DOI: http://dx.doi.org/10.26483/ijarcs.v8i9.5101

ISSN No. 0976-5697

Volume 8, No. 9, November-December 2017

International Journal of Advanced Research in Computer Science

RESEARCH PAPER

Available Online at www.ijarcs.info

EXTENSIVE REVIEWS OF OSPF FOR REDUCING THE CONVERGENCE TIME

Pertik Garg
Department of Computer Science Engineering
I.K.Gujral Punjab Technical University
Jalandhar, India

Anuj Kumar Gupta
Department of Computer Science Engineering
CGC, Landran
Punjab, India

Abstract: Link state routing protocols for example, OSPF synchronize the topology databases by flooding link state update messages occasionally or at whatever point there is an availability change. Topology changes trigger routing protocol to experience convergence procedure which gets ready new shortest routes required for packet delivery. Real-time applications these days need routing protocol to have a fast convergence time. This problem may be resolved by proposing an algorithm that can quickly respond to the topology change and reduce the convergence time by providing back up path which is already stored in routing table before the failover happens. EIGRP routing protocol gives a prevalent execution than OSPF routing protocol for real time applications. In this paper we reviewed the various papers on OSPF and EIGRP for the convergence time.

Keywords: OSPF, Link State Routing Protocol, IP, Packet loss, Convergence time.

I. INTRODUCTION

A. *Routing Protocol*

A routing protocol indicates how routers [1] communicate with every other, scattering data that empowers them to choose routes between any two nodes on a computer network. Routing algorithms decide the particular selection of route. Every router has from the earlier learning just of systems appended to it straightforwardly. A routing protocol shares this data first among quick neighbors, and after that all through the network.

Routing is the prime factor in this advanced period of internet communication. Several routing protocols are in presence in nowadays. The routing of packets between IP networks is completed by two distinct ways i.e. static routing & dynamic routing. In static routing "static routes are generally physically designed by network administrator by including entries into routing table however this may not generally be the case [2]. Dynamic routing is broadly utilized for enormous IP networks.

There are three classes of Routing Protocols

- Interior gateway routing by link state routing protocols
- Interior gateway routing by distance vector protocols
- Exterior gateway routing

B. *Link State Routing Protocol*

The essential idea of link-state routing [1] is that each node builds a guide of the availability to the network, in the form of a graph, indicating which nodes are related with which different nodes. Every node at that point freely figures the following best sensible way from it to each conceivable goal in the network. The gathering of best ways will then shape the node's routing table.

Through link state routing protocol

- Routers broadcast and get link state packets to and from different routers via the network. Link state packets contain the status of a router's links or network interfaces.
- The router builds a topology database of the network.
- The router runs the Shortest Path First (SPF) algorithm against the database and generates a SPF tree of the network with itself as the base of the tree.
- The router populates it route table with ideal ways and ports to transmit information through to achieve every network.

Examples of link state routing protocols are:

- Open Shortest Path First (OSPF) for IP
- The ISO's Intermediate System to Intermediate System (IS-IS) for CLNS and IP
- DEC's DNA Phase V
- Novell's NetWare Link Services Protocol (NLSP)

C. *Open Shortest Path First (OSPF)*

OSPF [3] is classified as an Interior Gateway Protocol (IGP), it bases on link-state routing algorithm. OSPF always choose the shortest path to forward IP packets. At the point when a few equivalent cost routes to a goal exist, traffic is conveyed similarly among them. The cost of a route is depicted by a solitary dimensionless metric. When the utilization ratio of the current shortest path is not high, to choose the shortest path to forward IP packets is the best selection. However, if the current shortest path is congested, and there are other paths whose costs are larger and utilization ratio are lower, to choose other paths to forward packets maybe better.

Open Shortest Path First (OSPF) [4] is a link state routing protocol (LSRP) that uses the Shortest Path First (SPF) network communication algorithm (Dijkstra's algorithm) to compute the shortest connection path between known devices.

The OSPF routing approaches to build a route table are administered by link cost elements (external metrics) related with every routing interface. Cost elements might be the separation of a router (round-trip time), network throughput of a link, or link accessibility and unwavering quality, communicated as simple unit less numbers. This gives a dynamic procedure of traffic load adjusting between routes of equivalent cost.

