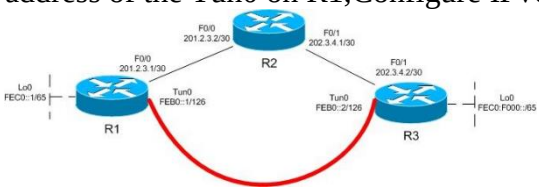
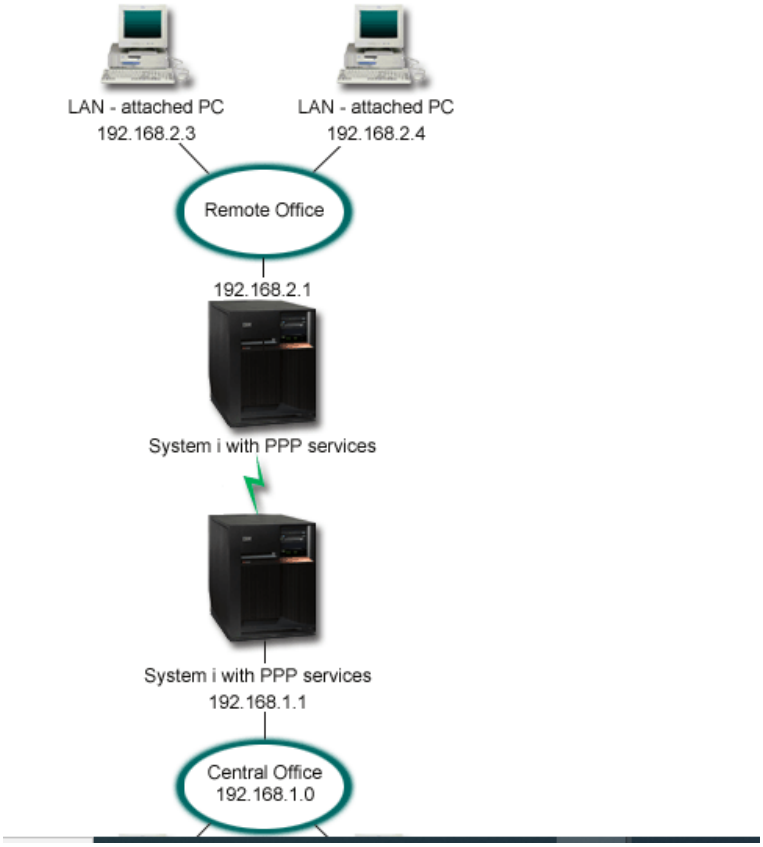
Answer all the Questions
(2 x 25 = 50 Marks)

Instructions: Answer the questions

Ql. No	Answer Key	Marks
1	i) Consider a Software firms needs to modernize its network and to make sure that they are ready for the future implementation of IPv6. The backbone of the network is still based on IPv4, and you are not allowed to make any changes. Being a senior network engineer, give an explanation on how do you provide a way to use an existing IPv4 in transition to IPv6? Ans : There are different methods of tunneling IPv6 through an IPv4 backbone, and they are divided into two major groups which are automatic and manual. Automatic tunnels are configured by using IPv4 address information embedded in an IPv6 address – the IPv6 address of the destination host includes information about which IPv4 address the packet should be tunneled to. Configured tunnels must be configured manually. These tunnels are used when using IPv6 addresses that do not have any embedded IPv4 information. The IPv6 and IPv4 addresses of the endpoints of the tunnel must be specified. we will be using a manually configured IPv6 tunnel since this is for a enterprise and there will be very minimal management required. All IPv4 and IPv6 addresses have been manually configured . OSPFv2 has been configured in the IPv4 domain for connectivity between the routers. Configure a IPv6 over IPv4 tunnel between router R1 and R3. Enable RIPNG on router R1,R2 and R3. R1:Enable IPv6 unicast routing, Configure a default IPv4 static route via R2,Configure Tun0 with a mode of ipv6ip, a source of F0/0, and the destination address of the Tun0 on R3,Configure IPv6 OSPF Area 0 on Lo0 and Tun0 R2:Configure the two interfaces with basic IP addressing R3:Enable IPv6 unicast routing,Configure a default IPv4 static route via R2,Configure Tun0 with a mode of ipv6ip, a source of F0/1, and the destination address of the Tun0 on R1,Configure IPv6 OSPF Area 0 on Lo0 and Tun0  	15
	ii) Decompress the following addresses and show the complete unabbreviated IPv6 address: a. 1111::3333	10

