

A Novel Inter and Intra Routing Algorithm

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Abstract— Routing algorithm plays a vital role in any NETWORK communications. The purpose of algorithm is to make a connection between the hops. Though different routing algorithms coexist for inter routing and intra routing but still there is need for the better one, so we make deep analysis on the existing algorithms and propose a new algorithm. The analysis addresses various routing algorithm issues and a method to overcome them. The parameters taken for comparison include speed, interconnection with the other algorithm and we develop an algorithm which will work in both inter and intra routing environment. The study analysis the functionality of the routing protocol in the real network by designing it using Gns3. Also it discusses the problems faced by the admin of the network by examining how it works in the real environment.

Keywords— Router, Switches, Protocols, RIP, OSPF, EIGRP, Real Networking Environment

I. Introduction

Routing protocol are mainly used for making a network between the routers. At present there are two type of routing protocol 1st is intra domain and the 2nd is inter domain both the routing protocol are work in very different manner and in different environment. The intra domain routing is used in making a network between the two routers or more router which are mainly used in LAN, WAN, MAN networks. The main agenda of the routing protocol is to study the available routes and build the connection and make decision. The routers uses the selection mechanism to measure the better path of sending the data. There is a group of router with similar policy is called an autonomous system (AS). We also can says that a single association can control management parts of a network is known as Autonomous System (AS). The group of autonomous systems is connected under tree called Internet. Autonomous System is a router program which is control by network manager on behalf of a management entity. Here a management entity can be a university, or any business firm or an internet Service Provider (ISP).

Due to increase in the use of internet or commercial internet the complexity in the network is handled by the ASes (privately-owned Autonomous System) is increased. Each autonomous system is assigned by a unique number called Autonomous System number (ASN). These number are given by the organization called IANA (Internet Assigned Number Authority). This organization keep the internet connected globally. It run the domain name and provides number and resources to protocol and Autonomous System.

The routing in Autonomous Systems are of two types, which is called Intra-AS routing which is also called Intra domain

routing mechanism which work within an autonomous system and other is inter AS-routing which is also called as inter domain routing mechanism which work between the autonomous systems. The routing protocol used within the AS to share the routing info is called as Interior Gateway Protocols (IGPs). Routing Information Protocol (RIP), Enhanced Interior Gateway Protocol (EIGRP), Open Shortest Path First (OSPF) are some of the Interior Gateway Protocol. The protocol which are used to exchange route between the Autonomous System are known as Exterior Gateway Protocol (EGPs). EGPs is the adhesive which stick the autonomous system to the Internet. Border Gateway Protocol is the paradigm of the Exterior Gateway Protocol.

II. Related Works

- Survey on the RIP, OSPF, EIGRP Routing Protocols 2014: Show a full architecture of the routing protocol and discuss each protocol thoroughly show the updates and through and well comparison between protocols. Fully elaborated that EIGRP is better protocol.
- Evaluation of OSPF and EIGRP Routing Protocols for IPv6: Elaborate the diff between IPv4 and IPv6 and also well discuss about both the OSPF and EIGRP protocol. And also show the effect of the connection between them. Fail to implement the proposed idea also show the system failure will implementing the idea.
- Performance Analysis of RIP, OSPF, IGRP and EIGRP Routing Protocols in a Network 2012: A well discussion on the networks and compare the performance of the different algorithm in different condition. After the given scenario is not well define and after that OSPF is better in performance in term of speed.

- OSPFN: An OSPF Based Routing Protocol for Named Data Networking: Making a link between OSPF and named data networking and also show the brief relation between OSLA queries and OSLA routers. Not more thing to understandable in paper many things are more complicated in the system.
- NIRA: A New Inter-Domain Routing Architecture: In this paper the author of the paper where propose and design a new routing algorithm called NIRA which is an inter routing protocol also shows the complete architecture of the NIRA. In proposed they also told that they have done it in router but after that it is not executed in router in different factor.
- A Two-layer Intra-domain Routing Scheme for Named Data Networking: The methodology used in this paper is used intra routing algorithm which is fully function in NDN named data networking we discuss here a brief discussion on the NDN like its background attributes

,routing and scalability. Hard to make connection between the NDN.

