

# Implementation of OSPF and EIGRP in GNS3 in Physical and Virtual Environment

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**Abstract:** In this paper, the Simulation of network router is proposed using GNS3 environment. The Graphical Network Simulator 3 is used to imitate, organize, test and troubleshoot networks. GNS3 allows the user that it could execute in small topology. In wire shark, the data transmission is simulated. There is proper arrangement to represent the connectivity of routers in GNS environment. The research would make the user capable to take future decision according to different topologies. Research would be suitable for various types of clouds such as private, public or hybrid cloud. This paper would reduce the cost of simulation in networked environment. It would be easy to predict the cost of setup and the simulation would be capable to handle the technical issues related to research. In my test case the efficiency of EIGRP has been determined best as compared to better than OSPF in case of data transmission.

**KEYWORDS:** GNS3, OSPF, EIGRP, WIRE SHARK.

## [1]INTRODUCTION

A lots of network engineers apply the GNS3. The engineers are utilizing the GNS3 on worldwide level. The Graphical Network Simulator 3 is used to imitate, organize, test and troubleshoot networks. There networks could be virtual. With the use of GNS3, the real networks are also configured. GNS3 allows the user that it could execute in small topology. This small topology has the laptop, handsets and desktops.

The hosting of these devices is done on several servers. In several situations, hosting has been done on cloud. Different types of clouds are there as private, public or hybrid cloud. The GNS3 is been considered open source software available to use without any charges. This is energetically progressed and supported. It has a growing user of over eight lakhs members. As the user get Graphical Network Simulator 3 in his system, he gets a connection to the community of joining to students and network engineers, architects. Its reason is that these students have also downloaded the GNS3. There are many companies in the world in which 500 fortune companies included.

## GNS3 (GRAPHICAL NETWORK SIMULATOR3)

This is mentioned that Graphical Network Simulator 3 is free open source software. This might be downloaded without any cost. User could get source code situated on Git Hub. This utilized according to the user interest have a peek at code. It has been hoped that the GNS3 is helpful and effective. In the situation the user dislike something in GNS3, operator could add something. For such objective it is essential that the user join community or volunteer. User joins it to confirm code. It is adding recommendations for code. With eight lakhs community members, they can all learn from each other.

Several options are there in the marketplace available to use. In these options are lot are techniques are available with less expenses. There is some on the cost basis. The user must use that works properly according to the requirement. The user uses several options as his requirement. For user there are several alternates available to use today. These are available to offer the assists to know further regarding networking.

## Advantages

- It is free software.
- This is open source application.
- To use the GNS3 it is not required to pay the regular fees for licensing.
- There is not limitation on number of instruments that are operated. Hardware such as CPU and memory has their own limitations.
- It is assisting several switching choices. These multiple switching options may be (ESW16 Ether):
- It supports the all VIRT graphics. These VIRT graphics are IOSvL2, IOSv.
- It allows the multi vendor environments.
- This could be executed using hypervisors or without using it.
- It allows the both type of hypervisors both (VMware workstation, Virtualbox). These hypervisors may be paid or free
- This might be downloaded, free. It is usually pre-configured. It is usually optimized with appliances.
- Native support in case of Linux without requirement of virtualization application.

- This is application from many vendors available to use without any cost.
- It offers the huge and community.

#### Limitations

- Cisco graphics are required to use by user. For this the users download the GNS3 from Cisco.com. He must buy the VIRT license, or may be make the copy from physical appliance.
- It is not self contained package. To use the GNS3 there is the requirement of local setup of software (GUI).
- GNS3 is influenced by installation of system and disadvantages of system. The reason is the local setting of firewall as well as security settings etc.

#### [2]MOTIVATION OF RESEARCH

To make the simulation of EIGRP routers' efficiency has been considered main objective of research. There is the requirement to make simulation of details of source, destination, protocol, length of packet along with information part in case of cisco EIGRP. The other objective is that simulation must be efficient to indicate the packet steaming at several routers. Furthermore there is also the requirement to represent the details of source, destination, protocol, length of packet along with information part.

