American International University- Bangladesh

Computer Networks

Final Term Assignment

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Section: L

1. VLAN stands for Virtual Area Network, which is a method of creating logical networks within a physical network infrastructure. It allows network administrators to segment the network into multiple broadcast domains, even if the devices are physically connected to the same network switch. VLANs provide benefits such as improved network performance, increased security and simplified network management.

VTP stand for VLAN Trunking Protocol, which is a Cisco proprietary protocol used to manage VLANs across a network, It enables the automatic propagation of VLAN information from one switch to another, reducing the need for manual configuration of VLANs on each switch. VTP operates in a client-server fashion, where one switch acts as the VTP server and others as VTP clients. The VTP server maintains the VLAN database and distributes updates to the clients.

Real Scenario of VTP:

Imagine there is a network administration for a 10 floor company and need to create multiple VLANs for different departments. Now, so many VLANs need to be configured for each departments on almost every switch. With VTP configured

on all the switches, we can create VLANs one one VTP server and leave all the hassle of creating VLANs on VTP. By creating the department VLAN on one VTP we can add new department information in all switch.

2. Some examples of dynamic protocols includes OSPF (Open Shortest Path First), RIP (Routing Information Protocol), EIGRP (Enhanced Interior Gateway Routing Protocol, and BGP (Border Gateway Protocol).

OSPF:

Open Shortest Path First (OSPF) is an interior gateway routing protocol commonly used in large scale networks. It is designed to determined the shortest path for routing packets within an autonomous system (AS).

Each OSPF router maintains a link-state database containing information about the networks topology. OSPF routers calculate the shortest path there for each destination based on the accumulated costs of the links.

OSPF supports fast convergence by quickly adapting to changes of the networks. Routers exchange information to ensure they have the ~~ter~~ latest network state. The protocol ~~i~~ supports hierarchical network desings with areas, reducing the amount of routing information exchange across the entire network. It also allows for route summarization, which helps in reducing routing table sizes.

Overall, OSPF provides efficient and dynamic routing by adapting to network changes, calculating shortest paths, and promoting fast convergence.

3. NAT stands for Network Address Translation. It is a technique used in computer networks to map IP addresses from one address space to another. NAT is primarily used to conserve public IP addresses and enable private IP address ~~to~~ a. ranges to access the internet.

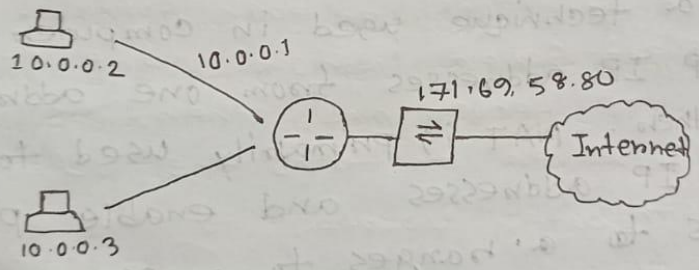
Answer to the question no 3

NAT:

Network Address Translation basically connects two networks and map the Private addresses into public address.

The main purpose of NAT is to conserve IPV4 addresses, as the number of available IPV4 addresses is Limited. NAT provides a Level of security by hiding ~~internal~~ internal IP addresses from the public internet.

Working of principles of NAT:



The diagram shows a home network with two PCs and a router with private IP. And there is a public IP given by ISP. When the PCs send a packet to the internet the router translate the PCs Private IP to given ISP's Public IP. Then router stands the packet to internet. When a packet arrives then it translates the public IP into Private IP again.

4. Link-Local Address is an IP address assigned to a network interface for communication within a local network segment, such as a single broadcast domain on a link. It is used for network auto configuration and communication between devices on the same link.

The process of generating a link-local address follows the rules specified in IPv6 Link-Local Addressing RFC. The address is based on the network interface's MAC (Media Access Control) address.

Importance:

i) Local Network communication:-

Link-Local Address do not require a DHCP server which can save time and resources.

ii) Security:

Link-Local Address are not routable on the public internet, which can improve security.

iii) Autometic Address Assignment:

Link-Local address can be autometically generated by devices, eliminating the need for manual configuration.

(6)

Process of generating link-local address:

i) Add prefix FE80::
ii) After 24 bit of MAC-address add FF:FE
iii) Flip the bit of MAC-address.

