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 Analysis of IS-IS and OSPFV3 with IPV6

Kuldeepika Sharma, Brijbhushan Sharma, R. K. Saini
Department of Electronics, Communication Engineering, Shoolini University, Solan, Himachal Pradesh, India

Abstract: ***Now day's internet grow to be most important part of human life. In twenty first century internet world, transmission networks are spreading extremely fast. In internet communication, routing protocol plays a huge role for transmit data this paper classify the achievement of OSPFV3 and IS-IS for IPV6. Several routing protocols evaluation and its comparison have been done on IPV4. This, reason we can do the evolution of IPv6 for these routing protocols. In this achievement evaluation of IS-IS and OSPFV3 used as simulation software GNS-3 in network on packet delay variation, end to end delay, traffic received, traffic sent, jitter, response time, convergence for IPv6.. This paper will firstly introduce IS-IS and OSPFv3 and their metric system. After discussing the simulation result a conclusion will be drawn to disclose the searching of this paper and which protocol performance the based upon executing within an IPV6 enterprise network.***

Keywords: IS-IS, OSPFV3, IPV6, IPV4, GNS-3, wires hark.

I. INTRODUCTION

Routing Protocols

In IP networks, the actual work of a routing protocol is to transmission of data packets and information from one node to another node [1]. The routers transmit the information with the help of routing protocols and deliver information that enables them to choose the best path between two networks. To determine the specific route for transmit the information is given by only the routing protocols[2]. The hopping is used for transmitting the information in routing from source to destination. Routing protocols should give at least two facilities: selecting routes for several combinations of source/destination nodes and, well transmitting data packets to a given destination. Routing protocols are used to explain how routers communicate information from each other, learn easy to used routes assemble in routing tables, make routing conclusion and exchange data surrounding neighbours[3**]**. Routers are used to connect different networks and to provide safe and best packet transmission for different combinations of networks. The main objective of routing protocols is to choose the best path for transmission data from a source to a destination. A routing algorithm uses different metrics based on a single or on several things to calculate the best way to approach a given network in route. Conventional protocols used in interior gateway protocols (IGP) networks communication are classified as Link State Routing Protocols and Distance Vector Routing Protocols. Routing protocols can be classified as:

Static routing protocol and dynamic routing protocols.

Classful routing protocol and Classless routing protocol.

Link state routing protocols and distance vector routing protocol.

Routing protocols forms are:

Distance Vector Routing Protocol: A router running distance vector protocol broadcast its connected path and learns new path from its adjacent **[4]**. The destination cost for routes is calculated by means of hops in the middle of nodes. For chosen the best path distance vector routing protocol is necessary, also known as "routing-by-rumors". The two routing protocols are RIPng and BGP (Border Gateway Protocol) are based on Distance Vector routing Protocol.

Link-State Routing Protocol: In this protocol accept the state of a Link and announce to its neighbors. Information about new relationship between the networks is learnt from its associate routers [5]. Later all the routing transmission of the data has been assembled, the Link-State Routing Protocol has its own algorithm to measure the best route in total available connections. OSPF and IS-IS are coming from link state routing protocols and IS-IS is the first link state routing protocol and both of them are uses common Dijkstra's algorithm for selecting Shortest Path First routing (SPF).

These protocols can be divided in two categories:

Interior Routing Protocol: Interior Routing Protocol is under a system is called as autonomous system that is used for, to allocate the routes between all routers within its internal boundary. Like: OSPF (Open Shortest Path First) [6]

Exterior Routing Protocol: In which an organization is used that is autonomous system (AS). An Exterior Routing Protocol is used for external purpose of two multiple routing transmission in autonomous systems (AS) or organization Like: BGP (Border Gateway Protocol) [7]. It is comes under network layer, transmission control protocol TCP for transmit the information between the routes.

II. PROTOCOLS

IPV6

In IPv6 the address spacing scheme is a 128 bits or 16 bytes, which is represented by a series of eight 16 bits field separated by colons [8]. IPv6 Address spacing scheme is designed by Internet Engineering Task Force (IETF). The IPv6 protocol represents the better configuration than IPv4. IPv6 is designed to solve the IP addresses shortage problems as well as improves and enhances their features over IPv4 [9].