III. Routing Algorithm

Presently there are two type of routing information are used in the networks they are interior gateway routing protocol and the exterior gateway routing protocol in interior gateway routing there are three type of routing first is the Distance vector in which RIP (Routing Information Protocol) and the second is Link State in which OSPF (Open Shortest Path First) routing protocol is used and the EIGRP (Enhanced Interior Gateway routing Protocol) is the hybrid protocol which we can discussed in next section.

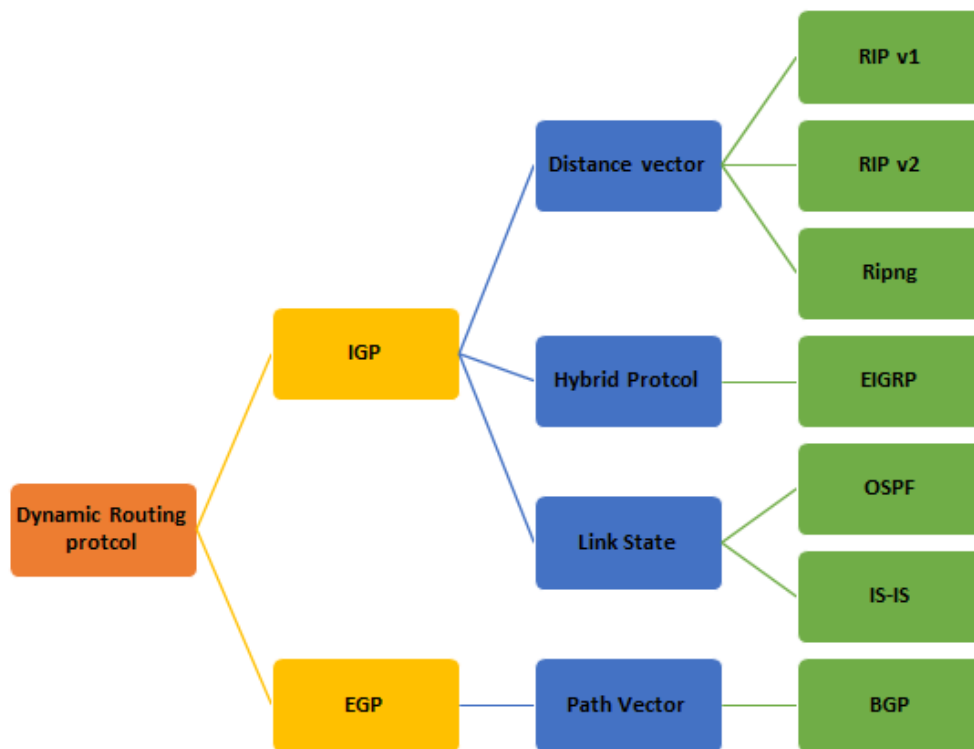


Fig 1: Classification of routing algorithms

Routing Information Protocol:

Routing information protocol (RIP) is one of the oldest protocol which is a distance vector protocol. The major function of this routing protocol is to choose the best path to goes to the prefer destination. This is done by the routing table by regularly updating them in the router by information taken from the neighbor's router in network. Each and every protocol has a metrics to select the best path

among the available paths. RIP use the hops count as the metric to measure the best path. The maximum number of hops that allows RIP to reach the destination is 15. If the destination is more than 15 then the prefix is marked as unreachable. So that is the reason the RIP is not useful for larger networks. The RIP protocol is fully functional and depend on the bellman ford algorithm.

- **Bellman Ford:**

The bellman ford algorithm is used to compute the shortest path from a single vertex to all the other vertices in a weighted graph. It is capable of handling graphs in which some of the edges are negative weights. Firstly, this algorithm was proposed by Alfonso Shimbel in 1955, but after it was named by Richard Bellman and Lester Ford who published it in 1958 respectively.