© 2015-19, IJARCS All Rights Reserved

OSPF chooses the best routes by finding the least cost ways to a goal. All router interfaces (links) are given a cost. The cost of a route is equivalent to the aggregate of the considerable number of costs designed on all the outbound links between the router and the destination network, in addition to the cost designed on the interface that OSPF got the Link State Advertisement on.

D. Protocol Messages

Not at all like other routing protocols [5], OSPF does not convey information by means of a transport protocol, for example, the User Datagram Protocol (UDP) or the Transmission Control Protocol (TCP). Rather, frames IP datagram specifically. OSPF characterizes five distinctive message types, for different types of correspondence.

- Hello

As the name proposes, these messages are utilized as a type of greeting, to allow a router to find other adjoining routers on its nearby links and networks. The messages build up connections between neighbouring devices (called adjacencies) and communicate key parameters about how OSPF is to be utilized as a part of the autonomous system or area.

- Database description

These messages contain portrayals of the topology of the AS or area. That is, they carry the substance of the link-state database for the autonomous system or area starting from one router onto next. Transferring vast LSDB may need a few messages to be sent; this is finished by having the sending device assigned as a master device and sending messages in sequence, with the slave (recipient of the LSDB data) reacting with acknowledgements.

- Link state request

These messages are utilized by one router to ask for refreshed data about a portion of the LSDB from the next router. The messages clearly describe which link(s) about which the asking device needs more present data.

- Link state update

These messages consist of updated data about the condition of specific links on the LSDB. They are got in response to a Link State Request message, and it is also broadcasted or multicast by routers on a regular basis. Their contents are utilized to update the data in the LSDBs of routers that get them.

- Link state acknowledgement

These messages give credibility to the link-state exchange procedure, by unequivocally recognizing receipt of a Link State Update message.

E. The hierarchical topology of OSPF has the following advantages:

- Reduced frequency of SPF calculations

Since itemized route data is kept inside every area, it is not important to surge all link-state changes to each area. Thus, not all routers need to run the SPF calculation when a topological change happens. Only those influenced by the change should recomputed routes.

- Smaller Routing Tables

When utilizing various areas, detailed route entries for inter area networks are kept inside the area. Rather of advertising these unequivocal routes outside the area, these routes can be condensed into one or more summary addresses. Publicizing these summaries reduces the number of link-state advertisements (LSAs) propagated between areas, while keeping all networks reachable.

- Reduced link-state update (LSU) overhead

LSUs can consist of various LSA types, including link-state data and summary data. Rather than sending an LSU about every network inside an area, we can publicize a solitary or a few summarized routes between regions, thus diminishing the overhead related with link-state updates passed to other areas.

F. Types of Routers

- Internal router

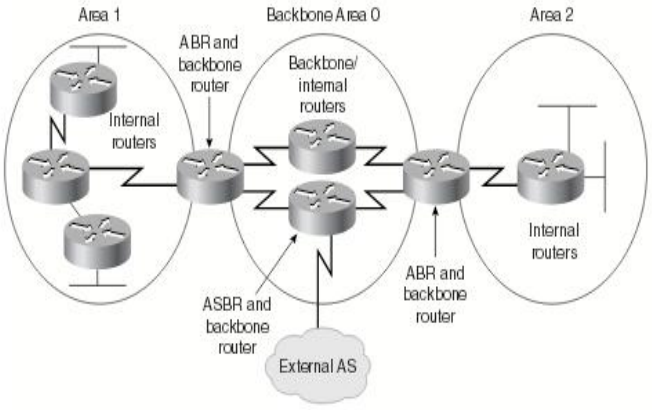
Routers that have all interfaces in the similar area are internal routers. Internal routers inside the similar area have indistinguishable link-state databases.

- Backbone router

Routers that sit in the backbone area, they have no less than one interface associated with Area 0. These routers keep up OSPF routing data utilizing the indistinguishable methods and calculations from inside internal routers. Area 0 serves as the transit area between other OSPF areas.