IPV6 provides end to end datagram transmission across multiple IP networks. It is an internet layer protocol for packet-switched internetworking, closely adhering to the design principles developed in the previous version of the protocol, Internet Protocol Version 4 (IPv4).

Some of the IPv6 features are listed below in the given table and there explanation is also given below:

Table 1: IPV6 feature list

Features of IPV6
Scalability increases in routing protocol and also IP addressing capabilities.
Make easy to understand the IP header.
It provides specific addresses for all of the present and coming IP devices transmission in the internet.
Broadcasting is replaced by multicast use on the local link.
Features such as payload encoding and authentication of the source of the transmission.
It provides better support from end to end networks for real time traffic, example VoIP, Voice And Video.

Scalability: In IPV6 just because of the scalability the capabilities of the routing protocol of the IPV6 increases. How large a network that should decided by the scalability based on the routing protocol that is deployed. The scalability increases only the large network.

IP header: IP header is used to make simple and easily undersantandable the network. It reduces the complexities in the network.

IP address: It gives a unique IP address for all IP devices to avoid the broadcasting. IP address makes the best path for transmission the data in the internet for routing. Every individual network has a unique IP address for better configuration of IPV6

No broadcasting: IPV6 is gives us no broadcasting is occur because it follows multicast services; it breaks the broadcast domain into small multiple sub domains. It comes under the classless addressing and reduces the IP wastage. IP packets forwarding the address by the multicast address with the help of hosts but other client hosts are not working till the sending hosts will not sends IP packets to these addresses. Multicast addressing also available site-wide and global services where clients host IPV6 of subscribe to a data stream.

Payload encoding and authentication: In IPV6 payload encryption of the data and authentication is available in the source not in the destination for transmission the data.

Better support of network: It provides support to select the better traffic from end to end networks for real time traffic. It provides best voice data and video transmission of data.

IPV4

IPV4 (Internet Protocol version 4) was invented in 1981 by iana; it provides a 32 bit binary (0,1) addressing space containing 4.3billion specific Internet Protocol (IP) addresses. Each IP device has a unique IP address for transmission from this address space; however the very fast growth of the Internet has resulted in these addresses being exhausted; with the last of the address space allocated in February 2012**) [10].** IPV4 uses many routing protocols like OSPFV2(Open Shortest Path First Version 2) it uses IPV4 for addressing.

OSPFV3:

Open Shortest Path First (OSPF) is a routing protocol comes from network layer for Internet Protocol (IP) networks. It uses a link state routing protocol algorithm and OSPV3 follows Dijkstra's algorithm. It uses Interior gateway routing protocol IGP), operating within a particular organization that is autonomous system (AS) [11]. It is defined as OSPF Version 2 in RFC 2328 (1998) for IPv4. But the IPv6 are specified as OSPF Version 3 in RFC 5340 (2008). OSPF routing protocol is maybe the greater used interior gateway protocol (IGP) in large enterprise transmissions [12]. An interior gateway protocol (IGP) in OSPF for routing Internet Protocol (IP) data packets only within a one domain routing with the help of IPV4 and IPV6 routing protocol, such as an autonomous system (AS). It collects link state information network from convenient routers and build a topology map of the transmission media. The topology is represented as a routing table to the Internet network Layer which routes datagram packets only on the destination IP (Internet Protocol) address identify in IP data packets [13]. OSPFV3 basis on Internet Protocol Version 4 (IPv4) and Internet Protocol Version 6 (IPv6) networks and feature is variable-length subnet masking (VLSM) which is comes under classless addressing. In which Classless Inter-Domain Routing (CIDR) addressing models are used as breaks big broadcast domain into small multiple sub domain (fast). VLSM is used for reduce IP wastage and gives approximately 0% wastage. Open Shortest Path First (OSPFV3) version 3 is an Interior Routing Protocol which is modified to support IPv6. This is a Link-State Protocol and uses Dijkstra's Shortest Path First algorithm to measure best path to destination [14].

