

Design and Development of Virtual Local Area Network and Securing Network using Network Address Translation

Kailasam Selvaraj, Kartheeban Kamatchi, Vishalraj A V K, Pandikishore R, Ram Guru Chandar M

Abstract - To develop and implement a Virtual Local Area Network by using sub-netting and to find the optimized IP depended on host number. When a company purchases web hosting from Internet Service Provider they will purchase several static addresses. As a result an automated system to store the information about assigned IP address and solve the problem. The main objective is to develop and discuss about the various Internet Service Provider (ISP) and securing the network by using Network Address Translator (NAT) and Access Control list (ACL). Static routes or a direct connection to the destination network i.e. a router might be running both an Open Shortest Path First version 3 (OSPFv3) process and a Routing Information Protocol (RIP) process. If the OSPF protocol is advertised to optimize the routes by RIP protocol, it is said to be redistributing RIP. The detailed information about the Dynamic protocols such as RIP, OSPFv3, EIGRP etc., its standards, functionality and internetworking issues in the networking domain are observed and troubleshoot the problems in the internetwork connectivity using the CISCO routers and end devices and hence to design a simple network with tool with multiple routing protocols in IPv6 domain and redistribute for end-to-end communication.

Keywords: RIP, OSPF, EIGRP, NAT, ACL, and ISP.

I. INTRODUCTION

In the system sub-netting, expansive system is partitioned into littler systems and that intended to deliver IPs from giving web address (IP) that give from Internet Service

Revised Manuscript Received on December 05, 2019.

* Correspondence Author

Kailasam Selvaraj*, Assistant Professor, Department of Information Technology, Kalasalingam Academy of Research and Education, India. Email: s.kailasam@klu.ac.in

Kartheeban Kamatchi, Associate Professor, Department of Computer Science and Engineering, Kalasalingam Academy of Research and Education, India. Email: k.kartheeban@klu.ac.in

Vishalraj A V K, Student, Department of Information Technology, Kalasalingam Academy of Research and Education, India. Email: vishaljamesh44@gmail.com

Pandikishore R, Student, Department of Information Technology, Kalasalingam Academy of Research and Education, India. Email: mail2kishore@gmail.com

Ram Guru Chandar M, Student, Department of Information Technology, Kalasalingam Academy of Research and Education, India. Email: mailtoguru1997@gmail.com

Provider (ISP) and separate into sub systems [4]. The stage training model sub netting IPv4 (PTMS-IP4) is a robotized framework which computes the subnet of a system. It shows well-ordered every one of the stages associated with sub netting. The framework initially figures the subnet veil into parallel [2]. The dealing with task of IP address is critical, as each or client associated with a given subnet will be appointed an IP address utilizing a similar system prefix, yet every sub system will have an alternate system prefix. We need three stages to sub netting; the initial step is to decide the quantity of host bits to be utilized for the sub-netting [6]. The quantity of host bits being utilized for sub-netting decides the conceivable number of subnets and hosts per sub-net. Second step is determining the new sub-network arrange IDs, in view of the quantity of host bits. Third step indicates the IP addresses for each step organize ID and determine the IP addresses for each part arrange ID by characterizing the scope of IP address. Packet Tracer is a cross-stage visual re-enactment apparatus structured by Cisco Systems that enable clients to make arrange topologies and emulate current PC systems [7]. The product enables clients to reproduce the design of Cisco switches and switches utilizing a mimicked order line interface [8]. Bundle Tracer utilizes an intuitive UI, enabling client to include and evacuate reproduced organize gadgets. The product is basically engaged towards Certified Cisco Network Associate Academy understudies as an instructive device for helping them learn essential CCNA ideas [9].

II. RELATED WORK

“Distributed Virtual Routing,” it is one the routers in network Coordinate to perform the work of data packets for the type of VLAN environment. The Distributed Virtual Routing, it is an effective process of the data routing technique and points is based on the traffic information collected from the data link, physical layer etc. along with the IP layer[5].

