3331

1 A 10-node Local Area Network (LAN) is using Time Division Multiple Access (TDMA) to share the common channel. The TDMA uses 1-ms slots. What would be the worst-case delay from the moment a frame is ready to be transmitted in a node to the time that the node can start transmitting the frame on the channel? Note that a frame transmission can commence only at the start of the slot designated for the node, i.e., the node cannot start transmission in the middle of a slot.

Select one alternative:

- ○ None of these
- ○ 8ms
- ○ 10ms
- ○ 9ms

1.时间节点：从某节点准备好传输开始，到它能够传输。（注意不是它传输完成）
2. TDMA，轮流的，最多能9次，另外9个节点各占1个slot

9ms

2 Which of the following multiple access techniques will allow two nodes to transmit at the same time?

Select one or more alternatives:

- ☐ CSMA
- ☐ Both CSMA and TDMA
- ☐ FDMA
- ☐ Token Passing
- ☐ TDMA
- ☐ Both CSMA and FDMA

csma同一时间发就碰撞了，谁都发不了。
fdma，同一时间发，各有各自的频率，成功发送。

没带ca，也没带cd。所以没防碰撞机制。

tdma不对，因为tdma是时间作为资源分片的。不可能同一时间都发送

只有带令牌的才能发送，确保了不会碰撞。（不会允许同一时间发两个节点）

方块是可以多选的。少选是能给一点分的，多选扣分。

FDMA
csma
both csma and fdma

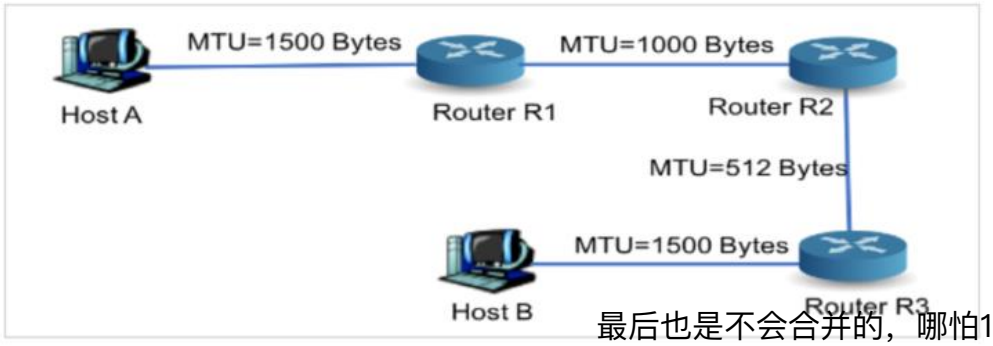
3 Which of the following multiple access techniques would allow collisions to occur?

Select one alternative: 只有允许同一时间发，才有发生碰撞的可能性。

- ○ FDMA
- ○ TDMA
- ○ Token Passing
- ○ CSMA
- ○ None of these

CSMA

4



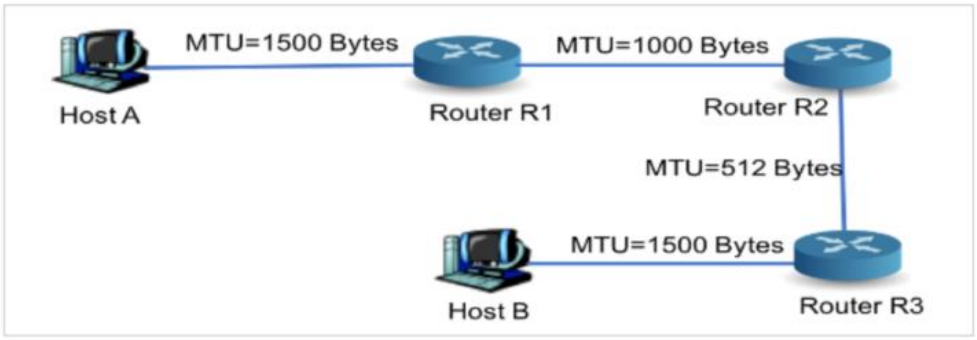
最后也是不会合并的，哪怕1500是更大的。

Consider the network in the illustration. Now suppose that the IP layer of Router R1 receives a datagram of size 1500 Bytes, including 20 bytes of IP header, from Host A.

How many fragments are received by the IP layer at Host B?: [ ] .