	b. :: c. 0:1:: d. AAAA:A:AA::1234 Ans: 1111:0000:0000:0000:0000:0000:0000:3333 b. 0000:0000:0000:0000:0000:0000:0000:0000 c. 0000:0001:0000:0000:0000:0000:0000:0000 d. AAAA:000A:00AA:0000:0000:0000:0000:1234	
	(OR)	
2.	i) Show the abbreviated colon hex notation for the following IPV6 address 1) 0000:0000:0000:0000:FFFF:FFFF:FFFF:FFFF 2) 0000:0000:0000:0000:0000:0000:0000:0000 3) FFFF:FFFF:FFFF:FFFF:FFFF:FFFF:FFFF:FFFF 4) AAAA:AAAA:AAAA:AAAA:AAAA:AAAA:AAAA:AAAA Ans : 1)::FFFF:FFFF:FFFF:FFFF 2) :: 3) FFFF:FFFF:FFFF:FFFF:FFFF:FFFF:FFFF:FFFF 4) AAAA:AAAA:AAAA:AAAA:AAAA:AAAA:AAAA:AAAA	10
	Consider a host with Ethernet address (F5-A9-23-11-9B-E3) has joined the network. What would be its global unicast address if the global unicast prefix of the organization is 3A21:1216:2165 and the subnet identifier is A245:1232. Describe the steps involved in the conversion process **Ans:** Step 1 : Creating a local link address by adding 10 bit prefix (1111 1110 10) and 54 zeros and append its 64 bit interface ID extracted from the Ethernet address : FE80 : :F7A9-23FF-FE11-9BE3(by inverting the seventh bit of 1st octet and adding FFFE after the third octet) Step 2 : On assuming this uniqueness it send the router solicitation message upon receiving the advertisement message it complete the auto configuration process by extracting the global unicast prefix and subnet identifier from the message as follows 3A21:1216:2165:A245:1232 and append it to the local link address **3A21:1216:2165:A245:1232: F7A9-23FF-FE11-9BE3**	15
3 .	i) A modem enables two remote locations (such as a central office and a branch office) to exchange data between them. In order to connect two LANs together by establishing a connection between a system in the central office and another one in	15

	the branch office, we need to configure a protocol using routers. Simulate the steps in configuring the protocol for the above scenario. Draw necessary diagram. Ans: PPP can connect two LANs together by establishing a connection between the systems as shown in the figure. In this case, assume that the remote office initiates the connection to the central office. You configure an originator profile on the remote system and a receiver profile on the central office system.  If the remote office PCs need access to the corporate LAN (192.168.1.0), the central office receiver profile will need IP forwarding turned on and IP address routing should be enabled for the PCs (192.168.2, 192.168.3, 192.168.1.6, and 192.168.1.5 in this example). Also, IP forwarding for the TCP/IP stack must be activated. This configuration enables basic TCP/IP communication between the LANs. You should consider security factors and DNS to resolve host names between the LANs. You can also configure IPv6 access for the remote office PCs by enabling IP forwarding in the TCP/IP IPv6 Settings section of the connection profiles. IP forwarding for the TCP/IP stack must also be activated.	
	ii)ATM has potential to transmit multimodal data such as voice, videos and images simultaneously over a single or integrated corporate network with Higher transmission capability. Explain how these multimodal data with different traffic characteristic handled by the ATM.	10

Ans:

- ATM is a form of cell switching using small fixed-sized packets.
- ATM adaptation layer assembles data from user connections into ATM cells for transportation and reassembly at their destination. 2. The ATM Layer is responsible for the end-to-end transfer of user cell streams, including functions such as flow control, cell routing and switching

ATM Adaptation Layer (AAL) – the protocol for packaging data into cells is collectively referred to as AAL.

