Name: _____
ID: _____

Network Architecture I: Sample Exam 3

- Put your name and student id.
- The exam is closed book/note/mind, besides one letter size paper.
- You have 120 minutes to complete the exam.
- There are 11 pages, 15 problems and 100 points total.
- Answer all the questions directly on the exam papers (back page included). If you need additional sheets, let the instructor know.
- *Be brief, but do not omit necessary details.*
- If the problem appears to be ambiguous to you, write your assumptions along with your answer.
- Enjoy and Good luck!

1. (3 pt) Which of the following is *not* true about Ethernet hub and switch? (Ans:____)

(a) Hubbed Ethernet LAN has a single collision domain.
(b) Switched Ethernets have multiple collision domains.
(c) Switched Ethernets have a single broadcast domain.
(d) Hub does store-and-forward Ethernet frames.

2. (3 pt) Which of the following does particularly differ from others? (Ans:____)

(a) TDMA
(b) FDMA
(c) CSMA
(d) CDMA

3. (3 pt) Which of the below is *not* related to link layer? (Ans:____)

(a) Framing needs to be provided.
(b) Not all link layers need a MAC (Medium Access Control) protocol.
(c) All link layer protocols need addresses.
(d) CRC is often used for error detection.

4. (3 pt) Which of the following protocol does not keep states or table for its operation? (Ans:____)

(a) Self-learning algorithm in Switch
(b) Ethernet
(c) ARP
(d) Mobile IP

5. (3 pt) Which of the following is not about Wireless LAN (802.11)? (Ans:____)

(a) A wireless LAN (Wi-Fi) network needs IP mobility
(b) It runs stop-and-wait ARQ (Automatic Retransmission Request) for error recovery.
(c) There are more than two address fields.
(d) Channel reservation packets may collide.

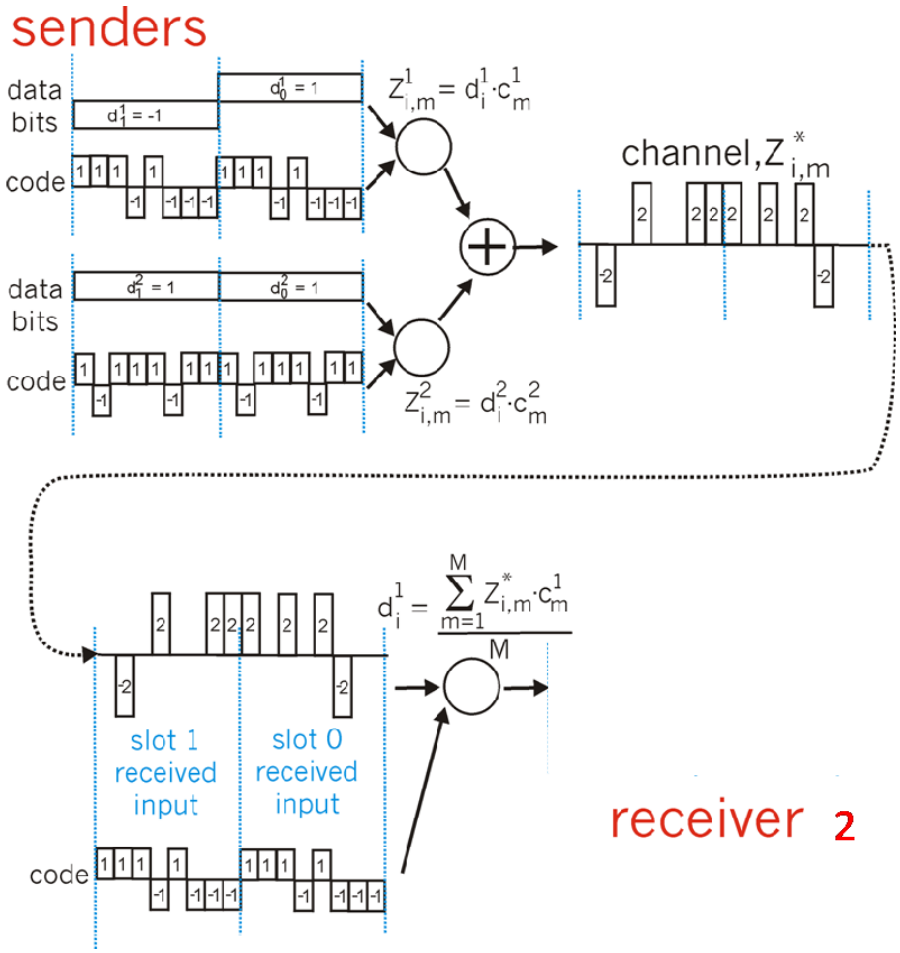
6. (3 pt) Which of the following is *not* correct about network devices? (Ans:____)

(a) Hub is a physical layer device repeating each bit.
(b) Switch does self-learning and filtering.
(c) Router performs store and forwarding.
(d) A host cannot act as a router.

7. (3pt) Which of the following does not apply to Ethernet protocol? (Ans:____)

(a) Carrier Sensing
(b) Collision Avoidance
(c) Exponential backoff
(d) Collision Detection

8. (10 pt) Suppose that the CDMA receiver in the figure below wanted to receive the data being sent by sender 2. Show (by calculation) that the receiver is indeed able to recover sender 2's data from the aggregate channel signal by using sender 2's code.



9. (10 pt) (Wireless LAN) Explain hidden node and exposed node problems in Wireless LAN and how IEEE 802.11 addresses/solves them.