The subnet degree refers to numerous interfaces held in the subnet. The degree of distribution of ISP is to find the same discrete sub netting process. In this ISP most of the subnets and its degree is said to be median degree. Therefore, they highly distributed the degree. At the same time, two ISP node has a minute number of degree Subnets having numerous ISP of different IP addresses which is from the Akamai



technologies [4]

Analysis of routing protocols in vane using ns-2 simulator. In this work, they were using WLAN technology for short range average calculation in between vehicle-to-vehicle and vehicle-to-roadside communications. [1]

In this work, they had to know about the current public education and resilience strategies. This work was conducted by GNS science community resilience research. [3]

III. NETWORK TOPOLOGY

A.Schematic Sketch

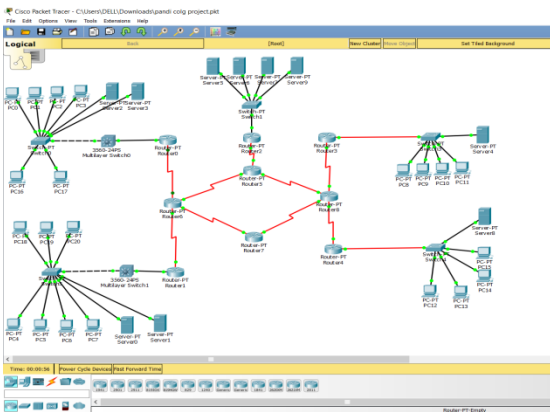


Fig 1 schematic diagram

1. DNS

We have 5 personal computers for client and there is one DNS Server and one switch device for connecting all the pc to form a LAN (local area network) in this branch. The user can communicate with other system through IP address (or) the domain name of the system in this branch the IP address is used as 10.0.0.0

2. IIS

We have 5 personal computers for clients and there is one IIS Server and one switch device for connecting all the pc to form a LAN (local area connection) in Mumbai branch the clients can communicate through the IP address in this branch the IP address is used as 172.16.0.0.

3. DHCP

We have 9 personal computer for clients and there is one DHCP Server and one switch device for connect all the pc to form a LAN (local area connection) in Bangalore branch. The clients can communicate through the IP address and there is DHCP (dynamic host configuration protocol) so client can get IP address through the DHCP server automatically. In this branch the IP address is used as 172.17.0.0

In this DHCP we have implemented DORA process

- D** – DISCOVERY **O** - OFFER
- R** – REQUEST **A** - ACKNOWLEDGE

4. DNS AND IIS

We have 3 personal computers for clients and there is one DNS Server, one IIS and one switch device for connecting all the PCs to form a LAN (local area network). In this branch the IP address is used 172.19.0.0. So the clients can communicate through the IP address (or) the domain name of the system through the help of DNS server and IIS server.

B.Sub-Netting

The system sub-netting how it is troublesomely to partitions a substantial system into littler systems that intended to deliver IPs from giving web address (IP) that give from Internet Service Provider (ISP) and separate into sub systems. An earlier workmanship way to deal with LAN excess has been to give at least two LANs, each having a LAN controller coupled to information specialized gadgets. Some product is required in the information specialized gadgets to switch between the LAN controllers when a disappointment happens in certain fragments of the system. Every gadget or client associated with a given subnet will be doled out an IP address utilizing a similar system prefix; however every subnet work will have an alternate system prefix. Show how each subnet has an alternate system prefix.

C.Routing Protocol

A router protocol is a protocol which advertises the nearest node and fetches the neighbour nodes. There are different protocols used to communicate between the networks. The IP

- Determination of optimal path to destination
- Delivering the data packets to the destination.

1. Static Routing Protocol

Static routing protocol is the method which is to assign the IP addresses manually to communicate among the networks. Static routing method is used to assign the IP address of the overall router network. Network administrator connected a router to computer and verified communication by using ping. They are not suitable for large Internetwork.

The command used for the static router protocol is,

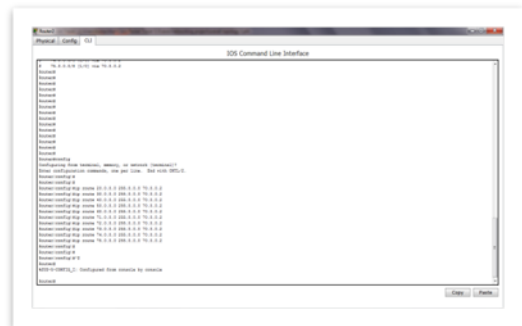


Fig2. STATIC PROTOCOL COMMAND



below in the screenshot.

