

Master's Comprehensive Examination Study Guide for Computer Networks

(Revised: September 20, 2008)

I. General Concepts

- A. Network Hardware
- B. Network Software
- C. Reference Models

II. The Physical Layer

- A. The Theoretical Basis for Data Communication
- B. Wireless Transmission
- C. Communication Satellites
- D. The Public Switched Telephone Network
- E. The Mobile Telephone System
- F. Cable Television

III. The Data Link Layer

- A. Data Link Layer Design Issues
- B. Error Detection and Correction
- C. Elementary Data Link Protocols
- D. Sliding Window Protocols
- E. Example Data Link Protocols

IV. The Network Layer

- A. Network Layer Design Issues
- B. Routing Algorithms
- C. Congestion Control Algorithms
- D. Quality of Service
- E. Internetworking
- F. The Network Layer in the Internet

V. The Transport Layer

- A. User Datagram Protocol (UDP)
- B. Transmission Control Protocol (TCP)

- C. Stream Control Transmission Protocol (SCTP)
- D. TCP Connection Establishment and Termination
- E. SCTP Association Establishment and Termination
- F. Buffer Sizes and Limitations

VI. Sockets in General

- A. Socket Address Structures
- B. Byte Ordering Functions
- C. Byte Manipulating Functions
- D. *inet_pton* and *inet_ntop* Functions

VII. Elementary TCP Sockets

- A. *socket* Function
- B. *connect* Function
- C. *bind* and *listen* Functions
- D. *accept* Function
- E. *fork* and *exec* Functions
- F. Concurrent Servers
- G. *getsockname* and *getpeername* Functions

VIII. TCP Client/Server Model

- A. Normal Startup and Termination
- B. Handling *SIGCHLD* Signals
- C. *wait* and *waitpid* Functions
- D. *SIGPIPE* Signal

IX. I/O Multiplexing

- A. I/O Models
- B. *select* Function
- C. Batch Input and Buffering
- D. *shutdown* Function
- E. *poll* Function

X. Socket Options

- A. *getsockopt* and *setsockopt* Functions

- B. Socket States
- C. Generic Socket Options
- D. IPv4 and IPv6 Socket Options
- E. TCP and SCTP Socket Options

XI. Elementary UDP Sockets

- A. *recvfrom* and *sendto* Functions
- B. Lost Datagrams
- C. Verifying Received Response
- D. *connect* Function with UDP
- E. Lack of Flow Control with UDP

XII. Name and Address Conversions

- A. Domain Name System (DNS)
- B. *gethostbyname* and *gethostbyaddr* Functions
- C. *getservbyname* and *getservbyport* Functions

Recommended Reading

- Computer Networks (4th Edition), Andrew S. Tanenbaum, Prentice Hall, 2003
- UNIX Network Programming, Volume 1 (3rd Edition), W. Richard Stevens, Bill Fenner, and Andrew M. Rudoff, Addison Wesley, 2004