

CS551

Basic TCP Mechanisms

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<http://merlot.usc.edu/cs551-f12>



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What Does TCP Provide?

- ↳ Does TCP Provide...
- Connection establishment?
- Connectionless communication?
- Congestion control?
- Differentiated services?
- Duplicate packet detection?
- Flow control?
- Loss recovery?
- Message or record boundaries?
- Ordered data delivery?
- Out-of-order data delivery?
- Quality of service guarantees?
- Urgent data indication?



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What Does TCP Provide?

- ↳ Does TCP Provide...
- Connection establishment? **Y**
- Connectionless communication? **N**
- Congestion control? **Y**
- Differentiated services? **Y (sort of)**
- Duplicate packet detection? **Y**
- Flow control? **Y**
- Loss recovery? **Y**
- Message or record boundaries? **N**
- Ordered data delivery? **Y**
- Out-of-order data delivery? **N**
- Quality of service guarantees? **N**
- Urgent data indication? **Y**



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Where And Why is TCP Used?

- ↳ Where: anywhere reliable communication is needed
- everywhere (60-90% of traffic is TCP)
- file transfer/ftp, http, p2p, DNS (zone transfers), BGP, SMTP, remote login/telnet
- ↳ Why?
- connection oriented (reliability, ordering, ...)
- has the right features (congestion control, flow control, ...)
- widely deployed → interoperability, understood, exhaustively studied, pretty good implementations
- doing your own protocol is a lot of work



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TCP Summary

- ↳ Communication abstraction:
- Reliable
- Ordered
- Point-to-point
- Byte-stream
- ↳ Protocol implemented entirely at the ends
- Assumes unreliable, non-sequenced delivery
- Fate sharing
- ↳ Operations
- OPENLISTEN, CONNECT, SEND, RECEIVE, ABORT