#### [3]PROBLEM FORMULATION

Here in this research the use of virtual router has been made instead of physical router. The GNS3 platform has allowed to virtual the actual router configuration that is complex and time consuming. The cost of real Cisco router is enough to raise the cost of overall implementation. In order to implement this work in real there is need of highly configured router. But in case of virtual router there is no need to purchase costly routers. The configuration of virtual router donot requires much man power. Real router configuration needs highly technical persons. Thus the cost of man power increases in case of real router. In this way proposed work has reduced the overall cost of configuration.

In research work, there is the requirement of highly configured hardware. The hardware is used to configure the Graphical Network Simulator 3. Along with this challenge, to configure the EIGRP router has been also considered a challenging job. To configure such routers, there is the requirement of highly skilled network engineers. It is very complex and costly task to make implementation of such routers. The research work also does the simulation of such network configurations. The procedure of Downloading and installation of EIGRP routers is made. It has been done to setup the network configurations.

The usual EIGRP issues have been listed here:

1. It is not efficient to form neighbour relationship with other EIGRP neighbors on the same segment.
2. Routers missing from the topology table or routing table.
3. There is no facility of Routers Redistribution into EIGRP.
4. EIGRP routes stuck in Active state.
5. There is lack of proper working of Load balancing.
6. User receiving EIGRP Not on Common Subnet error messages.
7. User can ping but cannot telnet across a Frame Relay network.
8. The Packet filters as well as the route filters do not allow the EIGRP packets as well as routes.
9. Split-horizon functioning over Non-Broadcast Multi-access networks for example Frame Relay as well as ATM.
10. There is chance of missing *broadcast* keyword in Frame Relay and ATM map statements.
11. There may be the Misconfiguration of IP addresses.
12. There may be not appropriate configuration of variance.
13. Frame relay header compression may be on merely on one side of network.

#### OSPF

Open Shortest Path First is considered as well known **routing protocol** for Internet **Protocol** networks.

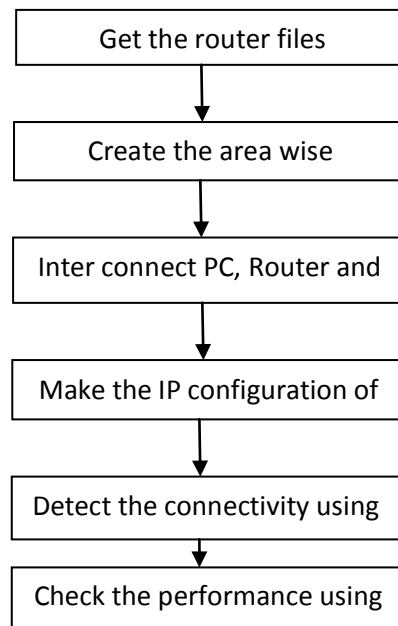
It is using a link state **routing algorithm** and falls into the group of interior gateway **protocols**, operating within a single autonomous system. It is defined as **OSPF** Version 2 in RFC 2328 (1998) for IPv4.

#### [4]PROPOSED WORK

1. The simulation of network router is made in proposed work. It has been done in GNS3 environment.
2. The Cisco site is used to download the router files.
3. The topology has been formulated that considers the several fields.
4. In every field, there are multiple routers.
5. A PC would have the connection to the router.
6. There would be a connection of router to the cloud on other side.
7. The configuration of Router has been made with IP configure command.