确定：4

5



Consider the network in the illustration. Now suppose that the IP layer of Router R1 receives a datagram of size 1500 Bytes, including 20 bytes of IP header, from Host A. What would be the value in Fragment Offset field of the last fragment received at Host B? .

Maximum marks: 3

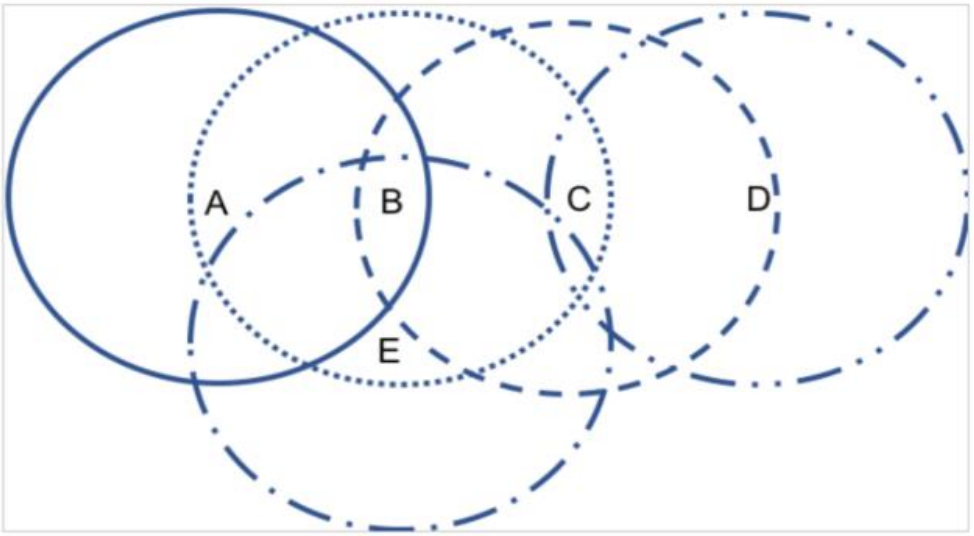
184

20 + 1480

20+980 — 20 +
20+500 — 20+492 — 20 + 8

offset = 0 + (1480 − 8)/8 = 184

6



Consider the wireless network in the illustration, which is an example of a wireless LAN topology comprised of 5 nodes marked A through E sharing the same frequency. Circles around each node illustrate their transmission range, e.g. A's range is shown by circle drawn in solid line. Assume that the transmissions from two nodes will interfere (or collide) at a location if and only if both nodes transmit at the same time and their transmission ranges overlap. Now assume that, using 802.11 MAC, node A is sending a data frame (not an ACK, an RTS, or a CTS) to node B, but node C (and only C) ignores the 802.11 MAC and sends a packet to node D at the same time. Which nodes will successfully receive a packet?

Select one alternative:

- ○ Only D will receive a packet successfully
- ○ Only B will receive a packet successfully
- ○ Both B and D will receive a packet successfully
- ○ Neither B nor D will receive a packet successfully

only D

7 A single-bit parity would be able to detect 3-bit errors in the message.

Select one alternative:

- ○ False
- ○ True

只要是

只要是奇数，都可以检测出来。偶数的话就不行。

True

8 An ISP client has two options for configuring its DNS query server. It can either select the local DNS server located inside its ISP, or it can send all its queries to a high-performance public DNS server located in the Internet. The local ISP server has a round-trip-time (RTT) of 10 ms, whereas the public server has 150 ms RTT. Despite such large RTT, the public server could be an attractive choice due to its high performance. For 90% of the queries, the public server can resolve a DNS query within 1 ms from the moment it receives a query, but for the remaining 10%, the resolving time is 100 times higher. In contrast, the local server can resolve a DNS query within 1 ms only for 10% of the queries, but for the remaining 90%, it takes significantly more time. Which of the following cases will yield faster DNS experience for the ISP client if it chooses the public DNS server instead of the local ISP DNS server?

