

Study Guide - Part 1

Numeric Coding Systems

Binary	Hexadecimal	Decimal
0000	0	0
0001	1	1
0010	2	2
0011	3	3
0100	4	4
0101	5	5
0110	6	6
0111	7	7
1000	8	8
1001	9	9
1010	A	10
1011	B	11
1100	C	12
1101	D	13
1110	E	14
1111	F	15

Base 10	increasing powers of 10 from R to L							Base 10	
<i>decimal</i>	10^7	10^6	10^5	10^4	10^3	10^2	10^1	10^0	<i>decimal</i>
804,327	0	0	8	0	4	3	2	7	804,327

Base 2	increasing powers of 2 from R to L							Base 10	
<i>binary</i>	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	<i>decimal</i>
1101 0010	128	64	0	16	0	0	2	0	210

Base 16	increasing powers of 16 from R to L						Base 10		
<i>hexadecimal</i>							16^1	16^0	<i>decimal</i>
D2							208	2	210

Study Guide - Part 1

Underlying Network Technologies

Type of Network

- circuit switched
- packet switched

Network Distance

- Local Area Network (LAN)
- Wide Area Network (WAN)

Communication

- IEEE 802.3 Ethernet
 - Twisted Pair Wiring
 - Ethernet - 10BaseT / 10Mbps
 - Fast Ethernet - 100BaseT / 100Mbps
 - Gigabit Ethernet - 1000BaseT / 1000Mbps
- Network Hardware Address
 - Media Access (MAC) Address
- Data Packet
 - Ethernet Frame
 - Unit value – octet / 8 bits
 - 64 – 1518 octets
 - Preamble | Destination Address | Source Address | Frame Type | Data | CRC

Internetworking Concept and Architectural Model

Network Architecture

- Peer-to-Peer
 - Computer to computer
- Network
 - One or more computers to one or more computers
- Internetwork (*Internet*)
 - Network to network

Study Guide - Part 1

Classfull Internet Addresses

- Universal Identifiers
- Addresses Specify Network Connections
- The All-0s Address
- Subnet And Classless Extensions
- IP Multicast Addresses
- Loopback Address
- Internet Addressing Authority
- Reserved Address Prefixes

Mapping Internet Addresses To Physical Addresses (ARP)

- The Address Resolution Problem
- Two Types Of Physical Addresses
- Resolution Through Direct Mapping
- Resolution Through Dynamic Binding
- The Address Resolution Cache
- Protocol Format
- Reverse Address Resolution (RARP)

Internet Protocol: Connectionless Datagram Delivery (IPv4)

- A Virtual Network
- Internet Architecture
- Connectionless Delivery System
- The IPv4 Datagram
 - Datagram Format
 - Datagram Size, Network MTU, and Fragmentation
 - Reassembly Of Fragments
 - Time to Live (TTL)
 - Other Datagram Header Fields

Study Guide - Part 1

Internet Protocol: Forwarding IP Datagrams

- Forwarding In an Internet
- Direct and Indirect Delivery
- Datagram Delivery Over A Single Network
- Table-Driven IP Forwarding
- Next-Hop Forwarding
- Default Routes
- Host-Specific Routes
- Establishing Routing Tables

Internet Protocol: Error and Control Messages (ICMP)

- The Internet Control Message Protocol
- Error Reporting Vs. Error Correction
- ICMP Message Delivery
- ICMP Message Format
- Testing Destination Reachability And Status (Ping)
- Echo Request And Reply Message Format
- Reports Of Unreachable Destinations
- Congestion And Datagram Flow Control

Classless and Subnet Address Extensions (CIDR)

- Minimizing Network Numbers
- Subnet Addressing
- Variable-Length Subnets
- Implementation Of Subnets With Masks
- Subnet Mask Representation
- Broadcasting To Subnets
- CIDR Address Blocks And Bit Masks
- Address Blocks And CIDR Notation
- CIDR Blocks Reserved For Private Networks

Study Guide - Part 1

Protocol Layering

- The Need For Multiple Protocols
- Functionality Of The Layers
- ISO 7-Layer Reference Model
- The TCP/IP 5-Layer Reference Model

User Datagram Protocol (UDP)

- Identifying The Ultimate Destination
- The User Datagram Protocol
- Format Of UDP Messages
- Reserved And Available UDP Port Numbers

Reliable Stream Transport Service (TCP)

- Properties Of The Reliable Delivery Service
- Providing Reliability
- The Transmission Control Protocol
- Ports, Connections, And Endpoints
- TCP Segment Format
- TCP Checksum Computation
- Responding To High Variance In Delay
- Response To Congestion
- Establishing A TCP Connection
- TCP Performance