CS380 Lab – Protocols and Channel Capacity

Part 1: Protocols

The lab will be about Protocols. Either download or use your browser to access the Jasper java protocol simulator (http://jaspersimulator.sourceforge.net). Note that you will need to switch on the java plug-in in Firefox and there is no plug-in in Chrome. Write short notes (about 10 lines each) to explain how IP and TCP simulations operate.

Part 2: Channel Capacity

[note: reading material on *Shannon's Law* is available in the **Networks and Standards** section of CS380 in Moodle]

The Maximum data rate of transmission on a noisy channel can be measured using the *Shannon formula.*

The *Shannon formula* for the Channel Capacity (maximum data rate C) measured in bits per second (bps) is

$C = B.\log_2(1 + S/N)$

The channel/line bandwidth is **B** (measured in Hz) and is assumed to have noise and the Signal to Noise ratio (SNR) is given by **S/N**.

1. Assuming a circuit through a PSTN (public switched telephone network), if S/N = 7 and B = 4kHz, then the channel capacity is? [note here: you need to convert 4kHz to Hz for use in the Shannon formula]
2. If the SNR increases to S/N = 15 and B is decreased to 3kHz, does the channel capacity remain the same?
3. It is possible to calculate the theoretical highest bit rate of a regular telephone line. A telephone line normally has a bandwidth of 3kHz. The signal-to-noise ratio is usually 3162. What is the channel capacity in this case?

Assignment Submission Instructions:

Submit your completed assignment through Moodle. You should submit (1) a pdf containing your answer to Part 1 of the assignment, (2) a pdf containing full details of your worked solution to Part 2 of the assignment.

Assignment submission deadline is available on Moodle. Penalties will be imposed on late submissions.