

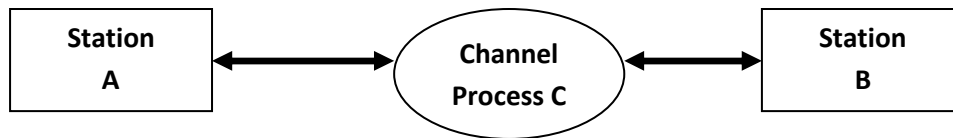
Computer Network Laboratory

Assignment given on: 25-08-2011

Submission deadline: 12-09-2011

Partial evaluation on: 05-09-2011

Assignment 4: Simulation of Data Link Control Protocols



- a) **Stop-and-wait ARQ:** Assume that two stations A and B are connected by a full-duplex (bidirectional) point-to-point link. The channel is assumed to be noisy and may lead to bit errors during frame transmission. Simulate A, B and C as concurrent processes interconnected through pipes, for the stop-and-wait ARQ protocol. Process A will generate frames to transmit using a Poisson distributed arrival mechanism (say, 50 bytes each), append a header to each frame containing a frame sequence number and checksum, and send it to process B through the channel process C. Receiver process B will receive the frame, and send back a positive acknowledgement back to sender A if the frame was received correctly. If no acknowledgement is received by A within a defined timeout interval, it will resend the packet. Simulate noisy channel by making the channel process C inject random bit errors in a frame based on some user specified bit error probability p_b . The simulator should generate as output a log file containing details of all frames transmitted and received, and the effective channel utilization.
- b) **Sliding window (error free):** Extend the above to simulate sliding window protocol, assuming that data frames can flow in both directions. Both A and B generate frames to transmit using a Poisson distributed arrival mechanism. Acknowledgements are piggybacked within data frames. Assume a suitable frame format, and consider that all data frames are of the same size. The size of the window and rate of frame generation should be controllable using some user specified parameter. Assume that there are no transmission errors. The simulator should generate as output a log file containing details of all frames transmitted and received, and the effective channel utilization.
- c) **Go-back-N sliding window:** Now consider that the channel is non-ideal, and can inject errors in the frames which are in transit. Based on a user specified bit error rate p_b , the bits being transmitted can get flipped by the channel process. Modify the frame structure of (b) above to include a 16-bit frame check sequence (FCS) field for error detection. Hence implement the Go-back-N protocol to achieve a reliable data link between A and B. Similar simulation outputs like in part (b) should be generated.