Must efficiently package higher level data such as voice samples, video frames and datagram packets into a series of cells

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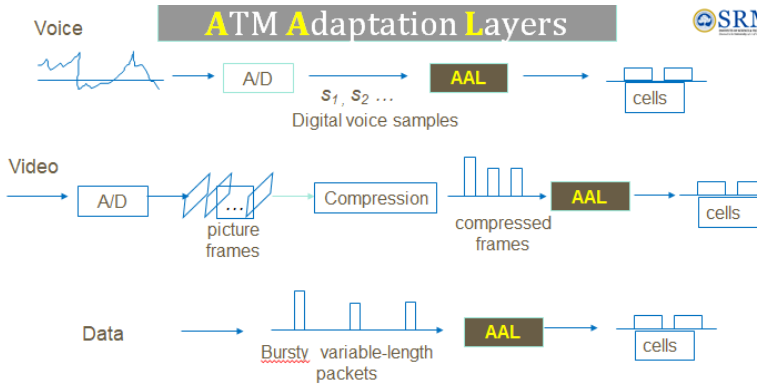


- two levels of ATM connections:

  virtual path connections

  virtual channel connections

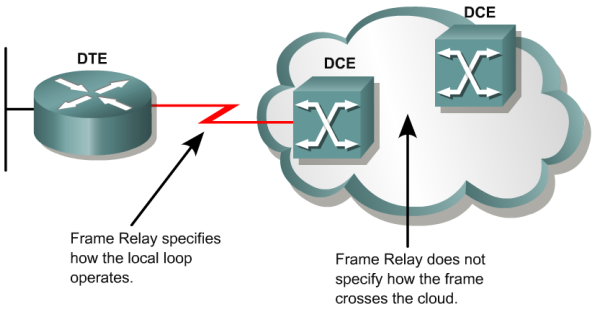
(OR)

4	i) Discuss the packet switching protocol designed to work at the data link layer. It is used to connect LAN and transmit data across WAN. (10 marks) ii) Describe how switching actions are carried out in this network. (10 marks) Elucidate on Flow control mechanisms (5 marks) Ans: **i)** **Frame Relay** is a packet-switched, connection-oriented, WAN service. It operates at the data link layer of the OSI reference model. ○ Frame Relay uses a subset of the high-level data link control (HDLC) protocol called Link Access Procedure for Frame Relay (LAPF).	25

- Frames carry data between user devices called data terminal equipment (DTE), and the data communications equipment (DCE) at the edge of the WAN.
- Frame Relay does not have the sequencing, windowing, and retransmission mechanisms that are used by X.25.
- Typical speeds range from 1.5 Mbps to 12 Mbps, although higher speeds are possible. (Up to 45 Mbps

ii)

Frame Relay is often used to interconnect LANs. When this is the case, a router on each LAN will be the DTE.
Access Circuit - A serial connection, such as a T1/E1 leased line, will connect the router to a Frame Relay switch of the carrier at the nearest point-of-presence for the carrier.



- DTEs generally are considered to be terminating equipment for a specific network and typically are located on the premises of the customer. **DCEs** are carrier-owned internetworking devices. The purpose of DCE equipment is to provide clocking and switching services in a network
- Two types of switching are
- **Switched Virtual Circuits (SVCs)** are Virtual circuits may be established dynamically by sending signaling messages to the network.

- **Permanent Virtual Circuits (PVCs)** are more common.
    - PVC are VCs that have been preconfigured by the carrier

iii)Flow control

- **Local access rate** – This is the clock speed or port speed of the connection or local loop to the Frame Relay cloud.
- **Committed Information Rate (CIR)** – This is the rate, in bits per second, at which the Frame Relay switch agrees to transfer data.
- **Committed burst (Bc)** – The maximum number of bits that the switch agrees to transfer during any Tc.

	○ The higher the Bc-to-CIR ratio, the longer the switch can handle a sustained burst. ○ The DE (Discard Eligibility) bit is set on the traffic that was received after the CIR was met ○ **Excess burst (Be)** – This is the maximum number of uncommitted bits that the Frame Relay switch attempts to transfer beyond the CIR. ○ **Excess Information Rate (EIR)** – This defines the maximum bandwidth available to the customer, which is the CIR plus the Be. ○ **Forward Explicit Congestion Notification (FECN)** . ○ **Backward Explicit Congestion Notification (BECN**	