Components algorithms of TCP network congestion control (RFC 2001):

- **Slow Start** - initial growth of CongWind
- **Congestion Avoidance** - AIMD-based “search” for optimal rate
- **Fast Retransmit** - quick recovery from isolated packet losses
- **Fast Recovery** - undoing congestion control steps under Fast Recovery
Variants of TCP (examples)

- Original TCP (RFC1122)
- TCP Tahoe (adds Fast Retransmit)
- TCP Reno (adds Fast Recovery)
- TCP CUBIC (current versions of Linux)
  - does not rely on the receipt of ACKs to increase the window size
- TCP Fast
TCP Fairness

Example: two TCP connections competing with each other on a bottleneck link:

- Perfect sharing, full utilization
- Unfair but full utilization
- Fair but underutilized
User Datagram Protocol (RFC 768)
- A wrapper protocol for IP to add port numbers
- 8 bytes

<table>
<thead>
<tr>
<th>Source Port</th>
<th>Destination Port</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>Checksum</td>
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