8. The transmission of packets has been made among separate router. In wire shark, the data transmission is simulated.

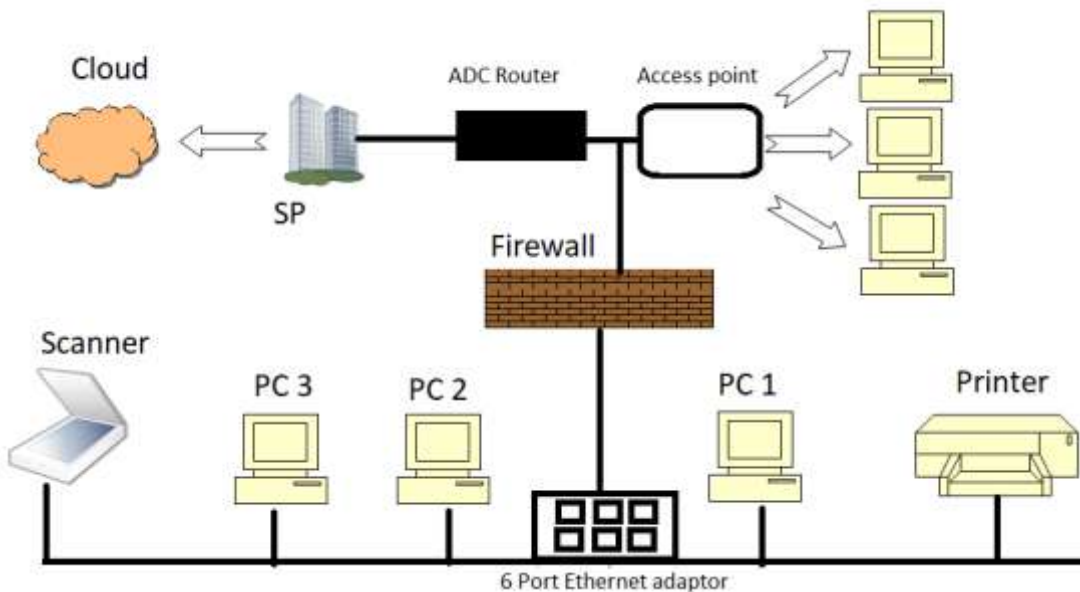
**Process flow of work**



**FIG 1** Flow Chart of Proposed Work

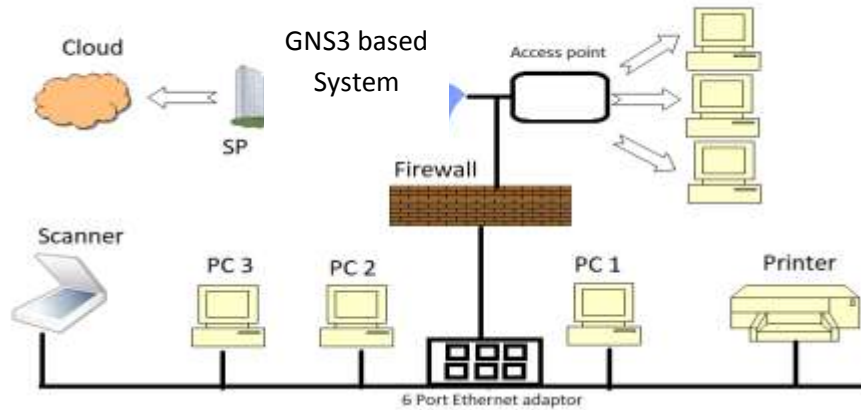
**[5] Topology**

The arrangement in following diagram is representing the connectivity of routers in GNS environment. The PC device is connected to switch and switch are connected to router. Multiple routers have been configured in multiple areas and these routers are connected to cloud. In figure 2 the physical router topology has been discussed.



**Fig 2** Actual physical router topology

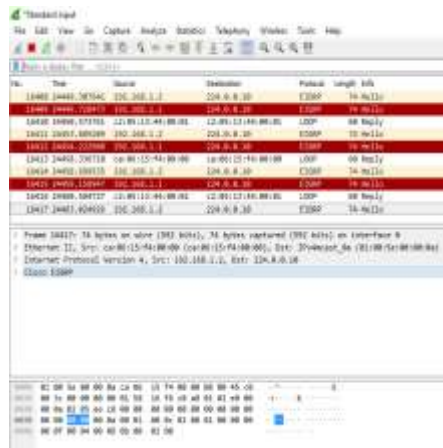
In figure 3 the virtual router topology has been explained where PC is setup with gns3 software instead of actual router



