DESIGN OF AN ENTERPRISE NETWORKINFRASTRUCTUREFOR A COMPANY USING CISCO PACKET TRACER

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Abstract: Access control list is a group of commands to filter the traffic that enters and leaves the interface. The commands of acl check the administrator to permit or deny traffic that enters the interface. The main perspective of this research paper is to design an enterprise network design of a company with considering ACL concept. Cisco packet Tracer was used to design and simulate this design. We simulate application layer protocols, routing with RIP, OSPF. Our design consists of data centre and two branches. One in Hyderabad and another one in Bangalore

Index Terms: Acl, Cisco packet tracer, sensor.

1 INTRODUCTION

The third layer of OSI model which is the system layer does the following: Routing- The process of establishing the routes that the packets must follow to reach the destination is called routing. Data Encapsulation-Adding headers and trailers to the data packets to make them more meaningful is called encapsulation. . Frame discontinuity -If the (n+1)th packet doesn't come after the nth packet then it is said to have discontinuity. In this paper we talk in detail about the access control list. These acl's in a system act as a gate by allowing or denying the data packets. These are mainly used for the safety and security of the system.

2 DESCRIPTION

2.1 Software:

Cisco packet tracer is one type of cross-platform simulation tool developed by cisco systems, The cisco packet tracer works on windows and linux, It available for free of cost at www.cisco.com, it is very easy to installation, cisco packet tracer offers a combination of realistic visualization and simulation experiences, and opportunities for multiuser competition and collaboration, using cisco packet tracer we can learn concepts and also it helps to students and teachers collaborate, solve problems in an dynamic social environment.

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2.1.1 Features of cisco packet:

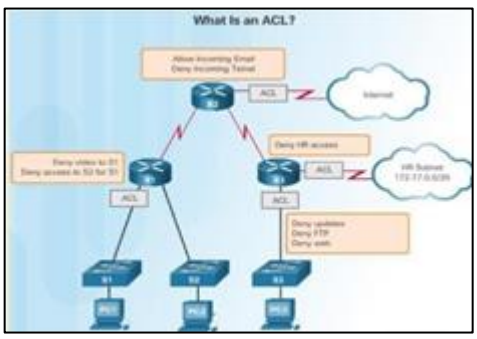
- Multi user functionality
- Multiple platform support
- Multiple language support
- Real time and simulation modes
- LAN,switching,TCP/IP,Routing,andWAN protocols.

2.2 ACL(Access control lists):

ACL is a network filter used by switches and routers to permit or deny data flows into and out of network interfaces. ACLS are positioned at almost every entry and exit of both private networks and outside the internet ,so that the incoming and outgoing networks can be monitored. The main function of ACL is to filter network traffic by controlling whether router packets are forwarded or blocked at the router's interfaces and also provide security in the network on which it is configured. Three types of ACLs can be configured on the routers. These are as follows:

1. Standard Access Control Lists-This is the oldest of the three. which is used to permit or deny traffic based on source IP address.
This ranges from 1 – 99.

2. Extended Access Control Lists-This list allows you to allow or deny traffic from one specific IP addresses to destination IP address. This allows you to specify traffic such as ICMP,



TCP, UDP, etc.
This ranges from 100 – 199.

3. Named ACL–This type is easier than the remaining because we can directly specify a name to this which can be easily remembered. You can configure up to 99 standard ACLs.
Ranges up to 1024.

Advantages of ACLs
1. Block unwanted traffic or users
2. Identify traffic for QOS features
3 .Provide band width control
4. Reduce the chance of DOS attacks
5. Restrict the content of routing updates

Disadvantages of ACLS
1. Energy consumption
2. Less functionality
3. ACLs can be hacked
4. Multiple network appliances may cause points for failure.