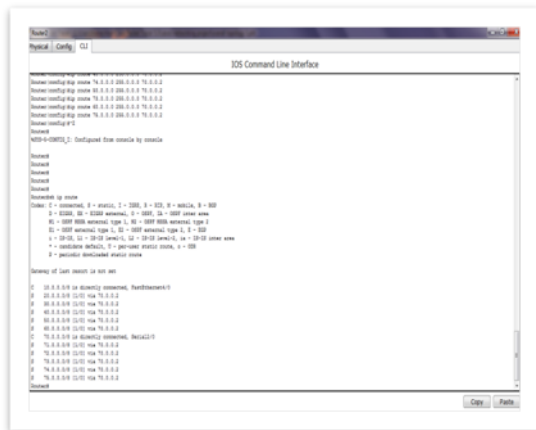


Fig 3STATIC PROTOCOL COMMAND

2. Dynamic Routing Protocol

Dynamic routing protocol is the method which is dynamically (automatically) assigns the IP address for the routers in the communicating network. By using Routing table, neighbour node are analysed and automatically update the routes in the table. In the WAN connection the multiple links between the networks, router performs more efficiently. Routers do this by getting the details from other routers. Routers create the routing tables which show the shortest path to deliver the data. In this dynamic protocol there are two main subdivided protocols used in the network communication.

Dijkstra Algorithm:

- To calculate the routing table all routers must use the Dijkstra algorithm to its link state database.
- The Dijkstra algorithm helps to find the shortest path between two points on a network, using a graph made up of nodes and edges.
- The algorithm divides the nodes as tentative and permanent.
- Choose a node, make it tentative, examines them, and if they pass the criteria make them permanent.
- Router# show IP route
- In this command the 1 represent the process id

3. EIGRP

EIGRP is the method which is used to overcome the drawbacks faced in the RIP routing protocol. Here in this more than 100 routers are utilized. It allows routers to select shortest path dynamically based on the current state between the two networks. It supports hierarchical topology and automatic load sharing among the routers. The overall connection is established using the routers. The EIGRP routing protocol uses the command format which is shown

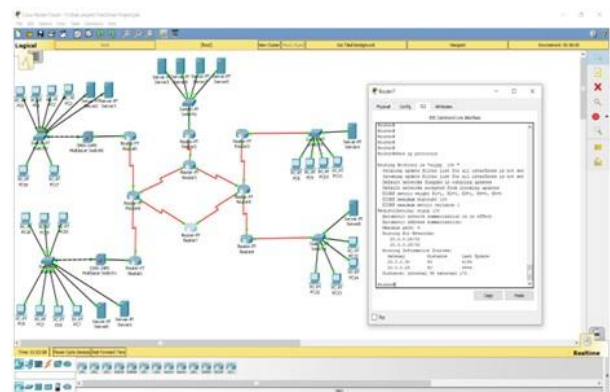


Fig 4. Neighbor Topology

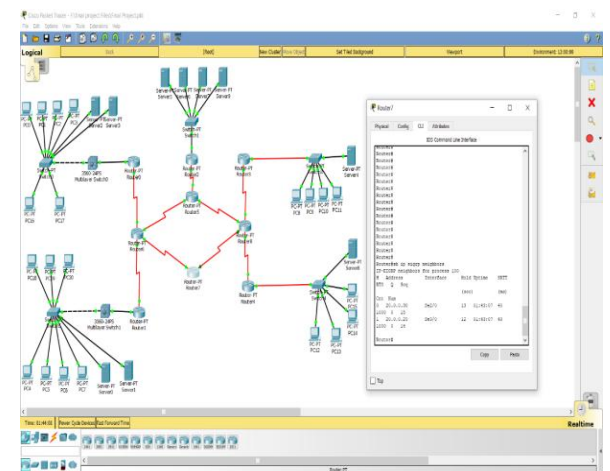


Fig 5 EIGRP Entries

D.Network Securing Protocol

IP inside for securing network, two securing protocol is used.

- NAT
- ACL

1. NAT

Network Address Translation is the process used to hide the Private ip in network to Public ip address .It provides the security from intruders.

There are three method used in NAT

- Static NAT
- Dynamic NAT
- Dynamic Overload NAT

2. Static NAT:

Static NAT is used to translate one private IP to one public IP.

3. Dynamic NAT:

Dynamic NAT is used to configure the set of public IP address for the group of private IP address.

IV. EXPERIMENTAL RESULTS

From this scenario, the result that we obtained is how the data transferred is executed all over the world. The protocols that are used are expressed in the stimulation factor. The software that was used is Cisco packet tracer provides the result which is much effective and hence the required topology is obtained. Here for the securing purpose, we have used the NAT and ACL protocol. Here we design a four branches and a central server, we connect those system using several routers and switches. Here we enabling the VLAN concept so that it reduce the traffic flow and we enabled L3 switch so that we can create the communication between two VLAN'S. And we use various ISP that provide the path to communicate between the branches. Here for the securing purpose, we have used the NAT and ACL protocol.

