handle verification and encryption of packet; this can lead to susceptibility when extend IPv4 system. This is addressed in IPv6 which enhance security through the use of integrated internet protocol security within the IPv6 protocol which provide encryption and evidence using cryptographic key **(Winter 2012).**

II. ROUTING PROTOCOL

(2.1) IPV6:

IPv6 Addresses is designed by the Internet Engineering Task Force (IETF). The IPv6 protocol represents an advance version of the IPv4 (**Oliveira, De Sousa et al. 2011) .** IPv6 is designed not only to solve the IP addresses shortage problems, but also improves and increase features over IPv4. IPv6 makes use of 128-bit addresses and so the next address space supports 2^128 addresses**(Hui and Thubert 2011**). The 128-bit addresses are subdivided into eight groups. These eight groups are further divided into 4 digit hexadecimal numbers which are separated by colons. The resulting representation of hexadecimal is called colon-hexadecimal**(Sarma 2015).** It is made of 128 bits, the IPv6 address is subdivided into eight 16-bits blocks. Each block is then converted into 4-digit hexadecimal numbers separated by colon. Types of IPv6 addresses are Multicast addresses which are used for the multicast applications. Fig shows the IPv6 multicast address format.



Multicast Address Format of IPV6 in bits

Anycast address: In this addressing the addresses are very close to each other this is the reason why anycast address is also very well known as one to nearest and due to this we can consider it as its disadvantage and this is why it is mostly not in use these days. This address is also known as One to Nearest. It is not mostly in use.

Unicast address: it is used to determine a single node. Traffic is used for a unicast address to send to a single interface.

(2.2) IPv4:

IPV4 network helps the other router in the internet to analyse easily the current position of IPV6 network**(Pan, Jain et al. 2009)** . IPV4 internet protocol version 4 was the first routing protocol which is publicly used version of the IP. Internet Protocol version 4 was developed in 1981 it provides a 32bit addressing space containing 4.3billionunique Internet Protocol (IP) addresses. In IPV4 32bit numbers are used for addressing and IPV4 is categorized into two major parts which are the network and second one is the host. Addresses of the IPV4 is categorized into three major types like class A, class B, class C. In class A, the networks prefix divided by eight are used and the class A type address is used for the large networks, whereas in class B the network prefix divided by sixteen are used and this class is used for our medium type networks. And in class C type addressing the network prefix divided by 24 is used and the class C type addressing is used in the small area networks in the starting era of the internet addressing was done without unexpected manner.

(2.3) OSPFv3:

OSPFv3 is a activating routing protocol which uses shortest path first algorithm and has been specially construct to run within an IPv6 environment (**Arafat, Sobhan et al. 2014)**. OSPFv3 uses link local address to secure its locality. OSPFv3 organize a number of key changes significant to operate in an IPv6 network**(Korhonen, Savolainen et al. 2013**) . OSPFv3 is a security mechanism which is used in the protection of the routing updates. OSPF is a routing protocol that was introduced by IGP (Internet gateway protocol) working group of the Internet Engineering Task Force for Internet routing Protocol (IP) networks. OSPF is a link state routing protocol that is used to stretch information within a single Autonomous System(AS) and performs routing calculations based upon data stored within a Link State Database (LSDB). To determine the best shortest path for the transfer of packet from source to destination we use the Dijkstra's algorithm. We have to calculate the cost of the link which depend upon the bandwidth of the link. Higher the bandwidth that means it allocated a lower cost and cost is inversely proportional to the bandwidth. OSPF routers inform the network of changes to the LSDB using Link State Advertisement (LSA), these are flooded to routers in the same area periodically. The OSPF protocol uses a hierarchical structure which is split into areas. The hierarchical structure also helps to ensure that network performance is not degenerate in large OSPF domains by limiting routing traffic flooding and LSA to within the routers current area. Each area in OPSF is specify with a 32-bit area ID, which are dotted decimal format and not compatible with IPv4 addresses, Area 0 is the backbone area of an OSPF which is open shortest path first of all OSPF areas need to connect to this backbone area which manages all inter-area routing.

