

# 计算机网络 Quiz 整理

## Quiz 1

Which of the following description about OSI layers is incorrect?

- ☐ The physical layer is concerned with transmitting raw bits over a communication channel
- ☒ The data link layer is a true end-to-end layer, all the way from the source to the destination
- ☐ The network layer controls the operation of the subnet and determines how packets are routed from source to destination
- ☐ The application layer contains a variety of protocols that are commonly needed by users

Answer:

Data link layer 不是 end-to-end layer，只考虑下一个端口。

Connectionless Services is also called

- ☐ virtual circuit service
- ☐ acknowledged datagram service
- ☐ client-server service
- ☒ datagram service

Answer:

Datagram service 就是数据包服务，数据包是无连接的，因此选择第四个。  
Acknowledged datagram service 带确认的数据包服务也算对，但是相对来说选择更加正确的。

A noiseless 2-k Hz channel is sampled every 1 msec. What is the maximum data rate?

- ☐ 1000 bps
- ☐ 2000 bps
- ☐ 4000 bps
- ☒ Can be infinite

Answer:

$f=1/1\text{msec}=1000\text{Hz}$  并没有超出 2KHz。通过 Nyquist 定理，在带宽确定的情况下，只要每次采样的信号 bits 数越多，其速率就越大，因此可以趋于无限大。

A CRC generator polynomial is  $G(X) = X^{16} + X^{15} + X^2 + 1$ . How many bits will the checksum be?

- ☐ 14
- ☐ 15
- ☐ 16
- ☒ 17

Show Answer 16

Answer:

校验码的位数=生成多项式  $G(X)$  的最高次幂。

## Quiz 2

1、 After the sender first sends frames from 0 to 6 and at the end of timeout receives the acknowledgements for frame 1, 3, and 5, the next frame it will re-transmit is frame \_\_\_\_\_. (assume the protocol is go-back-n)

- a). 1
- b). 2
- c). 5
- d). 6

Answer:

收到确认帧 1、3、5 表示第 5 帧包括之前的帧全部已收到，因此下一个将要发送的帧是第 6 帧。

2、 Consider building a CSMA/CD network running at 1000 Mbps over a 1-km cable with no repeaters. The signal speed in the cable is 200,000 km/sec. What is the minimum frame size?

Answer:

10000bits。最小帧长度=一个来回的路程，即一端到最远的地方再返回来的路程。这里一个来回的路程是  $1 \times 2 = 2\text{km}$ 。然后计算最小帧一个来回需要的时间， $2\text{km} / 200,000\text{km/s} = 0.00001\text{s}$ 。最后再乘以传输速率  $0.00001\text{s} \times 1000\text{Mbps} = 0.01\text{Mb} = 0.01 \times 10^6 = 10000\text{bits}$ 。

A network interface card mainly works at the \_\_\_\_\_ layer(s)

- ☒ physical and data link
- ☐ data link and network
- ☐ physical and network
- ☐ data link and transport

Answer:

网卡是用来允许计算机在网络上进行通讯的计算机硬件。由于数据链路层有 MAC 物理地址协议，而网卡拥有 MAC 地址，因此网卡属于数据链路层。同时网卡是在底层工作的，因此也属于物理层。

## Quiz 3

1、 Which is the IP address whose hexadecimal representation is 12230932?

- a. 12.23.09.32
- b. 18.35.09.50
- c. 50.09.35.18
- d. 32.09.23.12

Answer:

B. 先将十六进制数转换成二进制形式，然后在八位八位分组，每组转换成十进制即可。

2、 Which is a link state routing protocol?

