

Name: _____ Student ID: _____

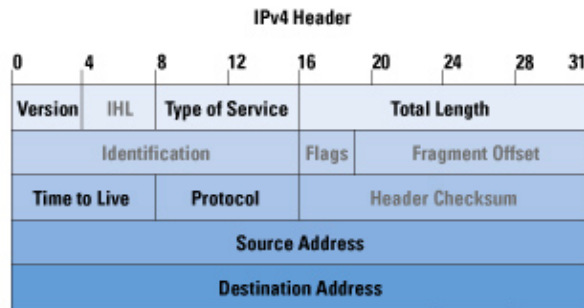
CSE123 Spring 2015
Instructor: Stefan Savage

Homework #2

Due Wednesday 4/29 at the beginning of class
(Please **TYPE** your answers... this will allow our TAs to be much more efficient)

1. IP Checksum

Below is a diagram of the IPv4 packet header format. The header is protected using a separate checksum (the “Header Checksum” field below) using the IP Checksum algorithm we described in class.



Consider a packet with the following content (in hex):

4500 0028 3e8a 4000 8006 9bd2 c0a8 0265 c73b 9b2a

- a) What is the value of checksum carried in this packet?
- b) Is it correct? (show your work to calculate the IP checksum for this data; note that the checksum field itself is set to zero when calculating the checksum)
- c) The “Time to Live” field in this packet is set to 128. However, each time the packet is forward by a router this field will be decremented by one (i.e., it will next be set to 127). How will the checksum need to change in response?
- d) Is it possible to update the checksum in this case (as per part [d]) without recomputing the checksum over the entire packet header? If not, why not? If so, how?

2. Reliable Transmission

Consider a system that uses ARQ as described in class, using timeouts to detect loss. Assume the sender has an infinite number of packets to send, but every third packet that is transmitted by the sender is lost en route (assume all ACKs are delivered correctly). The length of the timeout is t and the round-trip time is m ($m \ll 4*t$... i.e.). Consider how long it will take to successfully send the first eight packets. For each of the following cases,

- i) provide a comma separated list showing the order of packets sent by the sender, by sequence number (include packets lost in transit and any retransmissions) and
 - ii) describe how much time it will take to deliver all 8 packets (in terms of t and m)
- a) Using the alternating bit protocol (i.e., a send window of 1).
- b) Describe how much time it will take with a send window of 4 packets, but using the GoBackN retransmission strategy (i.e., a receive window of 1). Assume that serialization delay is 0 (i.e., you can send multiple back-to-back packets with no additional delay)
- c) Describe how much time it will take with a send window of 4 packets, a receive window of 4 and the selective retransmission strategy described in class (retransmit the first missing packet).

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3. Media access

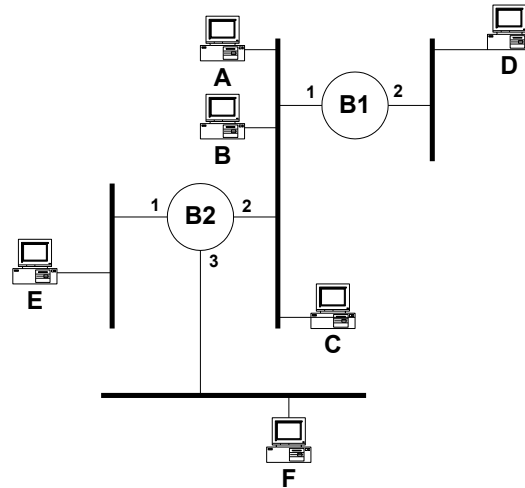
Consider a slotted Aloha system with four nodes in which the probability that each node has data to send in a given slot time is p .

- a) What is the likelihood that none of the nodes send any data in a given slot time?
- b) What is the likelihood that any node successfully sends data in a given slot time?
- c) What is the likelihood that there is a collision in a given slot time?
- d) Suppose the length of the slot time is doubled. Assume that each node always has data to send and modulation is unchanged (i.e., the same number of bits per second can be sent). Do you expect total “goodput” (successful transmission of data over time, measured in bits per second) to go up, down or stay the same? Explain?

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4. Bridging

Consider the network connected by learning bridges B1 and B2 shown below. Each LAN is connected to the bridge with a listed port number and each host is indicated with a letter.



Assuming that the initial forwarding tables are empty, show the forwarding table in each of the bridges after the following sequence of transmissions:

a) A sends to C

Bridge B1	
Destination	Port number

Bridge B2	
Destination	Porter number

b) D sends to A

Bridge B1	
Destination	Port number

Bridge B2	
Destination	Porter number

c) E sends to F

Bridge B1	
Destination	Port number

Bridge B2	
Destination	Porter number