Abstract

The coverage issue in remote sensor systems (WSNs) can be commonly characterized as a proportion of how successfully a system field is checked by its sensor hubs. This issue has pulled in a ton of enthusiasm throughout the years and subsequently, numerous inclusion conventions were proposed. Right now, first propose a scientific classification for grouping inclusion conventions in WSNs. At that point, we arrange the coverage conventions into three classes (i.e., coverage aware deployment protocol, sleep scheduling protocols for level systems, and cluster-based sleep scheduling protocols) in light of the system organize where the inclusion is enhanced. For every classification, pertinent conventions are completely looked into and ordered dependent on the embraced inclusion procedures. At long last, we talk about open issues (and prescribe future headings to determine them) related with the plan of sensible inclusion conventions. Issues, for example, practical detecting models, reasonable vitality utilization models, practical network models and sensor limitation are secured.

Index Terms: Coverage protocols, energy consumption, literature review, sensing models, survey, wireless sensor network (WSN).

Introduction

Wireless sensor networks (WSNs) have get the attention of lots of many intellectuals over from many fields of life over the past decade. The main reason behind this rapid increase in the field of WSNs are the advantages it gives to different aspects of life including defense, medicine, education law & order and many such more. All these mentioned fields required lots of sensor which can be used to upgrade our living standard but in more secure way. These applications require the deployment of several sensors to cover a given region of interest (ROI) in the network field. It is important to mention here that WSNs can work as individual points or joint venture as well which can get us good results which will be used to make decision. It is important to mention here that wireless sensor is very important which can communicate with each other if needed and can operate on its own depends on situations and the algorithm it used to get good results. Based on mentioned features which are just tip in the iceberg but still WSNs makes an excellent choice for many applications like such environments which are not safe for human health.

Unlike its advantages there are some draw backs to it as well and the major one is the coverage and as well energy problem. These coverage issues can be categorized into many ways. Its can be classified into frequency of network field monitor, into either continuous coverage problems or sweep coverage problems.

Continuous coverage problems can be further classified, according to the region of interest for monitoring, into three types: Area coverage, point coverage, and barrier coverage. Furthermore, coverage problems can be classified, according to the required coverage degree, into either 1-coverage problems or *k*-coverage problems.

Now if we come to coverage protocols, it can be classified as per connectivity requirement, to either connectivity aware coverage protocol or non-connectivity aware protocols. These connectivity aware coverage protocols can be further distributed according to the adopted algorithm characteristics, into either distributed protocols or centralized protocols. Brought together inclusion conventions can be additionally grouped into either evolutionary algorithm (EA) based conventions or non-EA based conventions. Besides, inclusion conventions can be grouped by the framework model of the system. There are four highlights under the framework model: Sensor area mindfulness (mindful or ignorant), sensor versatility models (static, portable or crossover of both), sensor organization models (deterministic or irregular), and sensor detecting model. Detecting models are comprehensively characterized, considering the detecting capacity, into two kinds: Deterministic detecting models and probabilistic detecting models.

Going further, sensing model can be classified based on directional sensing models which can either be directional sensing model or non-direction sensing model. Now if we talk about coverage protocols, it can also be subject to when coverage optimization is in process; i.e. into either coverage-aware deployment protocols, when coverage optimization happens before the deployment stage, or sleep scheduling protocols, when coverage optimization happens after the deployment stage. To sum up all the above statement figure below can sum up all for us.

It is important to mention here that huge work is already been done in the field of WSNs but none of the review ever covers completely the scope of WSNs to its extant due to which lots of literature reviews are already been done in the field of WSN.

Now I would like to go on some reviews papers which are already done in the field of WSNs;
A specific review of energy-efficient coverage protocols in WSNs is done in A. More and V. Raisinghani, "A urvey on energy efficient coverage protocols in wireless sensor networks," *Journal of King Saud University - Computer and Information Sciences*, pp. –, 2016. [Online]. Available: http://www.sciencedirect.com/science/article/pii/S1319157816300544 in which the author mainly focused on coverage problem n WSNs. The reviewed coverage protocols are characteristics in to distributed vs

clustered and the sensor nodes location information (location-aware vs. location-unaware). Finally, that mentioned review only focuses on coverage protocols that can only operate on static nodes only.

