ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

MID SEMESTER EXAMINATION **SUMMER SEMESTER, 2019-2020**

DURATION: 1 Hour **FULL MARKS: 50**

CSE 4615: Wireless Networks

Programmable calculators are not allowed. Do not write anything on the question paper.

There are **4 (four)** questions each with one or more sub-questions. You must answer only **5 (five)** sub-questions in total from the four questions. See the student-wise sub-question division document to determine which sub-questions you must answer. Figures in the right margin indicate marks.

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1. Illustrate the scenario in Figure 1 below with a diagram of communication among multiple stations according to the WLAN protocol (IEEE 802.11a). See sub-questions for details. 15

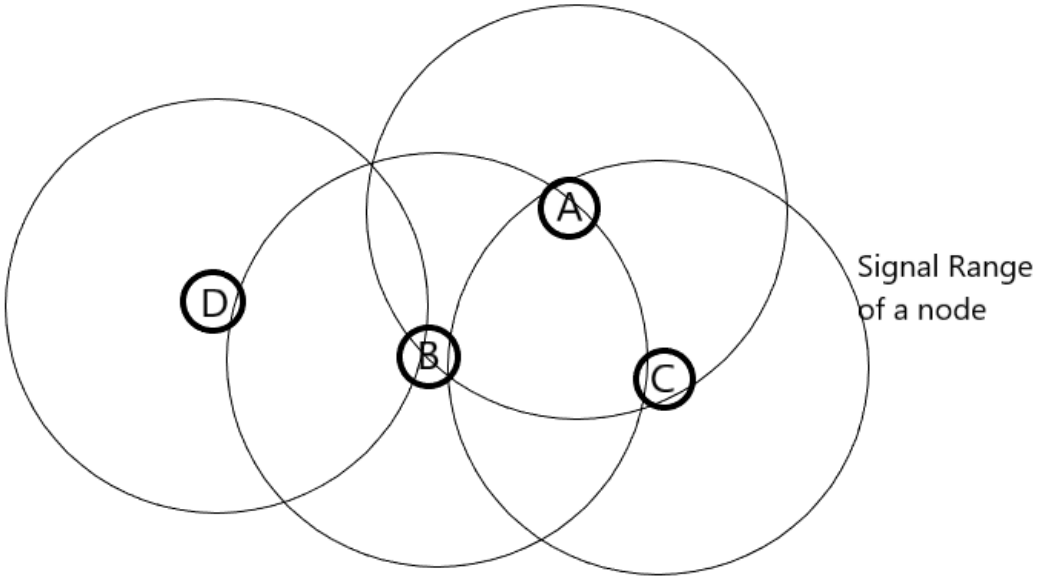

Figure 1: 4 stations following WLAN protocol (IEEE 802.11a)

   a) Station A is an AP of a BSS where B and C are stations. Station B wants to communicate with Station C and is trying to contend for the medium (in CP phase). However, station D is in another BSS and is also trying to access the medium. Draw a figure which represents a successful re-transmission of data from B to C after collision with D and shows the different inter-frame spaces and slots used. Use of RTS/CTS is optional.
   b) Station A is an AP of a BSS where B and C are stations. Station A is polling the stations in the BSS starting with station B and then C. Station C has data to send and responds to the poll in the CFP phase. In the CP phase before this CFP phase, B finishes sending a transmission to D. Station C sends a series of fragmented data packets and A acknowledges all of them (there is no block acknowledgement). Draw the diagram of the communication in this scenario and show the different time slots and inter-frame spaces used.

2. Write a short note on two of the following (see sub-question division document): 10
   a) Scanning in WLAN
   b) Lifetime Improvement in WSN
   c) Listen-Before-Talk in WLAN

d) Mesh Networking (IEEE 802.15.5)
e) Applications of WSN
f) Conversion of Traditional Network into SDN

3. Read the following situations and suggest an appropriate network architecture/protocol to handle the scenario. Mention your reasoning behind choosing said architecture/protocol. 10
   a) The buzzing city of Dhaka has about 158,417 vehicles as of 2019 according to CEIC. Due to such a huge number, the roads of the densely populated city are always filled with cars to the brim. In such a scenario, wide area networks are having trouble providing Internet to densely distributed fast-moving and static vehicles. Which network/networks would better provide Internet connection for the users and work as a communications media to reduce traffic? Assume that users can use certain applications to detect traffic in the roads.
   b) Staying at home has become a constant truth for most people due to the pandemic. Isolation is also necessary for some homes. As a result, it is difficult to control various devices at home like a central AC, the washing machine, lights, and heaters, etc. In this situation, a smart home helps to control the different home appliances remotely. Which network architecture/protocol will do the best job here? It can be a mixture of multiple protocols, but you must mention which specific protocol is used, where it is used, and why it is used.

4. Answer any one of the following sub-questions. See the sub-question division document to determine which sub-question you must answer. 15
   a) What is Internet? What is Edge Network, Core Network, and Access Network, and how are they related to the Internet?
   b) What is IEEE 802.15.1? Explain the architecture and structure of the network formed using the mentioned protocol.