

## **A Review on Routing Information Protocol (RIP) and Open Shortest Path First (OSPF) Routing Protocol**

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### **Abstract**

*The routing protocol transport the best connection, creating during message in the network. The router can work with the help of routing protocols. The various routing protocols can be present, but the most famous routing protocols are Routing Information protocol (RIP) and the Open Shortest Path First (OSPF). Smart Open Shortest Path First (S-OSPF), which offers the extended representations for conventional OSPF gives less congestion ratio by allocating traffic. Multicast Open Shortest Path First (MOSPF), it offers the facility to forward multicast datagram from one network to another. In this paper, we are defining the two protocols and the related worked on them. In this each link provides the autonomous system to create the shortest path to makes and creates the destination tables. Both logical and hardware address play the important roles, responsible for getting packet and forward through a correct destination host.*

**Keywords:** *RIP, OSPF, S-OSPF, MOSPF, Lsas*

### **1. Introduction**

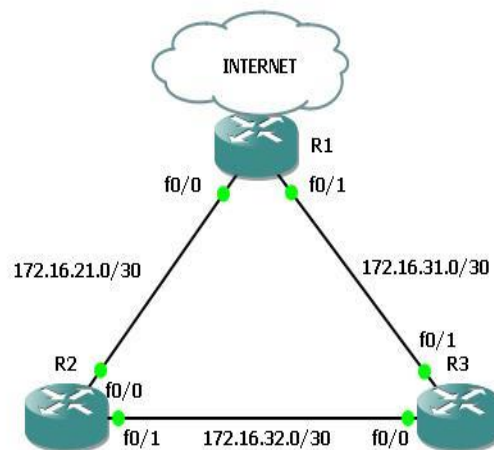
On the network the communication through a huge number of IP address can be work. The communication of distributing information from one single computer to another computer from different networks. The invention of protocols provides the better communication at long distances. The traffic request of the communication network increases first rapidly. To address this increasing traffic, it be supposed to discover the appropriates routing to avoid link failures problems. The actual routing protocol works on the set of procedures. The mixes of human language and the set of guidelines are known as routing protocols. An internet user to interact with every other provides the handshaking with long distances. There are lots of info can be sent through the internet. The computer can be worked in the different location with other networks. Nowadays communication with the help of internet at very peak point. At long distance, link with every other. So during the transmission of document certain data can be successfully reached the target and some others are not reached during configuration problems in the network. There are two kinds of routing protocols are static routing and dynamic routing.

Static routing provides the routing at the manual configuration and routing entry in a table. It is configured by the network administrator. Fill-in values in the routing table. In other dynamic routing provides are not manually configured. Static routing used in the small network like one or two routes. The static helps in the rearrangement of transmitting the routing information. But problems are that static not provides fault tolerance. One failure access in two routes it will not able to use usable until failure isrestored by the network administrator. While dynamic provides routes defined by their destination point. It is widely used for transportation. The number of records in the routing table is the maximum important factor of the network computer. The updating is soon as possible to change the topology. Here we are defining the both protocols and work done.

## 1.1. Routing Information Protocol (RIP)

RIP is the oldest distance vector routing protocol that uses hop count as a metric. It was developed in 1963 as a part of ARAPNET; it becomes popular in 1988 developed by the c. Hedrick of Rutgers university. The routing information protocol for local area network that gives the stability, and assured that if the network is down, it becomes quick send the packet through another connection.

The four components of RIP are RIP routing metric, routing stability, routing timers and routing update process. When topology change routing table updated with the help of timers. The advantages of static routing using RIP that starting configuration are simple, but manually updates not requires when topology becomes changed. The RIP communication network is shown:



**Figure 1. Router Connection Establishment Using RIP in Cisco Packet Tracer**

Rip comes in three versions : version 1, version 2 and RIPng.

The common features are:

- Hop count as a metric used, fifteen hop count limit until crates looping problem, the router can be balanced at 6 equal cost path by default is 4 paths.

### 1.1.1. RIP Version 1

RIP version 1 use local broadcast to share routing information. These updates provide periodic in nature. Actually by default 30 Sec. Withhold down period of 180 Sec. It uses hop count as a metric which is not always best metric to use. Example- if you have two paths to reach other network that are having to hop connection and another case was 128 kbps WAN connection, the RIP would use the slower 128 kbps connection becomes it having less hop count metric. RIP v1 are now outdated RIP support 15 hops on the packet, then 16 it will drop the packet to avoid packet for the loops. Version of RIP solved the count to infinity problem [8]. RIP v1 work on the classless protocol.