Our Contribution

Here in this paper we tried to cover vast fields of WSNs coverage problems as well protocols too. The main aim of this review was to get better and clear overview of different fields of WSNs coverage protocols and point out new branches of developing WSNs. More specifically, we discuss and compare coverage protocols in various sensing models, which includes a realistic sensing model that reflects the radio irregularity in WSNs. Our contributions are four-folds:

- In this paper we tried to cover wide area of WSNs various coverage protocols used by WSNs.
- All protocols depth analysis was presented which helps in resolving different coverage protocols in WSNs.
- Discussion of WSNs design and solving of energy issues in WSNs hardware.
- And finally, some future work which should be done to resolve the above-mentioned issues in WSNs.

In this section we will solely focus on design parameters that how should we make our WSNs more efficient and cost effective in real world deployment. Firstly, different scenarios of developing coverage protocols. Secondly then we will talk about some problems in WSNs, and lastly, we will present some recommendations for future work.

Design Factor

There are several design factors that have a direct impact on developing coverage protocols for WSNs.

Coverage Degree

In its simplest form, coverage means that every point in a ROI is monitored by (i.e., within the sensing range of) at least one sensor.

Sensor Deployment Models

This is the most important phase in designing a more efficient WSNs in real world scenario. It should be well balanced, the energy issues should be properly considered, and coverage protocols should be used such that it can cover huge areas by using minimal energy and hardware depending on the application requirements, sensor node deployment can be either random or deterministic. For large scale applications normally, we go for random deployment, while sensor nodes are scattered where the network field is. For random deployment small sensor in huge amount are dropped from airplane in remote areas where no ground transport is accessible. The other model which we used is deterministic deployment approach in which har points are pre-selected where sensors are deployed.

Algorithm Characteristics

Algorithm adopted by the coverage protocols can be either distributed or centralized algorithms. In distributed algorithm each node work as independent unit to decide what to do next, and on the other hand centralized algorithm requires each sensor to transmit data to a central point like base Station (BS) and from there they get further instructions.

Coverage Problems

Coverage problems can be classified, based on the frequency of monitoring the network field, into continuous coverage problems or periodical coverage problems. Moreover, there are other WSNs problems which can affect or get affected by the coverage problem.

