Communication Systems Exam

July 23, 2023

1 Question 1

Create a conceptual diagram of a communication system, including transmitter, receiver, and channel, and the intermediate stages necessary to conceptually place the following fundamental relationships:

1. $\overline{L} \geq H(\mathcal{S})$
2. $C = B \log_2 \left(1 + \frac{S}{N}\right)$
3. $H = \sum_{k=0}^{K-1} p_k \log_2 \left(\frac{1}{p_k}\right)$

Briefly define the meaning of each relationship, explaining the units of measurement for each involved magnitude.

2 Question 2

Describe, using a sequence diagram, the process of establishing a TCP connection and the process of closing a connection between a client and a server. Show both sequences of messages on the following TCP state machine:

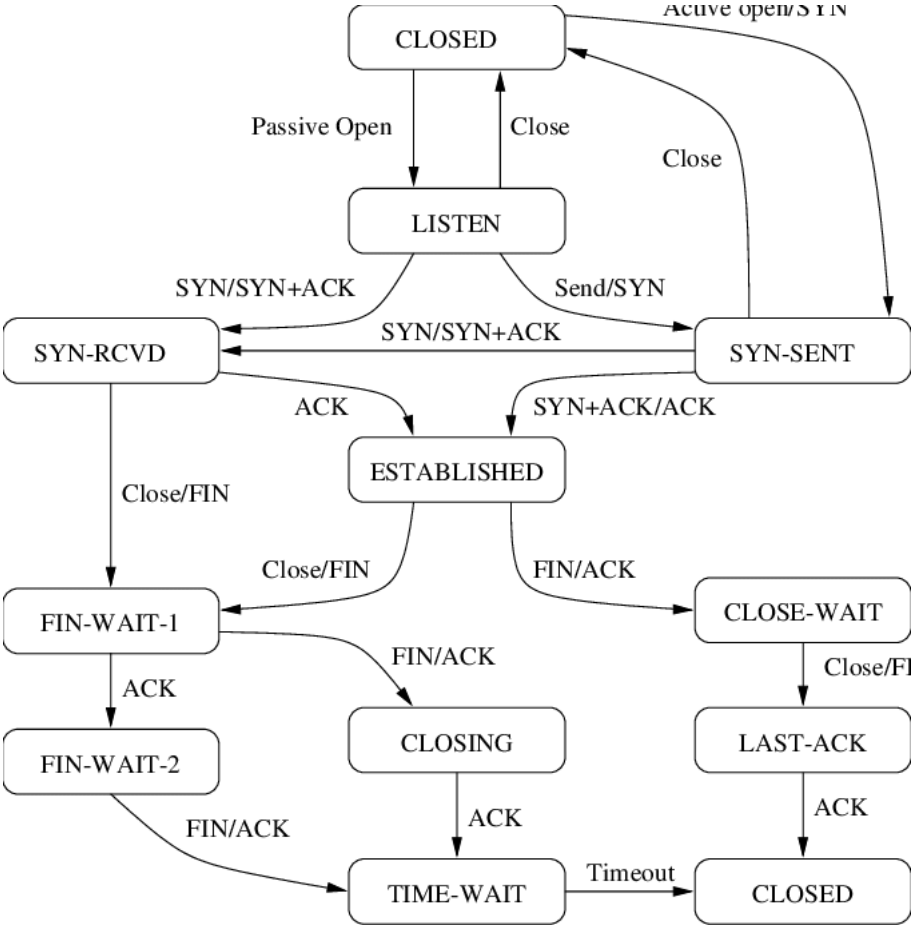

Figure 1: TCP state machine.

3 Question 3

Create two diagrams that highlight the difference between the Symmetric Key Cryptography system and the Public Key Cryptography system for communication between two different users, A and B, who need to send confidential information to a third user, C, over an insecure network. Describe one advantage and one disadvantage of each method.