### 1.1.2. RIP Version 2

It was developed in 1993. One thing in your mind back when work with RIP V2 in that based on RIP V1. It is also known as the hybrid protocol. The enhancement of RIP 2 is how dealing with updates features[8]. RIP 2 use multicast updates are advertised for 224.0.0.9 and to speed up convergence. It will use the triggered update mechanism [9]. Triggered updates provides at a timelyupdate if topology changes or link failure for all nodes. The second enhancement in Rip v2 is it provides a classless protocol. RIP v2

supports VLSM which provides the more than one subnet mask for the given class network. VLSM provides to increase the efficiency of the addressing design in very large scale networks. The third enhancement is support authentication. This is accomplished by using hash-password value.

### 1.1.3. RIPng

Defined in RFC 2080, it supports ipv6 extension of rip2. RIPng does not support Authentication. Ipv6 routers, used time IPsec for authentication. RIPng requires encoding for next hop for a set of route entries in the table. If the second at UDP port 521 for updates us in the multicast group of ff02: 9.

Rip provides the three types of message services to communicate with other network.

- Hello message
- Update message
- Acknowledgement message

RIP uses four timers for the analysis of working and track the connection of routes in the table.

- 1) Route update timer: The timer is 30 Sec. By default transmission of information and update routing nodes sends information to the connection user.
- 2) Route invalid timer: The timer is 180 Sec. By default, after time reached router declare route is invalid no packet will be sent. It only happens when not working occurs on the router.
- 3) Hold-down timer: The timer is 180 Sec. By default. It calculates the time that information not able to update in the neighboring router. It determines route is unreachable.
- 4) Route flush timer: When the working of invalid timer of hold-down timer, it will gain waits 60 Sec. Then flush the route from the table and router broadcast its details unreachable at 240 Sec. Totally[8].

RIP can be configured in the router using the router RIP and network commands and the version of it. RIP works on the 15 hop count 16 is unreachable on network. To avoid this problem some features added in the RIP are:

- 1) Route poisoning: It simply removes the looping. It shows the message with 16 hop count network.
- 2) Poison reverses: This message shows the particular network is not working down. It refuses to accept the split horizon method.
- 3) Split-horizon: It is prohibiting the route from advertising a route into the interface. It was learned from the router rip network.

There is some routing protocol work on the dynamic routing protocol that can use table configuration on the router. Here is RIP (routing information protocol), OSPF (open shortest path first), IS-IS (Intermediate system to intermediate system) and IGRP (Interior gateway routing protocol), or EIGRP (Enhanced Interior Gateway Routing Protocol) are the improved version of IGRP are categorized in the interior gateway protocol. In the computer network the dynamic routing deals on the two categories. First in distance vector and link state routing protocol[8]. The run time packet can be sent in the dynamic routing. They are sharing the route information to the neighbor routers. In the dynamic routing the updating is important and the cost of the path depends on the bandwidth as router choosing the path and the hop count. The configuration and the maintenance of the dynamic routing is simple. It's taking some disadvantages like looping problem and time shortage. Some time it will no updates be right time when failure to access the network and updating not in their topology. Dynamic routing is good, but has some problem, it will support the ipv4 and ipv6. Network for dealing with information. The network and the configuration changes, it will maintain the network

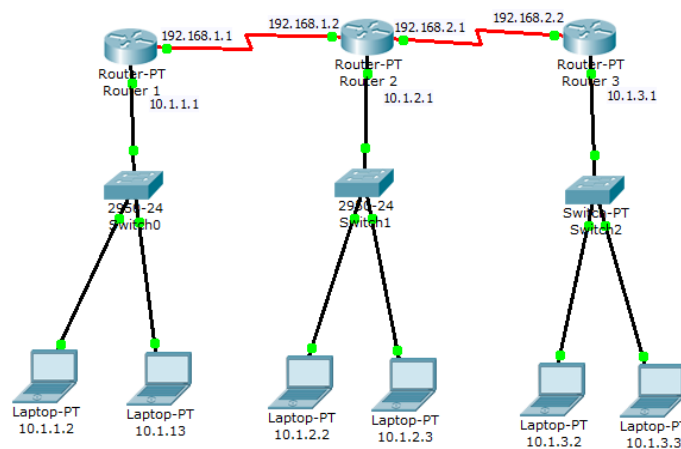
RIP packet header as below:

0		4		8		16		19		32	
version		length		Type of service		Total Length					
Identification						Flags		Fragment offset			
Time to live				Protocol		Header checksum					
Source address											
Destination address											
Option											
Data											

**Figure 2. Frame Format of RIP**

### 1.2. Open Shortest Path First (OSPF)

Open shortest path first created in the mid 1980s gives and provides the overcome many of the efficiency and the problem with RIP. It is based on the open standards. It is very popular in the corporate network today. OSPF is a link state routing protocol; it delivers the finest path in the network, which delivers the shortest path accessible from the source network to the destination network. Each and every router having some a database. It is used to describe the networking topology. It is an interior gateway routing protocol (IGP) working with internet engineering task force (IETF). Link state routers tell and send information about its neighbors[2].



**Figure 3. Connection Establishment Using OSPF in Cisco Packet Tracer**

OSPF gives the advertisement. It is a link state advertisement (LSAs) that provides the updates in the all neighboring routers that are connected to each other. When changes occur (LSAs) follow the information about the theatre. LSAs advertises is present the information exchanges between the routers. Every time network topology provides to change to update and send through LSAs to a network. Router in the network updates soon. OSPF router is storing the table information to the memory database. For message sending in the network the best and the shortest path, check of the OSPF network internet. For the shortest path djkastra algorithm used. Because of some failure in the RIP it is not preferred now a day. The many changes in the OSPF to overcome the RIP problem.

- 1) OSPF support the VLSM so efficiently searched by the IP address.
- 2) Better convergence.

- 3) Load balancing.
- 4) No limitation of the hop-counts.
- 5) It supports the IP-multicast to send the updates and reduced the load of the network.
- 6) It provides different authentication using a password.
- 7) It provides network divided into the areas.

OSPF provides the different packet type. Each packet has existing definite working with the OSPF routes on the router.

- 1) A hello packet(handshaking with neighbor)
- 2) Describe database topology description
- 3) Link state request
- 4) Link state update
- 5) Link state acknowledgement

OSPF provides the timers to handle the network. It has only one timer hello timer. First interface to 10 Sec. And dead time is 120 Sec[1].

OSPF protocol having some advantages and disadvantages is:

Advantages-

- 1) It is the open standard work on the most of the router.
- 2) For free looping topology, it provides by the edge dijkstra using an SPF algorithm.
- 3) It provides the better metric cost, which is the inverse of the bandwidth of the interfaces.
- 4) It provides VLSM route summarization.
- 5) It provides triggered update mechanism for faster convergence help LSAs for updates soon.
- 6) It is not a Cisco protocol.

Disadvantages:

- 1) It requires more memory to hold the neighbor information tables.
- 2) It requires extra CPU processing to run the SPF algorithm which provides the true when you finally reach the router and initially building the topology tables and adjacency.
- 3) More difficult to configure the distance vector protocol.

OSPF maintains two layers:

- 1) Backbone area (area 0): it provides the information to all area networks distributing. The area is identified by the 0.0.0.0 represent the top layer hierarchy of the OSPF network called backbone.
- 2) Off backbone limit area (1-65535): it provides the backbone area in the system. Every pack sends through the backbone area.

Metric structure: it is also used as a hop count as a metric OSPF area cost is inverse to the bandwidth. Using cost as a metric. OSPF provide and choose the more intelligent path than RIP protocol.

Router identities: every router in the OSPF network having a unique ID[3]. It provides the unique identity of the OSPF router. It provides the message in OSPF router to generate that other OSPF router with the process.

- 1) Highest IP address on the router active loopback interface is used.
- 2) No loop back interface exists with IP address, the highest IP address on its active interface to use router boot up.

Finding neighbor: An OSPF router knows about its OSPF neighbor and full adjacency and topology table and advertise with LSAs. Learning about the neighbor router is that we should know about the neighbor router information. In order of two routers becomes the neighbor having some things are:

- 1) Area number.
- 2) Hello and dead interval time on their interfaces.
- 3) The OSPF password. MTU size of the connected interface.
- 4) The area stub flag indicating types of area.

OSPF neighbor router having three states called exchange process.