Continues Coverage Problem

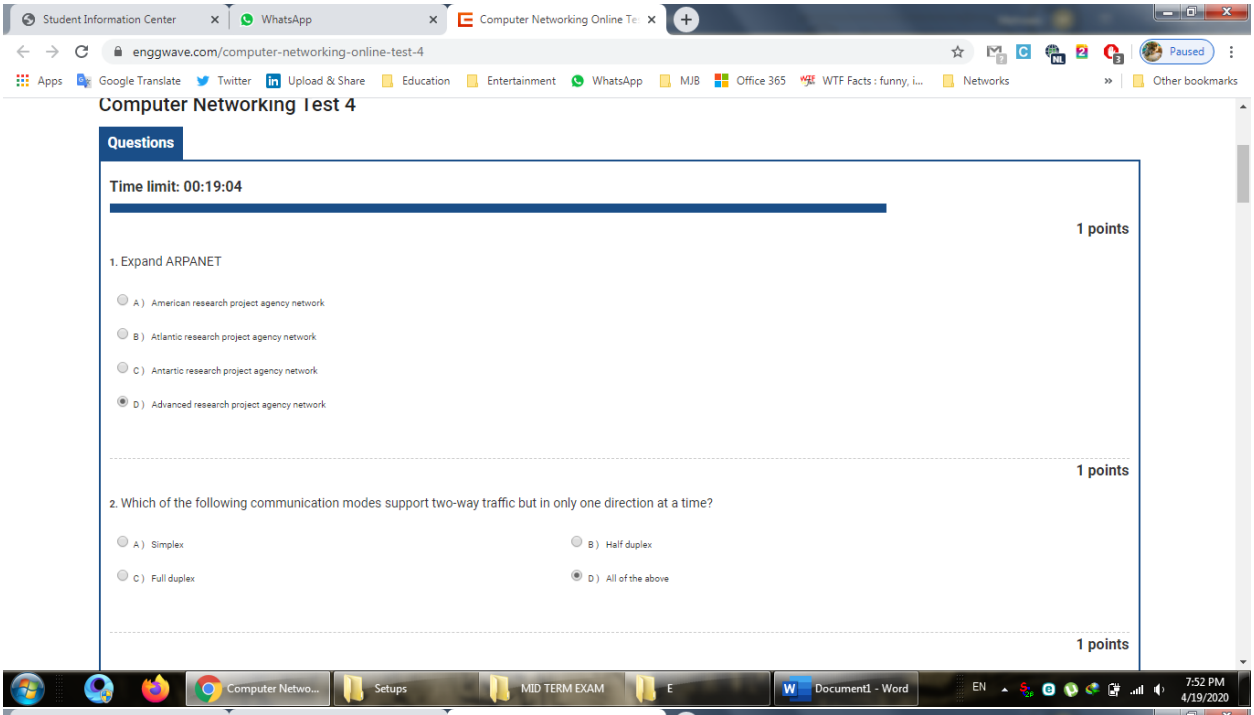
In such problems network administrator should be available to monitor such network continues to keep it running in case of any delay. This problem can be further classified in to three sub problems, area coverage, point coverage and barrier coverage.
Area/blanket coverage problems arise when the whole sensor field needs to be monitored. In other words, every single point of the network field should be within the sensing range of at least one sensor node. On the other hand, point/target coverage problems are related to monitoring a set of targets or points of interests (POI). Different from area coverage and point coverage, barrier coverage is not concerned with monitoring

either the entire ROI or any POI. Instead, barrier coverage is to monitor only the borders of a ROI to detect intruders.

Conclusions

Recently many fields of studies have been emerged to solve the coverage issues in WSNs to make it better. In this survey we presented thorough and up to date review of these coverage protocols. We found that the performance of these protocols is mainly limited by challenges related to determining a more realistic coverage model for the sensor nodes in the networks. More specifically, most of the proposed coverage protocols rest on less realistic assumptions such as location awareness and uniformity
of the signal strengths within a sensing and/or a communication range. Here it is important to mentioned that theses ideologized protocols uses energy efficient techniques for longer run. We also believe that radio signal should solve the issue of signal transmission more efficiently in realistic world scenario and it can provide better link for access.

