第六章

R1 The transportation mode. e.g. car, bus, train. car

R2 Not redundant. TCP can reorder packets

R3 framing. IP & TCP
link access : 没
Reliable Delivery: TCP有, IP无.
flow control: TCP也有
error detection. TCP & IP都有.
error correction; full duplex: TCP也有.

R4 会 相邻传输可能会导致碰撞

R5 1,2,4
1,2,3,4

R6 After the 5th collision, the adapter choose from {0,1,...3}. The probability ~~t~~ that it chooses 4 is 1/32. It waits 204.8 microseconds

R7 In polling, a discussion leader allows only one participant to talk at a time. with ~~eat~~ each participant getting a chance to talk in a round-robin fashion. For token ring. there isn't a discussion leader, but there is wine glass that the participants take turns holding. A participant is only allowed to talk if the participant is ~~to~~ holding the wine glass.

R8 ~~If~~ When a node transmits a frame, & the node has to wait for the frame to propagate around & the entire ring before the node can release the tok. Thus, if L/R is small as compared to t_{prop}. then the protocol will be inefficient

R9. 2^{48} Mac addresses; 2^{32} IPv4 addresses; 2^{128} IPv6 addresses.

R10. C's adapter will process the frames, but the adapter will not pass the ~~ts~~ datagrams up & the protocal stack. If the LAN broadcast address is used, then C's adapter will both process the frames and pass the datagrams up the protocal stack.

R11 An ARP query is sent in a broadcast & frame be cause the querying host does not ~~who~~ which adapter address corresponds to & the IP address in question. For the response, the ~~to~~ sending node ~~to~~ knows the adapter address to which the ~~repond~~ ~~respond~~ response should be ~~send~~ sent. So there is no need to send a broadcast frame.

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R12 No it is not possible. Each LAN has its own distinct set of adapters attached to it. with each adapter having a unique LAN address.

R13 The three Ethernet technologies have identical frame structures.

P1
1 1 1 0 1
0 1 1 0 0
1 0 0 1 0
1 1 0 1 1
1 1 0 0 0

P2 Suppose we begin with the initial two-dimensional parity matrix :
0 0 0 0
1 1 1 1
0 1 0 1
1 0 1 0

Now suppose there is ~~which~~ a bit error in row 2, column 3 and column 3, the parity of row 2 is now correct. The parity of columns 2 and 3 is wrong. But we can't detect ~~is~~ in ~~rot~~ which rows the error occurred!

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Q3 01100101 01110010

Q4 a) 00011001 00011110

b) 01100000 01011011

c) 11110111 11111010

Q5 R = 0100

Q6 a) R = 0000

b) R = 1111

c) R = 1001

P7 a) With loss of generality, suppose i^{th} bit is flipped, where $0 <= i <= d+r-1$ and assume that the least significant bit is 0^{th} bit.

A single bit error means that the received data is $K = D \times 2^r$ XOR $R + 2^i$. It is clear that ~~of odd number of~~ if we devide K by G then the ~~remain~~ remider is not zero. In general, if G contains at least two 1's, then a single bit error can always be detected.

b) The key insight here is that G can be devided by 0b11, but any number of odd-number of 1's cannot be divided by 11. Thus, a sequence of odd-number bit errors cannot be divided by 11. Thus it cannot be divided by G.

a)

P8. $E(p) = Np(1-p)^{N-1}$

$E'(p) = N(1-p)^{N-1} - N(N-1)p(1-p)^{N-2}$

$= N(1-p)^{N-2}[(1-p) - p(N-1)]$

$E'(p) = 0 \Rightarrow p^* = \frac{1}{N}$

b) $E(p^*) = N \cdot \frac{1}{N} \cdot (1-\frac{1}{N})^{N-1} = (1-\frac{1}{N})^{N-1} = \frac{(1-\frac{1}{N})^N}{1-\frac{1}{N}}$

$\lim_{N\to\infty}(1-\frac{1}{N}) = 1 \quad \lim_{N\to\infty}(1-\frac{1}{N})^N = \frac{1}{e}$

Thus $\lim_{N\to\infty} E(p^*) = \frac{1}{e}$

P10 a) A's average ~~thoug~~ throughput is given by $p_A(1-p_B)$

Total efficiency is ~~E~~ $p_A(1-p_B) + p_B(1-p_A)$

b) A's throughput is $p_A(1-p_B) = 2p_B(1-p_B) = 2p_B - 2p_B^2$

B $\quad p_B(1-p_A) = p_B(1-2p_B) = p_B - 2p_B^2$

Clearly, A's throughput is not twice as large as B's

c) A's throughput is $2p(1-p)^{N-1}$, and any other node has throughput $p(1-p)^{N-2}(1-2p)$

P13 The length of a polling round is $N(Q/R + d_{poll})$

The ~~[illegible]~~ number of bits transmitted in a polling round is NQ. The maximum throughput therefore is $\frac{NQ}{N(Q/R+d_{poll})} = \frac{R}{1+\frac{d_{poll}R}{Q}}$

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P15 a) No. E can check the subnet prefix of Host F's IP address, and then learn that F is on the same LAN. Thus, E will not send the packet to the default router R1.

Source IP = E's IP address.
Destination IP = F's IP address
Source MAC = E's MAC address
Destination MAC = F's MAC address.

b) No. 不在同一LAN中. E通过检查B的IP知道.
源IP = E的IP. 目的IP = B的IP
源MAC = E的MAC 目的MAC = 连接到子网的R1接口的MAC.

c) 向B. S1广播ARP包. 其他会收到. 不会转发.
不会 ARP包已包含A的MAC. 转发给A. 并更新转发表

P16 a) 否 b) 是 c) 向B交换机广播 会收到会广播. 同P15.

P17 $\frac{512 \times 100 \text{ bits}}{10 \text{ Mb/s}} = 5.12 \text{ ms}$. 100 Mbps → 512 μs.

P18 0: A和B开始传输.
245: A和B检测碰撞.
293: 碰撞检测和进行阻塞延迟48 bit time + 245. 结束发送阻塞信号 (A、B)
538: B的最后一比特到达A. A检测到线路空闲.
634: +96 bit time 检测线路空闲. A开始重传.
805 293+512. B回到第二步

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题20 a) 令β为节点成功占用信道的概率. $\beta = C_N^1 p(1-p)^{N-1} = Np(1-p)^{N-1}$

Y为成功所需次数 $P(Y=m) = \beta(1-\beta)^{m-1}$

$x = EX = EY - 1 = \frac{1-\beta}{\beta}$ $= \frac{k}{k+x}$

$= \frac{1-Np(1-p)^{N-1}}{Np(1-p)^{N-1}} = \frac{k}{k+\frac{1-Np(1-p)^{N-1}}{Np(1-p)^{N-1}}}$

b) $p = \frac{1}{N}$

c) $\lim_{N\to\infty} = \frac{k}{k+\frac{1-\frac{1}{e}}{\frac{1}{e}}} = \frac{k}{k+e-1}$

d) $\lim_{k\to\infty} \frac{k}{k+e-1} = 1$.

题26 ① 有 A、C、D、E、F. 交换表空.

② B

③ B

④ A

题27 a) $\frac{8\cdot L}{128\times 10^3}\,s = \frac{L}{16}\,ms$

b) 若 $L=1500$, $\frac{1500}{16}\,ms = 93.75\,ms$

$L=50$, $\frac{50}{16}\,ms = 3.125\,ms$

c) $\frac{L\cdot 8+40}{R}$.