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Survey on Dynamic Routing Protocols

Shewaye Sirika
Department of CS/ IT (SIT)
Symbiosis International University (SIU)
Pune, India

Smita Mahajan
Department of CS /I T (SIT)
Symbiosis International University (SIU)
Pune, India

Abstract: **In today's network communication, it's miles hard without routing protocols as they play a vital role in the direction, dedication to send site visitors fast and determines how the conversation is completed in router to a head the packets from source to end (destination). There are such a lot of routing protocols to be had like Static and dynamic routing protocols. In this paper, we surveyed various dynamic routing protocols consisting of RIP, EIGRP and OSPF primarily based on different metrics.**

Keyword--- RIP, IGRP, EIGRP, OSPF, GNS-3, OPNET, packet tracer.

I. INTRODUCTION

In the present day generation of network communication exchange routing is the top factor for communication exchange. Routing is the system of selecting first-class paths in a community which is normally performed by dedicated devices referred to as routers. Routing protocols had been created for routers to permit the exchange of routing tables, or regarded networks, between routers. Routing of packets is finished in two ways, i.e. static routing and dynamic routing. In static routing administrator manually enters the routes within the router table wherein as in dynamic routing it takes place routinely the use of routing protocols like RIP, IGRP, EIGRP, OSPF, and so forth. Verbal exchange among routing protocols is dependent on the routing set of rules which is solely depending on the metrics used to locate the path to switch the records across networks. There are three styles of Dynamic routing protocols, primarily based on the way that discover and make calculations, approximately routes; the ones are Distance Vector, Link state and Hybrid which can also called in not unusual indoors gateway routing protocols (IGP) and there also are different routing protocols referred to as outdoors gateway routing protocols (EGP) like BGP. On this paper three routing protocols, RIP (Distance vector protocol), OSPF (Link State Protocol) and EIGRP (Hybrid Protocol) are analyzed. So many researches are done on dynamic routing protocols. In this paper, we are going to review latest researches in this area.

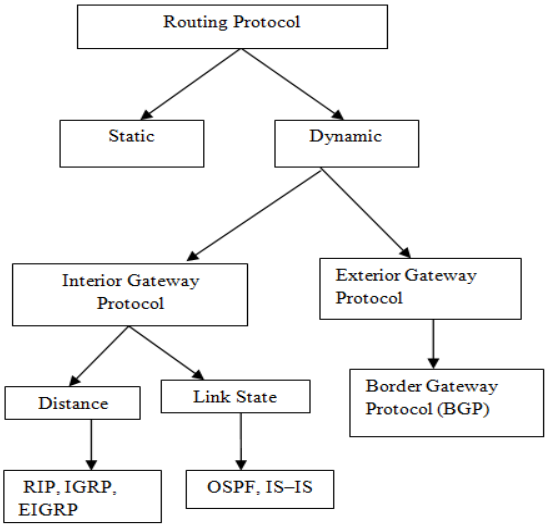

Fig1. Forms of Routing Protocols

II. ASSOCIATED WORKS

[1] Deciding on the best route from source to end is the necessary thing in the community and its miles completed the use of routing. RIP (Routing Information Protocol), IGRP (interior Gateway Routing Protocol), EIGRP (Enhanced interior Gateway Routing Protocol), OSPF (Open Shortest path First) and some other Dynamic routing protocols preserve the composition of paths the usage of routing algorithms for better performance. In this paper, RIP, OSPF, EIGRP and IGRP are evaluated on one of a kind scenarios for actual time applications the usage of OPNET (Optimized network Engineering device) for evaluating against distinct parameters that evaluate the performance of network: packets, delay variation, packet end-to-end delay, in addition to video traffic and down load reaction time, add response time of each electronic mail and FTP, web page reaction time and object reaction time in HTTP, convergence and queuing delay. And from the evaluation EIGRP behaves nicely and its performance is better than RIP, OSPF and IGRP.

[2] 3G wireless era that is called UMTS (Universal Mobile Telecommunication System) offers higher speed, security and bandwidth usage of assets. In this paper the overall performance of UMTS network is inspected under specific protocols like EIGRP, IGRP and RIP on the idea of performance and effectiveness of UMTS network under those protocols which presents better first-rate for one-of-a-kind type of offerings within a network. This study offers quick description approximately the UMTS and compares

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the overall performance of RIP, IGRP, EIGRP in step with bits sent in step with second, range of bits obtained in step with second over a state of affairs for the cost of transmission, router overhead and throughput and EIGRP has satisfactory overall performance.