Example:
MAC address: 5F39:8429:3064

i) FE80::5F39:8429:3064 (Add FE80::)
ii) FE80::5F39:84FF:FE29:3064 (Add FF:FE after 24 bit)
iii) FE80::5039:84FF:FE29:3064 (Flip the bit)

5. The DHCP (Dynamic Host configuration Protocol) is a network Protocol used to automatically assign IP addresses and other network configuration parameters to devices on a network. It simplifies the process of network configuration and allows devices to join a network without manual IP address assignment.

The DHCP protocol works in 4 steps:

1. DHCP discover:

The client sends a DHCPDISCOVER packet to the network. This packet is a broadcast packet.

2. DHCP offer:

The DHCP server responds to the DHCPDISCOVER packet with a DHCPOFFER packet. This packet contains an IP address, subnet mask, default gateway.

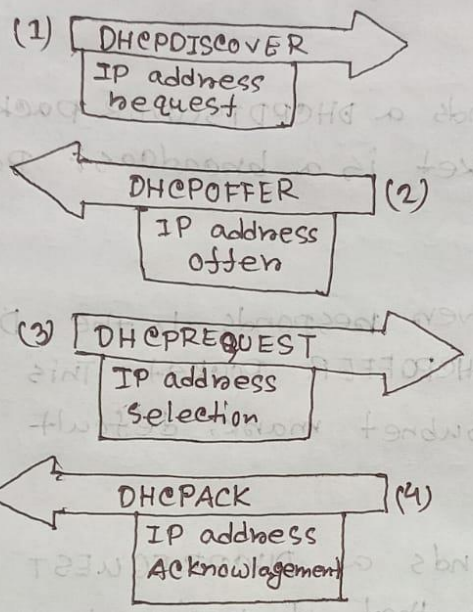
3. DHCP request:

The client sends a DHCPREQUEST packet to the DHCP server that it recieved the DHCPOFFER from. This packet tells the DHCP server that the client accepts the IP that was offered.

4. DHCP ask:

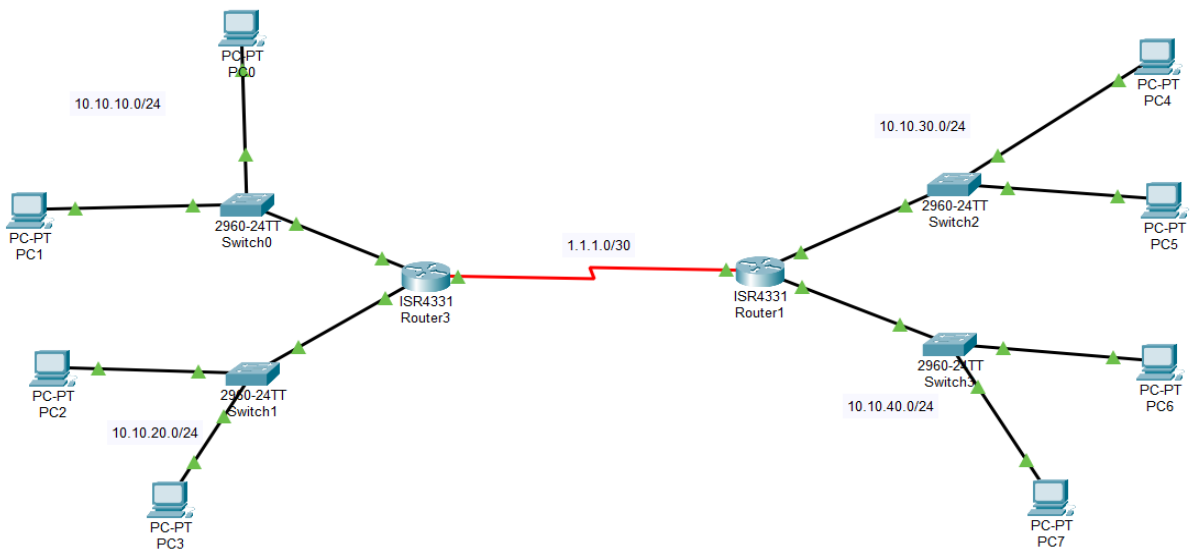
The DHCP server responds to the DHCPREQUEST packet with a DHCPACK packet. This packet confirms that the DHCP server has assigned the IP address and configuration information to the client.