Select one or more alternatives:

- ☐ The local server takes 100 ms to resolve a DNS query for 90% of the time
- ☐ The local server takes 200 ms to resolve a DNS query for 90% of the time
- ☐ The local server takes 90 ms to resolve a DNS query for 90% of the time
- ☐ The local server takes 170 ms to resolve a DNS query for 90% of the time
- ☐ The local server takes 180 ms to resolve a DNS query for 90% of the time

Reset Maximum marks: 1.5

The local server takes 170 ms to resolve a DNS query for 90% of the time

The local server takes 180 ms to resolve a DNS query for 90% of the time

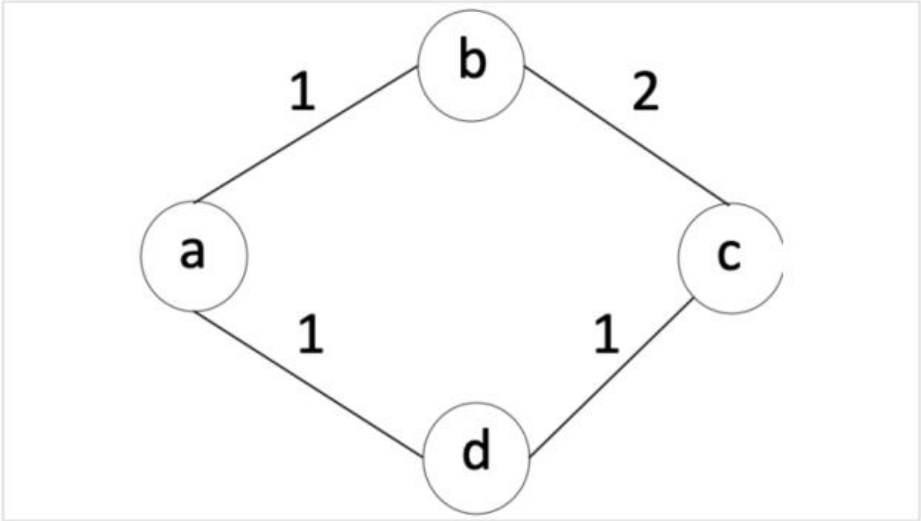
The local server takes 200 ms to resolve a DNS query for 90% of the time

$150 + 0.9 + 10 < 10 + 0.8 + 0.9x$

$x > 167.5$

Reset Maximum marks: 1.5

9



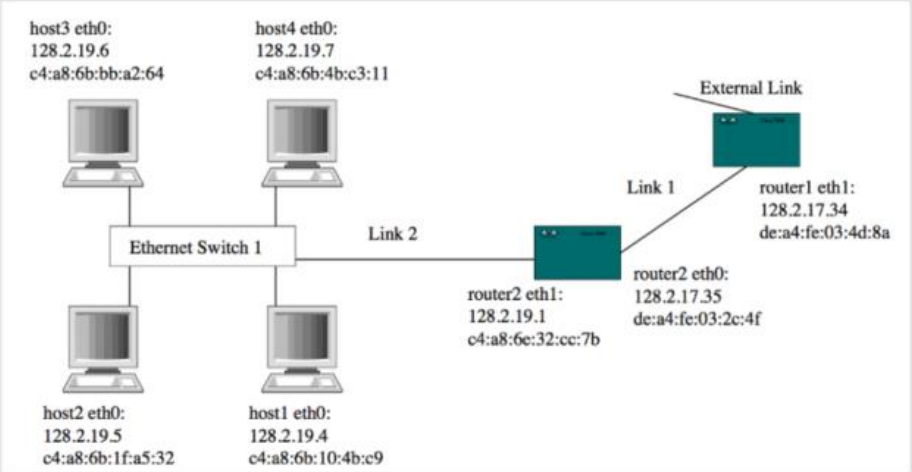
Consider the network in the illustration where the network runs a link-state routing protocol that computes shortest paths as sum of the link weights (costs). The number on each link is the weight (cost) of the link in both directions, e.g., links b-c and c-b both have a weight of 2. Suppose nodes a, b, and d send packets to destination node c. If links d-c and c-d fail, which of nodes a, b, and d could conceivably see their packets stuck in a temporary forwarding loop?

Select one alternative:

- ○ a and b
- ○ b and d
- ○ None of these
- ○ a and d

a and d

10



Consider the network in the illustration which shows a partial network topology involving Ethernet switches and IP routers. The hosts (host1 through host4) and router2 on the Ethernet subnet are connected to the self-learning switch in a star topology. Link 1 and Link 2 use the subnets 128.2.17.34/31 and 128.2.19.0/25, respectively. Now assume that an IP packet with a destination IP address of 128.2.19.5 arrives at router 1 on the external link. If this is the first packet to be forwarded on the network, what would be the MAC source address and MAC destination address, respectively, in the ARP request that will be sent out on Link 2?