(2.4) EIGRPv6:

EIGRP routers use the IPv6 multicast address FF02::10 rather than the preceding 224.0.0.10 multicast address(**Whitfield and Zhu 2015)**. However, despite the almost identic properties between EIGRP and EIGRPv6, a few changes have been implemented to prepare the protocol for routing within an IPv6**.** The use of Link Local Addresses to enabled neighbor adjacencies alternately using an IP subnet. EIGRPv6 implements the same evidence mechanism as EIGRP. Like OSPFv3, EIGRPv6 is also configured on a per-interface basis rather than been globally recognize. The formation of a router ID is required to profitably start routing operations. However, unlike OSPFv3, EIGRPv6 does not associate the use of IPsec to encrypt its routing updates, but instead uses the MD5 evidence method that was previously used in EIGRP for IPv4. EIGRP provide a number of tables used to perform routing; the neighbor table stores information about directly associated neighbor routers, the topology table stores loop free paths to destinations as well as route metrics, and successor routes ,feasible successors, the final table is the Routing table which provide the lowest cost path for every network **(Vetriselvan, Patil et al. 2014)**. EIGRP does not use periodic updates common in many routing protocols; instead EIGRP sends partial updates, containing only information which has changed to its neighbors, this will enable them to update their EIGRP tables and ensure optimal routing. EIGRP is easy to maintain and very fast network convergence with low resource usage and low routing protocol it also supports authentication and has backup routes prepared in the form of successors and feasible successors stored in the topology table, this increases reliability**(Garg and Gupta 2015**) . EIGRP Enhanced Interior Gateway Routing Protocol) is Cisco's proprietary routing protocol based on Diffusing Update Algorithm. EIGRP has the fastest router convergence among the three protocols we are testing**(Fiţigău and Toderean 2013**). The Enhanced Interior Gateway Routing Protocol (EIGRP) is a hybrid routing protocol which provides significant improvements on IGRP**(Islam 2010)**. EIGRP replaced IGRP in 1993 since Internet Protocol is designed to support IPv4 addresses that IGRP could not support**(Deng, Wu et al. 2014**). Hybrid routing protocol incorporates advantages of both Link-state and Distance-Vector routing protocols, it was based on Distance-Vector protocol but contains more features of Link-State protocol**(Chawda and Gorana 2015**). EIGRP saves all routes rather than the best route to ensure the faster convergence. EIGRP keeps neighboring routing tables and it only exchange information that it neighbor would not contain**(Wijaya 2011).** EIGRP is commonly used in huge networks, and it renew only when a topology changes but not periodically unlike old Distance-Vector protocols which is RIP**(Hoang 2015)**.

Differences between IP version 4 and IP version 6 packet layout mean that routing IPv6 traffic is not sustained by existing IPv4 routing protocols**(Gilligan and Nordmark 2000).**

- The use of Link Local Addresses is used to create neighbor adjacencies instead of using an IP subnet.
- EIGRP routers will use the IPv6 multicast address FF02::10 rather than the preceding 224.0.0.10 multicast address.
- OSPFv3 and EIGRPv6 is configured on a per-interface basis rather than been globally configured.
- The creation of a router ID is required to successfully start routing process.

III. ROUTING PROTOCOL TABLE

Parameters	OSPFv3	EIGRPV6
Interior/Exterior	Interior	Interior
Classless	yes	No
AD	110	115
Default Metric	Cost	Cost
Hop count Limit	None	None
update	Only Changes	Only Changes
Update timers	Only when changes occur	Only when changes occur
Convergence	fast	Fast
Type	Link-state	Link-state
Algorithm	Dijkstra	Dual

IV. CONCLUSIONS

In This paper we have compared the IPv6 and IPv4 versions of commonly used routing protocols OSPF and EIGRP. Comparative analysis shows that EIGRP which is a routing protocol has the advantage over OSPF. OSPF has advantages in the huge networks where its hierarchical nature increases scalability. This data will be collected using simulations and be used to construct accurate performance comparisons of the protocols.