(8)



DHCP Protocol

Answer to the Question No 6 :



Mon May 22 15:00:05 2023 Router0 Router>en

Mon May 22 15:00:08 2023 Router0 Router#conf t

Mon May 22 15:00:20 2023 Router0 Router(config)#int gig0/0/0

Mon May 22 15:00:49 2023 Router0 Router(config-if)#ip add 10.10.10.254 255.255.255.0

Mon May 22 15:00:55 2023 Router0 Router(config-if)#exit

Mon May 22 15:01:17 2023 Router0 Router(config)#int gig0/0/1

Mon May 22 15:01:46 2023 Router0 Router(config-if)#ip add 10.10.20.254 255.255.255.0

Mon May 22 15:02:50 2023 Router0 Router(config-if)#exit

Mon May 22 15:03:03 2023 Router0 Router(config)#int gig0/0/0

Mon May 22 15:03:10 2023 Router0 Router(config-if)#no shutdown

Mon May 22 15:03:17 2023 Router0 Router(config-if)#exit

Mon May 22 15:03:25 2023 Router0 Router(config)#int gig0/0/1

Mon May 22 15:03:31 2023 Router0 Router(config-if)#no shutdown

Mon May 22 15:04:53 2023 Router0 Router(config-if)#exit

Mon May 22 15:12:02 2023 Router1 Router>en

Mon May 22 15:12:05 2023 Router1 Router#conf t

Mon May 22 15:12:33 2023 Router1 Router(config)#int gig0/0/0

Mon May 22 15:17:23 2023 Router1 Router(config-if)#ip add 10.10.30.1 255.255.255.0

Mon May 22 15:17:40 2023 Router1 Router(config-if)#int gig0/0/1

Mon May 22 15:18:09 2023 Router1 Router(config-if)#ip add 10.10.40.1 255.255.255.0

Mon May 22 15:18:36 2023 Router1 Router(config-if)#no shut

Mon May 22 15:18:43 2023 Router1 Router(config-if)#exit

Mon May 22 15:18:50 2023 Router1 Router(config)#int gig0/0/0

Mon May 22 15:18:54 2023 Router1 Router(config-if)#no shut

Mon May 22 15:17:32 2023 Router0 Router>en

Mon May 22 15:17:38 2023 Router0 Router#cof t

Mon May 22 15:17:44 2023 Router0 Router#conf t

Mon May 22 15:20:41 2023 Router0 Router(config)#router eigrp 10

Mon May 22 15:21:17 2023 Router0 Router(config-router)#network 10.10.10.0 0.0.0.255

Mon May 22 15:21:43 2023 Router0 Router(config-router)#network 10.10.20.0 0.0.0.255

Mon May 22 15:21:57 2023 Router0 Router(config-router)#no auto-summary

Mon May 22 15:22:26 2023 Router1 Router(config-if)#exit

Mon May 22 15:22:47 2023 Router1 Router(config)#router eigrp 10

Mon May 22 15:23:24 2023 Router1 Router(config-router)#network 10.10.30.0 0.0.0.255

Mon May 22 15:23:42 2023 Router1 Router(config-router)#network 10.10.40.0 0.0.0.255

Mon May 22 15:23:51 2023 Router1 Router(config-router)#no auto-summary

Mon May 22 15:24:55 2023 Router0 Router(config-router)#exit

Mon May 22 15:25:14 2023 Router0 Router(config)#int se0/1/0

Mon May 22 15:25:40 2023 Router0 Router(config-if)#ip add 1.1.1.1 255.255.255.252

Mon May 22 15:25:53 2023 Router0 Router(config-if)#no shut

Mon May 22 15:26:58 2023 Router1 Router(config-router)#exit

Mon May 22 15:27:18 2023 Router1 Router(config)#int se0/1/0

Mon May 22 15:27:49 2023 Router1 Router(config-if)#ip add 1.1.1.2 255.255.255.252

Mon May 22 15:27:55 2023 Router1 Router(config-if)#no shut

Mon May 22 15:29:45 2023 Router1 Router(config-if)#exit

Mon May 22 15:30:04 2023 Router1 Router(config)#router eigrp 10

Mon May 22 15:30:36 2023 Router1 Router(config-router)#network 1.1.1.0 0.0.03

Mon May 22 15:30:58 2023 Router1 Router(config-router)#network 1.1.1.0 0.0.0.3

Mon May 22 15:31:17 2023 Router0 Router(config-if)#exit

Mon May 22 15:31:29 2023 Router0 Router(config)#router eigrp 10

Mon May 22 15:31:49 2023 Router0 Router(config-router)#network 1.1.1.0 0.0.0.3

Mon May 22 15:33:00 2023 Switch0 Switch>enable

Mon May 22 15:33:00 2023 Switch0 Switch#configure terminal

Mon May 22 15:33:00 2023 Switch0 Switch(config)#interface FastEthernet0/1

Mon May 22 15:41:07 2023 Router1 Router(config-router)#exit

Mon May 22 15:41:17 2023 Router1 Router(config)#int gig0/0/0

Mon May 22 15:42:01 2023 Router1 Router(config-if)#ip add 10.10.30.254 255.255.255.0

