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Evaluate Protocol OSPF using Graphical Network Simulator-3

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Abstract: In this study duration Networking progress played the main role to communication and the progress shows the better result with Networking Protocols. Because they offer a standardized means for moving data across various devices and networks, networking protocols are crucial in the computer industry. They provide correct and effective data transmission as well as the comprehension and processing of data by network devices. It would be challenging for various networks and devices to connect with one another and share information without these protocols. By giving networks and devices a way to authenticate and encrypt their interactions, networking protocols also play a significant part in computer networks. Open Shortest Path First (OSPF) on simulators Opnet and packet tracer. Performance evaluation of OSPF protocol enhances the functionality and is more effective for transmission among OSPF which performed in networks. These Study were arranged according to searches of a total of 20 articles from the academic databases of IEEE, ScienceDirect, Semantic Scholar, Microsoft, and OSPF to evaluate the use of graphical network simulator3. The evaluation is around convergence, delay time, and analysis performance of protocol.

Keywords: Protocol, Network, Open Shortest Path First, GNS3.

1. Introduction

Open Shortest Path First (OSPF) is a routing algorithm that is used to distribute routing information across a single autonomous system (AS) in a network. It is a link-state routing (LSR) protocol, which means that it builds a picture of all networks by determining the states of the links (i.e., the connections between two systems) and then using data to determine the best path for data transfer.

OSPF is a classless routing protocol, which enables it to accommodate varied network topologies inside a single OSPF area and variable-length subnet masks (VLSMs). Hierarchical routing is also supported, allowing for better scalability and the more effective use of network components. The usage of a hierarchical network that is separated into zones is one of OSPF's distinguishing characteristics. An area ID, a 32-bit number that is specific to each area, is given to it. All other areas in the OSPF domain are connected to the core network, sometimes referred to as area 0, at this point. An area border router connects every other area to the core network. In OSPF, a primary designated router and a secondary designated router are used by each broadcast and non-broadcast multi-access network. The Designated Router and Backup-Designated Router are chosen by the OSPF routers on the network, and they are in charge of regulating router-to-router contact. A link state advertisement is a tool used by OSPF to distribute routing data. To characterize the condition of its own links, each router in an OSPF area creates and floods Link State Advertisements. The link state database, which is used to identify the shortest path to each endpoint, is created using the LSAs by all the routers in the area. To help prevent unauthorized access to the OSPF routing information, OSPF additionally supports authentication. It can employ the less secure IPsec Identification Parameter or a straightforward encrypt authentication.

The simulator performance best method effort the simulator time to follow the parameters it giving best result [1]. OSPF is a strong and well-liked routing system that works well in huge network services. It

is very efficient and scalable because of its hierarchical system, compatibility for Variable Length Subnet Masks and hierarchical routing, and use of Designated Routers and Backup Designated Routers. Its capability for authentication also contributes to the network's increased security. It's mainly used for large-size systems in the network it assists unlimited routers in network. "O" means OSPF protocol in the routing table.

2. Literature Review

In Internet networking, network protocols constitute an important structure. The router uses IP messages (internet protocol packets) to help with network conversion. A router is a device that transmits data from a sender to a receiver, and dynamic protocols such as OSPF operate in networks as open-source protocols. The routing information protocol is a dynamic protocol, not a fast one. Typically used in a network for tiny systems. In the network, it assists with OSPF. It is mostly used for large-scale systems in networks and supports an unlimited number of routers. The ideal way for simulator performance is to give the simulator time to follow the parameters, which produces the best results. For (IP) networks, the OSPF routing protocol is employed. Since it offers variable-length subnet masks, that enable highly effective use of Internet Protocol address space, it is regarded as a classless routing protocol. Both service provider networks and enterprise networks use OSPF extensively.