[3] This paper affords the performance contrast of EIGRP over OSPF by way of designing three network situations which can be configured, with OSPF, EIGRP and mixture of EIGRP and OSPF respectively. The comparison and evaluation of these protocols are performed with the use of unique quantitative metrics inclusive of convergence length, packet delay version, Loss packet, jitter, end-to-end delay and throughput are used. These protocols are used to get better overall performance of one over the opposite inside the actual time visitors mainly voice conferencing and video streaming discover in the entire network. And the evaluation consequences display that EIGRP routing protocol is higher in overall performance than OSPF routing protocol for real time applications.

[4] IGP (interior Gateway Protocol) is routing protocol within self sufficient systems which facilitates to improve inter-network overall performance by assigning weights to the links among routers. To every link, fee factors may be applied based totally on several metrics. These consist of distance to a router, maximum feasible throughput of the link between routers, and the availability of a link. The use of these metrics, cost is assigned to that link which is a single unit-less number. OSPF is one of the normally used IGP routing protocols. 5 exclusive varieties of packets are used for OSPF communication:

1. Hello– Establishes and updates relationships.
2. Database Description – Describes and synchronizes the network topology database that's dispatched when a new adjacency is initialized.
3. The Link State Request – Used to request information about a particular portion of a neighbor's database.
4. Link state update – Used to ship normal LSA's, and additionally as a right away reaction to a link state Request.
5. Link State Acknowledgement – dispatched if you want to well known the receipt of a link state update.

This paper describes the development of a set of rules and control mechanism to automatically and dynamically adjust OSPF interface charges on routers primarily based upon the amount of site visitors flowing through a path, in preference for the absolute shortest direction. The motivation for this study is that commonly OSPF costs are set statically based totally on the rate of the interface.

[5] In this study evaluation of RIP and OSPF is accomplished. There are two sorts of routing protocols: Distance vector and link state routing protocols in which RIP is under distance vector and OSPF is under the link state routing protocol. The contrast, among these protocols is performed in terms of Latency, Throughput, Convergence time and Packet Loss the usage of the GNS-3 simulator. From the evaluation OSPF is the great one as it has a lower administrative distance price than RIP, it's far suitable for big networks and it has the least price of transmission in comparison to RIP.

[6] In this paper evaluation of OSPF and EIGRP is accomplished in the schema of IPV4 and IPV6. OSPF and EIGRP are dynamical routing protocols that have been used for utility in the later years. OSPF is recommended with the aid of the IETF, and EIGRP is Cisco proprietary, but they both are IGP protocols and have been widely used in the network. The principle challenge of this research paper is that which one is more suitable for a community. Comparable methods are chosen to talk about their gain and drawback. Simulation of topologies is achieved via using a Packet tracer software program in which three routers are utilized in every topology which might be linked to numerous private computers through community switches. In the first topology which is known as point-to-point network, the 3 routers are linked to each different through serial interface which can be linked to diverse computers through switches. And in multi-access network topology, the three routers are related to each other through the switches that are in addition related to the personal computers via network switches. The point-to-point topology is described in each IPV4 and IPV6 schemas while the second topology multi-access topology to be described in IPV4. Analysis of these two protocols is done on Administrative Distance, round-trip fulfillment cost, Metrics/value, Load Balancing, start up instances and link restoration, average time and Packet loss and from the analysis overall performance of EIGRP is better than OSPF in terms of Packet loss, end– to – end delay, Packet delay variation, Convergence duration and round – trip fulfillment cost.

[7] IPV4 and IPv6 are the 2 types of internet protocol. IPV4 normally uses one of the modern network communication exchanges and IPV6 is the next era net protocol a good way to eventually replace IPv4, but until then each the protocols want to coexist for a long time. The main difficulty is both the protocols are not like minded with each other. To configure an eventualities with IPV4 and IPV6 different styles of routing protocols are required which have extraordinary performances. Routing is not a clean undertaking in particular in case of Wi-Fi networks. In this paper overall performance evaluation of dynamic routing protocols like Routing Information Protocol (RIP), IPv6 Routing Information Protocol (RIPng), Open Shortest path First (OSPFv2), and IPv6 Open Shortest path First (OSPFv3) over mobile ad-hoc Networks is done using Cyber 1.1 simulators. The overall performance of networks is measured based totally on throughput, end -to- end delay, jitter and packet transport ratio, which is carried out on one hundred nodes the use of 4 CBR packages with varying packet sizes of 256, 512, 1024 and 2058 bytes. From the assessment held, performance of RIPng is great among all of the protocols because it has most throughput and packet transport ratio with minimal postpone and jitter.