Select one alternative:

- c4:a8:6b:1f:a5:32, ff:ff:ff:ff:ff:ff
- c4:a8:6e:32:cc:7b, ff:ff:ff:ff:ff:ff
- c4:a8:6e:32:cc:7b, c4:a8:6b:1f:a5:32
- ff:ff:ff:ff:ff:ff, c4:a8:6e:32:cc:7b

第二个

11 An 8-byte message is coded using 2-dimensional bit parity. The entire message is organised as an 8-bit X 8-bit matrix while computing a single parity bit for each row and column of the matrix. Show an 8-bit error pattern within the 8-byte message that could be detected as well as corrected by the 2-dimensional parity.

Fill in your answer here

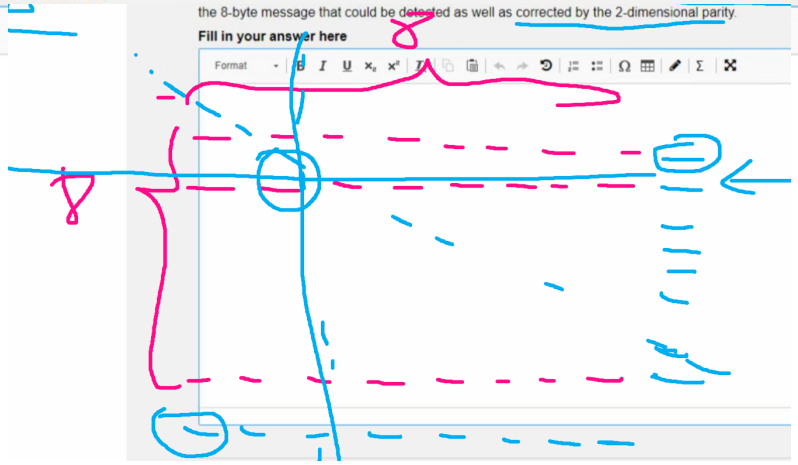
Help

Format

the 8-byte message that could be detected as well as corrected by the 2-dimensional parity.

Fill in your answer here

Format



如果只有1位错误，不管在哪，都能检测到。
如果是8位的，如果是对角线的错误，8-bi t，都能够检测到。

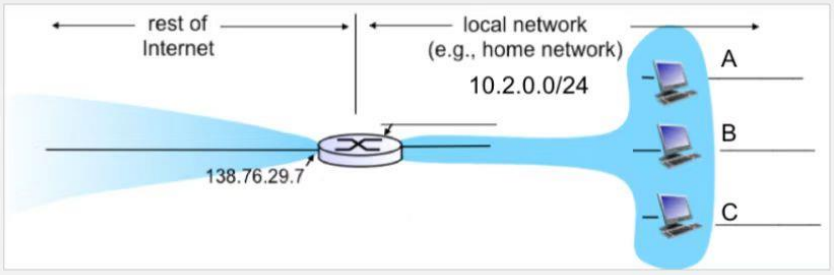
Words: 0

Maximum marks: 3

```
1 0 1 0 1 0 0 0  |  1

1 1 1 1 0 0 0 0  |  0
-------------------
0 1 0 1 1 0 0 0


1 1 1 1 0 0 0 0 -> 1 0 1 1 0 0 0 0


1 0 1 0 1 0 0 0  |  1

1 0 1 1 0 0 0 0  |  1
-------------------
0 0 0 1 1 0 0 0
```

detect the error 0, correct it to 1.

12



Consider the NAT configuration shown in the illustration.. The private network (i.e. local network) behind the NAT router is using IP addresses in the range 10.2.0.0/24. The WAN side address of the NAT router is 138.76.29.7. Answer the following questions:

(a) Specify IP addresses for all interfaces of the local network. This includes the 3 clients (A, B and C) and the LAN side interface of the NAT router. [2 marks]
(b) Now assume that the top-most client (A) in the local network sends an HTTP GET Request to http://www.unsw.edu.au (which is hosted at IP address: 129.119.103.149) and the local port for the TCP connection on this client is 7000. Assume the NAT translation table is initially empty. Show the NAT translation table with the information that would be entered in that table after the HTTP request has been forwarded from the NAT router into the WAN. [2 marks]
(c) What would be the source IP address, source port number, destination IP address and destination port number in the HTTP response message sent by the UNSW web server in response to this GET request? [1 mark]