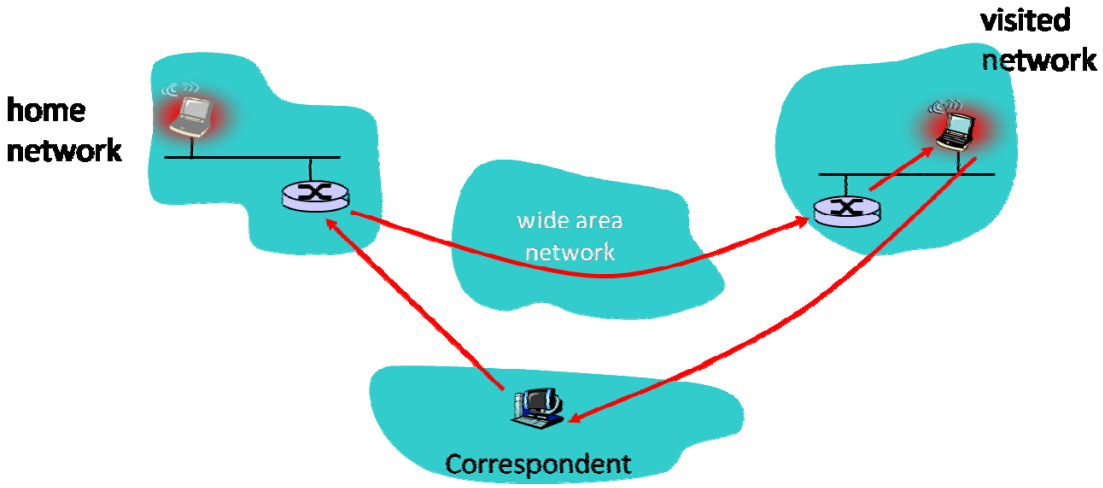
10. (10 pt) (CRC) Suppose the message bits are 1010011101, and assume that the generator used for computing CRC is 10101. What will be the bit sequence that gets transmitted? If during the transmission, the fourth bit from the left gets corrupted, what is the bit sequence received by the receiver? Can the receiver detect that error? If so how?

11. (10 pt) Suppose a CSMA/CD network is running 10 Mbps over a 1-km cable with no repeaters. The signal speed in the cable is 100,000km/sec.

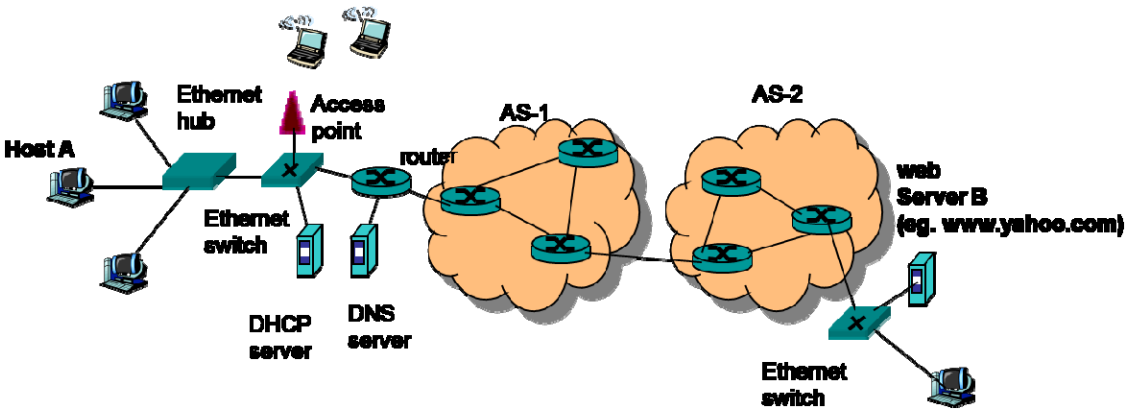
(a) Compute the following:
    a. End-to-end propagation delay.
    b. Worst-case collision detection time.
    c. Minimum frame size.

(b) Suppose we increase the bandwidth from 10 Mbps to 100 Mbps, how does it affect the above three values?

12. (15 pt) (MOBILE IP) Suppose a mobile node moves from its home network to a visited network as the figure below. i) Explain how indirect routing works. ii) Explain a situation where indirect routing such as Mobile IP may become very inefficient. iii) What information (table contents) should be kept in home and foreign agents.



13. (10 pt) Consider an end-to-end communication *from* a hosts A *to* webserver B. A user on host A clicks on the web page of web server B which is multiple AS hops away. All routers are connected with PPP (Point-to-Point Protocol) links. *Write a series of protocols used for a packet to be transferred from A to B throughout the protocol stack in data plane as well as control protocols necessary.* Assume host A just gets into an Ethernet local network, thus nothing has configured initially. Host B is connected to an Ethernet LAN. Routing protocols used in each AS is not given intentionally. *Assign any proper routing protocols.*



14. (10 pt) Make a ***non-trivial*** exam problem on your own and answer it. (This is to show your knowledge, perhaps not covered in the problems above.)

15. (4 pt) Do the following self-assessment of your course work:
(Be honest! Instructor will evaluate your assessment.)

(a) Your participation/interaction in class?

Outstanding …… Below Average

5 4 3 2 1

(b) Your effort outside of class?

Outstanding …… Below Average

5 4 3 2 1

(c) Your attendance?

Outstanding …… Below Average

5 4 3 2 1

(d) Your professionalism throughout the course?

Outstanding …… Below Average

5 4 3 2 1

(f) Your growth and learning development from Aug to Dec?

Outstanding …… Below Average

5 4 3 2 1

THE END