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Review paper of Network automation and security.

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Abstract

Network automation is very important in the communication and the IT industry because the technology is increasing day by day hence our communication should be automated, reliable and secure. To fulfil this requirement they have upgraded their networking devices like router, switch and firewall to the latest cisco ios. And the industry shifted from the default and static routing protocol to the dynamic routing protocol which is based on the automation there is no manual configuration on every interface like default, static routing. And the dynamic routing includes RIP, OSPF and EIGRP. And the cisco ios is upgraded to for the security purpose so that the can support the automation and the security in communication and the security patch includes like DHCP snooping, passive interface and the ARP database security.

Keywords

Cisco packet tracer, GNS3, default, static, dynamic, OSPF, RIP, EIGRP, passive interface, DHCP snooping, ARP table

Introduction

Network is the connectivity between the devices and networking is the overall efforts require to share data over the shared medium, using the hardware devices, software and the networking protocols with includes the wireless and wired technology. Our aim is to solve the manual problem and make the static and default routing protocol works like an dynamic protocols which makes the networking in the automation mode.

The utilization of IPv4 which needs to be subnetted while assigning the network in any organisation but in IPv6 which supports the automation in the network industry and which can provide the large number of IP address because the automation requires a large number of IP address**.**

Review on common networking principle and the working of the protocol in the network system.

The common networking principle for the communication between the devices you need two devices:

- NIC (Network Interface Card)
- System (devices like: computer, router)

Protocol is the set of rule and regulation, which defines the organization of data, internet protocol works on the various OSI model layer.

OSI Model: It defines the data flow from source to destination internally, it comprise of seven layers

Physical layer

Data layer

Network

Transport

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- Session
- Presentation
- Application

Various routing protocol

- Http: which is based on TCP/IP based communication use to send the traffic to the internet.
- Telnet: Telnet is used to use to remotely access the devices over the shared medium.
- ICMP: The Internet Control Message Protocol is used to verify the connectivity between the devices or to ping the network.
- SSH: The Secure shell is which is similar to the telnet which is also used to take access to the device remotely.

  RDP: The Remote Desktop Protocol is used to access the device remotely and your screen can be taken for the purpose like troubleshooting.

  Every protocol is assigned with the port number like telnet having port no:23 and HTTP having port no: 80

If you are sending the data, then it will transfer from the Application layer to the physical layer and at the receiving the packet travel from the physical layer to the application layer.

Routing protocols plays very important role for the networking (John, K. M., & Spini, M. 2017).

Review on the server in any organisation

There are several types of servers are:

Telnet server

List server

Collaboration server

FTP server

Real time communication server

Application server

Webserver

Server platform

Mail server

The type of server that we are going to use is web server, email server and DNS server for the DNS we will use the google DNS server address only because google DNS server is one of the fastest and updated servers and common to web server and email server we are going to design a small local area network then we can use the midrange server which will definitely save the cost as well as perform good according to the load in this scenario.

The basic sever utilization and cost (Thakkar, et. al. 2016)

Review on routing protocol and the efficient use of the network system

In this scenario, we will use the Enhanced Interior Gateway Routing Protocol(EIGRP) which is cisco innovation but now, we can this routing protocol in any device like juniper but we are using the cisco devices then we will use EIGRP.

EIGRP supports maximum no. of 255 router

It finds the best path based on a metric

It is dependent on five major factors i.e bandwidth, delay MTU, reliability, and load

Command for EIGRP is

R(config)#router eigrp 100

R#network 192.168.1.0

R#no auto-summery

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To efficient use of this routing protocol you should focus on mainly two-parameter which is bandwidth and delay the bandwidth should be larger value and delay should be low.

The designing of scenario according to requirement is important (Waheed, F. and Ali, M., 2018.)

Review on the devices and cable and perform the troubleshooting

For the initial level of testing we need few devices like network cable testing instruments which are designed to test the test the cable connectivity and the fault of the cable for the testing purpose we need the device and the cable is connected to the device at the both terminal and the testing device include the individual led for every wire in the cable if the led blinks at the both side then the cable is ok, otherwise you have to do the connection again.

Figure 1 Cable tester

The wire is connected in the RJ45 jack according to the colour coding of the wire like

For Cross cable

Orange-white-Orange ----------Green-white-Green

Green-white-Blue---------- Orange-whit-Blue

Blue-white-Green ---------- Blue-white-Orange

Brown-white- Brown---------- Brown-white-brown

For Straight cable

Orange-white-Orange---------- Orange-white-orange

Green-white-Blue ----------Green-white-Blue

Blue-white-Green ---------- Blue-white-Green

Brown-white- Brown---------- Brown-white- Brown

Troubleshooting with the help of OSI layer

Application layer: which are closest to the end user and this directly serves or interact with various application like your web browser.

