

Lab: Reliable transfer

In this lab, you will answer questions in small groups regarding reliable transfers and the algorithms used to achieve it. The objective is to understand the way these algorithms react in different scenarios and have discussions regarding their efficiency, advantages and drawbacks. All the questions are available on the course's website, <https://beta.computer-networking.info/syllabus/default/exercises/reliability.html>. This document takes a subset of the questions available on the website to be the focus of this practical session.

Open question 2

Transmission links have sometimes different upstream and downstream bandwidths. A typical example are access networks that use ADSL (Asymmetric Digital Subscriber Lines). Consider two hosts connected via an ADSL link having an upstream bandwidth of 1 Mbps and a downstream bandwidth of 50 Mbps. The propagation delay between the two hosts is 10 milliseconds. What is the maximum throughput, expressed in frames/second, that the alternating bit protocol can obtain on this link if each data frame has a length of 125 bytes and acknowledgments are 25 bytes long. Same question if the protocol is modified to support 1500 bytes long data frames.

Open question 3

How would you set the duration of the retransmission timer in the alternating bit protocol ?

Discuss

Compare the bandwidth of the links with the throughput you can achieve in practice when using the alternating bit protocol. Does it seem efficient ? Why ? What is the main factor impacting the throughput ? How to improve the algorithm ?

Open question 6

Consider a go-back-n sender and a go-back-n receiver that are directly connected with a 10 Mbps link that has a propagation delay of 100 milliseconds. Assume that the retransmission timer is set to three seconds. If the window has a length of 4 frames, draw a time-sequence diagram showing the transmission consisting of 10 data frames (each frame contains 10000 bits):

- when there are no losses
- when the third and seventh frames are lost
- when every second acknowledgment is discarded due to transmission errors

Discuss

How does go-back-n compare to the alternating bit protocol ? What factors impact the throughput ? What is the maximum window size you can set ?

Open question 7

Same question as the previous one when using selective repeat instead of go-back-n. Note that the answer is not necessarily the same.

Discuss

Compare go-back-n and selective repeat. Try to establish a list of pros and cons for each algorithm. What is the maximum window size for selective repeat ? Are there scenarios in which of these algorithms is better than the other ?

Discussion question 4

A go-back-n sender has sent data frames. All the frames have been received correctly and in-order by the receiver, but all the returned acknowledgments have been lost. Show by using a time sequence diagram (e.g. by considering a window of four frames) what happens in this case. Can you fix the problem on the go-back-n sender ?

Discussion question 5

Same question as above, but assume now that both the sender and the receiver implement selective repeat. Note that the answer can be different from the above question.