

تحليل وتصميم شبكات 12:2 الاثنين 29/3/2021 د/نجوى محمد عمر

Faculty of Computers & Information, Assiut University
4th Level
Final Exam
Duration: 2 hours

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Hi Kareman, when you submit this form, the owner will be able to see your name and email address.

* Required

1

* الإسم الرباعي (بالعربي فقط)

كريماني رفعت سعد عبدالودود

2

* رقم الجلوس

162017112

3

*** المستوى**

- ☐ الاول
- ☐ الثاني
- ☐ الثالث
- ☐ الرابع 2013
- ☐ الرابع 2014
- ☐ الرابع 2015
- ☐ الرابع 2016
- ☒ الرابع 2017

4

*** البرنامج**

- ☒ عام
- ☐ بايو
- ☐ هندسة

5

*** رقم المعمل**

6

* رقم الكمبيوتر

19

7

* كود المراقب 

DE21

8

* إسم الملف بالمسار (تملاً بمعرفة المراقب)

Enter your answer

9

A polling network is to be constructed with roll-call polling and the parameters are as follows: Propagation time is negligible; length of polling packet is 2 bytes; length of go-ahead is 1 byte; modem sync time is ignored; number of stations is 100; packet length distribution is constant; average packet length is 50 bytes; average input rate to each station is 10 packets per second; data rate of the channel is 1Mbps. Under these conditions the normalized throughput is approximately 0.4 *

(1 Point)

☐ True☒ False

10

A node in a network can be modeled as M/M/1 queue and connected by channel with output rate of 40 messages per second. The channel service rate is 40 messages per second. The average arrival rate per second is approximately *

(1 Point)

☐ 20☒ 40☐ 1☐ 0.05☐ 0.5☐ Non of the previous

11

In polling network, the packets arriving during the service period do not have a large effect on the average number of queued packets particularly if $\rho < 1$ and M is large *

(1 Point)

☐ True☒ False

12

Nonpersistent CSMA/CD, both slotted and unslotted, give greater maximum throughput than 1-persistent CSMA/CD for small values of "a" *

(1 Point)

- ☒ True
- ☐ False

13

The maximum offered traffic of ALOHA is *

(1 Point)

- ☐ 0.5
- ☒ 1
- ☐ 0.184
- ☐ 0.368
- ☐ Non of the previous

14

A node in a network can be modeled as M/M/1 queue and connected by channel that has bit rate of 1400 bps. There are 10 bits per message. Under certain condition it is known that an average of 50 messages are stored in the network (buffer and channel). Under these conditions the traffic intensity is 50/51 *

(1 Point)

- ☐ True
- ☒ False

15

In token ring network, the transmitting station is responsible for removing its packet from the ring and for generating a new free token *

(1 Point)

- ☒ True
- ☐ False

16

Question *

(1 Point)

The PDF for the random variable K that represents the number of failure of transmission trials considering that the probability of success is p is

- a. $f_k = (1-p)p^k$
- b. $f_k = (1-p)^k p$
- c. $f_k = \binom{N}{k} (1-p)^k p^{N-k}$
- d. $f_k = \binom{N}{k} (1-p)^{N-k} p^k$
- e. Non of the previous

- ☐ a
- ☐ b
- ☒ c
- ☐ d
- ☐ e

17

A group of personal computers uses ALOHA access scheme to communicate over a bus network with channel bit rate of 1 Mbps. If the packet length is 1000 bits and the propagation delay and the average backoff time are ignored, at the maximum offered traffic, the average delay due to retransmissions in seconds is approximately *

(1 Point)

- ☐ 1.718
- ☒ 2.718
- ☐ 0.0017
- ☐ Non of the previous

18

The Average Transfer Delay is normalized by using the channel bit rate *

(1 Point)

- ☒ True
- ☐ False

19

For M/M/1 queue with zero traffic intensity, the normalized average transfer delay has value greater than zero *

(1 Point)

- ☐ True
- ☒ False

20

Consider slotted ring of 1 km long, has 50 stations attached, and has a bit rate of 10Mbps. Consider the station latency is 1bit; the propagation delay is 5 usec/km and each slot has 3 bytes of data and 3 bytes of headers. The packets arrive at any station by rate 1 packet/sec. The packet length is 1200 bits. Then the number of slots that the ring can hold without adding any artificial delay is 3 *

(1 Point)

☒ True☐ False

21

For multiple token operation, the effective service time equals to the ring latency *

(1 Point)