REFERENCES

[1] Hinds, A., A. Atojoko, et al. (2013). "Evaluation of OSPF and EIGRP routing protocols for ipv6." International Journal of Future Computer and Communication **2**(4): 287.

[2] McKelvey, F. R. (2013). Internet routing algorithms, transmission and time: toward a concept of transmissive control, York University.

[3] Fall, K. R. and W. R. Stevens (2011). TCP/IP illustrated, volume 1: The protocols, addison-Wesley.

[4] Winter, T. (2012). "RPL: IPv6 routing protocol for low-power and lossy networks."

[5] Oliveira, L. M., A. F. De Sousa, et al. (2011). "Routing and mobility approaches in IPv6 over LoWPAN mesh networks." International Journal of Communication Systems **24**(11): 1445-1466.

[6] Hui, J. and P. Thubert (2011). "Compression format for IPv6 datagrams over IEEE 802.15. 4-based networks."

[7] Sarma, S. (2015). "EVALUATION OF IPV6 SECURE NEIGHBOR AND ROUTER DISCOVERY PROTOCOL, USING LOCALLY AUTHENTICATION PROCESS." Advance and Innovative Research **2**(1): 14.

[8] Pan, J., R. Jain, et al. (2009). Enhanced MILSA architecture for naming, addressing, routing and security issues in the next generation internet. 2009 IEEE International Conference on Communications, IEEE.

[9] Arafat, M. Y., M. A. Sobhan, et al. (2014). "Study on Migration from IPv4 to IPv6 of a Large Scale Network." Modern Applied Science **8**(3): 67.

[10] Korhonen, J., T. Savolainen, et al. (2013). Deploying IPv6 in 3GPP networks: evolving mobile broadband from 2G to LTE and beyond, John Wiley & Sons.

[11] Whitfield, R. J. and S. Y. Zhu (2015). "A Comparison of OSPFv3 and EIGRPv6 in a Small IPv6 Enterprise Network." Editorial Preface **6**(1).

[12] Vetriselvan, V., P. R. Patil, et al. (2014). "Survey on the RIP, OSPF, EIGRP Routing Protocols." International Journal of Computer Science and Information Technologies **5**(2): 1058-1065.

[13] Garg, P. and A. Gupta (2015). "Restoration Technique to Optimize Recovery Time for Efficient OSPF Network." Research Advances in the Integration of Big Data and Smart Computing: 64.

[14] Fiţigău, I. and G. Toderean (2013). Network performance evaluation for RIP, OSPF and EIGRP routing protocols. Electronics, Computers and Artificial Intelligence (ECAI), 2013 International Conference on, IEEE

[15] Islam, M. N. (2010). Simulation based EIGRP over OSPF performance analysis, Blekinge Institute of Technology.

[16] Deng, J., S. Wu, et al. (2014). "Comparison of RIP, OSPF and EIGRP Routing Protocols based on OPNET."

[17] Chawda, K. and D. Gorana (2015). A survey of energy efficient routing protocol in MANET. Electronics and Communication Systems (ICECS), 2015 2nd International Conference on, IEEE.

[18] Wijaya, C. (2011). Performance analysis of dynamic routing protocol EIGRP and OSPF in IPv4 and IPv6 network. Informatics and Computational Intelligence (ICI), 2011 First International Conference on, IEEE.

[19] Hoang, T. D. (2015). "Deployment IPv6 over IPv4 network infrastructure."

[20] Gilligan, R. E. and E. Nordmark (2000). "Transition mechanisms for IPv6 hosts and routers." Transition.

