Calculation of total transmission delay in a quiz master based on Bluetooth devices

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Fig. 1 shows a classroom equipped with a quiz master that is based on Bluetooth enabled devices. Each student in the classroom has either a mobile phone or mobile PC from which a signal is sent over Bluetooth to the mobile computer shown. The portable computer is also connected to a video projector via a VGA cable for displaying the information.

The students’ mobile terminals are equipped with software that allows them to send simple messages to the portable computer. In particular the quiz master in the classroom works as follows. The professor displays a question with say five possible answers (A, B, C, D & E) and the students answer the question by sending their choice over the Bluetooth channel. The portable computer can then display statistics of the results, etc.

The task in this assignment is to calculate the total delay in seconds incurred in receiving a batch of answers from N Students.

Hints:
1. Start by calculating the delay incurred to receive one single answer. Then calculate the delay if N students send their answers at the same time
2. Modify your calculation in (1) to allow for a normal distribution of sending times, if necessary
3. Plot the total delay against N, vary N from 1 to 300
4. Report all your reasoning to justify your calculations.

Submit your answer before 15th December, 2007

Figure 1