Universal Network Setup for Advanced Communication

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Abstract - *In traditional network systems, we need a Network Engineer to do design the preferred network which is always different for different jobs. So to tackle this problem we are designing a universal network setup that can be used as a common base in all network setup. Here we are providing advanced communications through latest firewalls for high security, BGP i.e. Border Gateway Protocol, for the effective packet delivery throughout the network from source to destination. Also multiple protocols as well as services are used here such as ACL, VLAN-VTP, HSRP, HTTPS, etc. This setup is designed on GNS3 software which has its own GNS3 operating system and it will show the actual implementation of network setup used in companies, schools, colleges, stadiums, etc.*

***Key Words*:** Routers, Switches, VLAN-VTP, GNS3 Software, ACL, HSRP, HTTP.

1. INTRODUCTION

The networks used in many areas are all differently designed as well as deployed as per the need of the vendor. This requires for us to design and develop a different type of Network Setup every time. This needs an appointment of Network Engineer all the times. But by using the Universal Network Setup, we are developing a general network design which can be used anywhere. This uses many techniques for advanced communication as well as increases the overall reliability, security and mobility of the network. Here we use the BGP/OSPF routing protocol, provide multiple services while using ring topology for efficient communication in any situation. In any traditional Network Setup, we normally don't use the BGP protocol as it is not needed at the initial time.

2. NECESSITY

In order to mitigate the problem of the network system used in the traditional networking solutions, few of the problems such as less security used, smaller routing protocols used, short distance communications, less support for wireless technologies, no support for webpage and secure website hosting, etc. we have developed a Universal Network Setup for this.

This Universal Network Setup tries to solve all such problems caused by the traditional networking setups. As in this fast growing world, we need advanced solutions to all the problems created by the traditional systems used worldwide; we can simply replace such old networking solutions by using the much advanced Universal Network Setup.

3. OBJECTIVE

The main objective of this project is to implement the Universal Network Setup using GNS3 or Cisco Packet Tracer for advanced communication by increasing the security, efficiency as well as mobility of the network and the network system used.

We have used the concepts such as ACL to improve the security of the network. Here we have provided the support for dynamic webpage hosting on a secure server and provided the HTTP as well as HTTPS services. To improve the overall mobility of the system is one of the most important objectives of this Universal Network Setup and to do this we have used advanced routing protocols such OSPF, BGP routing protocol.

4. SYSTEM DESCRIPTION

Routing Information Protocol (RIP) is a distance vector protocol that uses hop count as its primary metric. RIP defines how routers should share information when moving traffic among an interconnected group of local area networks (LANs).

In the enterprise, Open Shortest Path First (OSPF) routing has largely replaced RIP as the most widely used Interior Gateway Protocol (IGP). RIP has been supplanted mainly due to its simplicity and its inability to scale to very large and complex networks. Border gateway protocol (BGP) is another distance vector protocol that is now used to transfer routing information across autonomous systems on the Internet.

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5. PROPOSED SYSTEM

In the system we are going to use many of the services into the network setup. The main routing protocol that we are

going to use is the OSPF Routing protocol (Open Shortest Path First).

5.1 Router

Routers connect networks using the Internet Protocol (IP) and OSPF (Open Shortest Path First) is a router protocol used to find the best path for packets as they pass through a set of connected networks.

5.2 Open Shortest Path First

OSPF is designated by the Internet Engineering Task Force (IETF) as one of several Interior Gateway Protocols (IGPs) -- that is, protocols aimed at traffic moving around within a larger autonomous system network like a single enterprise's network, which may in turn be made up of many separate local area networks linked through routers.

Using OSPF, a router that learns of a change to a routing table (when it is reconfigured by network staff, for example) or detects a change in the network immediately multicasts the information to all other OSPF hosts in the network so they will all have the same routing table information. When routes change sometimes due to equipment failure of the time it takes OSPF routers to find a new path between endpoints with no loops (which is called "open") and that minimizes the length of the path is called the convergence time.
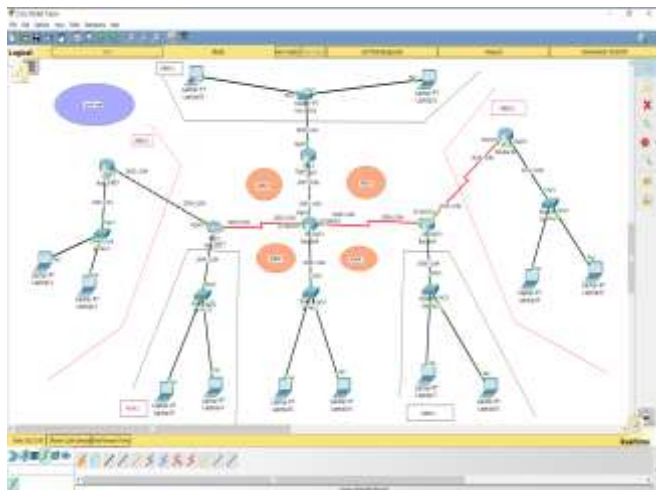

Fig -1: Block Diagram of OSPF Routing Protocol.

5.3 Switch

Switch is used to connect the different types of nodes (PCs). It channels incoming data from the input to the output port to reach it towards the destination. It transfers datagram packets between computers or other routers and switches.

When the network gets bigger and bigger day after day, we then need to change the whole network setup and use advance networking techniques. This in turn requires extra resources as well as it leads to the wastage of resources and money. Here using the Universal Network Setup we can finally overcome this problem by using essential networking

techniques and advanced networking concepts into the setup. As we are going to add protocol such as BGP/OSPF routing protocols, we can improve the services that can be provided such as ACL, HTTP, HTTPs, VLAN-VTP, etc. By adding such services the Universal Network Setup will become an efficient base for performing advanced communications.

Although it is intended to replace RIP, OSPF has RIP support built in both for router-to-host communication and for compatibility with older networks using RIP as their primary protocol. Rather than simply counting the number of router hops between hosts on a network, as RIP does, OSPF bases its path choices on "link states" that take into account additional network information, including IT-assigned cost metrics that give some paths higher assigned costs.

These are some of the different types of routing techniques used in different areas. Our aim is to build a universal network setup that uses latest routing protocol as well as advanced firewall techniques in order to increase the security protection. By using BGP/OSPF routing protocols, we can improve the services that can be provided such as ACL, HTTP, HTTPs, VLAN-VTP, etc. For achieving the goal of advanced communication, whether it's a network for a small shop or cafes or restaurants to larger networks in the airports or stadiums, we need to create an advanced universal network setup as a base for foundation to build an efficient communication network.

As shown in the block diagram, a central router is going to be connected to several other multiple routers which will in turn form a connection in a hierarchical way. The OSPF then divides the whole structure into different areas; and then sends the data very efficiently in less time. Further several switches as well as multilevel switches are also connected to these routers in order to connect multiple numbers of PCs or nodes. The OSPF routing protocol is applied while we configure the router settings. All the other additional services are also applied in order to make the Universal Network Setup ready.

6. CONCLUSIONS

The expected result of the entire system is that we will get the Universal Network Setup for the advanced communications by the usage of all the services said earlier. The Universal Network Setup will end all the limitations of the traditional systems that are used over a long amount of period. As the technology is changing day by day very rapidly, the Universal Network Setup will definitely provide a strong base for all the future networking communications used in numerous areas including Airports, Hotels, Library, Industry, Stadiums, etc.

The expected Universal Network Setup will include all the following features in it:

- OSPF/BGP Routing Protocol
- HTTP/HTTPs

- Ring Topology
- ACL
- HSRP
- VLAN-VTP
- Multilayered Switches
- Multiple Routers

This whole project will be done on Cisco Packet Tracer Software owned by CISCO Company, USA.

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