International Journal of Electronics Engineering (ISSN: 0973-7383)
Volume 11 • Issue 1 pp. 729-733 Jan 2019-June 2019 www.csjournals.com

# Investigating Scope of GNS3 in Virtual Network

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**Abstract:** Several network engineers apply the GNS3 on worldwide level. The Graphical Network Simulator 3 has been frequently used by them to imitate, organize, test and troubleshoot networks. There networks could be virtual.GNS3 allows the user that it could execute in small topology. This small topology has the laptop, handsets and desktops. In this paper the GNS3 has been introduced with its limitations and benefits.
**Keywords:** GNS3, Network simulator, Topology, Virtual network, Packet.

## [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.

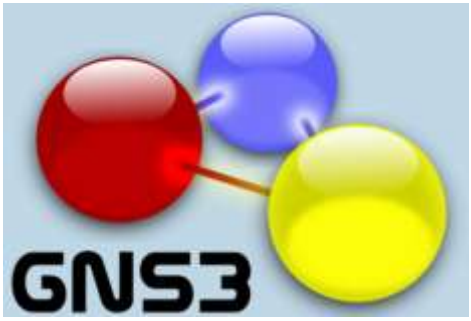


**Fig 1** GNS3 LOGO

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 lekhs 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.

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 lekhs 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.

## [2] 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 VIRL graphics. These VIRL 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.

**[3]LIMITATIONS**

- Cisco graphics are required to use by user. For this the users download the GNS3 from Cisco.com. He must buy the VIRL license, or may be make the copy from physical appliance.
- It is not self contained package. To user 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.

There are several researches in the field of efficiency of OSPF and EIGRP IN GNS3. Some of researches are on a real-time testbed used in routing network. Some other highlights the efficiency of IPv4 and IPv6 as Routing Protocols with the use of GNS 3 Simulator with the utilization of GNS 3 Simulator. In past, the research has written on link failure evaluation on EIGRP and OSPF protocol. It has been done using ipv4 and ipv6 on mixed topology networks. They have reviewed the efficiency of EIGRP and OSPF routing protocols. These protocols are used in real time applications. They have made the comparison of IGP and EGP routing protocols. They also described the efficiency of load balancing and redundancy from several AS. Routing is a vital process for transmission. The network allows the information transmission by a LAN and WAN. Some works are listed has been given below:

In 2012, K. Yao, W. Sun, et al [1] wrote on a real-time testbed used in routing network. The previous network test bed is making the creator able to evaluate performance of several routing protocols in network. The network test beds also assist the students. These help the students to enlarge their experiences. These also make in known the difficult and abstract perception related to routing protocols. It is feasible by enables them to have the projects on it. Second hand, network test beds have limited benefits. Along with this, these are very costly. It is very expensive to set the set-up of test beds and maintain it. To highlight the above described issue, this paper offers the ARTNet. The ARTNet stands for a real time Test bed for routing network. The ARTNet allows the well known routing protocol. It enables routing protocol in order to execute the particular applications. The execution of the particular application is possible at a low cost by ARTNet. Its implementation has been made on a multi processor server. The process in processed for users to generate and maintain the routing networks. The efficiency and evaluation of functionality has been measured on the ART Net platform. It has been determined a capable concept.

In 2018, D. R. Al-ani et al [2] discussed the efficiency of IPv4 and IPv6. This performance was in manner of routing protocols. The performance evaluation has been with using GNS 3 Simulator. Internet Protocol v6 solves the issue counted by Internet Protocol v4. Issues may be space issue and the security issue. This paper has discussed the virtual scenario. It is created to execute the testing of efficiency of IPV4 and IPV6 by a special attention. It is executed with analyze the efficiency in sending the information from the vendor to terminal. There are three kind of changeable routing protocols. Names are RIP, EIGRP and OSPF respectively. These routing protocols focus on latency. These also consider the end-to-end delay. The simulation runs with using these protocols for two IPVs. This simulation is revealed that the IPV6 have clear the benefit over IPv4. It lost the messages and delivery.

In 2015, J. Kumar, et al [3] did research on route redistribution between EIGRP and OSPF routing protocol. In this research the gns3 software has been utilized. The Routing is determined essential. It advertises the route of one to another network. Routing is also search better path from sources to targeted end. To do computing several kind of routing protocol are used. These routing protocols may be EIGRP and OSPF. These are applied to send the IP packet from source to targeted end. Along with this, several routing protocol applied the routing algorithm. The routing algorithms are used to get the better path between sources to targeted node. The EIGRP is considered as a cisco propertiary protocol. It executes the cisco router. The OSPF is considered as non cisco propertiary protocol. Therefore, it has lack of feasibility of sending the packet of EIGRP network to OSPF network. Hence the proposed works chiefly consider this issue. To fulfil this objective the Route Redistribution mechanism has been utilized. Route redistribution is full form of RR. It has turn out to be an integral division of IP network structure. This mechanism optimizes the network. It has done to advertise EIGRP route to the OSPF network and vice versa.