- 1) State: No exchange information with other router.
- 2) Link-state: Received no help and adds to its neighbor.
- 3) Two-way state: The new route received a unidirectional reply from the destination router. Added hello packet, and destination router to its neighbor.

If router going in the two way state. It deals with the election process to elect the DR (designated route) and BDR (backup designated router).

The DR and BDR are providing changed in the interface by interface basis one the DR or BDR election and re-election occurs when exists[3].

Sharing routing information and the exchange protocol to communicate is:

- 1) Exstart state: The DR and BDR from the adjacency with the OSPF router segments. DR is not master of the exchange process. The remaining router in the adjacency will be slaves.
- 2) Exchange state: Sharing information with slave. They are called database description packets (DDP). The responding slave with and acknowledgment with DDP from the master then slave compares information its own.
- 3) Loading state: Master has more update information thana slave.If the slave has, the more updates information it will again exchanges and loading state.
- 4) Fullstate: Once both master and slave synchronized they consider in the full state.

OSPF packet header as below:

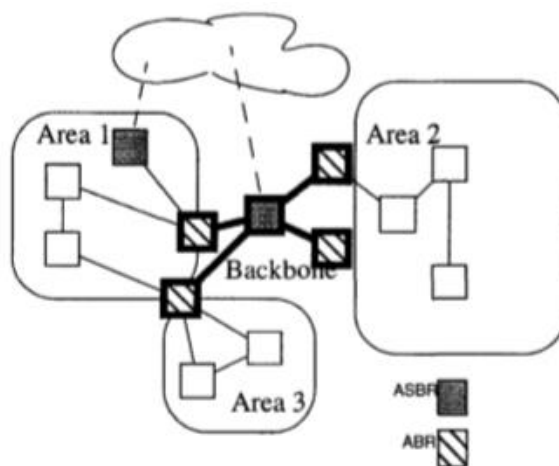
Bits							
0	8	12	16	20	24	28	32
Version Number		Type		Packet Length			
Router ID							
Area ID							
Checksum				Authentication Type			
Authentication							
Message Body							

**Figure 4. Frame Format of OSPF**

Open shortest path first (OSPF) is the most commonly used intra-domain routing protocol. It used to select the paths beside which traffic is routed within autonomous systems (AS), OSPF explores routes as a monitor. Every connection is allocated weights by an operative. Each node in the autonomous system calculates shortest paths and creates destination tables used to route records to the next node on the path to its destination. Shortest paths certainly allow for to path cost. Path cost is determined by sum of its weight links. Then link weights decide the shortest paths, in which turn decide the routing of network traffic flow. OSPF weights, setting, the problem is to find a set of OSPF weights that optimizes network performance[1]. OSPF weights, setting, the problem is an NP-hard problem. Last couple of years, numerous algorithms for OSPF weights, setting problems has been proposed. In this paper, we present a survey of OSPF weights, setting algorithms and compare their performances.

**Multicast Open Shortest Path First (MOSPF):** MOSPF protocol is a multicast overcome of OSPF (Open Shortest Path First) protocol to offer efficient multicasting over a network. It offers the ability to forward multicast datagrams from one network to another. It forward a multicast datagram on the base of both source and destination address of the datagram. MOSPF builds a distribution tree for every pair of source-group and calculates a tree for active sources sending the forward group. A link state change ensues or when the cache has rancid data, then the tree state is stored, and trees must be deliberate again. IGMP (internet group management protocol) is used in MOSPF routers to classify the membership in multicast groups by broadcasting IGMP Host Membership Queries and getting IGMP Host Membership Report. The cluster info is then transmitted in the network by overflowing of OSPF link state advertisements (LSA). In this protocol source is the root and multicast receivers are the terminal nodes and this cluster info is used by the routers to build the shortest path tree.

OSPF is an interior routing protocol deliberate to be used within a particular autonomous system(AS). OSPF permits the AS to be separated into collection of network called area. Each area runs a distinct copy of the base link state algorithm and the topology, particulars of the area are hidden from the rest of the AS, decreasing routing traffic. All areas are reconnected with the particular backbone area in a logical hub and spoke formations. Routers belong to a single area called internal routers. Which are going to extra than one area are called area backbone routers (ABRs). Any router which connections, routing information with an external AS is called Autonomous system boundary router (ASBR).