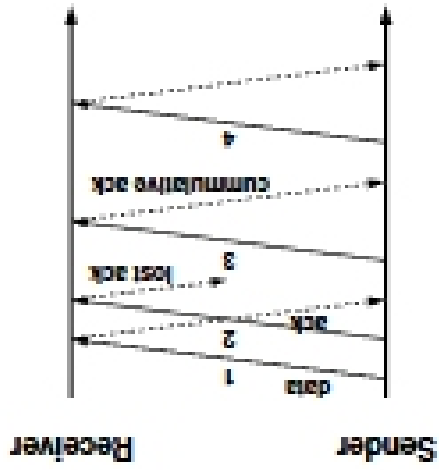


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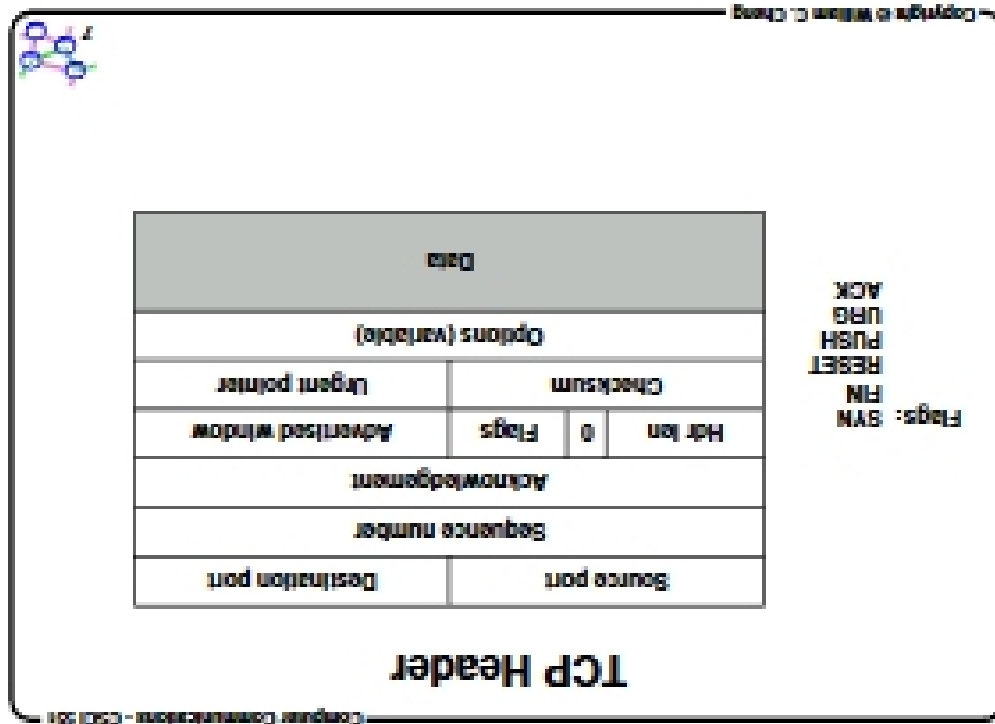
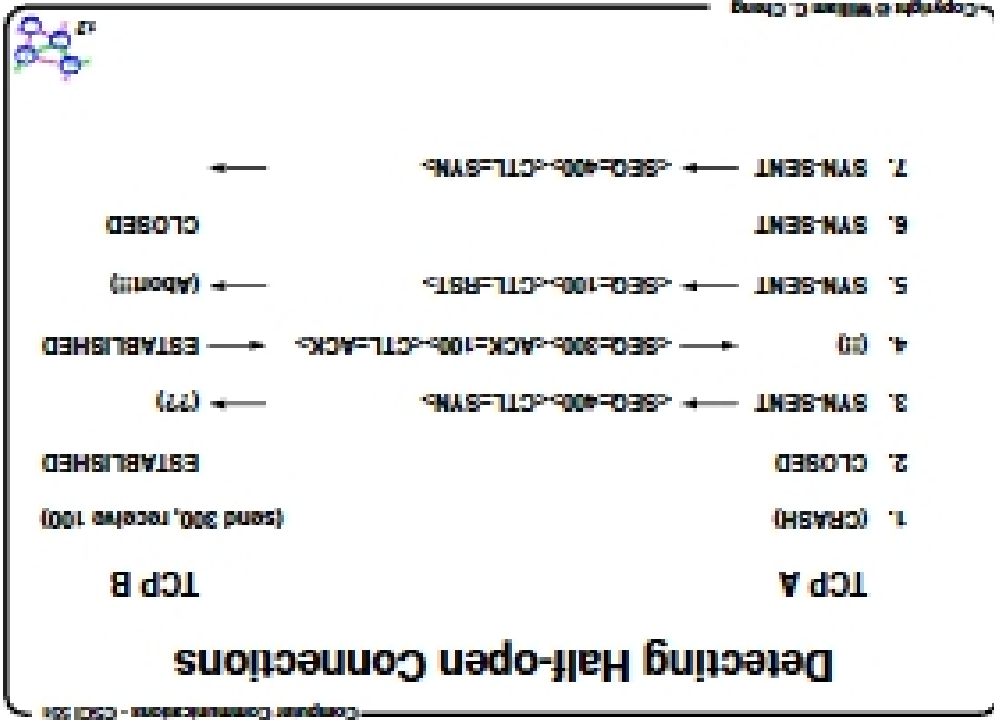
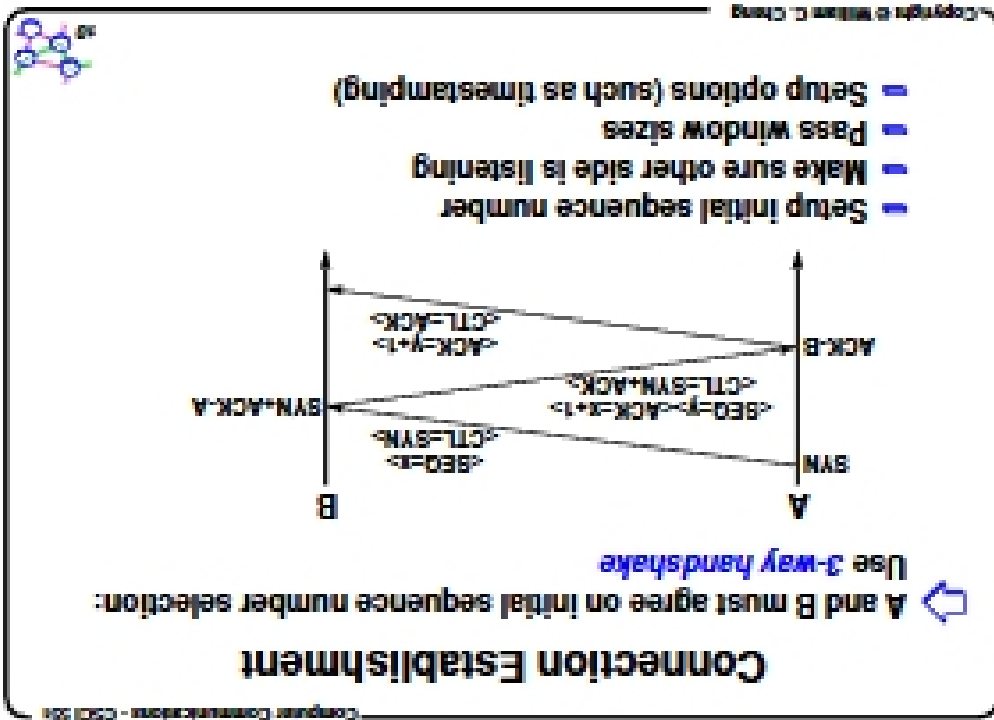
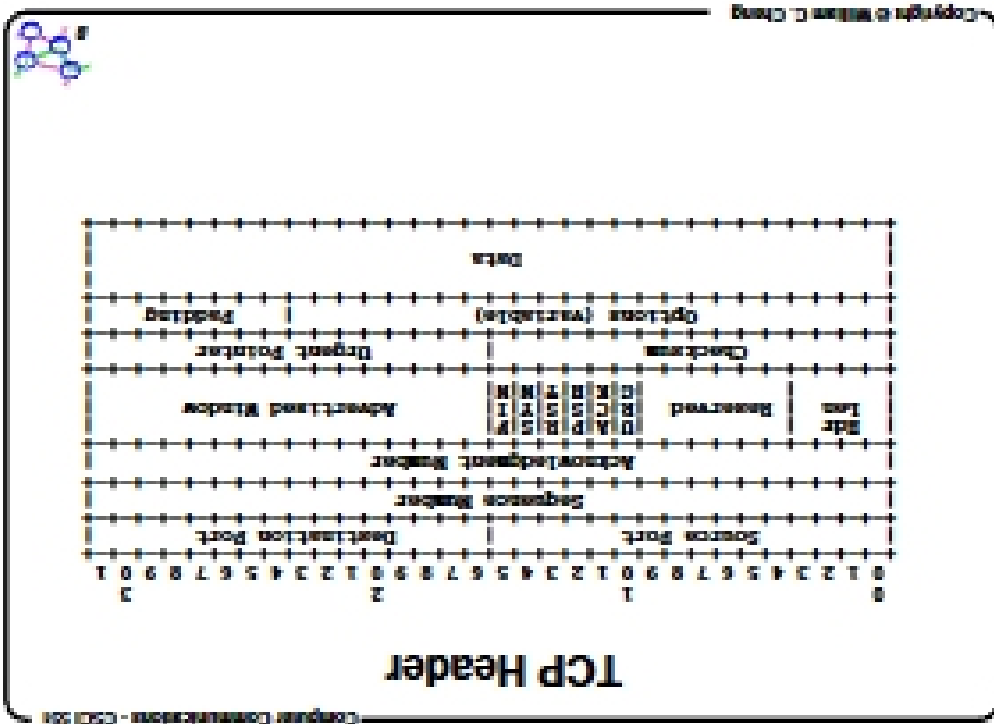
TCP Reliability Mechanism

- Summary or mechanisms
- window-based flow control
- sequence numbers, 3-way handshake
- reliability (ACK, retransmission policies)
- congestion control
- RTT estimation



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- ### TCP Mechanisms
- Connection establishment
 - Sequence number selection
 - Connection tear-down
 - Round-trip estimation
 - Window flow control

