Ph.D. Qualifying Exam: Computer Networks
Department of Computer Science and Engineering,
National Sun Yat-sen University

1. Physical Layer (20%):

(1) What is the difference between absolute and effective bandwidth? (4%)

(2) Why do we need multiplexing? (3%)

(3) When will fast fading occur? Give two popular models to describe fast fading. (6%)

(4) Why can the HF (high frequency) band support worldwide transmission? (3%)

(5) Explain how DPSK (differential phase shift keying) works. (4%)

2. Data Link Layer (20%):

(1) Does FDMA need network timing? Why or why not? (4%)

(2) Please give two collision scenarios for 1-persistent CSMA. (4%)

(3) Explain how the two duplexing schemes, FDD and TDD, work. (4%)

(4) What are false carrier and force collision in Ethernet? (6%)

(5) What is a coordination function defined in IEEE 802.11? (2%)

3. Network Layer (20%):

(1) Suppose that a router A send packets to another router B. What are the four types of delays used to measure the performance of such packet transmissions? Please well define each type of delay. (10%)

(2) Please give two types of care-of addresses defined in mobile IP and explain how to get them? (4%)

(3) What is a gratuitous ARP? (2%)

(4) What is the ingress filtering for firewalls? (2%)

(5) Please give the range of addresses in IPv4 class D (i.e., multicast addresses). (2%)

4. Transport Layer (20%):

(1) What is the SYN flood attack? How to conquer it by using SYN cookies? (12%)

(2) From the viewpoint of a TCP sender, please explain the difference between flow control and congestion control. (4%)

(3) Give two reasons why checksum is used in higher-layer protocols (e.g., TCP, UDP, and IP) while CRC is usually used in the link-layer protocols? (4%)

5. Application Layer (20%):

(1) In HTTP, what do the response codes of 1xx, 2xx, 3xx, 4xx, and 5xx mean? (10%)

(2) In SMTP, what do the response codes of 2xx, 3xx, 4xx, and 5xx mean? (8%)

(3) Please give the syntax of an absolute URI. (2%)