Review

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Chapter 1 Introduction

- **What is computer network?**

- **Network category**

- **Reference model**
  - **TCP/IP VS. OSI**
  - **Benefits of layered structure**
  - **PDU names**

- **Service VS. Protocol**

Chapter 2 Physical Layer

☐ **Bandwidth – Fourier Series**

■ **Hz and bps**

☐ **Nyquist theorem**

$$MaxDataRate = 2H \log_2 V \ bits/\sec$$

☐ **Shannon theory**

$$SNR_{dB} = 10 \log_{10}(\frac{S}{N}) \ \text{dB}$$

$$MaxDataRate = H \log_2(1 + \frac{S}{N}) \ bits/\sec$$

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Chapter 2 Physical Layer(cont'd)

- ☐ **UTP**

- ☐ **Copper wires and Optical fiber**

- ☐ **Understand modem**

  - ■ **Amplitude modulation(AM)**

  - ■ **Frequency modulation(FM)**

  - ■ **Quadrature Phrase shift keying (QPSK)**

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Chapter 2 Physical Layer(cont'd)

- **Master trunk multiplex technology**

  - **Frequency Division Multiplexing**

  - **Time Division Multiplexing**

- **Master circuit-switching ,message switching and packet switching**

- **understand mobile-phone system**

  - **Code division multiple Access (CDMA)**

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Chapter 3 data link layer

- **Master framing**
  - **Character count(字符计数法)**
  - **Flag bytes with byte stuffing(带字符填充的首尾界符法)**
  - **Starting and ending flags, with bit stuffing(带位填充的首尾标志法)**
  - **Physical layer coding violations(物理层编码违例法)**

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Chapter 3 data link layer(cont'd)

- **Master error detection and correction**

  - **Haimming distance (definition)**

  - **Error correction: hamming code**

    - **Correct one bit error:** $$m + r + 1 \leq 2^r$$

  - **Error detection:CRC**

- **The error-detecting and error-correcting properties of a code depend on its Hamming distance.**

  - **In order to *detect* d errors, we need a distance of d+1.**

  - **In order to *correct* d errors, we need a distance of 2d+1**

Error correcting and detecting

☐ **Hamming code**

☐ **CRC**

Chapter 3 data link layer(cont'd)

- **Master 6 dll's basic protocol**
    - **Utopia**
    - **Stop and wait**
    - **PAR (positive acknowledgement with retransmission) or ARQ (automatic repeat request)**
    - **One-bit sliding window**
    - **Go back n**
    - **Selective repeat**

    - **Max window sizes!**

Chapter 4 MAC sublayer(cont'd)

- ☐ **Multiple Access Protocols**
  - ■ **ALOHA**
    - ☐ **Pure ALOHA**
    - ☐ **Slotted ALOHA**
  - ■ **Carrier Sense Multiple Access Protocols**
    - ☐ **1-persistent CSMA**
    - ☐ **Non-persistent CSMA**
    - ☐ **p-persistent CSMA**
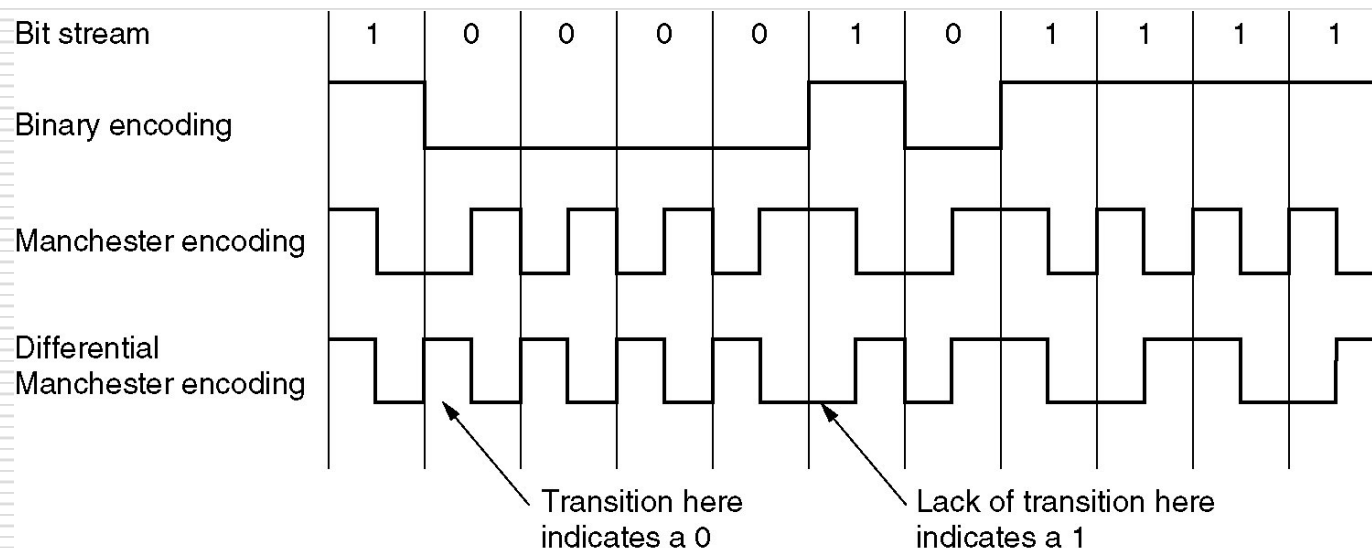   - ☐ **CSMA/CD (CSMA with Collision Detection)("先听后发、边发边听")**

