

Final Exam

*Open book and notes; In class**Monday, Dec 14th, 8a*

- ⊕ *Do not forget to write your name on the first page. Initial each subsequent page.*
- ⊕ *Be **neat** and **precise**. I will not grade answers I cannot read.*
- ⊕ *You should draw simple figures if you think it will make your answers clearer.*
- ⊕ *Good luck and remember, brevity is the soul of wit*

- All problems are mandatory
- I cannot stress this point enough: **Be precise**. If you have written something incorrect along with the correct answer, you should **not** expect to get all the points. I will grade based upon what you **wrote**, not what you **meant**.
- Maximum possible points: 50.

Name: _____

Problem	Points
1	
2	
3	
4	
5	
Total	

1. Nomenclature

(a) Describe the following: (2 points each)

- Burst error

- Repeater

- CSMA-CA

- Access Point

- Exposed Node Problem

2. Network and Transport

- (a) How are AS-level loops prevented in BGP? (2 points)
- (b) What will happen if an AS in Virginia advertises 128.8/16? How can this be *fixed* in the short term? (2+2 points)
- (c) Is it possible to demonstrate TCP simultaneous open using sockets? If yes, provide pseudocode; if not, then why not? (4 points)

MAC Protocols

3. (a) Describe a problem in 802.11 if the DIFS interval were the same as SIFS. (2 points)
- (b) Is there a minimum payload size for 802.11 frames? Why/Why not? (4 points)
- (c) We discussed 10Mbps Ethernet in class. Describe two changes to the protocol parameters, either of which would allow 100Mbps transmission. (2+2 points)

4. Application Layer

- (a) What is “fibrillation” in BitTorrent? (2 point)
- (b) What is the `notify` RPC used for in Chord? (2 points)
- (c) In `ftp`, the client initially creates a control connection to server port 21 (tcp). For each new transfer, the *client* listens on a new port, and sends its address and port information to the server on the control connection for the server to connect back to the client. When/why might such a design fail? How would you fix it? (2+4 points)

5. General

- (a) The CRC-32 polynomial $x^{32} + x^{26} + x^{23} + x^{22} + x^{16} + x^{12} + x^{11} + x^{10} + x^8 + x^7 + x^5 + x^4 + x^2 + x + 1$ is used in Ethernet. Can this CRC-polynomial detect all odd number of bit errors? Why (not)? (0+3 points)
- (b) The *Hamming Distance* between two bit strings A and B is the number of bits that have to be changed in A to obtain B. Prove or disprove: “The minimum Hamming distance between two valid messages using the CRC-32 ethernet polynomial is 16”. (2 points)
- (c) The vast majority of queries to DNS root servers are typos. (Why?) Design a system whereby DNS queries with typographic errors no longer traverse to the root. Analyze the tradeoffs of your design compared to current DNS resolution. (1+4 points+Bonus)

Bonus What is Dijkstra’s middle name? (1 point)