Motivated by the concerns, we carefully study, compare and analyze in detail all known coverage protocols on different design factors/features. Finally, we point out open problems and future research directions such as addressing coverage problem in a more realistic sensing model that reflects the anisotropic properties of WSNs. Most importantly, we conclude that network connectivity is a crucial factor that must be taken into consideration in designing future solutions.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1. Expand ARPANET
A) American research project agency network
B) Atlantic research project agency network
C) Antartic research project agency network
D) Advanced research project agency network
1 points
2. Which of the following communication modes support two-way traffic but in only one direction at a time?
A) Simplex
B) Half duplex
C) Full duplex
D) All of the above
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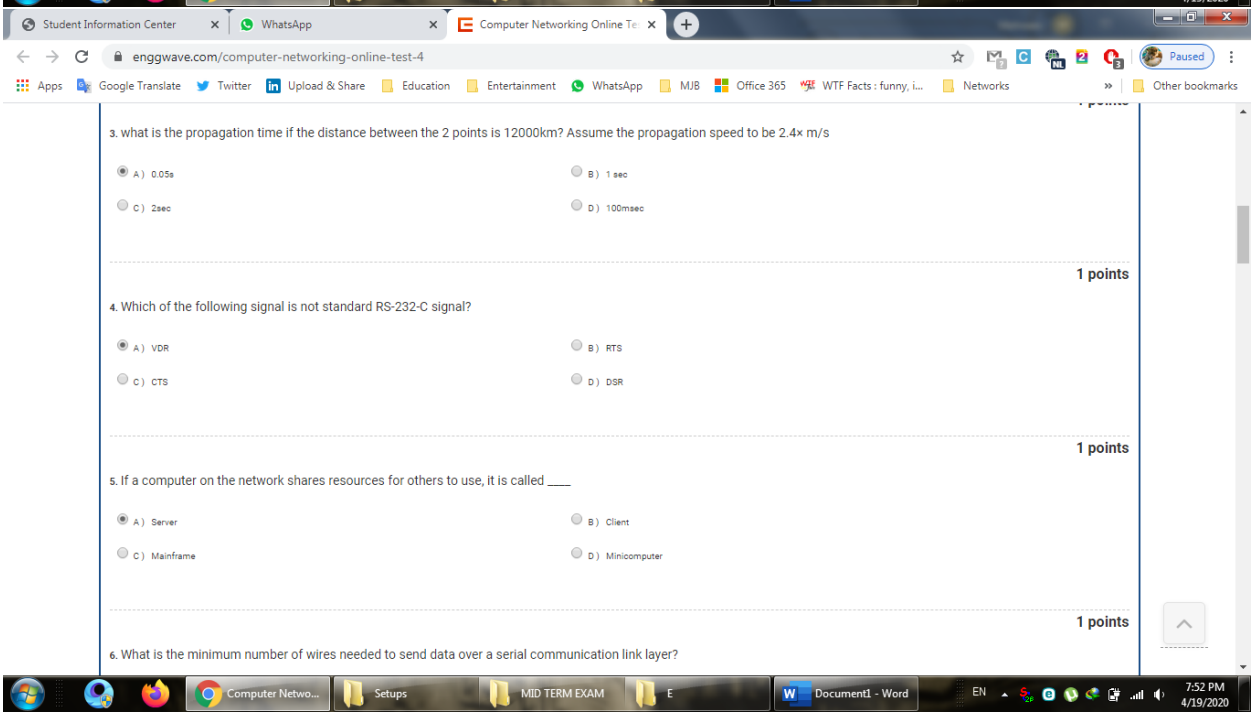
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3. what is the propagation time if the distance between the 2 points is 12000km? Assume the propagation speed to be 2.4× m/s
A) 0.05s
B) 1 sec
C) 2sec
D) 100msec
1 points
4. Which of the following signal is not standard RS-232-C signal?
A) VDR
B) RTS
C) CTS
D) DSR
1 points
5. If a computer on the network shares resources for others to use, it is called ___
A) Server
B) Client
C) Mainframe
D) Minicomputer
1 points
6. What is the minimum number of wires needed to send data over a serial communication link layer?
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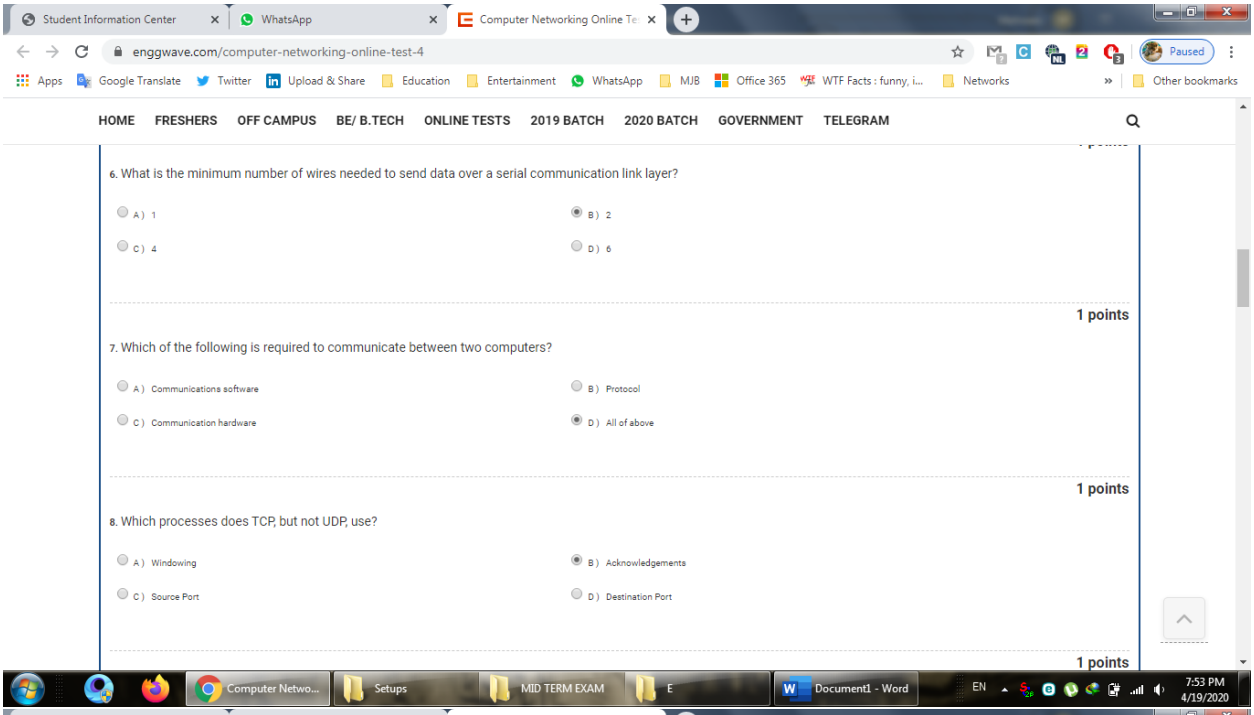
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6. What is the minimum number of wires needed to send data over a serial communication link layer?
A) 1
B) 2
C) 4
D) 6
1 points
7. Which of the following is required to communicate between two computers?
