

# CS 162 Section 8

## True/False:

1. BSD Socket API was created at Stanford.  
**False. At Berkeley in 1980.**
2. TCP guarantees reliable, in-order, and at most once delivery.  
**True.**
3. It is possible to solve the Two Generals Problem with certainty over a lossy channel.  
**False**
4. One computer can only have one network card.  
**False: may have multiple, e.g. one card for wired network, and one for wireless network.**
5. All hosts in a LAN can share same physical communication media.  
**True.**
6. Usually, router stores an entry for each individually IP address in its forwarding table.  
**False. One entry represents IPs with a common prefix.**
7. A store-and-forward router starts forwarding the packet as soon as it gets packet's header.  
**False: The router waits to receive the entire packet before forwarding it, hence the storeandforward name. This allows a router to enqueue packets if the output link is congested, and drop a packet if it has been corrupted.**

## Short Answer:

1. What is a protocol?  
**A protocol is an agreement on how to communicate. Includes:**
  1. **Syntax: how a communication is specified & structured**
  2. **Semantics: what a communication means**
2. What is network (interface) card/controller?  
**Hardware that physically connects a computer to the network**
3. What is MAC address?  
**48bit unique identifier assigned by card vendor.**
4. What is IP address?  
**32b (or 128b for IPv6) address assigned by network administrator or dynamically when computer connects to network**
5. How many layers in Internet Protocol? What main service does each layer provide?  
**Five layers.**
  1. **Physical: send bits**
  2. **Datalink: Connect two hosts on same physical media**
  3. **Network: Connect two hosts in a wide area network**
  4. **Transport: Connect two processes on (remote) hosts**
  5. **Applications: Enable applications running on remote hosts to interact**
6. What are the drawbacks of layering?

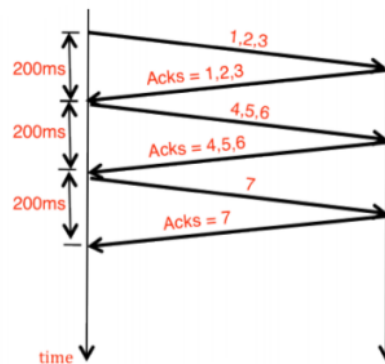
- Layering can hurt performance. e.g. hiding details about what is really going on
- Headers start to get really big
- Sometimes header byte size  $\gg$  content size
- Layer N may duplicate layer N-1 functionality. e.g., error recovery to retransmit lost data
- Layers may need same information. e.g., timestamps, maximum transmission unit size

**Long answer:**

Assume two endhosts using the sliding window protocol to implement flow control, and Selective Repeat to implement reliability. Assume sender sends 7 packets. The window size at the receiver is 3 packets, the roundtrip time is 200ms, and the retransmission timeout is 500ms. The transmission time of the packet is negligible, i.e., assume the size of a packet is 0. The time to send all packets is the interval between the time the sender sends the first packet and the time the sender receives the ack from the last packet.

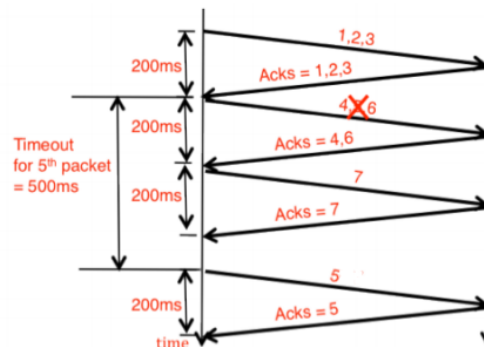
1. How long does it take to send all packets, assuming no losses? Draw the time diagram.

600 ms



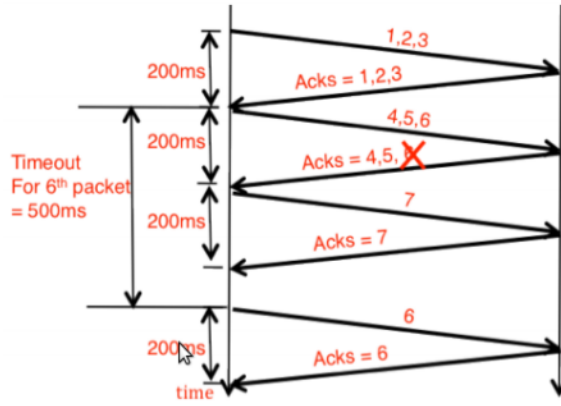
2. How long does it take to send all packets assuming the 5th packet is lost? Draw the time diagram.

900 ms



3. How long does it take to send all packets assuming the ack of the 6th packet is lost? Draw the time diagram.

900 ms



Alternate answer (using cumulative acks):

600 ms