☐ True☒ False

22

A node in a network can be modeled as M/M/1 queue and connected by channel with output rate of 40 messages per second. The channel service rate is 40 messages per second. The traffic intensity is approximately *

(1 Point)

☐ 20☐ 0.05☐ 0.5☒ 1

☐ Non of the previous

23

A polling network is to be constructed with roll-call polling and the parameters are as follows: Propagation time is negligible; length of polling packet is 2 bytes; length of go-ahead is 1 byte; modem sync time is ignored; number of stations is 100; packet length distribution is constant ; average packet length is 50 bytes; average input rate to each station is 10 packets per second; data rate of the channel is 1Mbps. Under these conditions the average cycle time is approximately 0.004 sec *

(1 Point)

☒ True

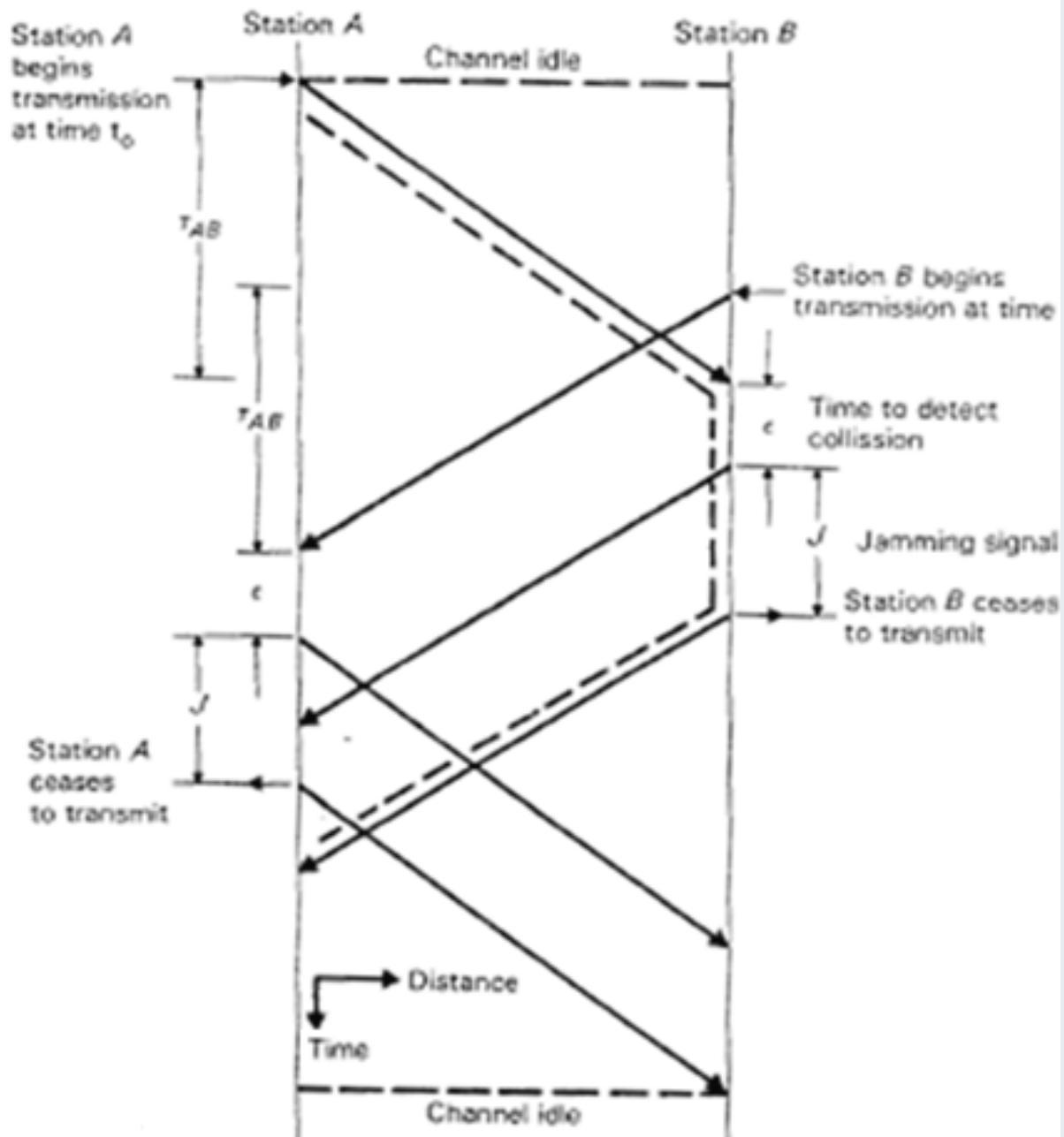
☐ False

24

Question *

(1 Point)