[8] Communication satisfactory of Voice over internet protocols (VoIP) relies significantly on the network; but assures the best exception of the site visitors is difficult. In this paper overall performance analysis of VoIP utility in BGP-MPLS VPN community among interior routing protocols specifically Enhanced Interior Gateway Protocol (EIGRP) and Open Shortest path First (OSPF) is achieved.

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The simulation of VoIP on MPLS VPN is conducted using OPNET Modeler 14.5 and the G.711 encoder scheme is used for the VoIP simulation with the aid of various interior routing protocols namely EIGRP and OSPF. The charge of a VoIP is fixed at 500, 2500 and 4000 calls/hour. Average designation, length is ready for 5 minutes and the voice waft length is set to 2.5 hours. The simulations are targeted to degree the voice packet end-to-end delay, voice jitter and mean opinion score as to define the overall VoIP high-quality in both scenarios in the way of the three VoIP situations. And from the simulation performed, OSPF performance is higher than EIGRP with respect to delay, jitter and MOS cost.

III. ASSESSMENT OF DYNAMIC ROUTING PROTOCOLS

An aggregate of networks linked by routers is known as an internet. When a packet is sent from source to destination there can be such a lot of passes through many routers until it reaches the router attached to the destination network. Autonomous system (AS) that's a group of routers under a common place management is also referred to as routing domains. Depending on the independent device, there are two sorts of routing protocols:

1. Interior Gateway Protocols (IGP): It is likewise known as intra-AS routing as it is used for routing inside an AS. RIP, EIGRP, OSPF, and IS-IS are a number of the examples of IGPs.
2. Exterior Gateway Protocols (EGP): It is likewise known as inter-AS routing that is used for routing between independent systems. The Border Gateway Protocol (BGP) is the only currently available EGP and is used by the internet formally.

Interior Gateway Protocols (IGP) may be
Categorized in groups:

A. Distance Vector protocols

Distance vector manner that routes are advertised the usage of characteristics:

- *Distance:* a feature which identifies how a long way it is to the destination network from the source based totally on a metric inclusive of the hop depend, value, bandwidth, delay, and greater.
- *Vector:* characteristic that specifies the route of the subsequent-hop router or exit interface to reach the destination.

Characteristics of Distance Vector Protocols:

- Collects statistics of the records of the routing desk of its neighbors.
- Determines the better direction, adding the metric cost that is acquired as the routing facts happens from router to some other one.
- The updates for the alternate of topology consist of periodic updates of the tables.
- Slower convergence.

RIP and EIGRP are a number of the examples of distance vector routing protocols.

B. The Link State Routing Protocols

The Link state routing protocol creates an entire view or the topology of the community through gathering statistics from all of the different routers and all link-state routers are the use of an identical map of the network. The link-state information is utilized by the link - state router to create a topology map and choose the first-class path to all destination networks inside the topology. This protocol does not use periodic updates, but the network has converged, a link-state update is most effective sent if there may be a change in the topology. Link-state protocols work quality in conditions in which:

- The network is big and hierarchical design is needed
- Fast convergence of the community is essential
- The administrators have top understanding of how the implemented link state routing protocol

Link state threats:

- The link state routing obtains a great print of the topology of entire internetwork amassing all the essential LSA.
- Each router independently calculates its very own shorter direction, in the direction of the networks destiny.
- Updates are induced typically by using – in the topology.
- Faster times of convergence while there may be any exchange of the topology because of the relatively small LSA that have long past to all of the other routers.

OSPF, IS-IS are examples of link state routing protocol.

IV. ROUTING INFORMATION PROTOCOL (RIP)

The Routing information Protocol (RIP) is one of the intra-area (interior) routing protocols used in an autonomous system. It is one of the distance vector routing protocols that is quite simple protocol. RIP implements distance vector routing immediately with some concerns.

RIP traits:

- Distance Vector routing protocol.
- It metric is the wide variety of hops
- The maximum number of hops is 15
- One updates each 30 seconds.
- Now not always it selects the fastest path with a minimum quantity of hope
- It generates traffic of community with updates.

There are variations of RIP, particularly RIPv1 and RIPv2.