The Display ip interface command is used to test the ACL on the interface, as shown in Figure. The output from this command includes the access list number or name and the path the ACL was applied to. The output shows router R1 has access list 1 added to its outbound interface S0/0/0 and the NO ACCESS access list applied to its g0/0 interface, also in the outbound direction. The example in Figure shows the outcome of issuing the command display access-lists on R1. Use the command show access-lists to view an individual access list, followed by the number or name of the access list. The statements of NO ACCESS may look strange. Note that the number 15 sequence is displayed before the number 10 sequence. This is the result of the internal process of the router and will be discussed in this section later. ACL Statistics After an ACL has been applied to an interface and some testing has taken place, the command show access listswill display statistics for each matched statement.Note that some of the statements have matched in the output in Figure. When traffic is generated to match an ACL statement, the matches shown in the command access-lists

3. METHODOLOGY

Enterprise network is developed by using cisco packet tracer. Packet tracer is a software used to show the picture of, how network work. It has two different views 1. Physical workspace 2.Logical workspace. There is two modes of operation
1.Real time mode,
2.simulation mode.

Here we design the basic topology of enterprise network. This network consists of datacenter, Hyderabad branch and Bangalore branch. All these three connected with using frame relay switch. All these three are able to communicate or get the resources from the internet. Here the Hyderabad branch has developing team and testing team and managers, who operating those teams. In the same fashion the Bangalore branch has testing team, deployment team, testing team, documentation team, deployment manager and Bangalore branch manager. This network is form with the help of EIGRP routing protocol. And use the ACL and DHCP server to decrease the network traffic. Here I used the standard ACL concept. Testing manager and development team can only get the data or sent the data to the team can only get the data or sent the data to the data centre . And branch manager and testing team can't access the data or sent the data to datacenter Hyderabad branch. When it comes to Bangalore branch manager and deployment team can only get the data or sent the data to the data centre . And deployment manager, documentation team and testing team can't access the data or sent the data to data centre. By doing this we can secure the company details from unauthorized persons. In the internet I created DNS server, mail server and web server. I created a sample website called www.mycompany.com and stored in web server. And I configure with a DNS server and I created two mail accounts for the two managers, they can share about the salary bills and project details between them. I also configure the IP phones, so that test members and the manager can able to communicate through Hyderabad branch and Bangalore branch also. And the configuration protocol is EIGRP. And in both the branches have divided the network into VLAN. Here the development team belongs to VLAN 30 and all the IP phones belongs to VLAN 10. I have used as a voice. VLAN 30 and VLAN 40 for date. That used by development team and testing team in Hyderabad branch. When it comes to Bangalore branch, VLAN 15 for IP phones. VLAN 35 and VLAN 45 for data.

3.2 Problem
Network traffic is very high in IT companies, cities, industries and homes. Because of these factors, the network performance decreases. Each company has it's own network architecture, When there is no entity or no increase in the network architecture, this lead to security problems. Some works have been proposed to implement a network architecture, but to control unauthorized persons in the network, to improve network security and to improve network performance by reducing network traffic, access control lists are key to the problem above. Enterprise computing model that was developed for this purpose, to facilitate the exploration and enhancement of communication protocols established. Within the scope, the corporate network may include LAN and WAN (local or wide area networks), depends upon requirements and departmental.

4 RESULTS

The following steps to implement enterprise network using acl concept are;

1.create a data centre model
First to create data centre, we are using network devices two pcs , three servers. And named those two pcs as pc 20, pc 21 and three servers are 1)HTTP server, 2)TFTP server, 3)NTP server.
IP configuration for Data centre is 162.18.3.0/24

Network devices	IP configuration
Web server	162.18.3.2/24
TFTP server	162.18.3.3/24
NTP server	162.18.3.4/24
Pc 20	162.18.3.151/24
Pc 21	162.18.3.152/24

All of above described devices are connected to 2980-24TT switch model. Internet cloud, branches and data centre are connect to 2811 Router. We configure the data centre as straight forward and simple configuration. We use only one routing

protocol is EIGRP, no STP and no VTP. Configure the serial interface connect to STP with the IP address 68.110.171.134/30.