In the following figure, the contention interval is $Y + J + 2\tau_{AB} + \epsilon$



Timing Diagram for CSMA/CD, Showing Contention

☒ True

☐ False

25

If we have a computer network with probability of 0.4 to receive single bit incorrectly. Then the probability of receiving all 8 bits of a single byte correctly assuming errors occur independently is approximately *

(1 Point)

- ☐ 0.016796
- ☒ 0.000655
- ☐ Non of the previous

26

The average waiting delay in polling networks consists of two delay components 1)the waiting delay in the station buffer while other stations are being served 2)the waiting delay in the station buffer while this station is being served *

(1 Point)

- ☒ True
- ☐ False

27

A node in a network can be modeled as M/M/1 queue and connected by channel with output rate of 40 messages per second. The channel service rate is 40 messages per second. The average transfer delay is approximately *

(1 Point)

- ☐ 0.075
- ☒ Infinity
- ☐ 0.1

☐ 1☐ Non of the previous

28

In Nonpersistent CSMA, if the channel is sensed busy, the station uses the backoff algorithm to reschedule the packet to a later time *

(1 Point)

☒ True☐ False

29

TDMA and FDMA are suitable for the bursty users *

(1 Point)

☒ True☐ False

30

In ALOHA, the offered traffic is related to the new arrivals as well as the arrivals due to retransmission. *

(1 Point)

☒ True☐ False

31

A polling network is to be constructed with roll-call polling and the parameters are as follows: Propagation time is negligible; length of polling packet is 2 bytes; length of go-ahead is 1 byte; modem sync time is ignored; number of stations is 100; packet length distribution is constant; average packet length is 50 bytes; average input rate to each station is 10 packets per second; data rate of the channel is 1Mbps. Under these conditions the walk time is approximately 0.024 ms *

(1 Point)

- ☒ True
- ☐ False

32

An idealized central control network services 10 stations and its channel bit rate is 9600 bps. At throughput of 0.5 and 500 bits message length the normalized average transfer delay is approximately *

(1 Point)

- ☐ 1.5
- ☐ 15
- ☐ 0.078
- ☐ 0.78
- ☒ 2
- ☐ Non of the previous

33

The polling network gives the same performance as idealized central control when walk and propagation times equal to zero *

(1 Point)

- ☒ True
- ☐ False

34

Considering that the propagation delay is 5 usec/km, then the maximum channel bit rate that can be used for 10 km bus length and packet length of 1000 bits if the CSMA/CD protocols are to have the largest capacity with normalized propagation delay less than 0.001 is 20000 bps *

(1 Point)

- ☐ True
- ☒ False

35

Question *

(1 Point)

Consider that there are three stations located on the ring as shown in the figure. Each station has latency of one bit. The propagation delay is negligible except between station 2 and station 3 which has a value of one bit. Station one is the only station with data to transmit, and it has 2 data bits. The following table correctly shows the position of the free token, the busy token, and data bits for single packet ring.

Time	In1	out1	out2	out3
1	□			□
2		■		
3		D	■	
4		D	D	
5	■		D	■
6	D			D
7	D			D
8		□		
9			□	
10				
11	□			□
12		■		
13		D	■	
14		D	D	

□=free token, ■=busy token, D =data

- ☐ True
- ☒ False

36

The probability of successful transmission in ALOHA is the probability of at most one arrival in the packet transmission time *

(1 Point)

- ☒ True
- ☐ False

37

The probability of successful transmission in FDMA is less than 1. This is to enable the network to work in the steady state *

(1 Point)

- ☐ True
- ☒ False

38

If in each 100-bit block there is 5 overhead bits that are used for error detection; the remaining bits carry data, 10 blocks are sent every second, the channel bit rate is 2000 bps. Then the unnormalized throughput is approximately *

(1 Point)

- ☒ 950 bps
- ☐ 1050 bps
- ☐ 0.52
- ☐ Non of the previous

39

For a stable network in the steady state, the average input and output rates must be equal *

(1 Point)

