Communication Networks

Spring 2025

Weiran Wang

https://comm-net.ethz.ch/

ETH Zürich

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Communication Networks

Exercise 9

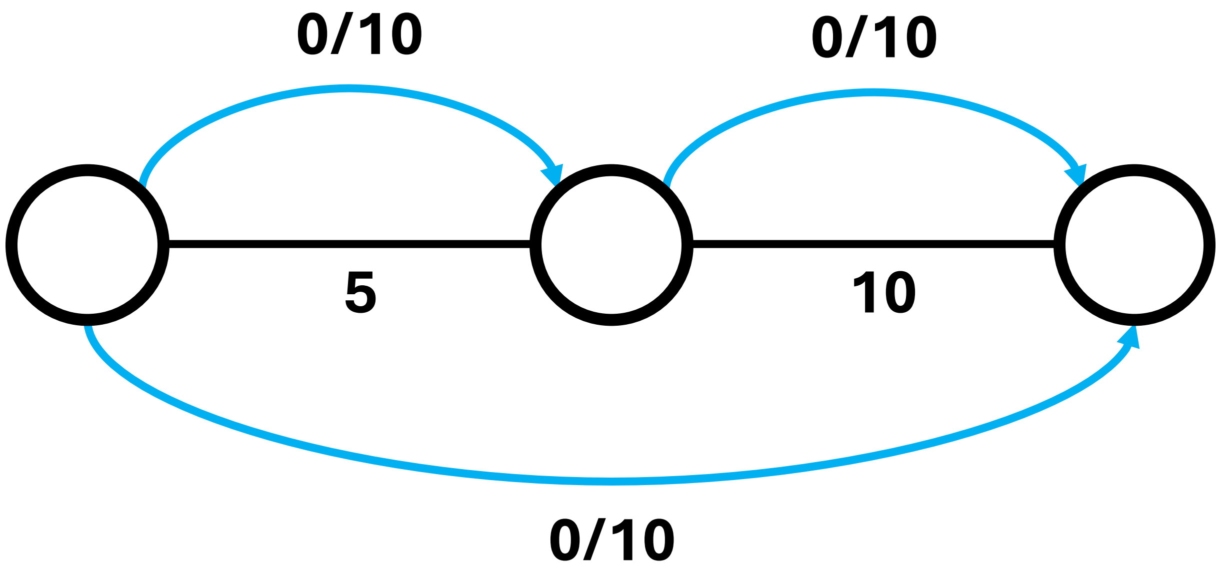
Important lecture topics

Introduction to this week's exercise

Time to solve the exercise

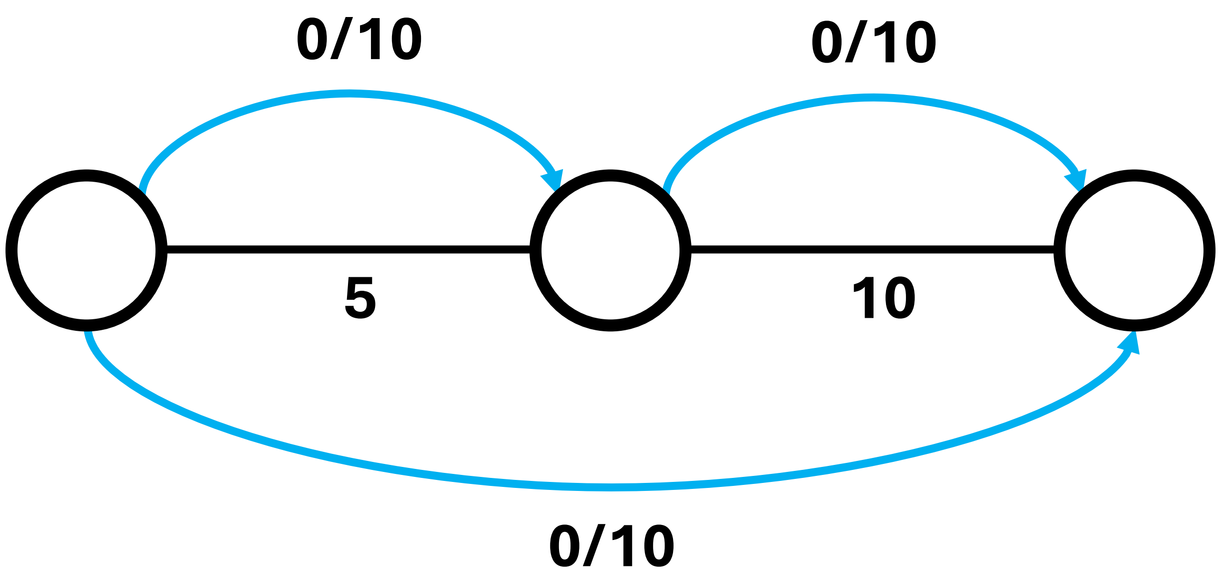
Max-Min Fairness Allocation Algorithm

Small toy example



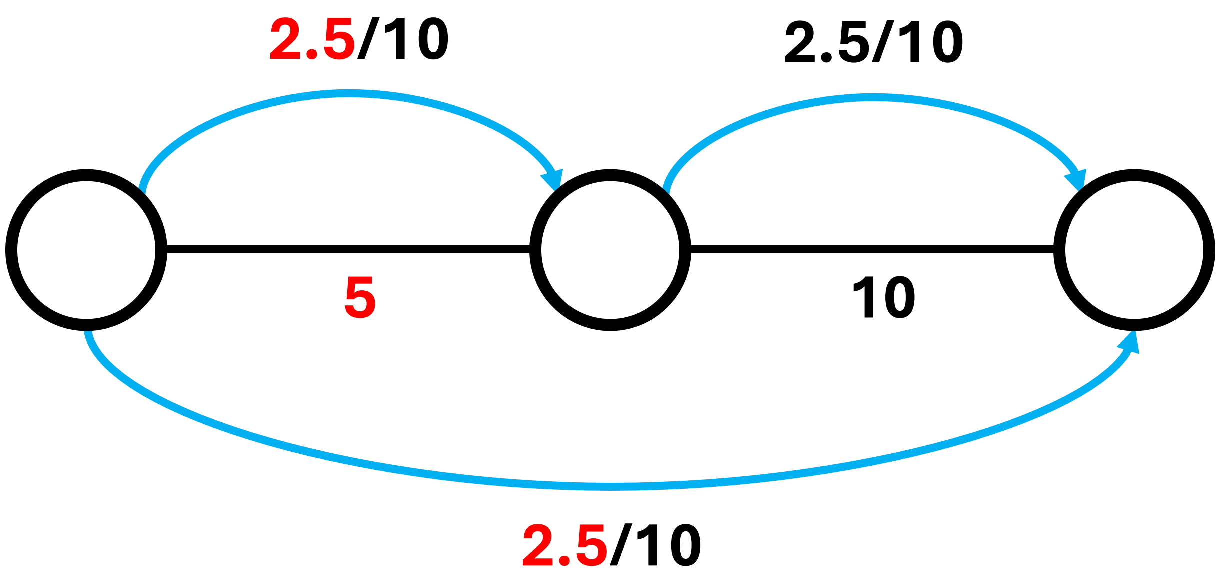
Max-Min Fairness Allocation Algorithm

Increase all flows equally until you reach the limit of a link



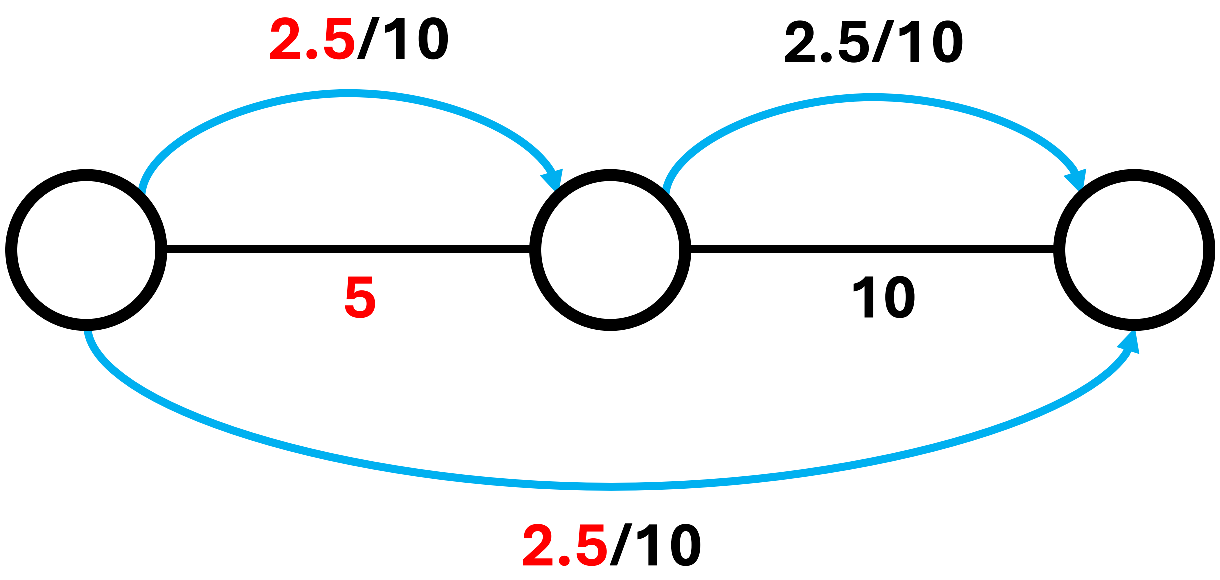
Max-Min Fairness Allocation Algorithm

Increase all flows equally until you reach the limit of a link



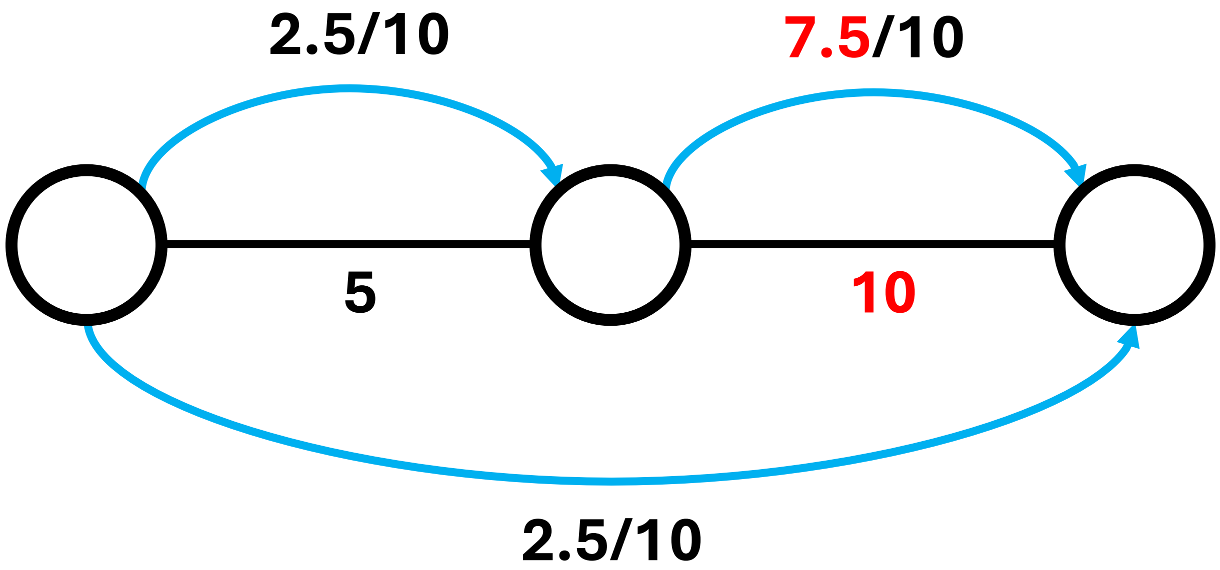
Max-Min Fairness Allocation Algorithm

Fix all the flows that reached the limit and continue to increase the others



Max-Min Fairness Allocation Algorithm

Repeat until all flows are limit either by the link capacity or the demand of the flow



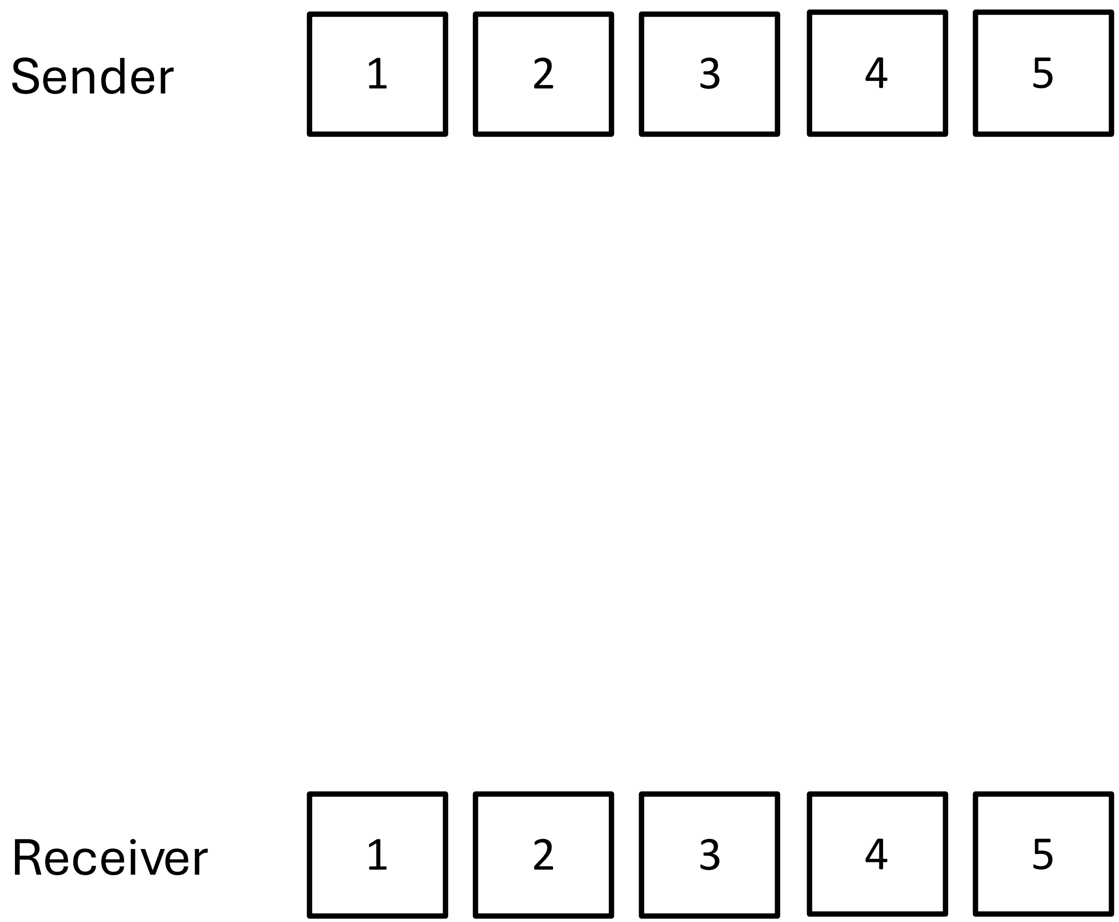
Sliding Window Protocols Summary

why	reliable in-order delivery of arbitrary #data using fixed-size sequence numbers
receiver	maintains window for undelivered data window advances when receiving process consumes data
sender	maintains window for unacked data window advances when new data is acked

Go-Back-N (GBN) is a Simple Sliding Window Protocol using cumulative ACKs

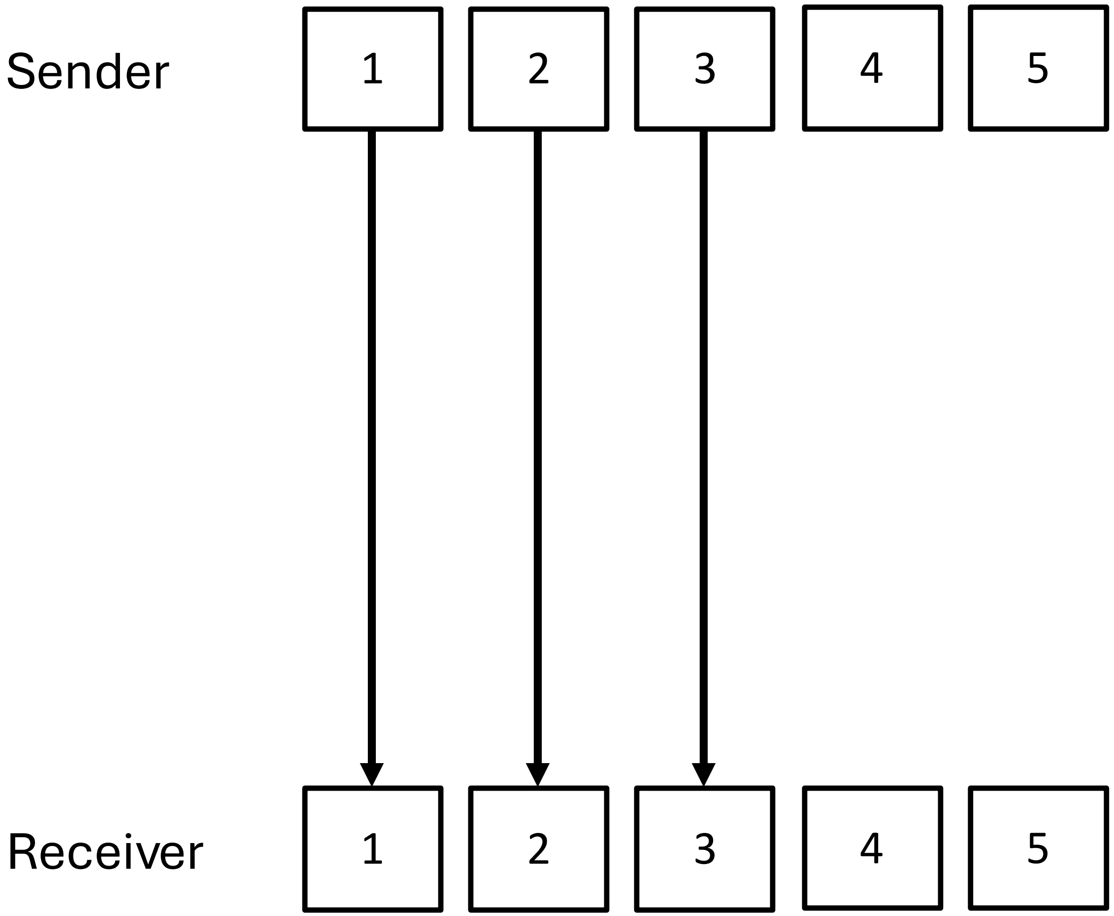
principle	receivers should be as simple as possible
receiver	delivers packets in-order to the upper layer for each received segment, ACK the last in-order packet delivered (cumulative)
sender	uses a single timer to detect loss, resets at each new ACK upon timeout, resends all W packets starting with the lost one

Go-Back-N



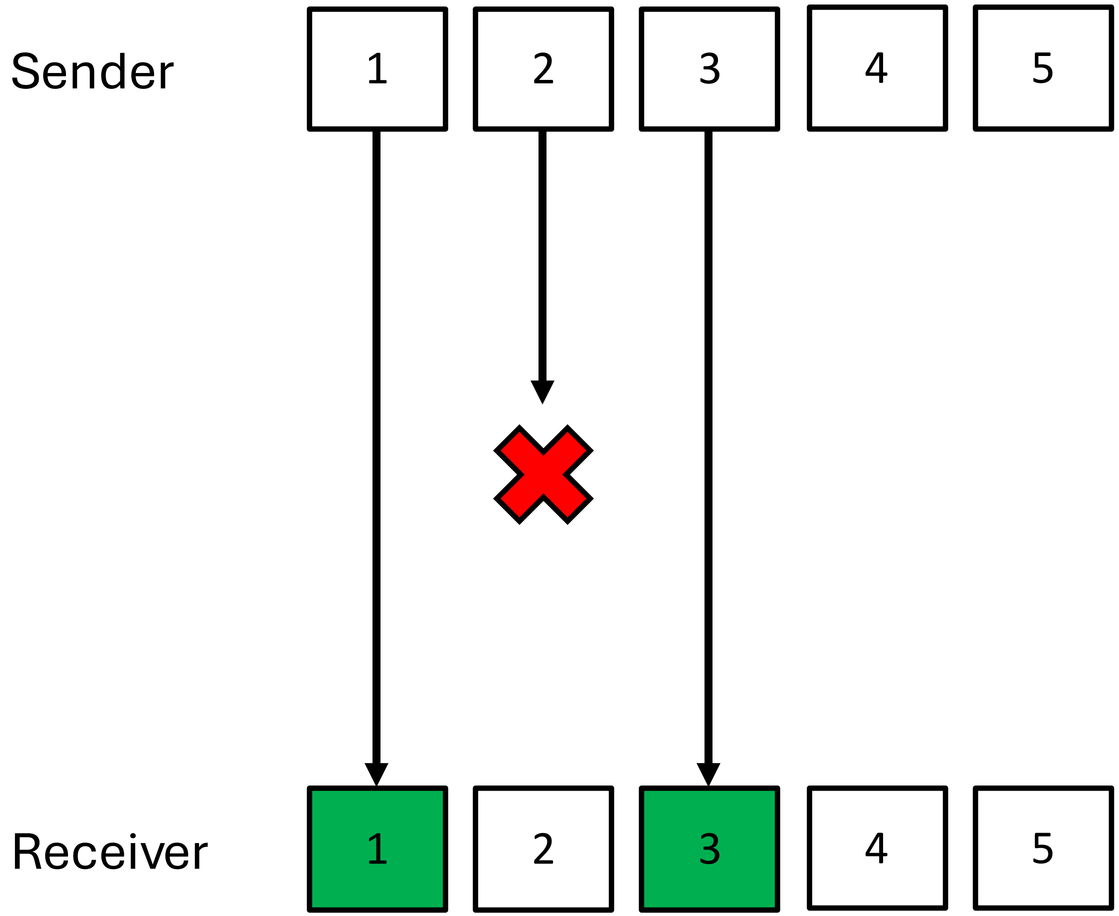
Simple example without accurate timing

Go-Back-N



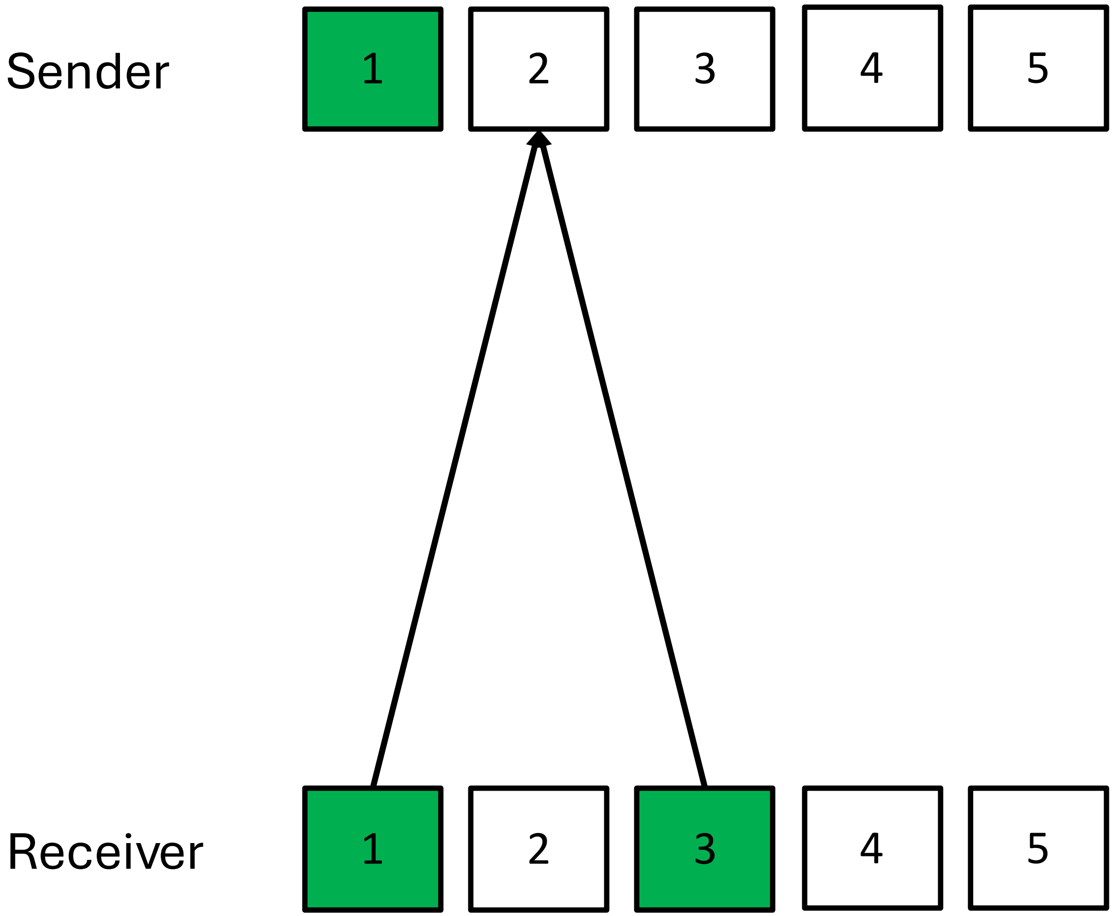
Sender sends first three packets

Go-Back-N



But number 2 never arrives

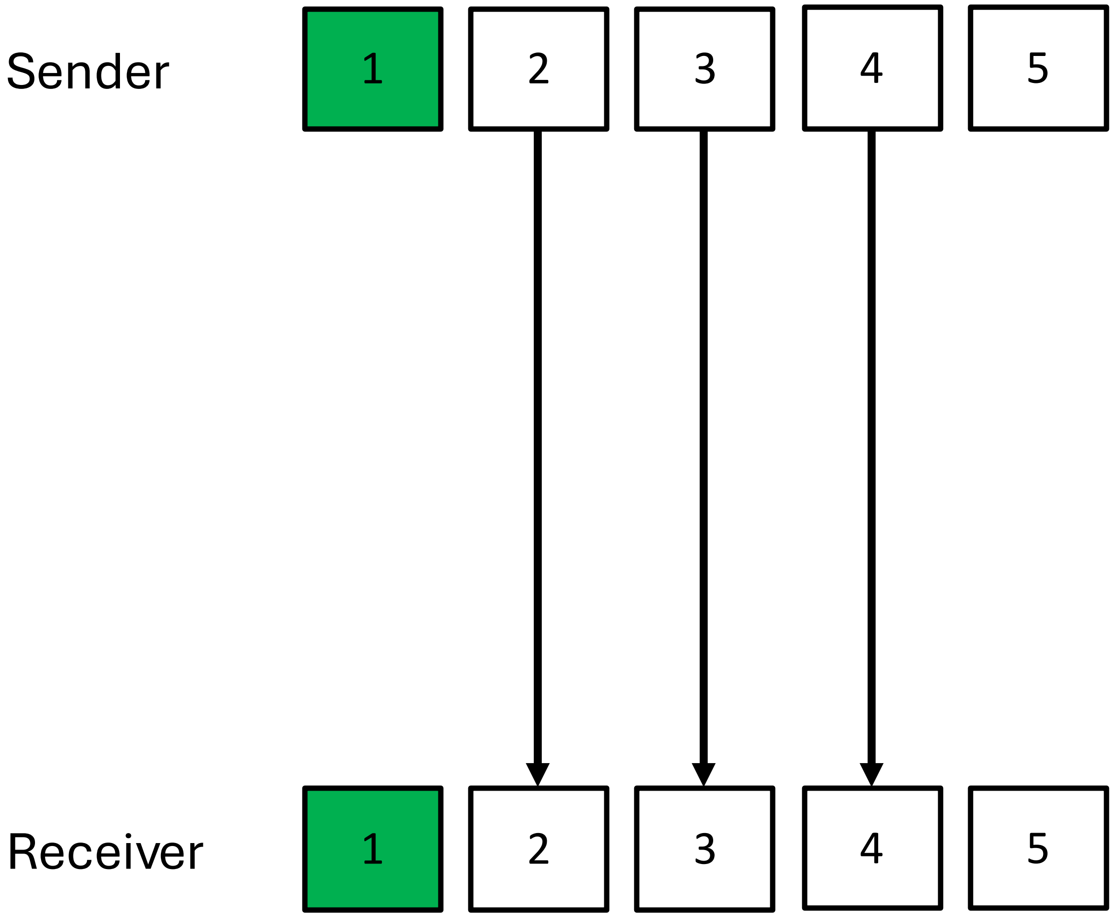
Go-Back-N



Receiver uses cumulative ACKs so it only acknowledges up to packet 1

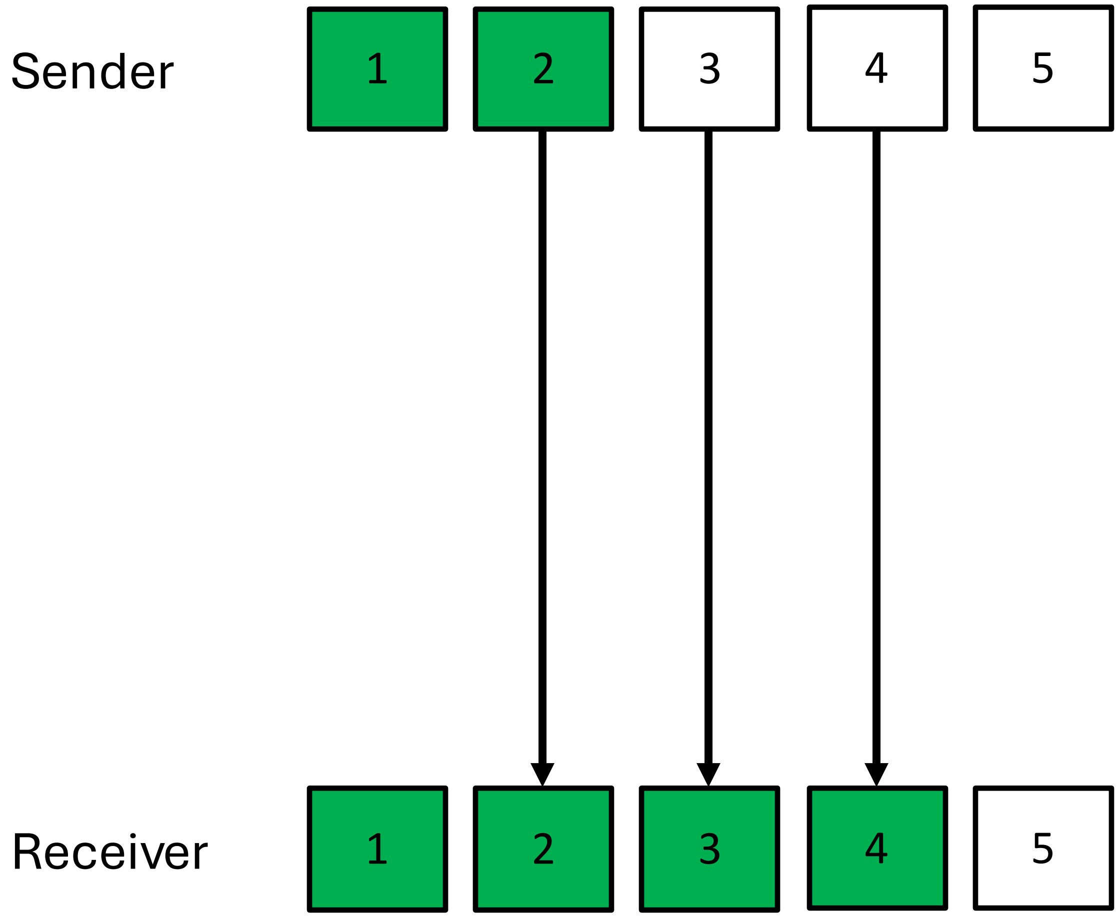
ACK points to next expected sequence number

Go-Back-N



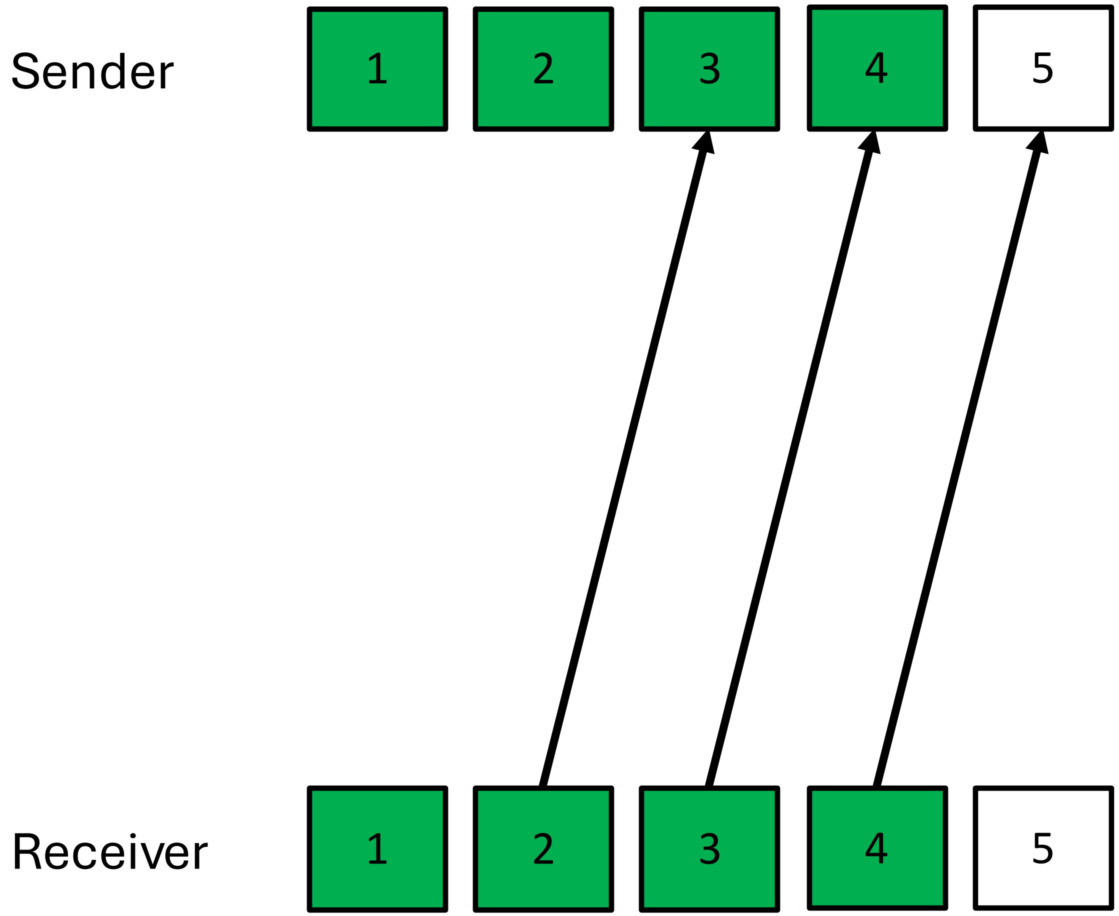
Sender retransmits packets that have not been acknowledged