- Area Border Router (ABR)

Routers that have interfaces connected to various areas. These routers keep up independent link-state databases for every area to which they are connected, and route movement bound for or touching base from different areas. ABRs are leave focuses for the region, which implies that routing data bound for another area can arrive just through the nearby area's ABR. ABRs may summarize data from their link-state databases of their attached areas and circulate the data into the backbone area. The backbone ABRs then forward the data to all other connected areas. An area can have one or more ABRs.



Types Of Routers

II. LITERATURE REVIEW

Prachi Thakur et al. [2] discussed that in this web period, routing protocols assume a vital part in path determination to send traffic fast. There are diverse sorts of routing protocols accessible, for example, static and dynamic routing protocols. Likewise, this paper gives depth study of various dynamic routing protocols for example, RIP, EIGRP and OSPF.

Vincenzo Eramo, et al. [6] analyzes intra-domain routing protocols to help new highlights required by real time services. They propose another multi-path dynamic algorithm which utilizes multipath data to make a quick assurance about the new

© 2015-19, IJARCS All Rights Reserved

shortest paths when a link failure happens, decreasing along these lines the network re-convergence time.

Xuezhi Jiang, et al. [7] presented the paper on Improving IGP Convergence through Distributed OSPF in Scalable Router; they propose a distributed OSPF (DOSPF) scheme to schedule routing computation through self-adaptively changing SPT waiting time.

Jaewon Kang, et al. [8] proposes an Adaptive Link Establishment (ALE) scheme that makes a link in view of its dependability as far as availability and channel condition. The key normal for the ALE plot is that it progressively controls the idleness of another connection creation by either tolerating or dropping approaching Hello messages without producing extra control packets on the wireless channel. Also, the ALE plot is completely perfect with the inheritance OSPF routing protocol.

Mohd Zahid, et al. [9] presented another routing table calculation scheduling scheme for OSPF routing protocol to better serve real-time applications. The proposed scheme focuses on speeding up OSPF networks convergence time by optimizing the scheduling of routing table calculations utilizing Generalized Regression Neural Network (GRNN).

M Goyal, et al. [10] examines the issue of scheduling routing table updates in link state routing protocols. They analyze the execution of different hold time schemes and propose another deal to schedule routing table updates, called LSA Correlation.

ZHANG Mingui et al. [11] discussed that as a promising way to deal with network reliability, proactive failure recovery (PFR) re-routes failure influenced movement to reinforcement ways without sitting tight for the finish of IP routing convergence. However, the failure affected traffic may cause blockage on the off chance that it is not precisely assigned over the reinforcement ways as per their accessible limit. A post failure traffic engineering (PostTE) deal is proposed adjust the heap in the PFR scheme. Loop-free backup paths are prepared in advance to cover all the potential single- link failures. The failure affected load is nearby allocated to the backup paths through tackling a linear programming (LP) issue . More often than not, the maximum link utilization (MLU) of the system is limited under both the failure and failure-free cases. For the tested education networks, the LP issue can be illuminated inside milliseconds.

Haresh N. Patel et al. [12] discussed that the expanding interest of computer networks is developing quickly step by step. The developing need to circulate applications crosswise over various systems with high limit and high-execution intermediate switching nodes and networks. This examination fundamentally concentrates on route redistribution and route summarization of different intra-domain routing protocols, for example, EIGRP and OSPF. Routing Protocols that utilization encourage to trade routing data between routers. Reasons for example, various offices oversaw various network Administrators, company mergers. Regardless, having a different routing protocol and various autonomous system in networks then without route redistribution we can't publicize route from source to destination. Obviously Network complexity will increase with the size of routing table of routers at that point route summarization is important, to diminish traffic and complexity of network.

Ankit Sharma et al. [13] discussed that the term routing is utilized for taking a packet from one device and sending it through the system to another device on a alternate network. Routers don't generally think about hosts— they just think about systems and the best way to every network. Because of the real part that routing protocol play in computer network infrastructures, exceptional considerations have been given to routing protocols with assembled – in security limitations. In this paper we have indicated how we can do routing with an EIGRP based routing protocol. A network model of Cisco routers has been utilized in a network simulation software 'packet tracer'. In the long run an EIGRP routing protocol has been arranged and keep running on a system model. Among all the routing protocols accessible EIGRP protocol has been mostly utilized for routing a complex network.