Presentation layer: In this layer decryption and encryption of data for the proper transmission of data is done

Session layer: which establishing the interaction among the devices and application so require to establish the session.

Transport layer: Transport layer is the main layer of the OSI model which serves the data in properly and in arranged manner.

Network layer: which provide the best path for the packet to flow inside the network.

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Data Link layer: In which the end to end connection between the devices for the transfer of data which also handles the troubleshooting of the physical layer.

- **Physical layer**: which identifies the error related to the voltage, frequency and the connection and power supply of the devices.

The testing process includes the proper utilization of devices (Sudaryanto, 2018)

Review on Installation and configuration of the devices

The basic installation includes of the networking devices which includes your router is connected via Internet service provider through router firewall is connected and through the firewall the switch is connected then the other device like access point and the computer and the server should be connected.

We have to do the sub netting of the IP 192.168.100/24

- Assign the IP address to the router
  R# configuration
  R(config) #interface fa0/0
  # IP address 192.168100.1 255.255.255.0
  #no shutdown
  Now we have to provide the IP to computer we can do it in two ways, first is go to setting of your computer and network sharing option and then advance network sharing option then click on IPv4 and then assign the IP address and other way is to apply Dynamic host configuration protocol on the router to provide the internet protocol address automatically.

Configuration is the process of exploring the services (Trabelsi, & Saleous, 2019)

Review on Maintenance of the network

Management of configuration: which includes that if you are going to do any changes in the network then firstly you have to acknowledge the commands and take a review from your senior before the implementation of the command.

Identify the Performance: your network performance should be very good, you have to properly identify the CPU utilization and RAM utilization and the storage because the working speed depends on the speed of your network and servers. And the server room should keep in cool and dry place otherwise the heating of the reduces down the performance

Maintenance of network retain and improve the efficiency (Sudaryanto, & Nurhayati, 2019)

Review on the network scenario

In the given scenario, firstly we have to install the hardware devices like the router, switch, firewall, printer and the computers according to the desired rating of the organization. After the installation of these devices we have to configure the devices with the various commands like routing protocol, DHCP, interval routing and vlan etc.

Commands for DHCP

R#IP DHCP pool cisco

#network (network ID) (Wild card)

#default gateway (IP of the gateway)

Command to assign int. in particular vlan

S# interface fa0/0

S#switch port mode access

S#switch port access vlan 2

Network implementation is the crucial part of network (Cheung, & Kataria, 2017)

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Review on network scenario after the installation and configuration

The given scenario is installed properly each and every device is checked and working properly and cable is also tested and the device is configured with all the commands and the commands is checked all the vlan is assigned properly and it is working and the interval routing is also configured which is also working we can able to send the packet among every department and the different subnet IP is assigned to each vlan of network 192.168.100.0/24

Analysis of network is the way of troubleshooting (Schneider, & Nachenberg, 2019)

Review on the enhancement of the network

In this network there can be any problem occur in future so we have to aware for those case we have to configure the devices with telnet to get the remotely access of the device from anywhere inside the network. The server and other devices are stored in cool place because the server can generate the heat and which can reduce the network efficiency and devices can be damaged. And also various security patch should be configured for the network security like passive interface and port security and the firewall should have advance configuration.

Enhancement of network include the maintenance (Qiu, et. al. 2019)

Review on the evaluation of the work

The network is configured with advance security patch to protect it from any kind of hack from inside and from the outside of the network. Like port security from which use analyse the access of your worker inside the network and if they any unethical activity then can be caught by their MAC address and the also the devices which installed having high quality hardware which can handle the load of the network having high reliability. The passive interface which server as a client nor give the access as a server inside your network which protect your network always.

The evaluation process includes the load of the network (Hartson,et. al., 2019)

Conclusion

The conclusion of the scenario is the vlan divides the network virtually through which we can separate the departments and interval routing enables the communication between the department and the IP is sub netted to assign IP to individual vlan and the security patch are assign for the network security and the routing protocols enables the router to provide the best path. And we have implemented the EIGRP routing protocol which supports up to 255 router and which find the best path on the basis of metric which includes the bandwidth, delay, reliability, MTU and the load.

Printer is connected in each department and the individual IP is assign to each printer belongs with the same network and the printer software is also installed in the computer.

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