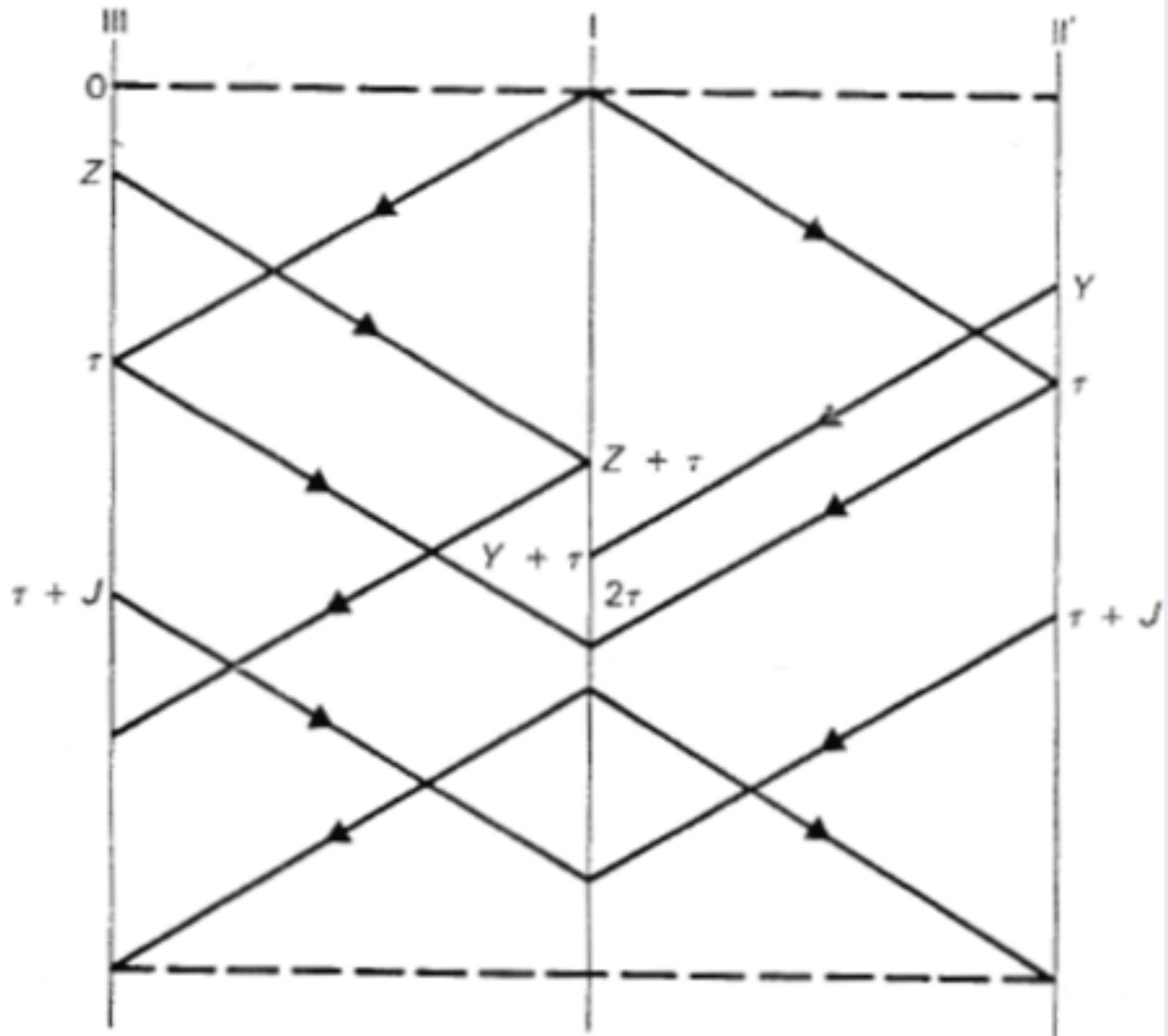
- ☒ True
- ☐ False

40

Question *

(1 Point)

In the following figure, if the jamming time is J , the contention interval



Three Colliding Transmissions in a Collision Period for CSMA

☒ True

☐ False

41

In hub polling, after the station has transmitted its backlog of messages, it notifies the central computer with a go-ahead suffix to its last packet and optional next-station address *

(1 Point)

- ☐ True
- ☒ False

42

A group of personal computers uses ALOHA access scheme to communicate over a bus network with channel bit rate of 1 Mbps. If the packet length is 1000 bits and the propagation delay and the average backoff time are ignored, at the maximum offered traffic, the average number of retransmissions is approximately *

(1 Point)

- ☒ 1.718
- ☐ 2.718
- ☐ 0.0017
- ☐ Non of the previous

43

Consider slotted ring of 1 km long, has 50 stations attached, and has a bit rate of 10Mbps. Consider the station latency is 1bit; the propagation delay is 5 usec/km and each slot has 3 bytes of data and 3 bytes of headers. The packets arrive at any station by rate 1 packet/sec. The packet length is 1200 bits. Then The overhead factor is 1 *