A) Communications software
B) Protocol
C) Communication hardware
D) All of above
1 points
8. Which processes does TCP, but not UDP, use?
A) Windowing
B) Acknowledgements
C) Source Port
D) Destination Port
1 points
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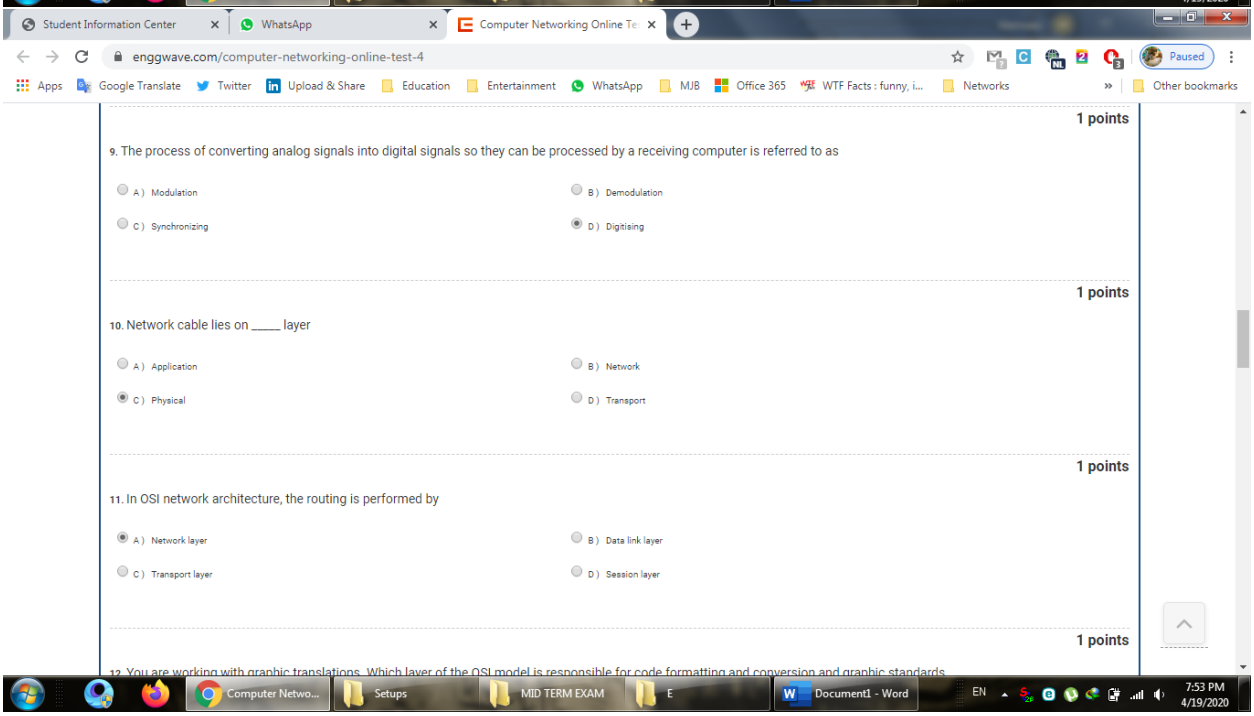
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1 points
9. The process of converting analog signals into digital signals so they can be processed by a receiving computer is referred to as
A) Modulation
B) Demodulation
C) Synchronizing
D) Digitising
1 points
10. Network cable lies on _____ layer
A) Application
B) Network
C) Physical
D) Transport
1 points
11. In OSI network architecture, the routing is performed by
A) Network layer
B) Data link layer
C) Transport layer
D) Session layer
1 points
12. You are working with graphic translations. Which layer of the OSI model is responsible for code formatting and conversion and graphic standards