  - ■ **Ethernet and IEEE802.3**
  - ■ **Min frame length**
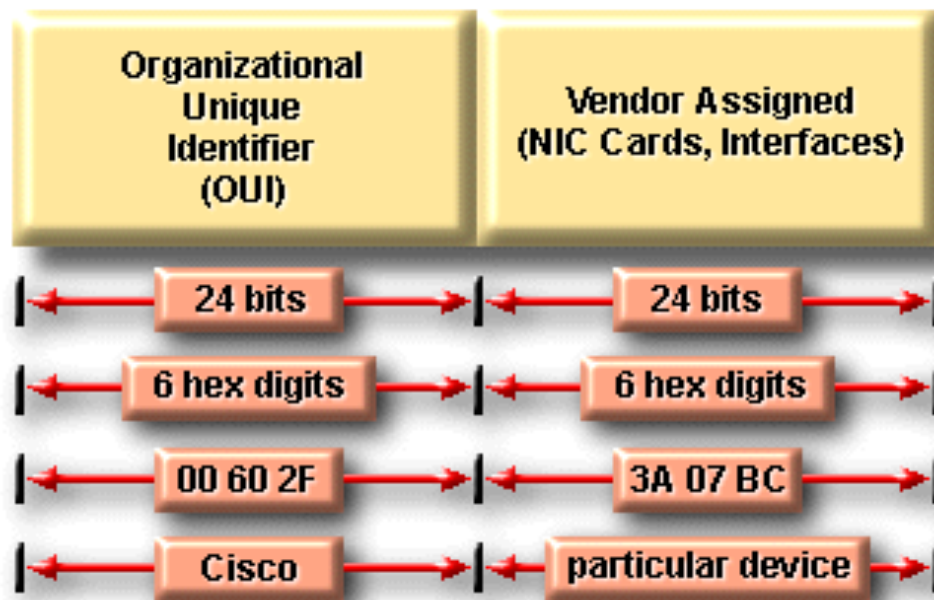
Chapter 4 MAC sublayer(cont'd)

☐ **Bit stream encoding methods**

- **Manchester Encoding**

- **Differential Manchester Encoding**

- **Question - Bit stream is 1001101001, sketch three waves:**

Bit stream	1	0	0	0	0	1	0	1	1	1	1

Binary encoding

Manchester encoding

Differential Manchester encoding

Transition here indicates a 0

Lack of transition here indicates a 1

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The MAC address

MAC Address Format

Organizational Unique Identifier (OUI)	Vendor Assigned (NIC Cards, Interfaces)
24 bits	24 bits
6 hex digits	6 hex digits
00 60 2F	3A 07 BC
Cisco	particular device

Working principle of swithing

- ☐ **Flooding**

- ☐ **Backward learning**

Chapter 5 network layer

- **Routing Protocol**

  - **IGP**

    - **DV:RIP**

    - **LS:OSPF**

- **Routed Protocol**

  - **IPv4**

  - **IPv6**

- **BGP**

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Routing algorithm

☐ **Routing algorithm**

■ **Static routing algorithm**

☐ **Dijkstra**

☐ **flooding**

■ **Dynamic routing algorithm**

☐ **DV**

☐ **LS**

IPv4

☐ **Main function of router**

☐ **Learn IP**

 ■ **IP packet format**

 ■ **IP address and it's classification**

☐ **Reserved IPv4 address**

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Other protocol and technology

- **Subnet and subnetting**

- **The idea of CIDR**

- **The principle of NAT/PAT**

Sup. :IPv6

- **Advantage of IPv6**

- **Differences with IPv4**

Chapter 6 transport layer

- ☐ **UDP (segment)**

- ☐ **TCP (segment)**

- ☐ **Pseudo header**

- ☐ **Socket**

Comparation

Chapter 7 Application layer

☐ **DNS**

□ **THANKS!**

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