

CSc 450/550

Computer Networks

Assignment 2

Jianping Pan
Summer 2006

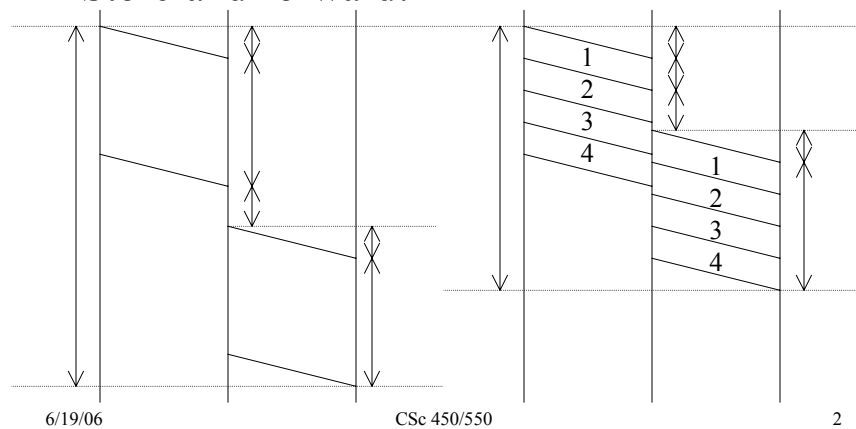
6/19/06

CSc 450/550

1

Message vs packet switching

- Store-and-forward!



6/19/06

CSc 450/550

2

Multiplexing technologies

- Frequency division
 - divided into frequency bands
 - wavelength division
- Time division
 - divided into time slots
- *Also*, code division
- In real world
 - all are used, often *together*!

6/19/06

CSc 450/550

3

Service models

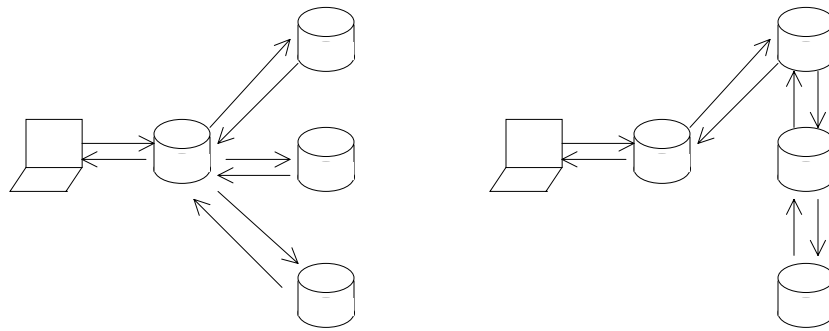
- Client-server
 - one server, many clients
 - bottleneck around the server
- Client-intermediary-server
 - proxy server
 - content distribution server
- Peer-to-peer
 - client/server-server/client

6/19/06

CSc 450/550

4

DNS queries

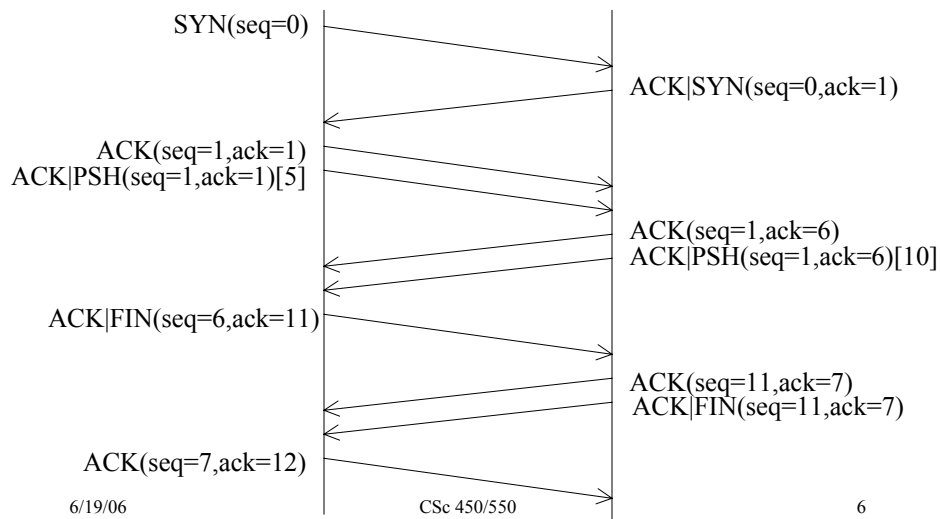


6/19/06

CSc 450/550

5

HTTP/TCP



6/19/06

CSc 450/550

6

TCP/IP-style checksum

- 16-bit aligned
 - padding if odd number of bytes
 - MSB (byte order)!
- 1's compliment sum
 - with carry bit
- 1's compliment of 1's compliment sum
 - verification is symmetric
- When checksum fails...

6/19/06

CSc 450/550

7

TCP timeout

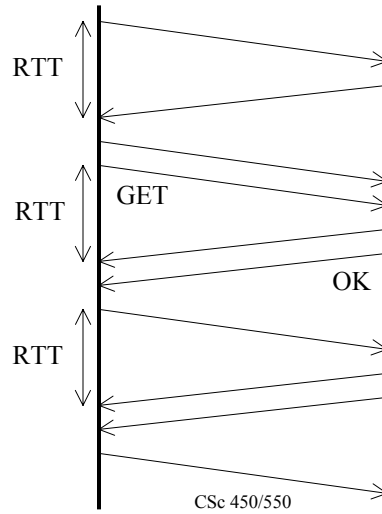
- Smoothed RTT (SRTT)
 - EWMA
 - $SRTT_{i+1} = SRTT_i + a (RTT_{i+1} - SRTT_i)$; $a = 1/8$
- RTT variance (RTTV)
 - $RTTV_{i+1} = RTTV_i + b (|RTT_{i+1} - SRTT_i| - RTTV_i)$; $b = 1/4$
- RTO
 - $RTO_{i+1} = d (SRTT_{i+1} + c RTTV_{i+1})$
 - c : initially 2, now 4
 - d (backoff factor): normally 1, doubled when timeout

6/19/06

CSc 450/550

8

HTTP/TCP (2)



6/19/06

CSc 450/550

9