Open Shortest Path First Protocol (OSPF):

Open Shortest Path First (OSPF) protocol is the thoroughly used IGP (Interior Gateway Protocol). It is a public routing protocol means that it is not owned by any company unlike EIGRP (Enhanced Interior Gateway Protocol) which is fully owned in license of Cisco routing protocol. OSPF is one of the finest Link State protocols which is mostly used by the market. As discussed earlier in link state protocol, a router has the topology of knowledge and updates are not sent by in term of period. The updates are only sent when there is a failure in the link in the router or if there is any change in the topology.

The OSPF computes the Shortest Path tree for each route method used which is based on Dijkstra's algorithm. The OSPF routing policies for constructing a table are governed by link associated with each interface. Cost factors also may affect the distance of the router, data of a link, or link reliability and reliability, as simple unit-less numbers. This provides the dynamic process of traffic load balancing.

Dijkstra's:

Dijkstra's algorithm is the algorithm for finding the shortest path b/w nodes and graph, which represents, for example, the road map network. It was firstly proposed by the computer scientist Edsger W. Dijkstra's in 1956.

The algorithm exists in many other variants; Dijkstra's genuine variant found in the shortest path b/w two nodes but a more common variant is to fix a single node as the "source" node and find the shortest paths from the source to other nodes in the graph, produce the shortest path tree.

Enhanced Interior Gateway Protocol (EIGRP):

Enhanced Interior Gateway Routing Protocol which is famously known as EIGRP is the Cisco restrictive convention. It is called as the half breed steering convention as it has both the elements of separation vector and connection state directing conventions. It utilizes Diffusing Update Algorithm (DUAL) to choose the best way. It ensures the circle freeways. EIGRP utilizes the transmission capacity and deferral as measurements to pick the best way. EIGRP sends the welcome parcels to the nearby switches to wind up neighbors. Every welcome parcel comprises of

Autonomous System Number (ASN), Subset number and metric segments. Every switch contains a hold-down clock which is 3 times the welcome bundle interim. The switch is set apart as inaccessible if the switch does not get any reaction.

Border Gateway Protocol (BGP):

Border Gateway Protocol is the Internet steering convention. The transmission is done between various Autonomous Systems (AS) and inside Autonomous Systems. It is the broadly utilized Exterior Gateway Routing Protocol. Each AS contains different switches and each AS is matched up with alternate ASes, up on a consented to arrangement and shared strategies. There exist different courses between the source AS and goal AS, yet the BGP convention chooses just a single best course to spread the activity by utilizing the best way calculation.

IV. GNS-3

Graphical Network Simulator-2 is a network emulator which was first introduced in 2008. It can allow the combination of real and virtual devices, used for complex network. It also uses the simulate software to simulate CISCO IOS.

GNS3 is used in many large firms including Walmart, NASA, Exxon and AT&T, is also very useful for preparation of network professionals. In 2015 a total of 11 million download has been done.

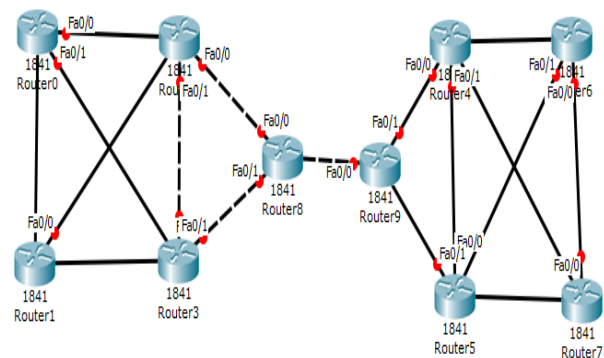


Fig 2 : GNS 3 network prototype

V. Proposed System

In this paper we are going to focus into the different IGP and EGP protocols. Firstly we are going to see the elaboration of routing protocols and after that we study in the deep with each protocol. Each protocol is explained with examples. We are also going to show the work of every protocol in different networks that how they work. Then we after studying we take all advantages and disadvantages of the protocol and define a new one.

Our major target is to develop an algorithm which can be work in both the environment either it is IGP or it is in EGP

environment. Which work in both the environment means that we have to only run the protocol in router either for connecting it in IGP or in EGP we also study the security threat which is present for the current protocols and try to overcome from it. We also mention the shortcomings of the existing protocol and suggest some enhancement for the future research.