In 2016, N. Hengpradit, et al[4] proposed link failure evaluation on EIGRP and OSPF protocol. The ipv4 and ipv6 are utilized on the mixed topology networks. This research analyzed the irregular time period after chief attached link not success in EIGRP and OSPF on the mixed topology networks. EIGRP stands for Enhanced Interior Gateway Routing Protocol. On the other hand OSPF refers to the Open Shortest Path First Protocol the time duration. Additionally, two topology networks have been applying the EIGRP or OSPF protocol. These networks connected with BGP. BGP refers to the Border Gateway Protocol for Simulation. The GNS3 is used for simulation of sharing on both networks. WIRESHARK are applied in order to analyze the function.

In 2017, S. Maiduli, et al [5] wrote on emulation of a backbone area network. The configuration of the network has been made over RIPv2 and OSPF protocol. The GNS3 Simulator is applied in this work. It is essential that incoming and outgoing transmission travel by this network. Therefore design of backbone creates the influence on efficiency of network. Here a backbone area network has been designed. Here, the CISCO 7200 series router's IOS image is applied along with GNS3 simulator tool. The configuration of the network has been made over RIPv2 and OSPF protocol differently. The efficiency of RIPv2 and OSPF protocol is analyzed along with packet request and reply time. It is executed by transforming several sizes of messages. The message is sent from source router to targeted router by designed backbone network.

In 2014, C. P. Analysis, et al [6] reviewed contrast of link recovery. This recovery has been made among EIGRP with OSPF. These are well known protocols. Such comparison is concerned to simulation. EIGRP with OSPF has been considered as dynamic routing protocol. These are applied in practical networks. These have been utilized to distribute the topology of network with the adjoining routers. A comparison of recovery of link between protocols of EIGRP and OSPF has been presented in the present research. Each routing protocol's efficiency varies with each other. Between the routing protocols, they have chosen the routing protocols of EIGRP & OSPF. Real-time traffics are analyzed by using them.

In 2018, V. Goyal, et al [7] offered the review paper on the comparison of OSPF,RIP & Protocols of EIGRP. Simulation has been used for doing this. Routing has been considered the vital role in internet communication. The routing have the dependency on based of routing protocols. There are several protocols of routing. Considering these routing protocols the most famous are RIP and OSPF. The meaning of OSPF is Open shortest path first. The meaning of RIP is Routing information protocol. Efficiency of these protocols is analyzed under this research on the basis of union. The second element is the traffic. The simulation tool named Cisco Packet Tracer has been applied under the design the network. They have analyzed the results with the use of standard tools.

In 2016, T. Chou [8] did comparison of simulation of network with emulation virtualization equipments. PT stands for Packet Tracer. PT utilized an official Cisco software simulator. This is applied in order to exercise the Cisco network tools. GNS3 stand for Graphical Network Simulator. This emulator software is free to use. GNS3 enables the user to run the real networking software graphics on computer. It offers the better GUI design. Here the GUI stands for graphic user interface. This is intensively applied by the learners. It has been applied in order to create, install in the networks. It also troubleshoots networks in a virtualized network environment. This research compares the PT and GNS3. They have made the comparison on the base of capability with complexity. The power with venality is discussed here. Additionally, the networks have been created to exemplify their discussion.

In2018, A. A. Susom [9] stated the efficiency of routing protocols. These routing protocols have been used in several networking scenarios. The routing protocol selection is considered as the essential in modern time of Internet transmission. There are the issue of network traffic and the network difficulties. These issues are enlarging vastly. The present paper has made the estimation of efficiency of routing protocols. These are three routing protocol. The name of first is routing information protocol version 2 (RIPv2). The second is Open Shortest Path First (OSPF). Third is enhanced interior gateway routing protocol (EIGRP), the hybrid protocols are dependent on such three routing protocol. Such routing protocol as well as hybrid protocol has been differentiated on the base of four metrics. The first base is throughput. The second base is jitter. The third base is the length of packet. The fourth and last is packet loss. Several kinds of networks have been launched with help of GNS3 network software emulator. The comparison of network efficiency has been made by four metrics. A Wireshark and Iperf tool are applied for this purpose. Along with this, three network topologies are formulated with using 7, 3, and 9 routers. These network topologies are termed as experimented, retracted and extended networks. The Simulated output has indicated that efficiency of EIGRP protocol is proved best. It shows the highest average throughput. The highest average throughput is 28packet/sec. Along with this, the RIP-OSPF hybrid protocol carry very low average throughput that is16 packet/sec. In addition, the EIGRP carry low value packet loss that is 2.66. Very low jitter value is got for hybrid RIP-OSPF-EIGRP protocols. Therefore, the EIGRP carry a reasonably high jitter value. In addition, EIGRP has standard size of length. Thus, the EIGRP is determined a best collection to use as a routing protocol. This is applicable in several sized networks.

In 2017, S. Pant, et al[10] wrote on performance analysis. This analysis is with RIP, EIGRP, OSPF and ISIS routing protocols. In field of computer network, the routers are applied to send the data or packets in any network. The execution of router has been monitored using the routing protocols. Routing Protocols are separated in two kinds of protocols. The first is interior gateway routing protocols. Other is exterior gateway routing protocols. Present work has considered valuation of four interior routing protocols. Such routing protocols may be RIP, EIGRP, OSPF and ISIS. The implementation of such routing protocols has been made on same network topology. This is executed with using GNS3. A simulator application has been developed. This simulator application can return the routing table of nodes in topology. Besides, the routing protocols are differentiated on the base of many parameters. Such parameters are hop count and administrative distance. The parameters consists route propagation and updates also. Routing protocols have been separated on the base of path metric, time demanded for getting target and round trip time.

In2017, S. Vishesh, et al [11] discussed open shortest path first that is also called OSPF. They have discussed the routing protocol and Virtual-Links. The OSPF routing protocol is considered as a changeable routing protocol. It applies the link-state routing and shortest path algorithm of Dijkstra. Using LSA, the local routing topology of router is addressed to all other routers. These routers are in OSPF sector. OSPF applied a hierarchical network framework applying Areas. Area 0 has been referred as backbone. The other areas are attached either to backbone sector or area 0 with using virtual-Links. The Hierarchical network system carries two chief benefits. The first is router that doesn't have the all knowledge about network topology. It is impossible for router with outside of its sector. So the router can make decrement in the size of the database. Therefore it proves helpful to execute vast interaction. The second advantages are that at the time of network division in areas, there is systematic grouping and transmission.

This is considered as logical compilation of OSPF networks with routers and links. These have the similar area classification. The Troubleshooting has become easy. This paper has explained deeply, the connection of other OSPF sectors to backbone sector. It also described the connection of other OSPF area with area 0 applying the virtual-Links. They have attached sector ten to sector 0 by virtual-link. It is also mention here that, a virtual-Link is capable to attach the backbone across non-backbone area. Area by which a virtual-link has been installed is referred as transit sector. The transit sector may be stub area. Transit sector includes the full routing information.

In2017, K. Gehlot , et al[12] reviewed the analyze performance related to the EIGRP and OSPF routing protocols. This evaluation is done with real time software. A fast progress related to the routing protocols is there in the field of transmission. Routing protocol is considered as a protocol. It is capable to decide the pattern for routers to make communication with other router. It sends the packets by the optimal path. This is made to transmit the information from source node to targeted node. Performance of every routing protocol is determined vary out of all. With the efficiency, each of router protocol has separate architecture, adaptability, route processing delays, convergence capabilities and so on. Out of several routing protocols, EIGRP and OSPF are the most excellent routing protocols. These are use in real-time applications. The present research has offer the simulation for comparative efficiency evaluation. Estimation has been made between EIGRP and OSPF routing protocols. It has been done for real time applications. The Best-Effort as well as QoS technique in the environment of OPNET simulator is applied. The analysis has dependency on several factors. The factor may be traffic transfer and got packet delay variation. It also consists the packet end-to-end delay. The simulator is applied in order to make evaluation of performance of EIGRP and OSPF. The 2 network models are mentioned here. These are installed with EIGRP as well as OSPF routing protocols in that order.

In 2016, A. B. Ali, et al [13] did comparison of IGP and EGP routing protocols. The paper has analyzed the efficiency along with load balancing as well as the redundancy across separate AS. The Routing performs an essential role in communication. The Network allows the data transmission over any LANs and WANs. Every routing protocol includes the several features, performance, architecture, and algorithms.

## 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. 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. 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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