Fill in your answer here Help

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(a)

router: 10.2.0.1

A：10.2.0.2

B: 10.2.0.3

C: 10.2.0.4

(b)

WAN side addr,

LAN side addr

138.76.29.7, 5001 最好说明，题目里没指定，1024–65535随机选 10.2.0.2, 7000

(之前写错了)

(c) source IP address: 129.119.103.149

source port number: 80

destination IP address: 138.76.29.7

destination port number : 5001

13 Consider a video streaming system that encodes all video at a fixed bit rate, and each video block is to be played out exactly over 10 seconds. The following table shows the transmission times of 7 video blocks at the server as well as the corresponding receiving times at the client (player). Once the client begins playout, each block should be played out exactly 10 seconds after the previous block.

Transmission and reception times of video blocks.

Video Block Number	Transmission Time at Server	Arrival Time at Client
1	T0	T1
2	T0+10	T1+15
3	T0+20	T1+22
4	T0+30	T1+28
5	T0+40	T1+32
6	T0+50	T1+45
7	T0+60	T1+81

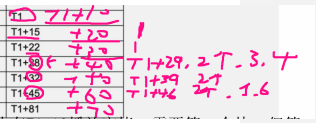
Answer the following questions:

(a) Suppose that the client begins playout as soon as the first block arrives at T1. How many blocks will have arrived at the client in time? Explain how you arrive at your answer. [2 marks]

(b) Now suppose that the client begins playout at T1+10. How many blocks will have arrived at the client in time? Explain how you arrive at your answer. [1 mark]

(c) Assuming the same scenario at (b) above, what is the largest number of blocks that is ever stored in the client buffer, awaiting playout? Explain how you arrive at your answer. [1 mark]

(d) What is the smallest playout delay at the client, such that every video block has arrived in time for its playout? Explain how you arrive at your answer. [1 mark]



（a） 第一个块在T1+10播放完毕，需要第二个块，但第二个块在T1+15才到，所以迟到了。对于2，3，4，5，6，这四个块都能连播。第7个块应该在T1+65之前到达

（b）1，2，3，4，5，6都是按时到达。

（c）最多两个包

（d）T1+21

（a）Because each video block is to be played out exactly over 10 seconds. Block 1 在 T1+10 时刻放完，但是 Block 2 没有到达。所以 Block 2 在 T1+15 时刻播放，Blocks 3，4，5，6 都 arrived in time（到达间隔小于 10 秒），Block 6 在（T1+15）+ 50 时刻放完，此时 Block 7 未到达。因此一共 4 个 block（3，4，5，6）arrived in time。

（b） Block 1 在 T1+20 时刻放完，所以 Block 2 arrived in time。同（a），blocks 3，4，5，6 也 arrived in time。因此 Block 6 在（T1+10）+ 60 时刻放完，此时 Block 7 未到达。因此一共 5 个 block（2，3，4，5，6）arrived in time。