Alex Hinds et al. [14] discussed that IPv4 addressing space has nearly been depleted; numerous associations will soon be required to play out the changeover to IPv6. Conventional IPv4 routing protocols must be supplanted with new IPv6 compatible protocols to guarantee frameworks keep on operating adequately; however these protocols have experienced critical changes so as to help IPv6. Understanding these progressions is essential while choosing a routing protocol for a framework, so as to encourage this, an examination and correlation of two well known routing protocols; OSPF and EIGRP has been attempted.. They identified, discussed and compared the significant changes between the IPv4 and IPv6 editions.

Syed Yasir Jalali et al. [15] discussed that in a network topology different protocols are utilized for sending the packets. A routing table is kept up by routers for effective conveyance of the packets from the source node to the right destined node. The degree of data put away by a router about the network relies upon the algorithm it takes after. The greater part of the well known routing algorithms utilized are RIP, OSPF, IGRP and EIGRP. Here in this paper they were assessing the execution e of RIP, OSPF, IGRP and EIGRP for the parameters: convergence, throughput, queuing delay, end to end delay, utilization through simulation which has been endeavored utilizing OPNET as simulating tool. They were attempting to discover which protocol suits the best for the network and through an exhaustive examination they had tried to discover the advantages and disadvantages of every protocol.

Pritesh Kumar Jain et al. [16] thought about the routing methodology based on logical addressing utilizing subnetting, idea of Dynamic Host Configuration Protocol (DHCP). Routing protocols are utilized to transmit packets over the Internet. Routing protocols indicate how routers communicate with each other. The router has earlier information about the adjoining systems (in view of routing algorithm), which can help with choosing the routes between two nodes. There are different types of routing protocols that are Inter domain and Intra domain, Routing Data protocol (RIP) ,open shortest path first (OSPF)and Enhanced Interior Gateway Routing Protocol (EIGRP) have been considered as the pre-prominent routing protocols for real-time applications. Subnet enables executives to separate their private system into for all intents and purposes characterized fragments with many preferences of subnetting. Dynamic Host Control Protocol is an administration that naturally allots IP addresses to devices that interface with the system.

V.Vetriselvan et al. [17] discussed that in this present time, routing protocols assumes a fundamental part. Determines how the correspondence is done in router to forward the packets from source to destination .In this paper, they surveyed execution assessment of different routing protocols with particular criteria's like Jitter, Convergence Time, end to end delay, and so forth.

Kirill Levchenko et al. [18] presented a another link-state routing algorithm called Approximate Link state (XL) went for expanding routing efficiency by smothering updates from parts of the system in this paper. We demonstrate that three straightforward criteria for refresh engendering are adequate to ensure soundness, fulfillment and limited optimality for any such calculation. They appeared, by means of reenactment, that

© 2015-19, IJARCS All Rights Reserved

XL altogether beats standard link-state and distance vector algorithms now and again diminishing overhead by more than a request of extent while having unimportant effect on way length. At long last, they contended that current link-state protocols, for example, OSPF, can incorporate XL routing in a backwards compatible and incrementally deployable mold.

III. RESEARCH GAP

Following are the research gaps that should be fulfilled in the present study.

- In fast IP networks, interior gateway protocol like OSPF has no facility to acquire another route to bypass failure in time.
- In OSPF a lot of packets loss during the OSPF convergence period caused by failure.
- Lack of backup routes for destination with the goal that it can rapidly adjust to backup ways to go.
- On link failure or topology change recompilation of SPF tree and route table.
- Real time application like voice and video got qualities has been effected because of packet loss in convergence.

IV. CONCLUSION

Conventionally, for the vast majority of the routing protocols that pre-figure various disjoint paths as applicant paths, both the convergence time for first bootstrapping and the refresh time of hopeful endless supply of a network failure are very long, especially in large-scale networks. The convergence time for OSPF is fundamentally decreased without debasing the optimality of the pre-computed path table, especially in large-scale networks where the routing calculations cannot be performed continuously. The present study improves the OSPF execution convergence by providing back up path, improving OSPF routing algorithm, in case of failure, and makes it a preferred choice for today's network designers. By reviewing the various papers on OSPF we conclude that if back up path will be give to OSPF its execution will be improved by reduction of convergence delay.

