University of Tromsø

INF-2301 Computer Networking and Security

Assignment 3 Alternating-Bit-Protocol

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1. Introduction

This report describes the reliable data transfer protocol, the Alternating-Bit-Protocol. The implementation is running on a simulated network environment.

2 Technical Backgrounds

2.1 Alternating-Bit-Protocol

Alternating-Bit-Protocol[1] is a simple network protocol and operates in the data link layer that that sends messages, and also resends messages which are lost or corrupted.
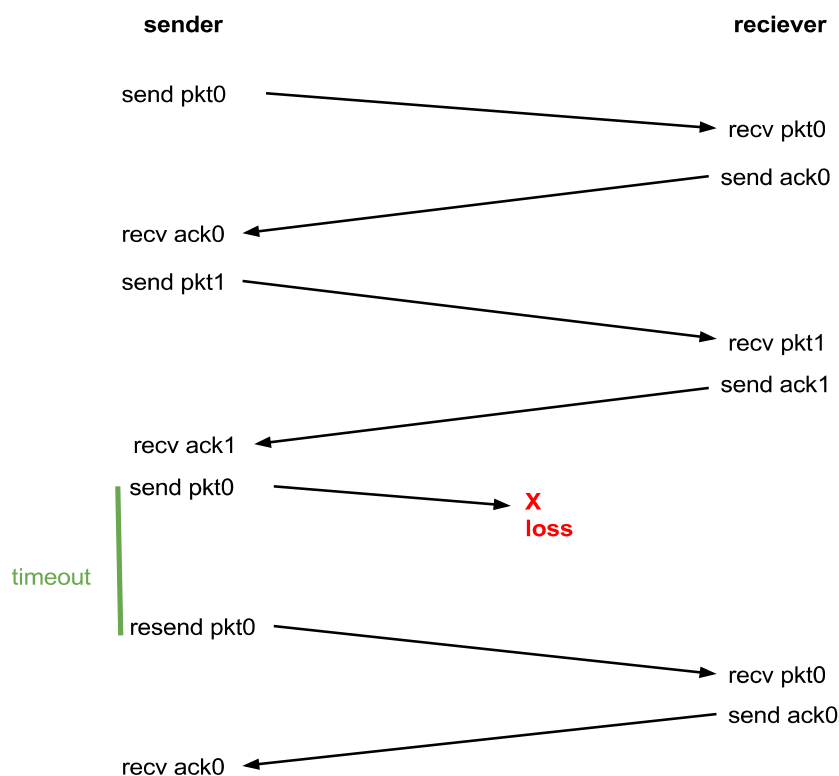
```
       sender                              reciever

   send pkt0  ──────────────────────────╮
                                          ╰──▶ recv pkt0
                                         ╭──── send ack0
   recv ack0  ◀───────────────────────╯
   send pkt1  ──────────────────────────╮
                                          ╰──▶ recv pkt1
                                         ╭──── send ack1
   recv ack1  ◀───────────────────────╯
   send pkt0  ──────────────▶ X
                                loss
timeout
   resend pkt0 ─────────────────────────╮
                                          ╰──▶ recv pkt0
                                         ╭──── send ack0
   recv ack0  ◀───────────────────────╯
```

Figure of the Alternating-Bit-Protocol

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1   http://en.wikipedia.org/wiki/Alternating_bit_protocol, [Online accessed Oct 26, 2014]

2.1 Go-Back-N protocol

The Go-Back-N protocol allows the sender to transmit multiple packets without waiting for an acknowledge. The receiver will only accept the next sequence number it is expecting, other sequence numbers are ignored.

3 Design

The implementation is made very simple, however the requirements are obtained.
The sequence number which is being generated with the packet, is made by using modulo. This will make it easy to check if both acknowledge number and sequence number is 0 or 1. If none of the if-test is correct, it means that the packet is is not correct, and you send a copy of the packet to the receiving side.

Another design question is how you're going to send the acknowledge. You can either switch between 0 and 1 when you send an acknowledge, or you can increase by one each time.

The checksum in this implementation, is made of the packets payload and it's being increased by the packets payload for each iteration. The checksum is used to check if the right packet is received. If the packet is corrupted or not received, an NACK (not acknowledge) is sent back to the sending side.

4 Implementation

The following code has been written in C and run in the Linux terminal.

5 Discussion

The implementation is made very simple and there is nothing surprising about it. The Alternating-Bit-Protocol is used to send one packet at a time and you have to receive an acknowledge before you send the next one. This can therefore a slower implementation then for example the Go-Back-N protocol. To make the sequence number more difficult to change or find, the sequence number could have been multiplied with a big prime number.

6 Conclusion

This report have described the one of the reliable data transfer protocols, the Alternating-Bit-Protocol. The implementation, which is the sending and receiving transport-level, will be running on a simulated network environment.

References

"*Computer Networking – A top-down approach*" sixth edition, James F. Kurose, Keith W. Ross.