（c）

Time	Buffer
T1	T1
T1+10	empty
T1+15	T2
T1+20	empty
T1+22	T3

T1+28 T3, T4

T1+30 T4

T1+32 T4, T5

T1+40 T5

T1+45 T5, T6

T1+50 T6

T1+60 empty

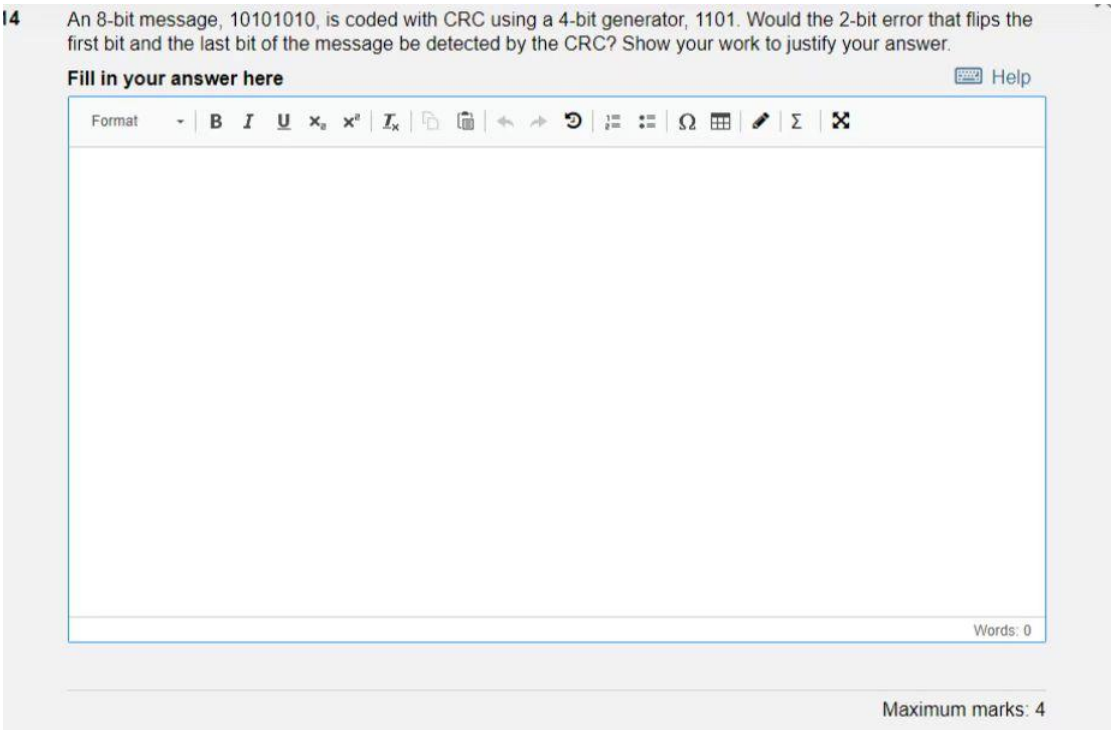
T1+70 empty

T1+81 empty

According to the table, the largest number of blocks in buffer is 2.

(d)

- -
- -



(抄一些题干)

(首先说明，需要在发送端和接收端都进行一次 crc)

在发送端:

(给出一个形式，就是 10101010 000 除以 1101 以后，余数是多少，这里我算出来是 110，　　后面的公式可以用文字描述：10101010 000 % 1101 = 110)

(接着说明，要发送的信息就是 10101010 加上这个余数：　) message sent is 10101010 110

在接收端:

(这里要把上面要发送 的信息的第一位和最后一位取反) 获取的数据是: 101010 111

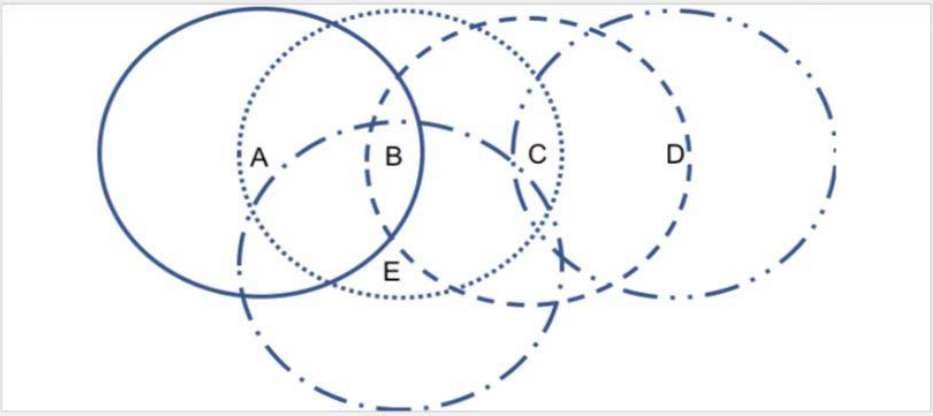
(这里说明计算出来是有余数的，余数在 001，010， 110， 111 之间选一个，文字和公式形式都可以) 00101010 111 % 1101 = 100

结论就是: (crc 能检测到发现了错误。错误类型是无法检测出来的)

,

2-bit error that flips the first bit and the last bit of the message: 10101010 -> 00101011

15



Consider the wireless network in the illustration., which is an example of a wireless LAN topology comprised of 5 nodes marked A through E sharing the same frequency. Circles around each node illustrate their transmission range, e.g. A's range is shown by circle drawn in solid line. Assume that the transmissions from two nodes will interfere (or collide) at a location if and only if both nodes transmit at the same time and their transmission ranges overlap. Now assume that node B transmits to node C. **What are the potential hidden terminals and exposed terminals?**

Fill in your answer here Help

Format

B C, (A D

不在 B D

C B 和 D)

exposed terminals: