1. Explain the concepts of Default Gateway in IP

A gateway is a device that connects networks using different communication protocols in a way that allows for information to pass from one network to the other. It both transfers and converts the information into a form that can be used by the protocols on the receiving network. Think of it as a TCP/IP node that has routing capabilities.

In other words, a gateway is a kind of router. A router, by definition, is a device or computer that sends packets between two or more network segments as necessary, using logical network addresses, most often IP addresses. The default gateway is the path used to pass information when the device doesn’t know where the destination is. More directly, a default gateway is a router that connects the host to remote network segments. It’s the exit point for all the packets in the network that have destinations outside the network.

1. Explain the concepts of SNAT and DNAT

**Source Network Address Translation (source-nat or SNAT)** allows traffic from a private network to go out to the internet. Virtual machines launched on a private network can get to the internet by going through a gateway capable of performing SNAT. The gateway has one arm on the public network and as part of SNAT, it replaces the source IP of the originating packet with its own public side IP. As part of SNAT, the source port is also updated so that multiple VMs can reach the public network through a single gateway public IP.

It is typically used when an internal/private host needs to initiate a connection to an external/public host. The device performing NAT, changes the private IP address of the source host to public IP address. It may also change the source port in the TCP/UDP headers.

A typical scenario where we generally use SNAT is when we are required to change the private address or port into a public address or port when the packets are leaving the network. In terms of order of operation on NAT device, SNAT feature comes to fore after the routing decision has been made. Moreover, when there are multiple hosts on the “inside” network who want to get to any host on the “outside” network, SNAT is used.

**DNAT** stands for **Destination Network Address Translation**. Destination NAT changes the destination address in the IP header of a packet.

It may also change the destination port in the [TCP](https://networkinterview.com/tcp-header/)/[UDP](https://networkinterview.com/udp-header/) headers. The typical usage of this is to redirect incoming packets with a destination of a public address/port to a private IP address/port inside your network.

Destination NAT is performed on incoming packets, where the [firewall](https://ipwithease.com/network-based-firewall-vs-host-based-firewall/)translates a public destination address to a private address. DNAT is a 1-to-1, static translation with the option to perform port forwarding or port translation.

Users over Internet Accessing a Web Server hosted in a data centre is a typical example where DNAT is used to hide the private address of Web Server and NAT device translates the Public Destination IP reachable to Internet Users to Private [IP address](https://ipwithease.com/difference-between-ip-address-and-port-number/) of Web Server.

3.

A.192.168.101.2/24

            B.192.168.101.3/24

            C.192.168.102.2/24

            D.192.168.102.3/24

            A,B,C,D are the IPs to be assigned to four computers ;

1. What network elements are need to arrive at the above network architecture; explain their configurations in terms at L3/L2

A and C are connected via L2 device say S1 and B and D are connected via another L2 device say S2. S1 and S2 are further connected by a L3 device R1.

1. Details of the IP assignments to be given to each node ;

A.192.168.101.2/24 - CIDR Range - 192.168.101.0 - 192.168.101.255

            B.192.168.101.3/24 - CIDR Range - 192.168.101.0 - 192.168.101.255

            C.192.168.102.2/24 – CIDR Range - 192.168.102.0 - 192.168.102.255

            D.192.168.102.3/24 - CIDR Range - 192.168.102.0 - 192.168.102.255

1. Explain ARP

The Address Resolution Protocol (ARP) is a communication protocol used for discovering the link layer address, such as a MAC address, associated with a given internet layer address, typically an IPv4 address.