V. EIGRP ROUTING PROTOCOL

Enhanced interior Routing protocol (EIGRP) incorporates features of distance vector protocols, and link state protocols and is called a hybrid protocol. It is far a Cisco proprietary routing protocol, making use of the Diffusing update algorithm (dual). EIGRP is IGP which uses the idea of autonomous systems to organize routers, which carry out the identical duties. It gets records about the routes from updates of different routers, but unlike different Distance vector protocols it maintains a partial topology of the network. There are three tables to make routing selections in EIGRP. Those are; The Routing table, the Neighbor

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table and the Topology table. EIGRP uses bandwidth and Delay as the metrics to determine the best route from the source to end. And it could additionally use bandwidth MTU, Reliability, load as metrics.

EIGRP traits:

- Superior distance vector
- Uses bandwidth, delay, MTU, Reliability and load as metrics.
- The maximum amount of hops is 255
- Used in massive community
- Quicker convergence

VI. OPEN SHORTEST Path FIRST (OSPF)

Open Shortest path First (OSPF) is one of the link state routing protocols which are examples of interior routing protocols, operating in an autonomous system (AS). OSPF detects link breakdowns, and converges inside the topology within seconds. And it uses Dijkstra's set of rules, a shortest path first algorithm to compute the shortest path tree for each way. The OSPF routing uses link state cost factors as a metric to construct a topology table that is related to every routing interface. The distance of a router (round-trip time), information throughput of a link, or link availability and reliability, expressed as simple unit less numbers may be considered as cost elements. This presents traffic load balancing between routes of equal value in a dynamic system.

There are five exceptional packet varieties of OSPF that have a unique motive in the root:

1. Hello packet.
2. Database description.
3. Link state request packet.
4. Link state update.
5. Link state acknowledgement packet.

Link-state advertisement (LSA) is used over all its adjacencies of OSPF routers. OSPF areas are categorized into 5 types based upon the way the routing has to happen:

a. *Backbone (location zero):* it lets in Router LSA, network LSA, community summary LSA, ASBR précis LSA and AS outside LSA
b. *Non-backbone, non-stub:* it allows Router LSA, network LSA, community summary LSA, ASBR summary LSA and AS outside LSA
c. *Stub:* it allows Router LSA; network LSA, network précis LSA
d. *Absolutely Stub:* it allows Router LSA and network LSA
e. *No longer-so-stubby:* it permits Router LSA, network LSA, network summary LSA, ASBR summary LSA and NSSA outside LSA.

OSPF characteristics:

- OSPF constantly determines the loop free routes.
- Updates routinely if any adjustments occur inside the network.
- Low bandwidth usage.
- OSPF is primarily based on the cost of the interface.
- OSPF helps multiple routes for a single trip advertisement network.

VII. EVALUATION OF RIP, EIGRP AND OSPF

TABLE I COMPARISON OF RIP, EIGRP and OSPF [5]

Contrast of protocols, features				
FEATURE	RIPV1	RIPV2	EIGRP	OSPF
Variety	Distance vector	Distance vector	Advance distance vector	Link state
Algorithm	Bellman- Ford	Bellman- Ford	DUAL	Dijkstra
Class full/classless	Class full	Classless	Classless	Classless
Metrics	Hop count	Hop count	Delay and bandwidth	Cost
Update timer	30	30	Automatic	Automatic
AD amount	120	120	Internal 90 External 170	110
Authentication	No	Yes	MD5	MD5
Maximum Hop	15	15	255	NO
Convergence	Slow	Slow	Very fast	Fast
Update Type	Full table	Full table	Only changes	Only changes
VSLM support	No	Yes	Yes	Yes
Network size	Small	Small	Large	Very large
Split horizon	No	No	Yes	Yes
Area Type	-	-	-	5 types

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VIII. CONCLUSION

Nowadays, so many demanding situations and layout troubles are faced with in routing protocols. In this Paper; we have mentioned one-of-a-kind dynamic routing protocols, and evaluate their residences as a result. RIP benefit is composed in its simplicity, however, it does now not paintings nicely in huge scale networks due to it hop rely restrict to 15. OSPF provides protection centers, multipath facilities, facilitate the use of various cost metrics, included support for both routing uncast and multicast to a rapid convergence. OSPF is an open well-known protocol, evaluating with EIGRP that is a Cisco proprietary protocol, in which best Cisco routers are allowed to implement EIGRP. EIGRP is a robust protocol and hybrid protocol that combines the attributes of each distance-vector and link state protocol attributes. And it is simple to configure, proficient, and fast. It has a faster convergence, improved scalability and superior dealing with in the routing loops. Evaluating with other protocols the performance of EIGRP is first-class as it has the least cost of transmission, lower route overhead and most throughput than the others. Taking a hybrid of EIGRP and OSPF can be right for better performance.

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