

Mid-term exam

- In-class examination
- Tuesday March 4, 6:00-7:30pm
- Questions and exercises
- Open book and notes
- Review topics covered by slide sets 1 to 7
 - see following slides
- Review your homework and understand your mistakes
- Come and see me during office hours if you still have doubts or need further explanations on some topics

1

Lecture 1

- What is a Wide Area Network
- What is an Autonomous System
- Differences between switching paradigms
 - circuit
 - datagram
 - virtual circuit
- Layering concepts
- Protocol functions

2

Lecture 2

- WANs design issues
- The End-to-End argument
 - where do we implement functionalities
- The impact of link transmission quality
- Latency-Bandwidth tradeoff
 - a parameter
 - critical bandwidth

3

Lecture 3

- What is network congestion
- Data link layer flow and error control
- ARQ fundamentals
- Stop-and-wait
- Sliding window
 - Go-back-n
 - Selective repeat
- ARQ performance: link utilization
 - error free (stop-and-wait, sliding window)
 - with error (stop-and-wait, selective repeat)

4

Lecture 4

- End-to-end flow and congestion control
- Closed-loop schemes
 - feedback strategy
 - control technique
 - control level strategy
- ATM ABR congestion control
 - ERICA explicit rate feedback scheme
- M-K scheme

5

Lecture 5

- Open-loop end-to-end congestion control
- Traffic descriptors
- Traffic burstiness
- Traffic policing and shaping
- Leaky bucket
- Token bucket

6

Lecture 6

- IP router main functions
- Routing and forwarding table
- Table lookup, Patricia trie
- Router architecture
 - crossbar
 - Clos network
- Queue positioning in routers
 - output queuing
 - input queuing
 - virtual output queuing
 - shared buffer

7

Lecture 7

- QoS requirements
 - bandwidth, reliability, delay, jitter
- Packet scheduling characteristics
- FIFO, M/G/1 queue
- Priority queuing, Cobham's formula
- Conservation law
- Max-Min fair share
- Fair scheduling
 - Fair Queuing, Processor Sharing
 - Generalized P.S., Weighted Fair Queuing
 - Weighted Round Robin, Deficit Round Robin

8