The advantages of OSPF are:

- OSPF is not a Cisco proprietary protocol.
- OSPF always conclude the loop free routes for routing.
- If any changes occur in the network it updates fast otherwise network is updates is slow.
- OSPF minimizes the routes and compress the size of routing table by configuring area.
- Less bandwidth utilization is used.
- Several routes are supported.
- Support variable length subnet masking (VLSM) for reduce IP wastage by classless addressing.
- It is suitable for large network communication.

The disadvantages of OSPF are:

- Difficult to configure.
- Link state scaling problem is configured.
- More memory requirements.

IS-IS

IS-IS (Intermediate System to Intermediate System) is a link-state interior gateway routing protocol from OSI (Open System Interconnection) layer that is network layer. IS-IS uses both addressing IPV4 and IPV6 routing protocol, IS-IS runs the Dijkstra's algorithm which is used for shortest-path first (SPF) to create a database of the intermission topology and, from that database, to select the best (that is, shortest) path to reach the destination. IS-IS and OSPF (Open Short Path First) have not the major difference for naming its routing protocol packets [15]. Because it was invented as part of the OSI Open System Interconnection) comes under network protocols and not part of TCP/IP, IS-IS doesn't use IP (Internet Protocol) addresses but uses a NET (network entity title) for addressing. IS-IS use different addresses are called NETs, or network entity titles. While IP (Internet Protocol) addresses are 32 bits uses binary (0,1) long and are commonly written in dotted quad notation (such as 192.168.1.2), Example:47.0001.1921.6800.1002.00 NETs(network entity title) can be 8 to 20 bytes long, but are generally 10 bytes long and are written as shown in this example

The IS-IS addressing combination of three parts:

Area identifier: In this NET the first three bytes are used for the area ID. The first byte 47 of this example is used as a combination of this address family identifier (AFI) of the authority, which is similar to the IP address space that is selected by an autonomous system (A) [16]. The 47 AFI value is what IS-IS uses for independent addressing, which is the similar of RFC 1918

address space for IP routing protocols. Secondly two bytes of the area ID0001 —locate the area number for IS-IS. For this example, the area number is 1 for 0001 **[17]**.

System identifier: The next six bytes identify the node (that is, the router) on the network. The system identifier is equivalent to the host or address portion on an IP address [18].

NET selector: The last two bytes 00 are used for the (NET selector) NSEL. For IS-IS, they must always be 00, to indicate that system. In routing system and policies for a national network or for a campus network for the basic layer to manage the best resilience and better traffic distribution between all connections within the network to provide best transmission from source to destination. Making a good choice for the routing protocols is always a challenge and many factors should be considered in this [19]. External routing protocol is not an issue as BGP (Border Gateway Protocol) is always used to provide connectivity with other networks for the upstream to the Internet and for the peering connections with another connection [20].

Its work is to move information efficiency with a computer network.

Best route is selected by data grams through a packet-switched network.

For shortest and best path IS-IS uses Dijkstra's algorithm.

ISIS has a 2 layer:

Level-2 is used as backbone.

Level-1 is used for the areas.

Level 1-2.

Level-1: Level-1 is used for only the same area and its neighborhood for transmission of data.

Level-2: Level-2 is used same as well as other area for transmission of data.

Transmission in the area with level-2(L-2) only but level-1(L-1) areas transmission is easily handling also called Backbone area. In future aspects the level-1(L-1) area is used.

Level 1-2: It uses for transmission at any area.

III. TABLE FOR COMPARISION OF ROUTING PROTOCOL

TITLE	OSPFv3	IS-IS
Type	Link-state	Link-state

Interior/Exterior?	Interior	Interior
Algorithm	Dijkstra	Dijkstra
Convergence	Fast	Fast
Hop count Limit	None	None
AD	110	115
Update timers	Only when changes occur;	Only when changes occur
Updates	Only Changes	Only changes
Classless	Yes	Yes
Default Metric	Cost	Cost

IV. CONCLUSIONS

This paper discussed with the complicated issues of, OSPF V3 & IS-IS in IPV6 (Internet Protocol). As IPV6 is becoming famous day to day life; due to high-speed applications; and great hierarchy of IPs. Earlier than IPV6 the lot of work has been done with ipv4 in internet .In this paper, we have presented a comparative analysis of choose routing protocols such as IS-IS, OSPFV3 and mixture of IS-IS and OSPFV3. The comparison has been done in the similar network with multiple protocols for real time applications. Performance has been calculates on the basis of some parameters that aimed to figure out the effects of routing protocols.

