ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)

22 July 2014 (Morning)

ORGANISATION OF ISLAMIC COOPERATION (OIC)

Department of Computer Science and Engineering (CSE)

MID SEMESTER EXAMINATION

DURATION: 1 Hour 30 Minutes

SUMMER SEMESTER, 2013-2014

FULL MARKS: 75

CSE 4805: Wireless Networks

Programmable calculators are not allowed. Do not write anything on the question paper.
There are **4 (four)** questions. Answer any **3 (three)** of them.
Figures in the right margin indicate marks.

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a) Wireless networks are easy to install, which makes them inexpensive. Nevertheless, they also have some challenges. Explain a few of them. 6

b) IEEE 802.16 based network is going to be deployed in your city. Therefore, appropriate antennas are required to install at the base station for communicating with different subscriber stations. What kind of antennas can be used at the base station? Justify your response. 4

c) Define Access Networks. Depict a taxonomy describing the hierarchy of different access networks. 3+7

d) Describe the significance of SIFS (Short Interframe Space) in medium access procedure. 5

a) What are the main factors those influence the wireless signal distortion? 6

b) Why traditional MAC protocol (like: IEEE 802.11 CSMA/CA) are not suitable for WSN (Wireless Sensor Network)? 7

c) Mention appropriate context and few applications of DTN (Delay Tolerant Network). 8

d) Why is post-back off performed by the IEEE 802.11 MAC? 4

a) A wireless LAN with three stations (A, B, C) uses the CSMA/CA protocol to send/receive data in the infrastructure-less mode of IEEE 802.11e. Suppose, each station uses two access categories for assuring quality of service, and the binary exponential backoff mechanism for collision resolution. Draw a diagram showing the transmission and reception of the frames which satisfies the followings:- 20

i. The diagram should show one successful MSDU transmission containing audio data from node A to node C, another MSDU transmission containing video data from B to C, and one collision.

ii. The diagram should show the backoff process with all containing backoff entities which includes the backoff slots and appropriate Inter Frame Space durations.

Note that, the x-axis of the diagram shows time and y-axis shows one horizontal line for each containing backoff entity. The transmission/reception of the frames of any containing backoff entity should represent as rectangles on the horizontal line with source and destination addresses inside the rectangle.

b) In Figure 1, four stations A, B, C, and D are shown. Which of the last two stations (i.e., stations C and D) do you think is closer to A and why? 5
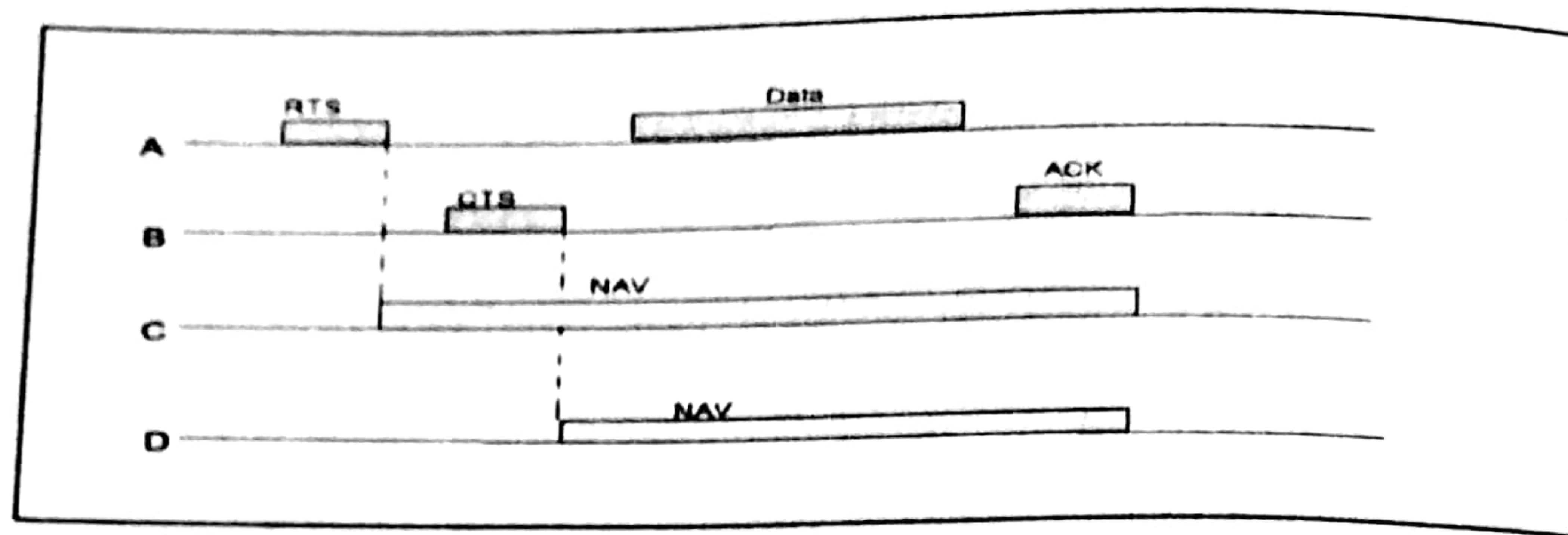
Figure 1: Figure for the question no. 3 (b)

