

The detailed throughput analyses for ALOHA and CSMA can be found in the classical Kleinrock-Tobagi paper "Packet Switching in Radio Channels: Part I-Carrier Sense Multiple-Access Modes and Their Throughput-Delay Characteristics". The Kleinrock-Tobagi paper can be found online and is also attached. Based on equations in the Kleinrock-Tobagi paper, please use Matlab or any other software to plot a figure similar to Figure 9 of the Kleinrock-Tobagi paper to compare slotted ALOHA, pure ALOHA, non-persistent CSMA, 1-persistent CSMA, and p-persistent CSMA.

**A clarification: You do not need to implement any of slotted ALOHA, pure ALOHA, non-persistent CSMA, 1-persistent CSMA, and p-persistent CSMA. Just use equations in the provided Kleinrock-Tobagi paper to plot throughput curves for generating your figure. Among curves in your figure, p-persistent CSMA will probably take the most amount of time. Please start early.**

Your figure should not be exactly the same as Figure 9 of the Kleinrock-Tobagi paper (more details are provided in the requirements below). After plotting the figure, please submit a report (in pdf, doc, or docx) which presents your figure and your findings based on the figure. The report should be no more than two pages. Please also submit your code used to generate the figure. You do not need to submit the figure separately since it is already in your report.

Requirements about the figure: 1. In your figure, please do not set  $a=0.01$  which is used in Figure 9 of the Kleinrock-Tobagi paper. Please choose a different value for the parameter  $a$ . As noted in the Kleinrock-Tobagi paper,  $a$  is defined as the ratio of propagation delay to the packet transmission time. In the lecture notes,  $a$  is referred to as the normalized propagation delay. 2. For p-persistent CSMA, you only need to choose one value for  $p$  and draw the corresponding curve. However, please do not set  $p=0.1$  or  $0.03$  used in Figure 9 of the Kleinrock-Tobagi paper. 3. In your figure, you do not need to draw a curve for slotted non-persistent CSMA, since we did not teach slotted non-persistent CSMA in class.