

ECEN 621 - HW#1: Please answer the following questions:

- 1) **What are major functions of computer networks?**  
Convenient information sharing and communications
- 2) **What are the major differences between wired and wireless networks?**  
Wired networks transmit data through wired connections such as cable. Wired channels are usually very reliable.  
Wireless networks transmit data by using electromagnetic wave, which does not need physical wired connections. Wireless channels are subject to channel fading, resulting higher error rate as compared to the wired networks.
- 3) **Why do we need the wireless communications networks?**  
Cable connection is not convenient and inefficient and its costs are high.  
Requirements on mobile communications  
Requirements on long-distance communications.
- 4) **What's the protocol layering principle and why do we need to use the layered protocol stack?**  
The network protocol layering principle partitions the communication functions into a set of relatively independent layers, so that each of protocol layers can be optimized separately/independently.  
  
By using layering principle, we can optimize the performance of each protocol layers independently/separately.
- 5) **Give your definition of the computer network protocols.**  
A set of communications rules/standards followed by communicating peers/parties.
- 6) **What does TCP stand for and what are functions of TCP?**  
Transport Control Protocol  
Functions Flow control and Error control
- 7) **What are the two major functions for TCP protocol?**  
Functions:  
    Flow control to avoid congestion  
    Error control for reliable communications.
- 8) **What does MAC stand for and why do we need the MAC protocol?**  
Medium Access Control  
We need MAC protocol to share transmission medium among different links and reduce collisions.
- 9) **What does PHY stand for and why do we need the PHY layer algorithms?**  
Physical Layer.  
We need PHY layer algorithm for efficient resource allocation, error control, which highly depend on the medium physical properties.

**10) What are the major two types of computer network traffics?**

Non-real-time traffics and real-time traffics.

**11) What does QoS stand for and what is QoS for the real-time traffic and what's QoS requirement for the non-real-time traffic?**

Quality of Service.

Non-real-time traffics have more stringent requirements on reliability QoS.

Real-time traffics have more stringent requirements on delay QoS.

**12) How to classify the flow control mechanisms?**

- Open-loop control scheme
  - Flow control function is achieved without using feedback via the closed-loop channel.
- Closed-loop flow control scheme
  - Flow control adapt its transmission rate to the bottleneck available bandwidth according to the feedback through the closed-loop channel
  - Window-based scheme vs. Rate-based schemes
  - Explicit scheme vs. Implicit scheme
  - End-to-end scheme vs. Hop-by-Hop scheme
- Hybrid schemes
  - Mixing open-loop flow control with closed-loop scheme