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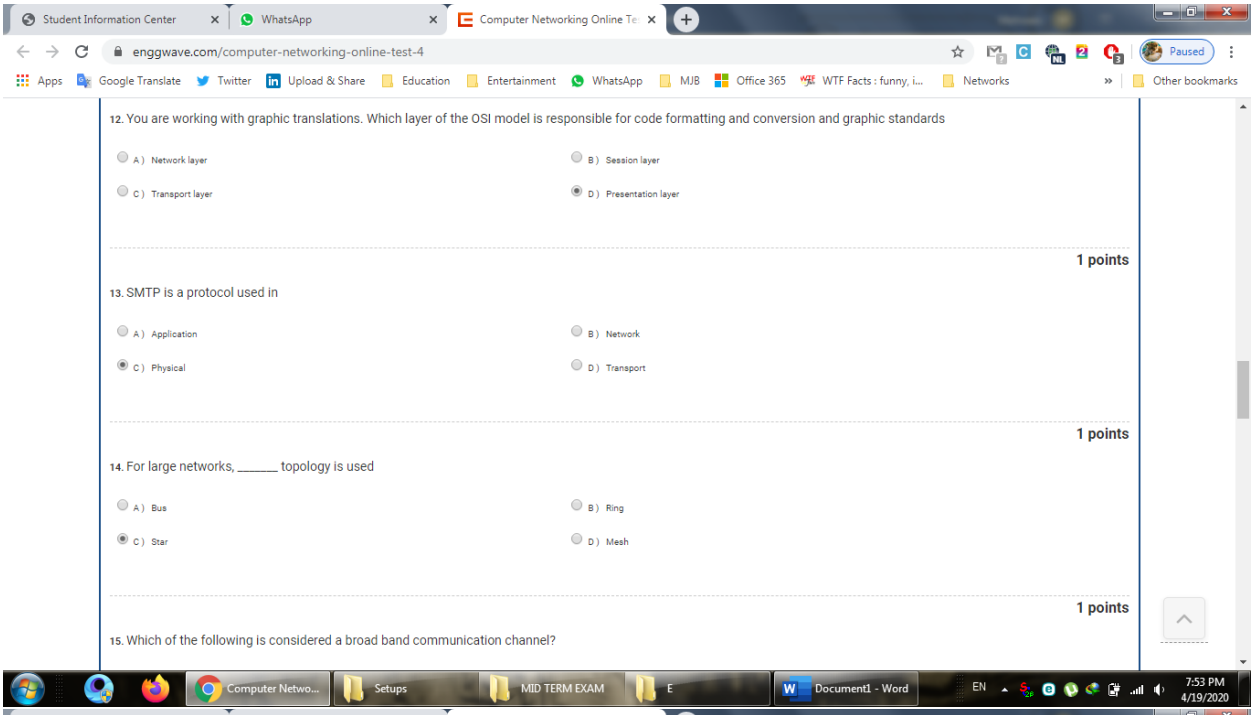
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12. You are working with graphic translations. Which layer of the OSI model is responsible for code formatting and conversion and graphic standards
A) Network layer
B) Session layer
C) Transport layer
D) Presentation layer
1 points
13. SMTP is a protocol used in
A) Application
B) Network
C) Physical
D) Transport
1 points
14. For large networks, _____ topology is used
A) Bus
B) Ring
C) Star
D) Mesh
1 points
15. Which of the following is considered a broad band communication channel?
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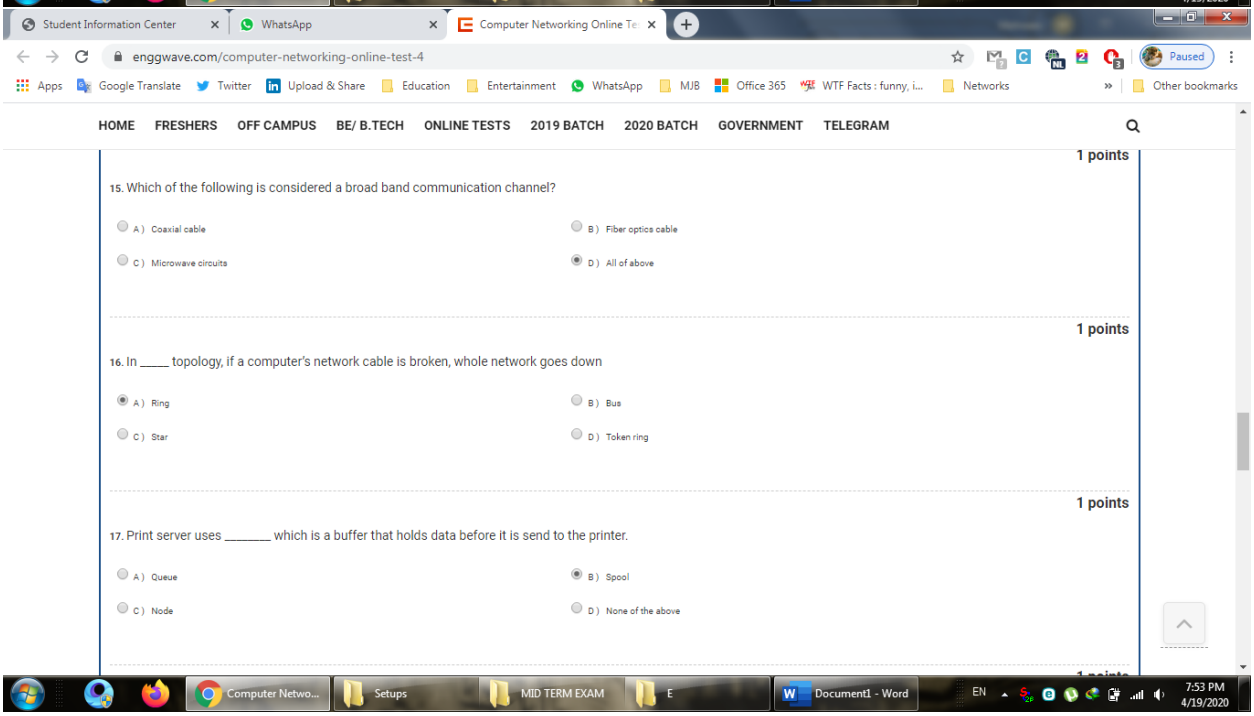
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TELEGRAM
1 points
15. Which of the following is considered a broad band communication channel?