V. FUTURE WORK

In this paper the future works on the basis of all the aspects of, OSPF V3 & IS-IS. We can enhance the speed of OSPFV3 like IS-IS to build and manage better network with the help of IPV6 and can get best results as compared to IPV4 (Internet Protocol version 4). In near future we will simulate the given IPV6 based on the simulation tool protocols in GNS3 Tool.

REFERENCES

[1] Zhang, Z. (2006). "Routing in intermittently connected mobile ad hoc networks and delay tolerant networks: overview and challenges." IEEE Communications Surveys & Tutorials **8**(1): 24-37.

[2] Jain, S., K. Fall, et al. (2004). Routing in a delay tolerant network, ACM.

[3] Sharef, B. T., R. A. Alsaqour, et al. (2014). "Vehicular communication ad hoc routing protocols: A survey." Journal of network and computer applications **40**: 363-396.

[4] Leong, B., S. Mitra, et al. (2005). Path vector face routing: Geographic routing with local face information. 13TH IEEE International Conference on Network Protocols (ICNP'05), IEEE.

[5] Strassner, J., J. W.-K. Hong, et al. (2009). A framework for modeling and reasoning about network management resources and services to support information reuse. Information Reuse & Integration, 2009. IRI'09. IEEE International Conference on, IEEE.

[6] Le Roux, J., J. Vasseur, et al. (2008). OSPF protocol extensions for path computation element (PCE) discovery.

[7] Murphy, S. (2006). "BGP security vulnerabilities analysis."

[8] Babatunde, O. and O. Al-Debagy (2014). "A comparative review of internet protocol version 4 (ipv4) and internet protocol version 6 (ipv6)." arXiv preprint arXiv:1407.2717.

[9] Dai, K. (2011). Ipv4 to ipv6 transition research based on the campus network. Intelligence Information Processing and Trusted Computing (IPTC), 2011 2nd International Symposium on, IEEE.

[10] Xylomenos, G., C. N. Ververidis, et al. (2014). "A survey of information-centric networking research." IEEE Communications Surveys & Tutorials **16**(2): 1024-1049.

[11] Yang, Y., R. I. White, et al. (2010). Border router with selective filtering of link state advertisements, Google Patents.

[12] Cerrón Sánchez, C. (2011). "Multi-service OSPF network analyzing in the simulation enviroment OMNET++."

[13] Vasseur, J., N. Agarwal, et al. (2011). "RPL: The IP routing protocol designed for low power and lossy networks." Internet Protocol for Smart Objects (IPSO) Alliance**36**.

[14] Shand, M. and S. Bryant (2010). IP fast reroute framework.

[15] Yannuzzi, M., X. Masip-Bruin, et al. (2005). "Open issues in interdomain routing: a survey." IEEE network**19**(6): 49-56.

[16] Kinnunen, M. (2011). "Signalling of Point to Multipoint Trees in Metro Ethernet and Core Networks."

[17] Sun, B., H. Li, et al. (2005). "Implementation of IS-IS routing protocol for the eXtensible Open Router Platform (XORP)."

[18] Detti, A., N. Blefari Melazzi, et al. (2011). CONET: a content centric inter-networkingarchitecture. Proceedings of the ACM SIGCOMM workshop on Information-centric networking, ACM.

[19] Akkaya, K. and M. Younis (2005). "A survey on routing protocols for wireless sensor networks." Ad hoc networks **3**(3): 325-349.

[20] Chamania, M. and A. Jukan (2009). "A survey of inter-domain peering and provisioning solutions for the next generation optical networks." IEEE Communications Surveys & Tutorials**11**(1): 33-51.

