

## Final Exam

*Closed book and notes; In class**Thursday, December 18th*

- ⊕ *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: 60.

Name: \_\_\_\_\_

Problem	Points
1	
2	
3	
4	
5	
6	
Total	

1. General

(a) Please give a *precise* definition for the following terms. Give an example as well if you think it would help (2 points each):

- p-persistence
  
  
  
  
  
  
  
  
  
  
- Token Holding Time (THT)
  
  
  
  
  
  
  
  
  
  
- CRC (cyclic redundancy check)
  
  
  
  
  
  
  
  
  
  
- Hidden node problem
  
  
  
  
  
  
  
  
  
  
- Exposed node problem

2. IP addressing and routing

(a) Does BGP have to be aware of CIDR address blocks? Why or why not? (3 points)

(b) State one advantage and one disadvantage of distance vector routing (over link state routing). (2 points)

(c) How does PIM-SM solve the problems of DVMRP? (5 points)

### 3. Transport, MAC

(a) Can a reliable transport protocol be built using only *NAKs*? Explain (2 points)

(b) Can a TCP still send data after one-side has sent a FIN? (3 points)

(c) Precisely explain why the *time-wait* state is required in TCP. You might want to construct an example in which an error occurs without the *time-wait* state being kept. (5 points)

4. More MAC, and application-layer protocols

- (a) What are data connections normally managed by FTP? What about if there is a NAT on the path? (3 points)

- (b) *Token rings are more efficient than Ethernet under high loads.* Why or why not? (3 points)

- (c) Does a HTTP proxy have to know if persistent connections are in use? Why or why not? (4 points)

## 5. Advanced topics: P2P and traceback

- [illegible]

## 6. Design

- (a) The “Slashdot Effect” is a colloquial term which describes overload on servers that host popular pages (e.g. pages that have recently been referenced on [www.slashdot.org](http://www.slashdot.org)). The slashdot effect is also apparant for popular *large* files, e.g. a new version of a browser, a new security patch, or a new version of an OS. Devise a protocol for handling such short busty load spikes for large files. If your solution works, then the expected download time for popular files will not increase appreciably even if the number of users downloading these files increase by several orders of magnitude.

Clearly, I don’t expect you to come up with a complete protocol spec.; instead, you should try to explore a single idea that might work. You must be precise about your assumptions and describe the shortcomings (if any) of your solution. (10 points)