Overview

In this project you will form a team of 2 students (you may choose your team member). Your task is to explore the behavior of the different ARQ protocols when employing CRC error detection under different channel conditions.

Project Description

Your team’s task is to implement SW-ARQ, GBN-ARQ, SR-ARQ and any other schemes that you might come up with. You should implement a CRC error detection scheme (look at Bertsekas and Gallagher, pg. 64 for generating polynomials) as your frame error detection scheme.

Your data sources should involve randomly generated data frames

You should assume that both your forward and backward channels introduce bit errors (with probability $p$) as well as drop packets (with probability $q$). Your implementations should be able to handle both of these error types, and operate in a correct mode.

In order to evaluate the performance of these different schemes, look at different $p$ and $q$ values, as well as evaluate different code rates (hint: by changing the data packet size, you can adjust the rate $R = k/n$ of the error correcting code). One possible performance metric you might want to explore is throughput. It is recommended that your team devise additional performance measures to evaluate the performance of these schemes.

Note: There is a non-zero probability that a packet will be corrupted in such a way that it will pass the error detection scheme. You do not need to worry about these cases.

What to Turn In

Having implemented your methods in your favorite computer language, evaluate the performance of your schemes. Try to answer questions, such as: What happens to your scheme if you increase the bit-error probability? What happens if you increase the packet drop probability? How do your results compare to the (ideal) throughput calculations we carried out in class?

You will hand in a technical report summarizing your findings. Your report should contain a description of implementation challenges, how you solved these challenges, as well as any additional technical analysis to support your conclusions.

Your grade will be based upon the clarity and thoroughness of your investigation. There is no ultimate answer, so continue to try to improve on your design and investigate!