

1. **DHCP:** Dynamic Host Configuration Protocol. Automatically assigns devices (client) connecting to the server (router) a unique IP address from a pool of 'dynamic' IP addresses.  
**NAT:** Network Address Translation. Translates the IP addresses of computers in a local network into a single IP address, often used by the router, which then can connect to the internet. This adds extra security as the router can be configured as a firewall, and only allow authorized systems access to the computers within the local network.
2. **Dijkstra's Algorithm:** Uses weighted paths to find the shortest route through all possible nodes of a network, with a target node as it's goal. It visits all possible nodes from the current node and marks them down as visited, and if the goal is not found then the algorithm returns down the path and goes onto the next unvested path, adjusting the weights on the way.
3. **Distance Vector Algorithm:** Works similarly to Dijkstra's, for routers to find the shortest path to a host. The main difference is that it uses Routing tables for the weighting information. These tables contain the hop count and direction of the routes location.
4. **IGP examples:** two commonly used – RIP: Routing Information Protocol, and OSPF: Open Shortest Path First
5. Networks within an autonomous system communicate routing information to each other using an IGP. An autonomous system shares routing information with other autonomous systems using the BGP.
6. **iBGP:** BGP used within one AS (internalBGP)  
**eBGP:** BGP used to connect one AS to other ASs (externalBGP)
7. Local preference value attribute: policy decision  
Shortest AS-PATH  
Closest NEXT-HOP router: hot potato routing  
Additional criteria  
It uses the path vector algorithm to identify new routers
- 8.
9. **MAC address:** Media Access Control is a filter that makes sure the packet being received is for the hardware address for the network access card.
10. A parity bit sits at the end of a data bit sequence, this is used to check whether the number of 1 bits in the data sequence are even or odd and parity bit checking is based on this. In terms of error detection, either the number of 1 bits are added up to see if it is odd or even and confirm the data is fine by checking the parity bit indicates the same, odd checking is the opposite. To correct the data, another request is sent.
11. **CRC:** Cyclic Redundancy Checking. A sending device applies a 16 or 32 bit polynomial to a block of data and appends the cyclic redundancy code to the block. The receiver applies the same polynomial to the data and compares it with the attached result from the sender. If they agree then the data has been received successfully, otherwise the sender can resend the data.
12. **FDMA:** Frequency Division Multiple Access. Divides the channel spectrum into frequency bands. Each station assigned a fixed frequency band. Unused transmission time in frequency bands go idle.  
**CSMA:** Carrier Sense Multiple Access. Listen before transmit. If channel sensed as idle, the whole frame is sent. If sense busy, defer the transmission. In the case of a collision the entire packet transmission time is wasted
13. **ARP:** Address Resolution Protocol. A packet destined for a machine on a LAN arrives at the gateway, the gateway asks the ARP program to find a MAC address that matches the IP

address. The ARP program looks at the ARP cache and if it finds the address, provides it so the packet can be formatted correctly and sent to the machine. Otherwise the ARP program sends a specially formatted request to all machines on the LAN to see if one machine knows the IP address associated with the packet. A reply is sent to the ARP if so and the ARP updates the ARP cache with the IP-MAC pair and sends the packet to the correct machine. In terms of the switch, it stores the MAC address to a table, and if the source is unknown it stores the port number the packet was received on as well. If the destination port is known then the packet is sent directly out, otherwise it will send a flood of the packet to all ports except the receiving port.