**Figure 5. Area Configuration in OSPF Using ASBR and ABR**

**Smart-OSPF (S-OSPF):** This scheme was suggested by Mishra in 2007 [10]. It is a prolonged scheme from OSPF. S-OSPF is acting like OSPF, but, only edge nodes have dissimilar function. It is able to issue traffic flow. The function aims at declining network congestion by allowing edge nodes to choose a better transportation policy. The implementation of S-OSPF is hard to current network routers since they are set with unique configurations by various vendors, individually. The present routers do not have function of allocating traffic. We need to add the purpose these ones and write to router's kernel. Hence, attention on SDN and OpenFlow which can make programmable network by user. It will be helpful for applying S-OSPF more easily. We want to use current networks with SDN since we think it must be more adaptive method. We should implement distributing traffic purpose to edge nodes on execution of S-OSPF.

## 2. Related Work

Ahmed *et al* [1], In this paper, we used dissimilar algorithms used to explain OSPFWS problem such as local search, genetic algorithms, simulated annealing, and hybrid genetic algorithms. It discusses each algorithm and illustrates the advantages and disadvantages of each one. The Association is also made between algorithms, it illustrates that each algorithm is better than another according to the papers that used in, finally we create our new proposal for resolving the OSPWS problem.

V. Vetrivelan *et al.* [4], In this paper, in routing protocols has distinctive challenges and plan issues in this Paper; we have conferred estimation of various routing protocol factors are varied for various routing protocols. When it is used in actual situations.

Karamjeet *et al.* [2], In this paper, find the best route in OSPF through simulation. The work on wired and wireless LANs and in network perform various types of simulation. The different formation of network in effect, of various parameters. The network designed in OPNET to perform the operation of OSPF protocol. The OSPF protocol planned with different IP nodes. For analysis seven different IPs have been investigated. The OSPF has been simulation at OPNET as guidelines appendix-I the various factors of LANs and wireless LANs using simulator-OPNET. The simulation result specify OPNET to estimate the performance of wireless protocol including OSPF.

G.C Nwalozie *et al.* [3], In this paper, the entire research on the performance and OSPF implementation. The conventional routing protocol RIP and its optimized model. The research shows the OSPF used to optimized performance metric in the network and dijkstra process to find the shortest path for the destination network.

Abdullah *et al.* [9], In this paper, we proposed a new method to recover the efficiency of RIP by incorporating an element of intelligence. The inform of routing table is triggered by the mechanism that detects the changes in the topology. Our method avoids the unused of bandwidth in informing the routing table by activating an update only when there is a change in topology. Later, it decreases the capacity of update works which evidently carried by a router on a fixed interval even there was no modification in the network topology. The planned method serves an initial step in creating self-configured network. For the future work, we intend to work further by joining a self-organized element within the detection of the topology changes.

P. R. Gundalwar *et al.* [7], In this paper, we can say that the OSPF protocol dedicated to the type of network, route, area, routers and subprotocols and their packet format. The implement of OSPF protocol. OPNET IT Guru academic edition 9.1 in configuration of new parameters. We studied their configuration in IP network failure for shortest path calculation. The results show better find the shortest path after link failure of 100s delay from source to destination routers.

Pankaj *et al.* [5], In this paper, On analyzing the result of the performance of various routing protocols naming RIP, OSPF, IGRP & EIGRP. Over transmission cost, router throughput, delay. We can say OSPF have finest act whole. Router Overhead as RIP, EIGRP perform well as above OSPF. For best service transmits a packet OSPF better than others.

Md Samil *et al.* [6], in this paper, we have compared the RIP and OSPF from the theoretical point of view. We have underlined the gradual development of the routing protocols in the field of networking. OSPF reaches the RIP in situations of average throughput and instant packet delay in moving sizes of the network. OSPF can adjust the link plus OSPF coverage network extra quickly than RIP, though, if RIP is better by using FS-RIP, then RIP offers a better act than OSPF.



### 3. Conclusions

In this paper, we are talking about the RIP and OSPF protocol from a theoretical point of view and the development in the two protocols, routing protocol has unique challenges work done. In this work, accessible the comparative study of two elective protocols RIP and OSPF. Finding the best route in both protocols in wired and wireless LANs. Implementation in various fields works in these protocols. OSPF outperforms the RIP in term various efficient throughput and packet delay in networks. But the RIP is enhanced by using the triggered-RIP, OSPF adjust the link and coverage better than RIP. RIP offers better performance than OSPF in a limited number of nodes.

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