(1 Point)

☒ True

☐ False

44

The maximum throughput increases by increasing the jamming signal time in case of CSMA/CD *

(1 Point)

☐ True

☒ False

45

A group of personal computers uses Slotted ALOHA access scheme to communicate over a bus network with channel bit rate of 1 Mbps. If the packet length is 1000 bits and the propagation delay is ignored, at the maximum offered traffic the maximum throughput is approximately *

(1 Point)

☐ 0.184

☒ 0.368

☐ 0.5

☐ 1

☐ Non of the previous

46

An idealized central control network services 10 stations and its channel rate is 9600 bps. At throughput of 0.5 and 500 bits average message length. The average arrival rate per second per station is approximately *

(1 Point)

- ☒ 0.96
- ☐ 96
- ☐ 1.04
- ☐ Non of the previous

47

For single token operation, if the packet is longer than the ring latency, the transmitting station generates a new free token and places it on the ring immediately following the last bit of the transmitted data *

(1 Point)

- ☒ True
- ☐ False

48

The relationship between offered traffic and throughput for FDMA, TDMA, and idealized central control protocols is linear *

(1 Point)

- ☐ True
- ☒ False

49

Consider slotted ring of 1 km long, has 50 stations attached, and has a bit rate of 10Mbps. Consider the station latency is 1bit; the propagation delay is 5 usec/km and each slot has 3 bytes of data and 3 bytes of headers. The packets arrive at any station by rate 1 packet/sec. The packet length is 1200 bits. Then the normalized throughput is 0.006 *

(1 Point)

☐ True☒ False

50

The average time messages spend in the network equals to the product of the average number of messages stored in the network and the average arrival rate of messages to the network *

(1 Point)

☐ True☒ False

51

The p-persistent CSMA protocol never allows the channel to go unused when there is a ready station. If the channel is sensed idle, the packet is transmitted. If the channel is sensed busy, the station keeps on sensing the channel until the channel goes idle, and then it transmits the packet *

(1 Point)

☒ True☐ False

52

Question *

(1 Point)

The average transfer delay for TDMA network with constant length packets is derived in a textbook. But, the average transfer delay of TDMA network that has an exponentially distributed packet lengths is

a. $T = \frac{\bar{X}}{R} + \frac{M\bar{X}}{2R} + \frac{MS}{2(1-S)} \left(\frac{\bar{X}}{R} \right)$

b. $T = \frac{M\bar{X}}{R} + \frac{S}{2(1-S)} \left(\frac{M\bar{X}}{R} \right)$

c. $T = \frac{\bar{X}}{R} + \frac{M\bar{X}}{2R} + \frac{MS}{1-S} \left(\frac{\bar{X}}{R} \right)$

d. $T = \frac{\bar{X}}{R} + \frac{M\bar{X}}{R} + \frac{S}{2(1-S)} \left(\frac{M\bar{X}}{R} \right)$

e. Non of the previous

☐ a

☐ b

☒ c

☐ d

☐ e

53

A group of personal computers uses Slotted ALOHA access scheme to communicate over a bus network with channel bit rate of 1 Mbps. If the packet length is 1000 bits and the propagation delay is ignored, at the maximum offered traffic, the average new arrivals per second to the network is approximately *

(1 Point)