Table 1: Comparison of various attributes of Existing system and proposed system

Properties for comparison	Existing system	Proposed system by VLAN
Security	Initially they use Firewall configuration for all the systems.	Here we initialize the NAT to the router so we use same IP for all systems.
Success Rate	Compare to VLAN it has more Delay up to 0.5 ms	Here by using EIGRP the delay rate is reduced to 0.1ms
Bandwidth	Clock rate -64,000 bit/sec	Clock rate – 20,00,000 bit per sec max.
Sub-netting	Sub-netting concept is not used	Here sub-netting concept is used to reduce the IP wastage in a network.

Here we compared the clock rate speed of both existing and proposed system. In the existing general work the clock rate is 64,000 bit/sec when compared to the proposed one our clock rate speed up to max 20, 00,000 bit per sec max.

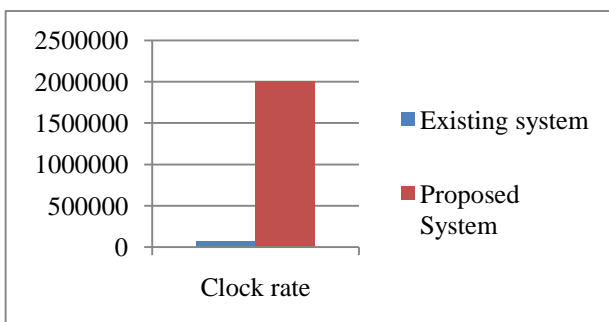


Fig 6 comparison of clock rate with existing system

Here we compared the success rate of the general work and our proposed work. Normally the success rate should be less so that the delay of the data transmission will reduce.

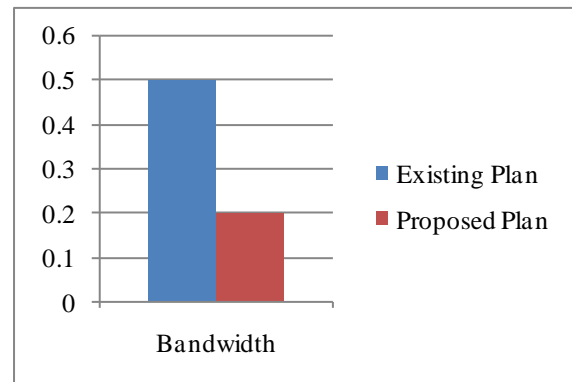


Fig 7 comparison of Bandwidth success rate

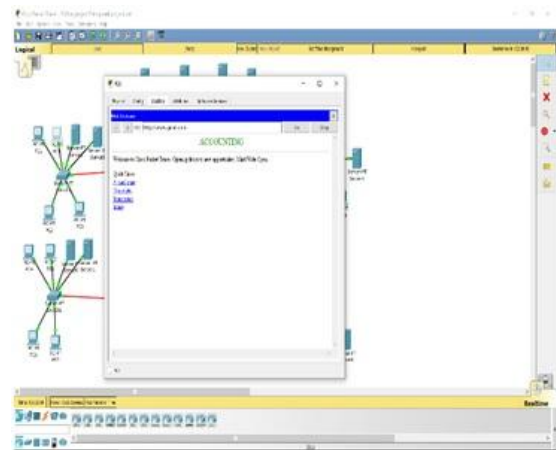


Fig 8 Server Reached output

This is the result were we successfully reached out the server from the branch node which is designed by VLAN.

V.CONCLUSION

By using CISCO packet tracer the output simulation is easily analysed and there is no issue in using number of routers. In this we have use NAT and ACL for securing purpose which provides efficient protection while transferring the data. From this scenario, the result that we obtained is how the data transferring is executed all over the world. The protocols that are used are expressed in the stimulation factor. The software that was used is CISCO packet tracer provides the result which is much effective and hence the required topology is obtained. Here for the securing purpose, we have used the NAT and ACL protocol. By using CISCO packet tracer the output simulation is easily analyzed and there is no issues in using number of routers .In this we have use NAT and ACL for securing purpose which provides efficient protection while transferring the data.



REFERENCES

1. PriyankaGoyal and AnishSoni, "Simulation and analysis of routing protocols in vanet using ns-2 simulator," International Journal of Advanced Research in Computer Science –Volume 5, No 7, September – October 2014 by (University Kurukshetra, India).
2. Junfeng Li, Dan Li, Yukai Huang, Yang Cheng and Ruilin Ling, "Quick NAT: High Performance NAT Systemon Commodity Platforms Identification of Hosts behind a NAT Device Utilizing MultiPle Fields of IP and TCP," 2016
3. J.becker, s.mcbride and d.paton, "Improving community resilience in the hawke's bay: a review of resilience research, and current public education, communication and resiliencestrategies.gns," in science report –march 2013.
4. M. EnginTozal, KamilSarac, "Subnet Level Network Topology Mapping," in Department of Computer Science, The University of Texas at Dallas, TX 75080 U.S.A.
5. Denver Colorado and Toshio Hirotsu, "Dynamic and Distributed Routing Control for Virtualized Local Area Network," in 35th Annual IEEE Conference on Local Computer Networks LCN 2010, Computer and Information Sciences Hosei University.
6. P. Richter, F. Wohlfart, N. Vallina-Rodriguez, M. Allman, R. Bush, A. Feldmann, C. Kreibich, N. Weaver and V. Paxson, "A Multi-perspective Analysis of Carrier-Grade NAT Deployment," arXiv preprint arXiv:1605.05606, 2016.
7. F. Bensalah, N. El Kamoun and A. Bahnasse, "Analytical performance and evaluation of the scalability of layer 3 tunnelling protocols: case of voice traffic over IP, IJCNs," in International Journal of Computer Science and Network Security, vol. 17, no.4, April 2017, pp.361-369.
8. Jun Tao and Yunsheng Yan "A Hierarchical Divisive Algorithm for Topology Discovery in Multi-subnet Networks," in 2017 17th IEEE International Conference on Communication Technology. Computer and soft Engineer Department Anhui Institute of Information Technology
9. S. Yadav and A. Jeyakumar, "Design of traffic engineered MPLSVPN for protected traffic using GNS simulator," in 2016 International Conference on Wireless Communications, Signal Proceedings of the Second International Conference on Computing Methodologies and Communication (ICCMC 2018) IEEE Conference Record # 42656; IEEE Xplore ISBN:978-1-5386-3452-3
10. Man wah Chiang, ZeljkoZilic, KatarzynaRedecka and Jean Samuel Chenard, "Architecture of Increased Availability Wireless Sensor Network Nodes," 1 IEEE, Vol.2, pp 1232-1240, Feb 2004.



Mr.Vishalraj. A V K is a B.Tech student in the Department of Information Technology, Kalasalingam Academy of Research and Education. He has completed B.Tech (IT) in 2019 in Kalasalingam Academy of Research and Education. His areas of interests include Internet of Things, Image processing, Programming and Networks.



Mr.Pandikishore R is a B.Tech student in the Department of Information Technology, Kalasalingam Academy of Research and Education. He has completed B.Tech (IT) in 2019 in Kalasalingam Academy of Research and Education. His areas of interests include Image processing, Networking and Virtual Local Area Networks.



Mr.Ramguru Chandar M is a B.Tech student in the Department of Information Technology, Kalasalingam Academy of Research and Education. He has completed B.Tech (IT) in 2019 in Kalasalingam Academy of Research and Education. His areas of interests include Programming, Networking and Virtual Local Area Networks.

AUTHORS PROFILE



Mr.S.Kailasam, working as Assistant Professor, Department of Information Technology, Kalasalingam Academy of Research and Education, Krishnankoil, Tamilnadu, India. He received his M.Tech degree in Computer Science and Engineering from Kalasalingam University in 2009. He is currently doing his research in the area of Video analytics. He has published papers in Scopus indexed conferences. His areas of interests include Video analytics, Image processing, Cryptography and Network Security and cloud computing.



Dr. K. KARTHEEBAN working as Associate professor, Department of computer Science and Engineering, Kalasalingam Academy of Research and Education, Krishnankoil, and Tamilnadu, India. Also he was worked as a Deputy Director Academic. He received his M.E degree in computer science and Engineering from College of Engineering, Anna University, and Chennai in 2007 and Completed PhD in the title of "Development of Efficient Algorithms for Secure Communication in Distributed Computing Environment" in the Department of Computer Science and Engineering at Kalasalingam Academy of Research and Education, Anandnagar, and TAMILNADU, INDIA in 2014. He worked as a faculty from Adhiyamaan College of Engineering, Hosur, India between 1996-1998. Currently 1 scholar completed his PhD and 6 students are doing their PhD under him with the topics such as Internet of Things, Medical Image Processing, Video Analytics, Cyber Forensics , Sentimental Analysis and Scheduling in Cloud computing. He has published many papers in SCI journals and Scopus indexed conferences. Also he has submitted proposals to DeIT, SERB and DRDO. His areas of interests include IoT, Medical image processing, cryptography and bioinformatics and grid and cloud computing.