Go-Back-N



All of them arrive

Go-Back-N



Receiver acknowledges packets including the ones already in the buffer

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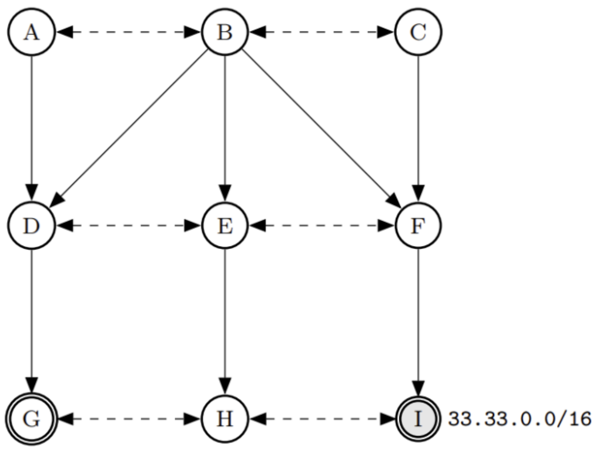
Task 9.1 BGP Hijack

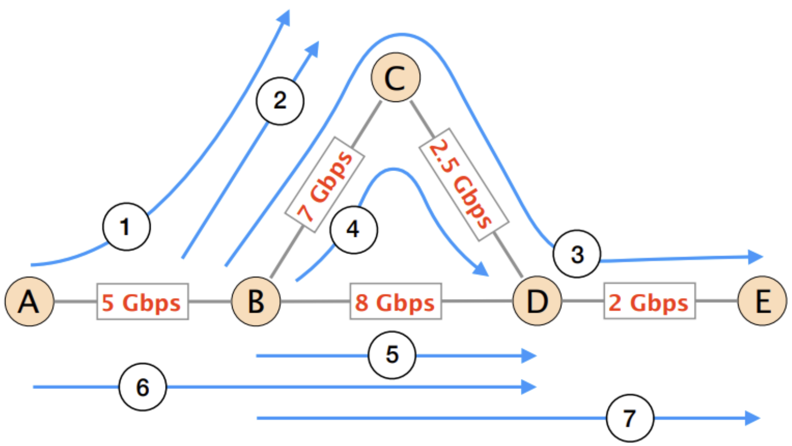


BGP Hijack similar to last time's exercise
(17 April)

Task 9.2 & 9.3 Reliable Transport Basics

Conceptual questions regarding reliable transport and NACKs

Task 9.4 Fairness of Bandwidth Allocation

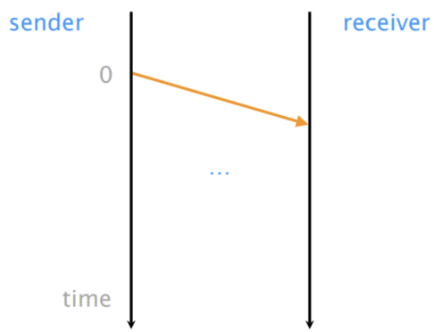


Apply max-min fairness algorithm

Task 9.5 Go-Back-N

Conceptual question regarding Go-Back-N

Task 9.6 Timing of Reliable Transport



How long would a transfer take?

Apply Go-Back-N algorithm make sure to think about the timing

Important delays:

- Transmission delay
- Retransmission delay
- Propagation delay

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