Mon May 22 15:42:07 2023 Router1 Router(config-if)#no shut

Mon May 22 15:42:12 2023 Router1 Router(config-if)#exit

Mon May 22 15:42:21 2023 Router1 Router(config)#int gig0/0/1

Mon May 22 15:42:41 2023 Router1 Router(config-if)#ip add 10.10.40.254 255.255.255.0

Mon May 22 15:42:46 2023 Router1 Router(config-if)#no shut

Mon May 22 17:41:33 2023 Router3 Router>en

Mon May 22 17:41:38 2023 Router3 Router#config t

Mon May 22 17:41:56 2023 Router3 Router(config)#int gig0/0/0

Mon May 22 17:42:25 2023 Router3 Router(config-if)#ip add 10.10.10.254 255.255.255.0

Mon May 22 17:42:36 2023 Router3 Router(config-if)#no shutdown

Mon May 22 17:42:44 2023 Router3 Router(config-if)#exit

Mon May 22 17:43:07 2023 Router3 Router(config)#int gig0/0/1

Mon May 22 17:43:40 2023 Router3 Router(config-if)#ip add 10.10.10.254 255.255.255.0

Mon May 22 17:44:29 2023 Router1 Router>en

Mon May 22 17:44:34 2023 Router1 Router#config t

Mon May 22 17:45:09 2023 Router1 Router(config)#int gig0/0/0

Mon May 22 17:50:11 2023 Router1 Router(config-if)#ip add 10.10.30.254 255.255.255.0

Mon May 22 17:50:15 2023 Router1 Router(config-if)#no shutdown

Mon May 22 17:50:17 2023 Router1 Router(config-if)#exit

Mon May 22 17:50:32 2023 Router1 Router(config)#int gig0/0/1

Mon May 22 17:51:23 2023 Router1 Router(config-if)#ip add 10.10.40.254 255.255.255.0

Mon May 22 17:51:32 2023 Router1 Router(config-if)#no shutdown

Mon May 22 17:51:48 2023 Router3 Router(config-if)#int gig0/0/1

Mon May 22 17:52:08 2023 Router3 Router(config-if)#ip add 10.10.20.254 255.255.255.0

Mon May 22 17:52:15 2023 Router3 Router(config-if)#no shutdown

Mon May 22 17:52:29 2023 Router3 Router(config-if)#exit

Mon May 22 17:52:40 2023 Router3 Router(config)#router eigrp 10

Mon May 22 17:53:12 2023 Router3 Router(config-router)#network 10.10.10.0 0.0.0.255

Mon May 22 17:53:38 2023 Router3 Router(config-router)#network 10.10.20.0 0.0.0.255

Mon May 22 17:53:51 2023 Router3 Router(config-router)#no auto-summary

Mon May 22 17:53:54 2023 Router3 Router(config-router)#exit

Mon May 22 17:56:17 2023 Router3 Router(config)#int se0/1/0

Mon May 22 17:56:49 2023 Router3 Router(config-if)#ip add 1.1.1.1 255.255.255.252

Mon May 22 17:56:55 2023 Router3 Router(config-if)#no shutdown

Mon May 22 17:57:20 2023 Router1 Router(config-if)#exit

Mon May 22 17:58:09 2023 Router1 Router(config)#int se0/1/0

Mon May 22 17:58:34 2023 Router1 Router(config-if)#ip add 1.1.1.2 255.255.255.252

Mon May 22 17:58:44 2023 Router1 Router(config-if)#no shutdown

Mon May 22 17:58:54 2023 Router1 Router(config-if)#exit

Mon May 22 17:59:07 2023 Router1 Router(config)#router eigrp 10

Mon May 22 17:59:28 2023 Router1 Router(config-router)#network 1.1.1.0 0.0.0.3

Mon May 22 18:00:40 2023 Router3 Router(config-if)#exit

Mon May 22 18:00:45 2023 Router3 Router(config)#router eigrp 10

Mon May 22 18:01:05 2023 Router3 Router(config-router)#network 1.1.1.0 0.0.0.3