EL-GY 5373 Pop Quiz Two

Name: _____ Student ID: _____

1. Which is the highest protocol layer these devices operate on: hubs, bridges, and routers?

A: Among those devices, routers operate on the highest protocol layer – Network.

To be more specific for each type of devices, the respective highest protocol layer that hubs, bridges, and routers operate on is Physical, Data Link, and Network.

2. What are two key differences between an IP address and a MAC address?

A: 1) MAC address is hardware address that gets used on layer 2 – Data Link layer. IP address is acquired as network address for an interface working on layer 3 - Network layer.

2) MAC address uses 48 bits, while IPv4 address has 32 bits (IPv6 uses 128 bits).

3) Related to 1) above, MAC address is assigned/burned to the hardware (regardless when, how, and even whether it gets connected). However, an IP address is assigned for the time being as the interface connected to a specific network.

3. What is multiplexing and de-multiplexing in the context of TCP/IP? What is the advantage of this approach?

A: In communication networks, multiplexing/demultiplexing allows multiple signals combined as one and transferred over a shared medium. In the context of TCP/IP, multiplexing is carried at source host by collecting Application data from different sockets, encapsulating them into proper Transport protocol segments, and passing these to Network layer to form IP datagrams. Demultiplexing is carried at destination host by identifying IP payload as respective Transport segments, and further delivering the contained data through correct sockets to Application processors. Note multiplexing/ demultiplexing is performed at both Transport and Network layers using the information carried in the packet headers. IP layer uses Protocol field in the header to indicate encapsulated data. Transport layer uses unique source and destination port numbers in the segment headers to indicate associated sockets.

Multiplexing/ demultiplexing, as a key scheme to implement layered protocol architecture, provides needed flexibility in network design and management. This further improves the overall network efficiency and performance.