4. a) Timing Synchronization Function (TSF) synchronizes all the stations within a single BSS 8 to a common clock. Let an Independent Basic Service Set (IBSS) consists of 4 nodes A, B, C and D. However, their present clock times are 14.00, 14.08, 13.55 and 14.05, respectively. Draw a diagram showing the time synchronization procedure among the nodes of the IBSS.

   b) IEEE 802.16 based network has a channel width of 20 MHz. How many bits/sec can be sent 4 to a medium distant subscriber station?

   c) IEEE 802.16 supports four service classes. Which service class is the best choice for sending 6 uncompressed video? Justify your answer.

   d) Figure 2 shows that a single Bluetooth device is attached to two piconets at the same time. Is 7 there any reason that the single device cannot be the master of both the piconets at the same time?
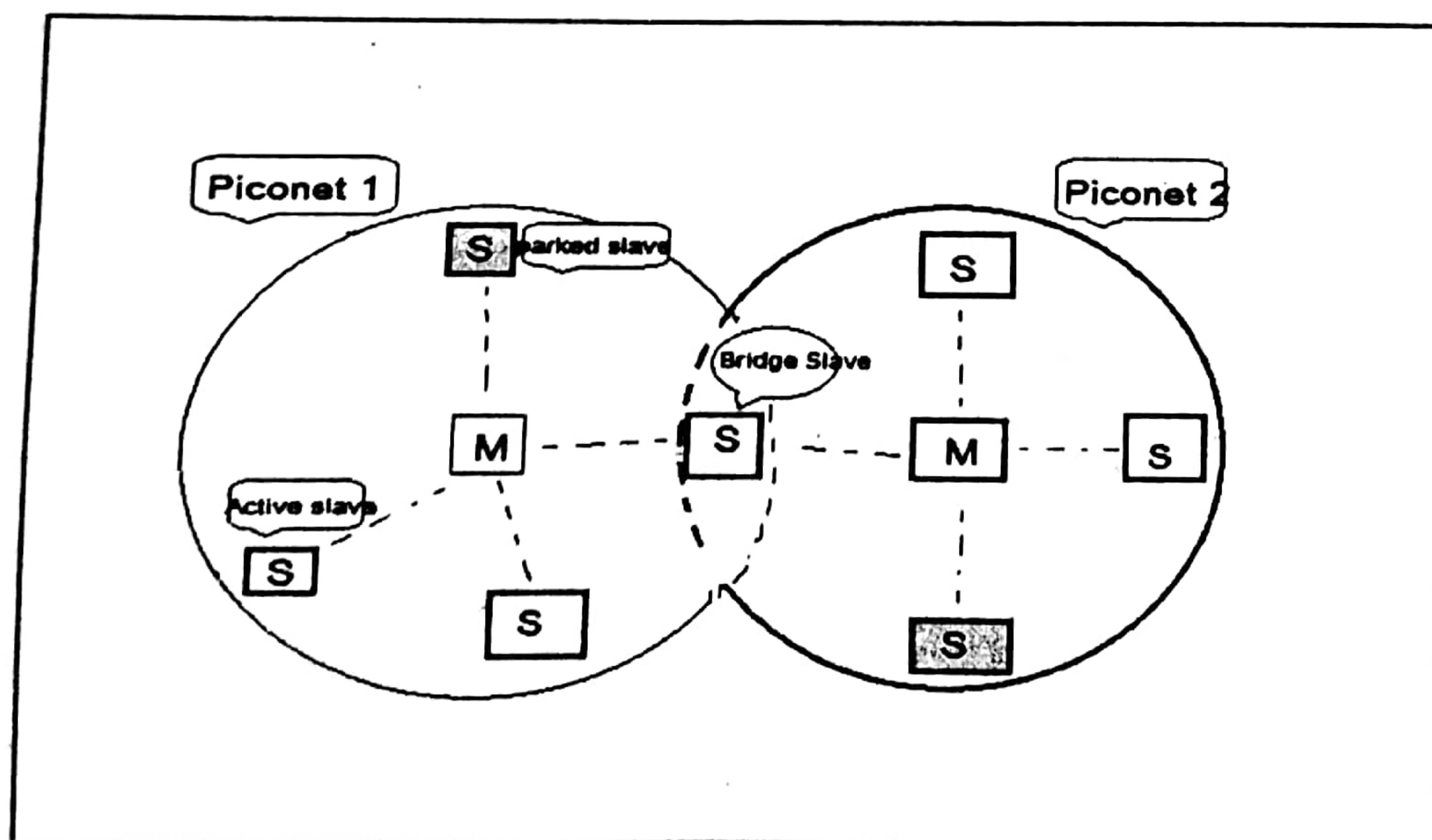

Figure 2: Figure for the question no. 4 (d)