V. REFERENCES

[1] Introduction;"IPRouting";http://www.cisco.com/en/US/tech/ tk365/t sd_technology_support_protocol_home.html

[2] Prachi Thakur and Yogesh Bansal(2014), "Survey of IP Routing Protocols", International Journal of Advanced Research in Computer Science and Software Engineering, Volume 4, Issue 7.

[3] ZHOU Haijun, PAN Jin, SHEN Pubing (2003). Cost Adaptive OSPF, Fifth International Conference on Computational Intelligence and Multimedia Applications (ICCIMA'03), IEEE.

[4] R. Coltun, D. Ferguson, J. Moy, and A. Lindem(2008), "OSPF for IPv6,"Internet Engineering Task Force, Request For Comments (StandardsTrack) RFC 5340.

[5] P. Priyadhivya and S. Vanitha(2015), "A Survey on Interior Gateway Protocols", International Journal of Advanced Research in Computer Science and Software Engineering, Volume 5, Issue 2.

[6] Vincenzo Eramo, Marco Listanti, and Antonio Cianfrani(2008), "Design and Evaluation of a New Multi-Path Incremental Routing Algorithm on Software Routers", IEEE Transactions on Network and Service Management, Vol. 5, No. 4,IEEE.

[7] Xuezhi Jiang, Mingwei Xu, Qi Li, Lingtao Pan (2009). Improving IGP Convergence through Distributed OSPF in Scalable Router. 11th IEEE International Conference on High Performance Computing and Communications, IEEE.

[8] Jaewon Kang, Mariusz A. Fecko and Sunil Samtani (2010). ALE: Adaptive Link Buildment in OSPF Wireless Ad-Hoc Networks The 2010 Military Communications Conference , IEEE

[9] M Zahid, M Soperi, M Haide, K Abu Bakar (2011), Scheduling of OSPF routing table calculation using Generalized Regression Neural Network ,2011 IEEE

[10] MGoyal, M Soperi, H Hosseini (2009). Analyzing the Hold Time Schemes to Limit the Routing Table Calculations in OSPF Protocol 2009 International Conference on Advanced Information Networking and Applications, 2009 IEEE

[11] ZHANG Mingui and LIU Bin(2011), "Traffic Engineering for Proactive Failure Recovery of IP Networks", TSINGHUA SCIENCE AND TECHNOLOGY, , Volume 16, Number 1, pp.55-61.

[12] Haresh N. Patel and Prof. Rashmi Pandey(2014), "Extensive Reviews of OSPF and EIGRP Routing Protocols based on Route Summarization and Route Redistribution", International Journal of Engineering Research and Applications , Vol. 4, Issue 9(Version 4), pp.141-144.

[13] Ankit Sharma & Sheilly Padda(2012), "Configuring an EIGRP based Routing Model", International Journal of Scientific and Research Publications, Volume 2, No. 2.

[14] Alex Hinds, Anthony Atojoko and Shao Ying Zhu(2013), "Evaluation of OSPF and EIGRP Routing Protocols for IPv6", International Journal of Future Computer and Communication, Vol. 2, No. 4.

[15] Syed Yasir Jalali, Sufyan Wani and Majid Derwesh(2014) "Qualitative Analysis and Performance Evaluation of RIP, IGRP, OSPF and EGRP Using OPNET", Advance in Electronic and Electric Engineering., Volume 4, Number 4, pp. 389-396.

[16] Pritesh Kumar Jain, Manoj Sindhwani and Shippu Sachdeva(2014), "Comparative Study of Routing Protocols with Subnetting Implementation in Cisco Packet Tracer", International Journal of Advanced Research in Computer Science and Software Engineering, Volume 4, Issue 12.

[17] V.Vetriselvan, Pravin R.Patil and M.Mahendran(2014), "Survey on the RIP, OSPF, EIGRP Routing Protocols", International Journal of Computer Science and Information Technologies, Vol. 5 , No.2 , 1058-1065.

[18] Kirill Levchenko, Geoffrey M. Voelker, Ramamohan Paturi and Stefan Savage(2008), "XL: An Efficient Network Routing Algorithm", SIGCOMM'08.

© 2015-19, IJARCS All Rights Reserved