- a. RIP
- b. IGRP
- c. BGP
- d. OSPF

Answer:

D. OSPF 是链路状态的路由协议，属于内部网关协议，用于同一个自治系统内部。该协议将链路状态组播传送给在区域内的所有路由器。而距离矢量路由协

议则是将部分或全部的路由表传递给与其相邻的路由器。

3、What is the valid host range for subnet 212.10.10.32, mask 255.255.255.224?

a). 212.10.10.0 through 212.10.10.255

b). 212.10.10.32 through 212.10.10.63

c). 212.10.10.33 through 212.10.10.62

d). 212.10.10.1 through 212.10.10.254

Answer:

C. 224->1110, 0000, 32->0010, 0000, 主机地址有 5 位可供 32 个地址。再减去全 0 的网络地址和全 1 的广播地址, 剩下 30 个地址。主机地址应从 000001 开始, 即 33。

4、A router has the following (CIDR) entries in its routing table:

Address	Mask	Next Hop
135.46.64.0	255.255.192.0	192.168.0.1
135.46.80.0	255.255.240.0	172.16.0.1
135.46.128.0	255.255.224.0	10.0.0.1
0.0.0.0	0.0.0.0	123.0.0.1

Which is the next hop if a packet with the destination address 135.46.95.2 arrives?

a. 192.168.0.1    b. 10.0.0.1    c. 172.16.0.1    d. 123.0.0.1

How about the destination address is 135.46.161.2?

a. 192.168.0.1    b. 10.0.0.1    c. 172.16.0.1    d. 123.0.0.1

Answer:

解题思路: 首先将 IP 地址的网络地址写成二进制形式, 并列出掩码长度。然后转换题目的 IP 地址, 再与表中的地址进行比对, 选择匹配中最长的。

由于表中 IP 地址前两部分相同, 因此仅转换第三部分即可。第一小题: 95->0101, 1111, 第一个和第二个地址都匹配, 然后选择最长的, 即 135.46.80.0。第二小题: 161->1010, 0001, 101 和 100 不匹配, 因此选择 123.0.0.1 作为下一跳地址。

5、In a TCP/IP network, an original IP datagram contains 1500 bytes of data and 36 bytes of header. When it passes through a router with the maximum datagram length (header+data) of 420 bytes, it breaks into multiple fragments. In the format (header length, total length, identification, DF, MF, offset), the values of original datagram's header fields are (9,1536,13762,0,0,0).

a). The original datagram breaks into 4 fragments, the length of the first fragment's data part is 384 bytes, and the length of the last one's data part is 348 bytes.

b). Please fill these fragment's header fields values with the format (header length, total length, identification, DF, MF, offset) in the following blanks:

The first fragment:	9	420	13762	0	1	0
The second fragment:	9	420	13762	0	1	48
The last fragment:	9	384	13762	0	0	144

Answer:

a).  $1500+36=1536$  Bytes.  $1536/420 \approx 4$  fragments.  $420-36=384$  Bytes. 所分成的每个段其 data 部分能够放下 384 Bytes,  $1500-(3*384)=348$  Bytes 为最后一段的 data length。

b). 4 Bytes(32 bit)为一行,  $36/4=9$ , 即 Header 一共有 9 行;  $348+36=384$  Bytes; 所有 ID 都一样, 不会改变;  $384/8=48$ ,  $384*3/8=144$ , 减去头, 只把数据部分的长度相加再除以 8 Bytes。

6、A large number of consecutive IP address are available starting at 202.101.0.0. Suppose that four organizations, A, B, C, and D, request 1024, 2000, 2000, and 4000 addresses, respectively, and in that order.

Please assign the IP address and the mask in the w.x.y.z/s notation.

Answer:

	第三字段	
202.101.0.0/22	<u>0000 0011</u>	分配 1024 个地址, 空间足够
202.101.8.0/21	0000 0100	100~111, 可提供 1024 个地址
202.101.16.0/21	<u>0000 0111</u>	不够分配 2048 个, 因此不能为 4
202.101.0.32/20	0000 1000	分配 2048 个地址, 空间足够
	<u>0000 1111</u>	
	0001 0000	分配 2048 个地址, 空间足够
	<u>0001 0111</u>	
	0001 1000	1000~1111, 可提供 2048 个地址
	<u>0001 1111</u>	不够分配 4096 个, 因此不能为 24
	0010 0000	分配 4096 个地址, 空间足够