A) Coaxial cable
B) Fiber optics cable
C) Microwave circuits
D) All of above
1 points
16. In ____ topology, if a computer's network cable is broken, whole network goes down
A) Ring
B) Bus
C) Star
D) Token ring
1 points
17. Print server uses _____ which is a buffer that holds data before it is send to the printer.
A) Queue
B) Spool
C) Node
D) None of the above
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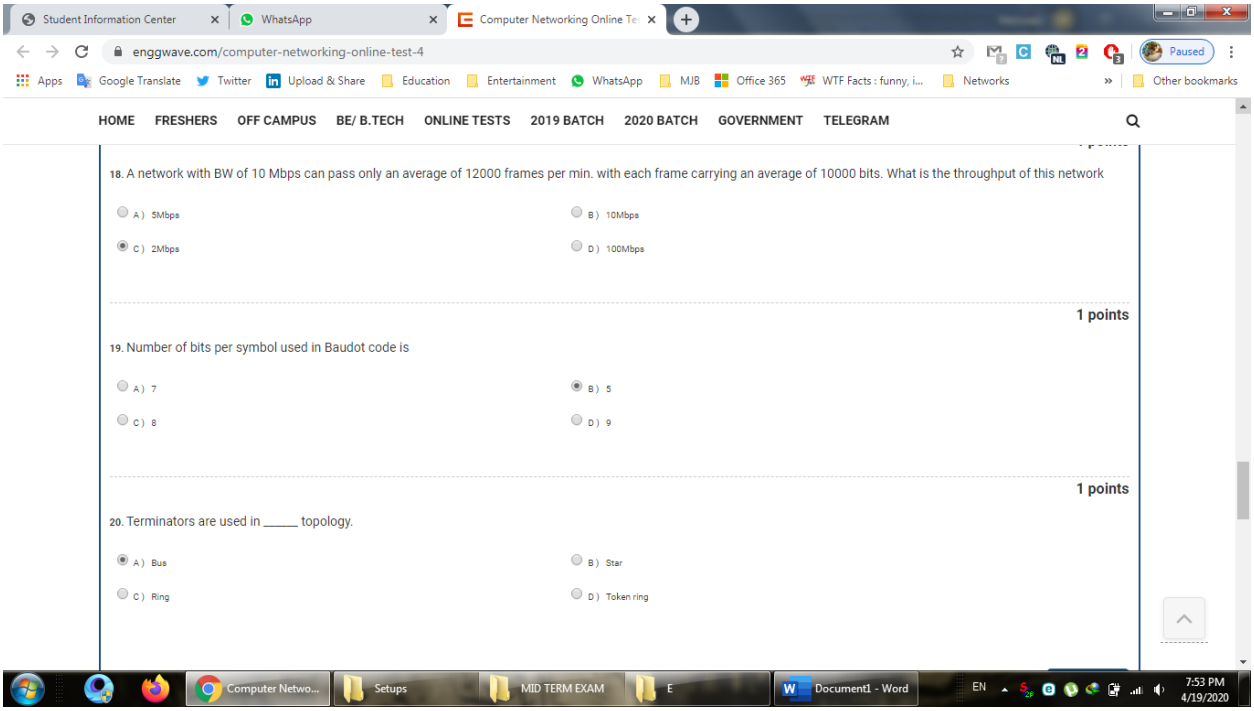
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18. A network with BW of 10 Mbps can pass only an average of 12000 frames per min. with each frame carrying an average of 10000 bits. What is the throughput of this network
A) 5Mbps
B) 10Mbps
C) 2Mbps
D) 100Mbps
1 points
19. Number of bits per symbol used in Baudot code is
A) 7
B) 5
C) 8
D) 9
1 points
20. Terminators are used in _____ topology.
A) Bus
B) Star
C) Ring
D) Token ring
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