**Fig 3** Virtual router topology

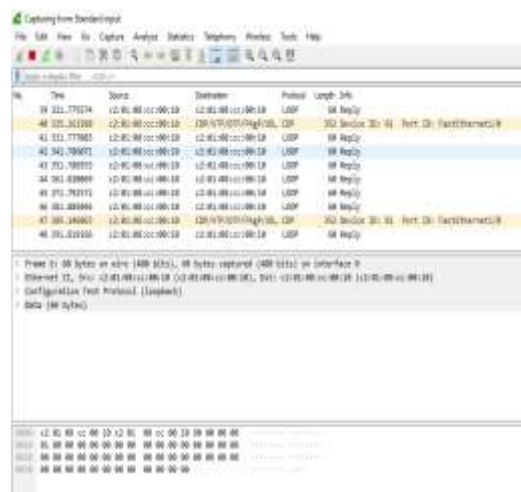
**[6]RESULT AND DISCUSSION**

In wireshark the simulation represent the details of source, destination, protocol, length of packet along with information part in case of cisco EIGRP



**Fig 4** Wireshark simulation in case of EIGRP tested with loopback adaptor

Following simulation is representing the wireshark simulation of packet steaming at router 1. In wireshark. the simulation represent the details of source, destination, protocol, length of packet along with information part.



**Fig 5** Packet streaming at router1 to LAN topology



Fig 6 Router streaming with Loop back adapter

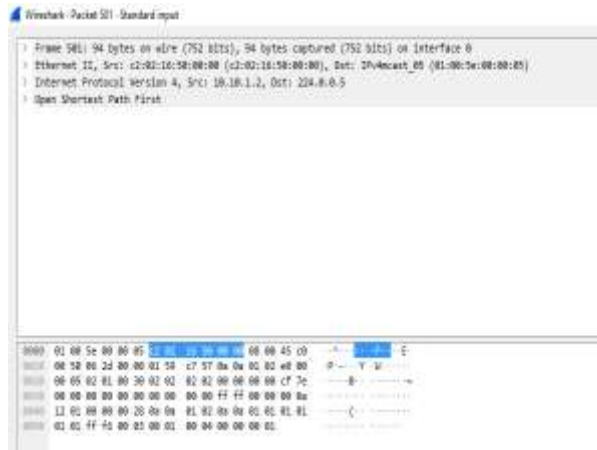


Fig 7 Particular Packet Information

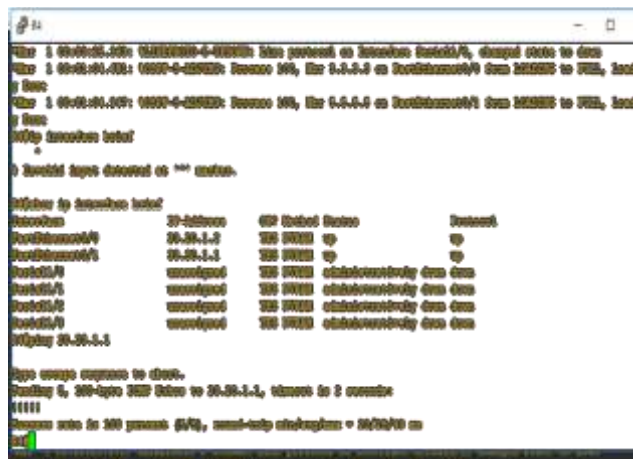
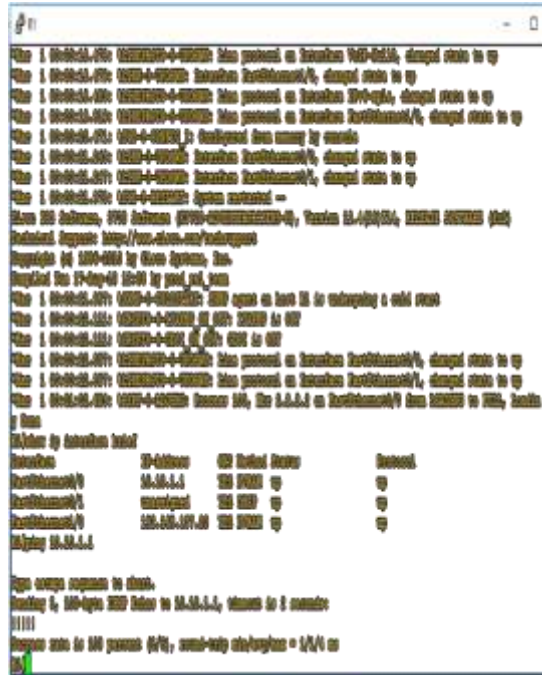