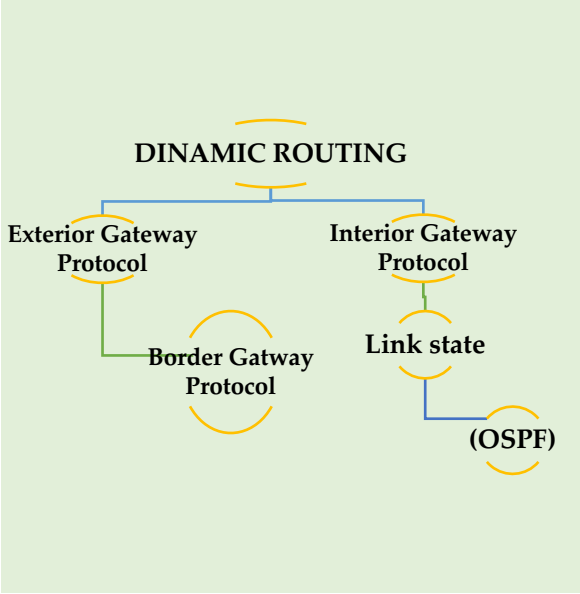

Figure 1. OSPF Link-State protocol

The fact that OSPF can accept variable-length subnet masks is one of its key advantages. As a result, subnets of various sizes can be created, allowing for more effective use of IP address space. In comparison to static routing, which employs predefined pathways that cannot react to network changes, this offers routing that is more flexible and scalable.

Emulation definite "EIGRP" is the finest excellent for all topologies of network executed as it a fast Link, while also effectively operating bandwidth. "OSPF" is the next optimal for big networks and "RIP" achieves out of sorts in big networks and is so simple, restricted to small networks [5]. In the IP routing system, which is crucial for the optimal performance of real-time applications, routing protocols play a critical role. The parameters that are most important for real-time applications, especially convergence, throughput, jitter, delay in packets variation, delay from end-to-end, traffic dropped, bandwidth utilisation, etc., have been taken into account for the proposed integrated routing protocol. The experimental findings reveal that, in the majority of circumstances, integrating multiple routing protocols yields superior performance than using a single routing protocol. When it comes to performance for the applications, EIGRP/OSPF outperforms all other integrated routing protocols [6].

EIGRP, OSPF, RIP and IGRP protocols have been studied and investigated through extensive simulation process by carefully selective parameters to achieve their properties in terms of their routing algorithms. Voice traffic delivered, voice calls received, average end-to-end delay, and average point-to-point

throughput utilising OPNET 14.5 software are the variables in this case. Based on various criteria that determine the network level, it was discovered that OSPF performs better than the other protocols [3].

3. Methodology

3.1. Network Simulation

To perform the simulation of protocols we use the GNS3 simulator it is a great simulation tool in graphical representation.

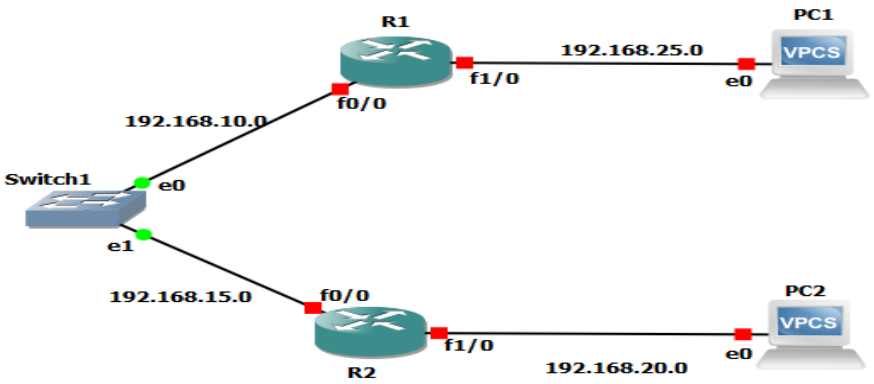

Figure 2. Topology Off-Scenario

The routers also will communicate regarding their routers, creating a comprehensive representation of the structure of the system. To identify which routes are the most effective, the routers will compare their routing databases. This is an on-scenario OSPF function in GNS3 with a topology of two routers: R1 and R2 connect with a switch with fastEtherne line R1 fastEthernet0/0 Ip-address 192.168.10.0 and f1/0 which connect with pc1 and Ip address is 192.168.25.0 similarly R2 F0/0 connect with switch Ip address 192.168.15.0 and the other side f1/0 Ip Address 192.168.20.0 connected with pc2.

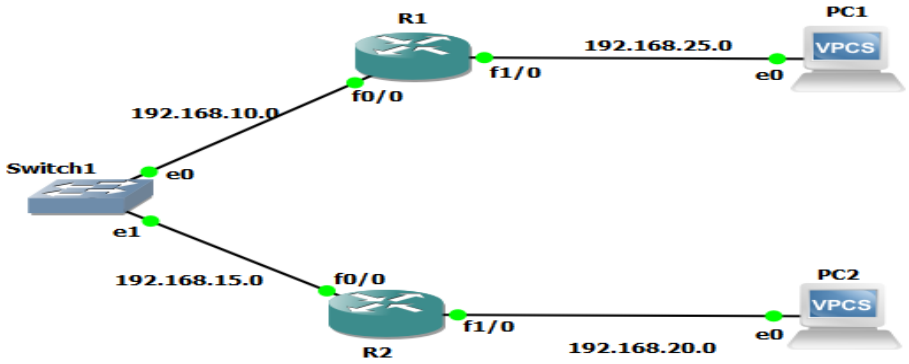

Figure 3. Running Communication Networking

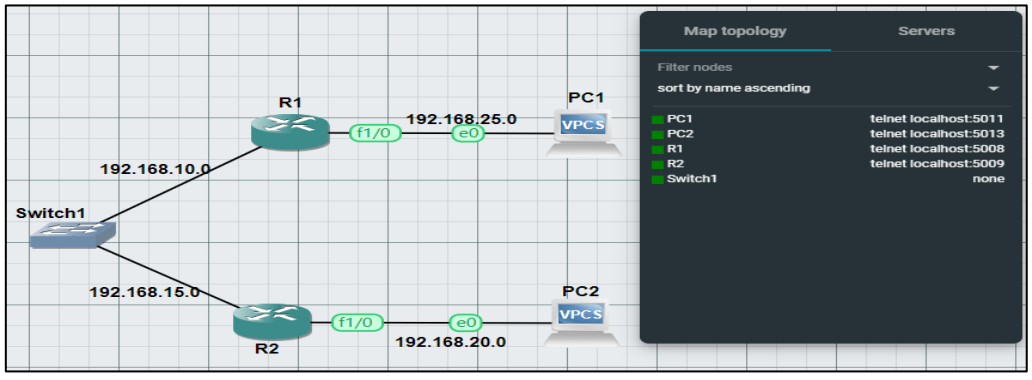

Figure 4. Topology Web-UI

Using the extreme version of the Inception (Xception) model, the fundamental purpose of this study is to build an automated deep transfer 25 learning-based methods for diagnosing COVID-19 infection in chest X-rays. This will be accomplished. Extensive comparisons demonstrate that the proposed model operates significantly more effectively than the ones that are currently available in the market.

4. Result and Discussion

4.1 PCs & Routers Configuration

```
R1#
R1#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#interface f0/0
R1(config-if)#no shutdown
R1(config-if)#ip add 192.168.10.0 255.255.255.0
Bad mask /24 for address 192.168.10.0
R1(config-if)#exit
R1(config)#interface f1/0
R1(config-if)#no shutdown
R1(config-if)#ip add 192.168.25.0 255.255.255.0
Bad mask /24 for address 192.168.25.0
R1(config-if)#exit
```

Figure 5. R1 Configure Terminals

```
R1(config)#
R1(config)#router ospf 100
R1(config-router)#network 192.168.25.0 0.0.0.255 area 0
R1(config-router)#network 192.168.25.0 0.0.0.255 area 0
R1(config-router)#exit
R1(config)#exit
R1#
*Mar  1 00:12:19.111: %SYS-5-CONFIG_I: Configured from console by console
R1#wr
Building configuration...
[OK]
R1#show startup-config
Using 1595 out of 260088 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
```

Figure 6. Configure OSPF Router

```
PC1> ip 192.168.25.2 255.255.255.0 192.168.25.1
Checking for duplicate address...
PC1 : 192.168.25.2 255.255.255.0 gateway 192.168.25.1
```

Figure 7. Addressing to PCI

```
R2#
R2#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#interface fastEthernet 0/0
R2(config-if)#ip add 192.168.15.0 255.255.255.0
Bad mask /24 for address 192.168.15.0
R2(config-if)#no sh
R2(config-if)#exit
R2(config)#
*Mar  1 00:03:00.383: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
*Mar  1 00:03:01.383: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/
0, changed state to up
R2(config)#interface fastEthernet 1/0
R2(config-if)#ip add 192.168.20.0 255.255.255.0
Bad mask /24 for address 192.168.20.0
R2(config-if)#no sh
R2(config-if)#exit
R2(config)#
*Mar  1 00:04:02.827: %LINK-3-UPDOWN: Interface FastEthernet1/0, changed state to up
*Mar  1 00:04:03.827: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/
```

Figure 8. R2 Configure Terminals

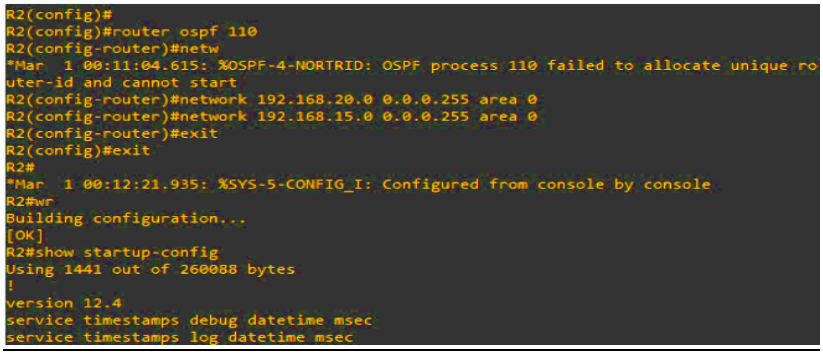

Figure 9. R2 Configure OSPF Router

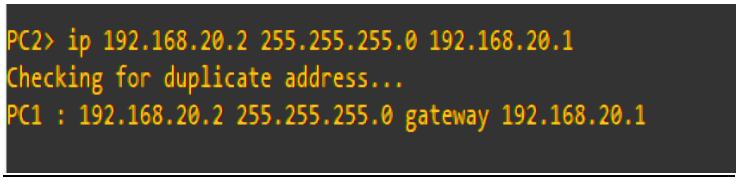

Figure 10. Addressing PC2

All pcs configuration and working performance are accurate with the network. Routers configure details performed in the simulation process.

Table 1. Assessment Table

	Measurements	OSPF
1.	Throughput (kbps)	620
2.	Delay Time (ms)	41
3.	Convergence time (ms)	9
4.	Drop packet's	4
5.	Secure packet's	490

With simulation findings, it can be said that OSPF gave a clear overview of the OSPF routing algorithm, its distinguishing features, and Cisco's short summary of the open requirements update.

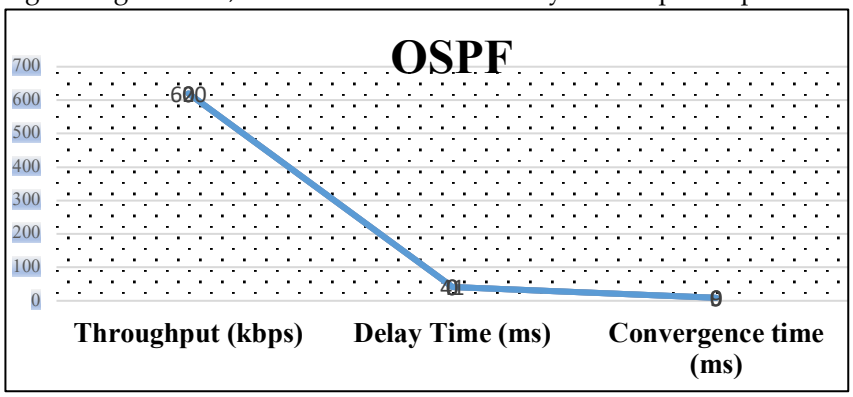

Figure 11. Result Graph

5. Conclusion and Future Work

According to the simulation outcomes, it can be said that OSPF gave a clear overview of the OSPF protocol routing algorithm, its distinguishing features, and Cisco's short summary of the release of the open specification. The sections that followed showed the network topology that was employed during testing. The router devices must be connected to the f0/0 (fastEthernet) line to execute these simple solutions. Thus, Windows (64 bits) may test and deploy this suggested setup and network. the OSPF settings. To access control between the routers, the point-to-point protocol is used to enable authentication in between each router. Each router has an identity detail, and interaction between two devices just happens if they match.

In the same network, throughput, end-to-end latency, and convergence time are all examined. Convergence time, which is a key component of routing protocols, has a direct impact on throughput and end-to-end delays. If a router is added or removed from OSPF, or a route is altered due to a connection being down or up, just the new information not the entire routing dataset is sent. The first point is the connectivity of routers switches and pcs in the virtual lab which is created in GNS3. (IP) networks, the Open Shortest Path First routing algorithm is employed. Since it allows variable-length subnet masks, that enable more effective use of IP address space, it is regarded as a classless routing protocol both service provider networks and business networks utilize OSPF extensively. The fact that OSPF can accept variable-length subnet masks is one of its key advantages.

As a result, subnets of various sizes may be created, allowing for more effective use of IP address space. This is especially beneficial for big networks because using a single subnet mask may waste a lot of IP ad-dress space. In future work evaluate and install this suggested setup Graphical Network Simulator-3 (GNS3) and network into VMworkstations. OSPF compares with other advanced dynamic protocols like IS-IS.

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