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LB04 Computer Network. Answer assignment

1. TCP & UDP
   1. Differences
      1. TCP. Transmission Control Protocol. Data sending guaranteed complete and accurate. Any failure must be retried. Designed for download file accurately where file must be complete according to original copy.
      2. UDP. User Datagram Protocol. Just fire and forger. Do not care failure. Designed for realtime live streaming where delay is big no-no.
   2. TCP application: Download, Send, File Transfer Data Transfer. File transfered must be in order, complete, no flaw just like the original source, unlike UDP, TCP checks for quality and retry if any failure presents.
   3. UDP application: realtime monitoring, live streaming, multiplayer online game computer to computer(s). Delay is big no no, unlike TCP, UDP just fires anything they can without any quality checking, allowing data be sent as received as it was happened i.e LIVE.
2. 100 PC a network
   1. Address Resolution Protocol is protocol to get one PC’s network card’s MAC address out of the IP used in the network card of one PC. In order to communicate to other computer, a PC must has an idea of one’s MAC address on one PC. If a PC who hold ARP cache is empty or the MAC list to particular IP address aren’t existed, the PC will send ARP broadcast. The matching IP address then give the MAC address to whom did broadcasted ARP.  
      ARP only without DHCP / RARP setup i.e. (probably) Static IP address is used for where the setup are guaranteed stationary for its entire carreer e.g. office which PCs are interconnected through cable such as Ethernet or so. Each PC, the IP address will manually assigned by the network admin according to the network schematic along with other parameters like Subnet mask, Default gateway, and so on. Now, everytime a PC going to communicate with other PC through IP address (Layer 3 Network), the ARP works to resolve MAC address that has the matching IP.
   2. Dynamic Host Configuration Protocol is a protocol to have every PC’s IP address assigned. Each PC requires IP address in order to communicate in a network. DHCP is a service that can be run on a server or a router. DHCP will lease sets of set range of IP adresses to be assigned for requesting PC. DHCP lease may have certain time that will expire for condiditions such as not being used until the expiry time, etc. DHCP allows easy network setup as the service will automaticly assign newly joined devices IP address, Subnet mask, Gateway, DNS, and so on.  
      DHCP network setup is used for where quick and easy networking is focused i.e. dynamic setting such as WiFi where portable devices joins WiFi network and users expect internet connection to be available as they joined the WiFi. The DHCP assigns network parameters like IP address, Subnet, Gateway, and so on that are required for a device to communicate to network and internet.
3. COmmunicate
   1. Find IP address using DNS  
      Computer who wish to open NUS.EDU.SG will ask Resolver the IP Adress of that website. If Resolver do not know, it will ask Root Server (Top level of DNS). If Root Server do not know, it will redirect Resolver to Top Level Domain which handles EDU and SG domain. Now Resolver will ask TLD the website. If The TLD do not know the address, the TLD will redirect Resolver to Authoritative name server which responsible for handling website names and its IP address. They are final authority. Resolver will ask Name server and will get the IP address of NUS.EDU.SG and send the IP address back to the client computer so they can retrieve and view the website. In addition, the Resolver will store the IP address to its memory cache in case for another query of the website.
   2. Transport Layer  
      Website. HTTP port number is 80, or 443 for HTTPS. Connects using TCP.  
      the port number has been assigned by standard.  
      TCP allows guaranteed accurate data transmission. Website page is the protocol where it has to be exactly like from the server. They usually do not need realtime. Unless, in case there is a livestream either video or live exam score, that particular part will use UDP as the update of such part has to be in realtime.
   3. Router to Router  
      to every router, the IP address will be translated. Network Address Translation.  
      so, Binus has this private IP address. Then in the router, the IP address will be translated to another IP address. As the picture shows, there are 4 routers to be passed. Presumably, there will be 4 times of NAT since routers are to route networks, i.e. makes a whole different scene. Yet, IPv4 probably in use.
   4. Data transfer at layer 2  
      The MAC address. Address Resolution Protocol.  
      in order to make communication from one device to other device, one device needs to know their MAC address. MAC address is physical address that is tied within its network card of one device. Let’s say Binus do not know the MAC address. Now Binus computer will send ARP broadcast to ask the MAC address. Binus now know NUS.EDU.SG’s IP address. It will now ask MAC address being held by that IP address. The NUS will send its MAC address back to Binus and the communication will begin. ARP broadcast result will be stored in the cache and it is dynamic. Dynamic are not permanent and will be flushed periodically. ARP can be entered manually and is static. But there is No. reason to type manually the ARP since the network is going out of the local area. ARP manual should only be done for local area instead.