IP Configuration of 2811 R_DC router is

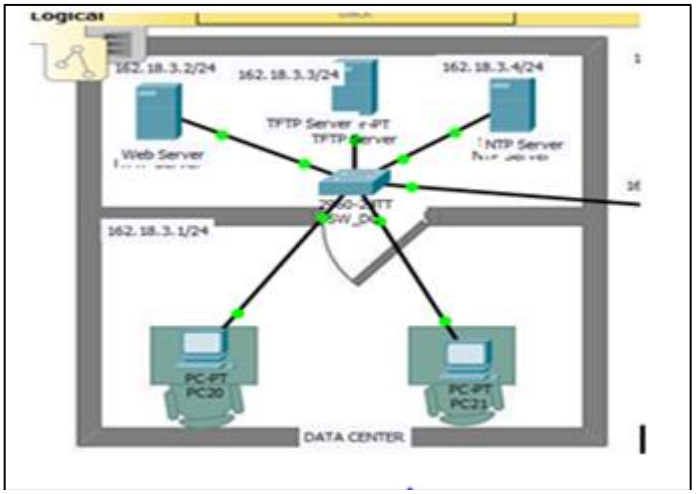
Fast Ethernet→162.18.3.254

Serial0/2/0 →67.110.171.134

IP Configuration of RISP router is

Serial0/1/0→55.55.55.57

Serial0/1/1→67.110.171.133



2. creates internet cloud

Consists of three IP address

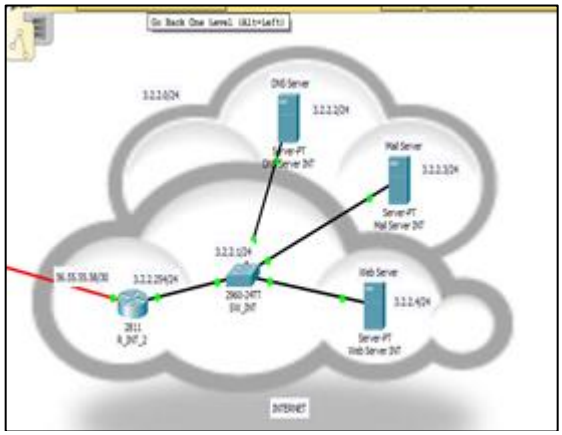
1) DNS server→3.2.2.2/24
2) MAIL server→ 3.2.2.3/24
3) WEB server→ 3.2.2.4/24

Consists of one switch, and named it as SW_INT and assumed it'sIP configuration is 4.2.2.1/24.

Fastenthernet0/0→ 3.2.2.254

Serial0/3/0 →56.55.55.58

Which is connect to the ISP



Create a cloud. 2855 R_DC router is connect to the cloud, by using this cloud we transfer the packets from data centre to branches or branches to data centre.

3. create a two branches with a same architecture

Create Hyderabad branch consists of testing team, testing manager, development team, DHCP server. And allot 5 pcs for testing team, 5 pcs for development team, 1 pc for testing manager, 1 pc for branch manager, and allot 1 IP phone for branch manager and 1 IP phone for testing manager. And create Bangalore branch as like above. And divide VLAN into three parts in each branch. Use two trunks for connecting pcs in each branch. And connect two trunks to one switch in each branch. And switch is connect to two routers. And each router in each branch connect to a frame relay switch.Ip configuration of all the network devices and ports in Hyderabad branch

VLAN 30 used by development team and testing manager
VLAN 40 used by testing team and branch manager
VLAN 10 for IP phones
VLAN 10→162.16.10.0/24
VLAN 30→162.16.30.0/24
VLAN 40→162.16.40.0/24

VLAN 30 used by development team and testing manager.
VLAN 40 used by testing team and branch manager.
VLAN 10 for IP phones.
Two trunks configuration is
162.16.1.2/24
162.16.1.3/24
Switch→162.16.1.1/24
CME_NY routers configuration is
Fastethernet0/1→162.16.1.254/24
R_WB_GW routers configuration is
Fastethernet0/1→162.16.40.1/24
Serial0/0/0→9.1.1.2/30

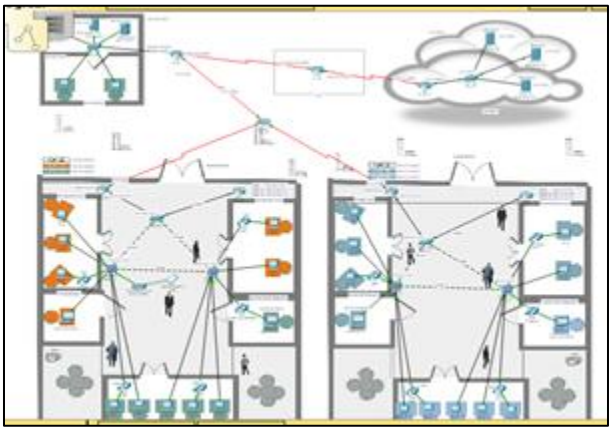
Ip configuration of all the network devices and ports in Hyderabad branch

VLAN 15 used by IP phones.