Fig 8 Configuration of router 4 to other routers

Following figure is representing the configuration of router 1 to other routers



**Fig 9 Configuration of Router 1 to other Routers**

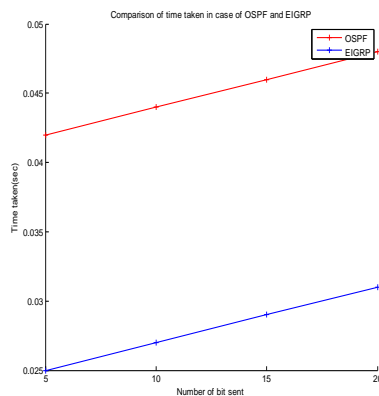
The Matlab based simulation of bit sent in case of OSPF and EIGRP has been shown below

**Table 1 Comparison of Time Taken in Case of OSPF and EIGRP**

Number of bit sent	OSPF	EIGRP
5	0.042	0.025
10	0.044	0.027
15	0.046	0.029
20	0.048	0.031

```

a=[5 10 15 20]
b=[0.042 0.044 0.046 0.048]
c=[0.025 0.027 0.029 0.031]
hold on;
plot(a,b,'r+-');
plot(a,c,'b+-');
xlabel('Number of bit sent');ylabel('Time taken(sec)');
title('Comparison of time taken in case of OSPF and EIGRP');
legend('OSPF','EIGRP')
    
```



**Fig 10 Comparison of time taken in case of OSPF and EIGRP**



## [7]CONCLUSION

The simulation of network router is made in proposed work. It has been done in GNS3 environment. The Cisco site is used to download the router files. The topology has been formulated that considers the several fields. In every field, there are multiple routers and PC has been connected to the router. The router has been connected to cloud on other side. The configuration of Router has been made with IP configure command. The transmission of packets has been made among separate router. In wire shark, the data transmission is simulated. Arrangement has been made to represent the connectivity of routers in GNS environment. The PC device has been connected to switch and switch are connected to router. Multiple routers are configured in multiple areas and these routers are connected to cloud. Topology is consisting of components such as switch, Pc, Router, Cloud. This research would reduce the cost of simulation in networked environment. It would be easy to predict the cost of setup and the simulation would be capable to handle the technical issues related to research. In my test case the efficiency of EIGRP has been determined best as compared to better than OSPF in case of data transmission.

## [8]SCOPE OF RESEARCH

It has been observed that lots of network engineers apply the GNS3. The engineers are utilizing the GNS3 on worldwide level. The Graphical Network Simulator 3 is used to imitate, organize, test and troubleshoot networks. These networks could be virtual. With the use of GNS3, the real networks are also configured. GNS3 allows the user that it could execute in small topology. This small topology has the laptop, handsets and desktops. This research would be beneficial for network administrator. The research would make them capable to take future decision according to different topologies. The hosting of these devices is done on several servers. In several situations, hosting could be made over the cloud. Research would be suitable for various types of clouds such as private, public or hybrid cloud. The GNS3 would be considered open source software available to use without any charges and it would energetically progressed and supported.

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