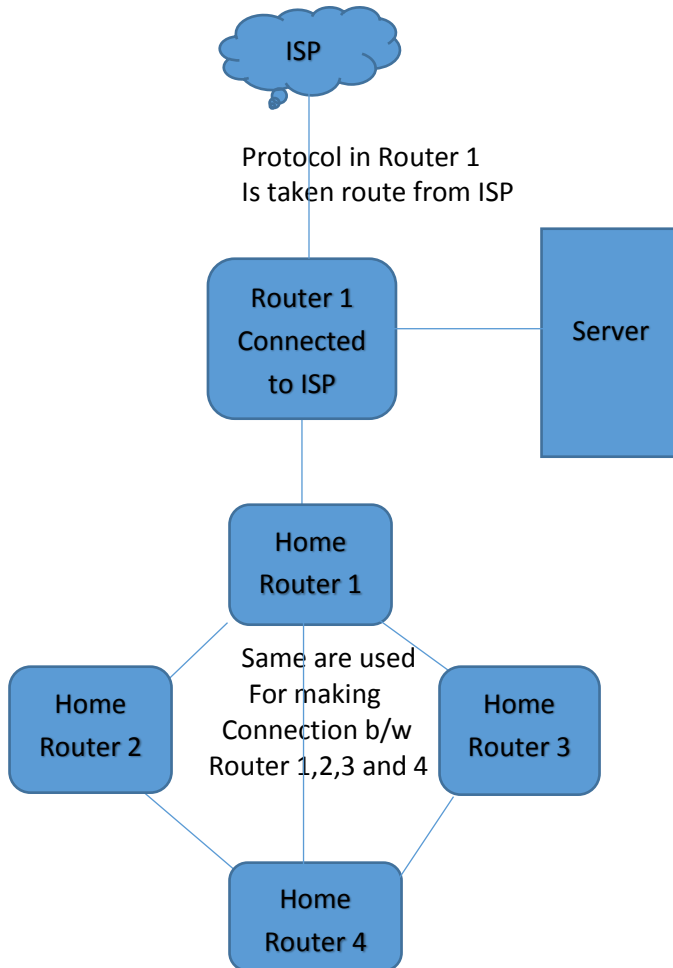


Fig 3: System architecture of the proposed model

As we first mention that our algorithm is the hybrid algorithm that can be work in both the function the algorithm This algorithm is joint combination of the Dijkstra's and the Bellman ford that can work on both the inter and intra routing environment this is hybrid version for selecting path as well as shortest link.

Initialization

$d(v) \leftarrow \infty$, for all $v \in V$ (set the distance vertex is infinity)
 $\pi(v) \leftarrow \text{nil}$, for all $v \in V$
 $d(s) \leftarrow 0$ (distance to source vertex is zero)

Relax (u, v)

If $d(u) + c(u, v) < d(v)$ (see for if shortest distance)
 $d(v) \leftarrow d(u) + c(u, v)$ (set the best path selection)

$\pi(v) \leftarrow u$

P lain scan

for each edge $(u, v) \in E$ (for selecting each and every edges)

Relax(u, v)

$S \leftarrow \emptyset$ (set the visited vertices as empty)

while(there is a vertex in $V \setminus S$ with $d < \infty$) do

(while selecting it for minimum distance)

find vertex u in $V \setminus S$ with the minimal value of d

$S \leftarrow S \cup \{u\}$ (add all visited vertex)

(for each edge $(u, v) \in E$ /* scanning u*/)

Relax(u, v)

Dijkstra(G, s)

Dijkstra, scan (//initialization scan for prefer link)

return(d, π)

Bellman-Ford(G, s) (ready to initializing the proper path)

Initialization

$I \leftarrow 0$ (check for the link)

do

$i++$ (check again if any link has better cost)

P lain scan

until((there was no change of d at P lain scan) or($i = |V|$))

if ($i < |V|$) return(d, π)

else return(There exists a negative cycle reachable froms.)

Bellman-Ford-Dijkstra(G, s)

Initialization

$I \leftarrow 0$

(//first implement for bellman ford and initialize it)

do

$i++$

Dijkstra scan

until ((there was no change of d at Dijkstra scan) or($i = |V| - 1$))

if($i < |V| - 1$)

return(d, π)

else return("There exists a negative cycle reachable from s.")