184



368



1000



500



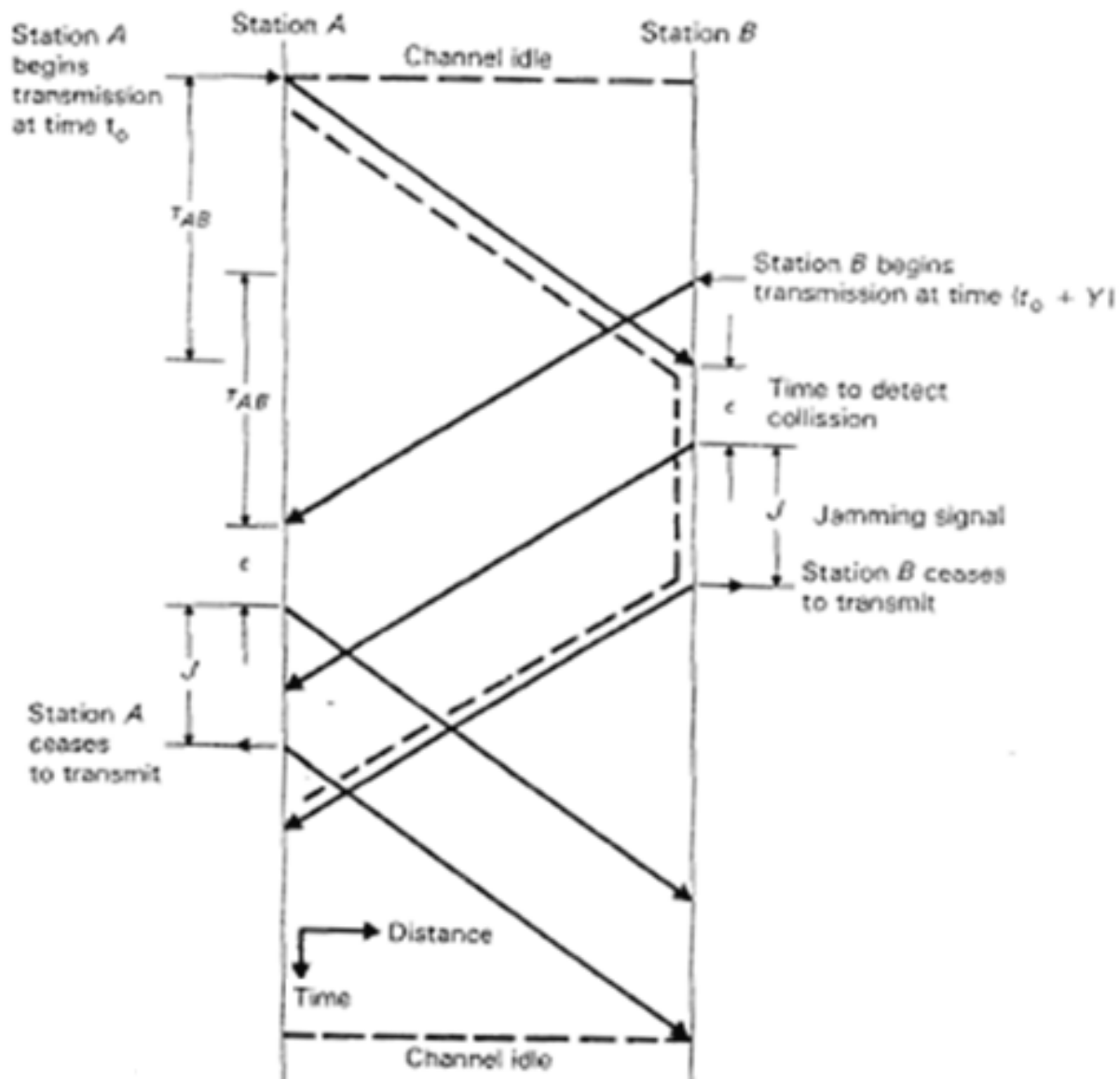
Non of the previous

54

Question *

(1 Point)

In the following figure, stations view the channel as active for exactly the same length $J + 2T_{AB} + \epsilon$



Timing Diagram for CSMA/CD, Showing Contention

☒ True

☐ False

55

A node in a network can be modeled as M/M/1 queue and connected by channel that has bit rate of 1400 bps. There are 10 bits per message. Under certain condition it is known that an average of 50 messages are stored in the network (buffer and channel). Under these conditions the normalized average transfer delay is 51 *

(1 Point)

- ☐ True
- ☒ False

56

Consider slotted ring of 1 km long, has 50 stations attached, and has a bit rate of 10Mbps. Consider the station latency is 1bit; the propagation delay is 5 usec/km and each slot has 3 bytes of data and 3 bytes of headers. The packets arrive at any station by rate 1 packet/sec. The packet length is 1200 bits. Then the ring latency is approximately 10 usec *

(1 Point)

- ☒ True
- ☐ False

57

Consider slotted ring of 1 km long, has 50 stations attached, and has a bit rate of 10Mbps. Consider the station latency is 1bit; the propagation delay is 5 usec/km and each slot has 3 bytes of data and 3 bytes of headers. The packets arrive at any station by rate 1 packet/sec. The packet length is 1200 bits. Then the average transfer delay is approximately 490.8 us *

(1 Point)

- ☐ True

☒ False

58

The monitoring function in hub polling for ring topologies can be implemented if a polling sequence progresses between adjacent stations. If the stations are polled in the same sequence they are physically located on the ring *

(1 Point)

☒ True

☐ False

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