VLAN 45 used by deployment team and branch manager.

VLAN 35 used by testing team, documentation team and deploymentmanager.

VLAN 10 for IP phones
VLAN 15→162.17.15.0/24
VLAN 35→162.17.35.0/24
VLAN 45→162.17.45.0/24
Two trunks configuration is
162.17.2.2/24
162.17.2.3/24



Switch→162.17.2.1/24
CME_NY routers configuration is
Fastethernet0/1→162.17.2.254/24
R_WB_GW routers configuration is
Fastethernet0/1→162.17.35.1/24

5.CONCLUSION

So as to structure a decent system we require the four significant crucial specialized necessities they are Manageability, accessibility, security ,adaptability. Without this crucial ideas we can't structure a decent endeavor organize. In this venture we simply plan endeavor organize foundation for an organization utilizing ACL(Access control list) idea.
The primary motivation behind this paper is:
•Decreasing the system traffic in big business arrange plan
•To improve security
•Latest arrange structure technique

6. FUTURE SCOPE

Cisco packet tracer may experience significant challenges in achieving reliable communication due to packet losses, collisions and contention delays.

7. ACKNOWLEDGEMENT

We thankfully acknowledge management of KL University to provide each and every source and required facilities for completion of this work.

8 REFERENCES

1. 1 K. Sohrabi and G. J. Pottie,"Performance of a novel self organization for wireless and enterprise network", Proc. IEEE 50th Vehicular Technology Conf., pp.1222 -1226 1999
2. 2.W. R. Hein Zelman, A. Chandrakasan, and H. Balakrishnan,"Design and optimization of a data centre", Proc. Hawaii Int. Conf. Systems Sciences, pp.3005 -3014 2000
3. A. Woo and D. Culler, "A transmission control scheme for data centre", Proc. ACM/IEEE Int. Conf. Mobile Computing and Networking, pp.221 -2352001
4. V. Bhargava, A. Demers, S. Shankar, and L. Zhang," AACAW: A Internet access protocol for wireless lanes", Proc. ACM SIGCOMM, pp.212 -225,1994
5. J. C. Harsens, "The Switching system", IEEE Pers. Common. Mag., pp.28 -362000
6. Y.-C. Tseng, C.-S. Hsu, and T.-Y. Hsieh, "IEEE 802.11-based multi-hop Switching system", Proc. IEEE INFOCOM, pp.200 -209 2002
7. 7 .S. Xu and T. Sadie, "Internet computing protocol in multichip wireless ad hoc networks?" IEEE Common. Mag., pp.130 -137
8. 8..Zhongyuan Xu and Scott D. Stoller, "Mining Attribute-based Access Control Policies", IEEE Transactions on Dependable and Secure Com-puting
9. I. Molloy, H. Chen, T. Li, Q. Wang, N. Li, E. Bertino, S. B. Calo, andJ. Lobo, "Mining roles with multiple objectives", ACM Trans. Inf. Syst.Secur., vol. 13, no. 4, 2010.
10. 10.I. Molloy, N. Li, Y. A. Qi, J. Lobo, and L. Dickens, "Mining roles withnoisy data", in Proc. 15th ACM Symposium on Access Control Models and Technologies (SACMAT). ACM, 2010, pp. 45-54.
11. I. Molloy, N. Li, T. Li, Z. Mao, Q. Wang, and J. Lobo, "Evaluating rolemining algorithms", in Proc. 14th ACM Symposium on Access Control Models and Technologies (SACMAT). ACM, 2009, pp. 95-104.
12. 12.Z. Xu and S. D. Stoller, "Algorithms for mining meaningful roles", inProc. 17th ACM Symposium on Access Control Models and Technolo-gies (SACMAT). ACM, 2012, pp. 57-66.
13. Zhongyuan Xu, Scott D. Stoller, "Mining parameterized role-based
14. policies", in Proc. Third ACM Conference on Data and Application
15. Security and Privacy (CODASPY). ACM, 2013.