VI. Conclusion and Future Scope

In this paper the combination of both the shortest path algorithm and the bellman ford algorithm provides very solution of the problem solving method in networking by coding of the algorithm is also inducted. This can be useful to examine the distance in various networks. Dijkstra assign the label which is use for determines the minimum length at start of the vertex itself, whereas Bellman-ford acknowledges the edges with negative weight. Hence, we conclude both these algorithm are tested using defined test cases. This algorithm is used in both the environment. In future we can use the authentication that can use for

authentication of message passing in it and further we can also use more advanced authentication problem in it. This algorithm is advancement in different way that it can be able to work on different condition like in intra as well as inter routing after that particular algorithm is able to working in the GNS 3 tool.

VII. References

- [1] V.Vetriselvan, Pravin, R.Patil, M.Mahendran, "Survey on the RIP, OSPF, EIGRP Routing Protocols", International Journal of Computer Science and Information Technologies, Vol.5, Issue.2 pp.1058-1065, 2014.
- [2] Alex Hinds, Anthony Atojoko, SYing Zhu, "Evaluation of OSPF and EIGRP Routing Protocols for IPv6", International Journal of Future Computer and Communication, Vol.2, No.4, pp.169-175, 2013.
- [3] Pankaj Rakheja, Prabhjot kaur, Anjali gupta, Aditi Sharma, "Performance Analysis of RIP, OSPF, IGRP and EIGRP Routing Protocols in a Network", International Journal of Computer Applications Vol.48, No.18, pp.795-805, 2012.
- [4] N. Kishore, S. Singh, R. Dhir, "Energy Based Evaluation of Routing Protocol for MANETs", International Journal of Computer Sciences and Engineering, Vol.2, Issue.3, pp.14-17, 2014
- [5] Leena Pal, Pradeep Sharma, Netram Kaurav , Shivilal Mewada, "Performance Analysis of Reactive and Proactive Routing Protocols for Mobile Ad-hoc –Networks", International Journal of Scientific Research in Network Security and Communication, Vol.1, Issue.5, pp.1-4, 2013.
- [6] Sunil Taneja, Ashwani Kush, "A Survey of Routing Protocols in Mobile Ad Hoc Networks", International Journal of Innovation, Management Technology, Vol.1, No.3, pp.2010-0248, 2010.
- [7] Kevin Butler, TR. Farley, Patrick McDaniel, Jennifer Rexford, "A Survey of BGP Security Issues and Solutions", Proceedings of the IEEE, Vol.98, No.1, pp.100-122, 2010.
- [8] Xiaowei Yang, David Clark, Arthur W.Berger, "NIRA: A New Inter-Domain Routing Architecture", IEEE/ACM transaction on networking, Vol.15, No.4, pp.775-788, 2007.
- [9] Nick Feamster, Jared Winick, Jennifer Rexford, "A Model of BGP Routing for Network Engineering", SIGMETRICS/ Performance-04, New York, pp. 331-342, 2004.
- [10] Huichen Dai, Jianyuan Lu, Yi Wang, Bin Liu, "A two-layer intra-domain routing scheme for named data networking", 2012 IEEE Global Communications Conference (GLOBECOM), Anaheim, CA, pp. 2815-2820, 2012.
- [11] David Applegate, Edith Cohen, "Making IntraDomain Routing Robust to Changing and Uncertain Traffic Demands: Understanding Fundamental Tradeoffs", Proceedings of the 2003 conference on ATAP for computer communications, Germany, pp.313-324, 2003,
- [12] BR. Smith, J.J. Garcia-Luna-Aceves, "Securing the Border Gateway Routing Protocol", Defense Advanced Research Projects Agency (DARPA) under Grant F19628-96-C-0038 , Vol.4, Issue.3, pp.41-46 2002
- [13] R. Nathiya, S.G. Santhi, "Energy Efficient Routing with Mobile Collector in Wireless Sensor Networks (WSNs)", International Journal of Computer Sciences and Engineering, Vol.2, Issue.2, pp.36-43, 2014.