CYSE 250 Basic Cybersecurity Network Topics

- Network security – Confidentiality, Integrity, and Availability
- Network – a shared medium
- Types of networks – Word-of-mouth, Cell phone/telephone, and Computer
- Various media used to link system components – Copper wire, Fiber-optic cables, Radio waves, Infrared waves, and Microwaves
- Advantages – easily share information and exchange emails around the world
- Characteristics of computer network – Fault tolerance, Scalability, Quality of Service, and Security
- Types of networks – Personal area networks (PANs), Local area networks (LANs), Metropolitan area networks (MANs), Campus area networks (CANs), and Wide area networks (WANs)
- Network nodes – Workstations, Hosts, and Servers
- Workstation
- Host
- Servers
- Physical Topology and Logical Topology
- Bus Topology, Ring Topology, Star Topology, Mesh Topology, Hybrid Topology, and Tree Topology
- Sharing printers
- Connecting Home resources
- Office Network, Networks for saving money, and Business

Network devices

- Hub – Physical layer, connects multiple computer networking devices
- Router – Network layer, interconnect two or more heterogenous networks
- Gateway – Transport and Session layer
- Switch – Data link layer or Network layer, sends the data to the exact recipient
- Bridge – Data Link layer, learning, filtering, and forwarding
- Repeater – Physical layer, receives a signal and retransmits it at a higher level or power
- Modem – Modulator/Demodulator
- Firewall – allow or deny network traffic

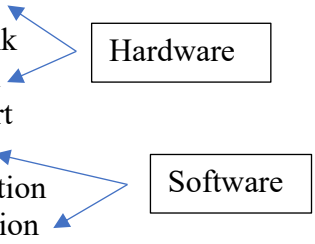
Basic Networking commands

- ipconfig
- ipconfig /all
- nslookup
- ping
- tracert

OSI Model – It helps users understand all of the functions of a network.

Please Do Not Throw Sausage Pizza Away

1. Physical
2. Data Link
3. Network
4. Transport
5. Session
6. Presentation
7. Application



Application layer (7) – gives interfaces for applications to access network services
Example: file sharing, message handling, and database access

Presentation layer (6) – handles the data formatting and translation

Session layer (5) – allows two computers to hold ongoing communications
Example: Name lookup, user logon, user logout, and keeping audio in with videos

Transport layer (4) – controls data transfer from one application to another over a network
- Breaks long data down into "segments"

Example: Source and destination port numbers, sequence and acknowledgement number, window sizes

Network layer (3) – controls logical addressing, translates IP addresses into physical addresses, and executes best path selection and routing in an internetwork

Data Link layer (2) – works with frames and is the intermediary between the Network and Physical layer
- MAC address defined here
- Discards frames having CRC and other errors
- Sends resulting packet to Network layer for future processing

Physical layer (1) – It converts bits into signals for outgoing messages and signals into bits for incoming messages
- Encoding

Example: Connectors used to connect the medium to the NIC

- Bit – smallest unit of information (1 or 0)
- Byte – 8 bits is a byte
- Binary – Computers use it as a numbering system based on zeros and ones.

Addressing in Networking

- TCP/IP
- IP addresses – IPv4 and IPv6, 32-bit node address in IPv4 and 128-bit node address in IPv6 (Looks like: 205.0.116.14)
- IPv4 – 8-bit binary octets, totaling 32 bits, Network ID and host ID, Class A through Class E
- Netmask – configured subnet mask TCP/IP requires
- Subnet mask – 32-bit number written dot-decimal notation
- Show class of addressing used
- Divide networks to control traffic

Cisco Packet Tracer – designing and checking networks

- Hub to 4 PCs
- Switch to 4 PCs
- Router to 2 switches broken off into 3 PCs
- Ping command to check the network connection
- Gateway for routers