Telematics Homework #10

Niklas Neumann 14 January 2010



First things first

- Mock examination ("Probeklausur")
 - Available on course web pages (beginning of next week)
 - Intended for self-study; there will be no answer sheet or exercise session
- Question and Answer Session
 - 28 January 2010, 10:15h (until all questions are answered)
 - Entirely for your benefit!
 - $_{\circ}~$ If there are no questions, there will be no answers
 - If you want a well prepared answer, please send us an email in advance



Practical Course

- Practical Course Networking Lab (BSc)
- o https://wiki.net.informatik.uni-goettingen.de/wiki/Teaching
- B.Inf.802/803/804: Fachpraktikum I/II/III (180h, 6 ECTS)
- Block course during the semester break
- 2 weeks, groups of 2 persons
- Send the TAs an email if you are interested





Quality of Service Building Blocks

- Q: What are the four building blocks of Quality of Service?
- Classification: distinguish one flow/class from another
- Policing: ensure the traffic is in conformant to the contracted parameters
- Scheduling: ensure the QoS guarantees (e.g., bandwidth, delay)
- Admission control and resource reservation: check if resource requirements can be met and admit or deny flows acordingly



Scheduling Policies

 Q: Name and characterize four scheduling policies that were introduced in the lecture.

• First In First Out (FIFO)

- Packets are sent in order or arrival
- $_{\circ}~$ If queue is full, discard either
 - Newly arriving packets
 - Packets based on priority
 - Random packets



Scheduling Policies (cont'd)

- Priority Scheduling
 - $_{\circ}~$ Packets are sent in order of priority
 - o Discard policy?
- Round Robin
 - Packets are sent alternating between different classes
- Weighted Fair Queuing
 - Combination of Priority Scheduling and Round Robin
 - Weighted amount of packets sent from each class every cicle





- Q: What are the criteria that policing mechanisms can use to control a data stream?
- (Long term) Average Rate
 - E.g. 6,000 packets per min (ppm)
- Peak Rate
 - E.g. 6,000 ppm on avg but limited to 1,500 packets per sec (pps) peak rate
- o (Max.) Burst Size
 - E.g. 500 packets



Packet Scheduling

- Q: Illustrate in what sequence packets from three different queues (a, b, c) can be sent from a sending buffer that implements a WFQ scheduling policy. Suppose the weights for the queues are 0.25, 0.25, and 0.5. How could the sequence look like if there are no packets in queue 'c'?
- abcc abcc abcc
- \circ acbc acbc acbc



Token Bucket

- Q: Consider a token bucket that is filled with a rate of 1,000 tokens/min and has a size of 500 tokens. Each bit of data consumes one token. Does a flow of 20bps conform to this bucket?
- 20 bit per second = 1,200 bit per minute → excess of 200 bit per minute
- \circ => The flow does not conform to this bucket

 However: If the bucket is full, flow has 2.5 min to adjust (500 tokens / 200 tokens/min)

Ctrl-c, Ctrl-v

- Q: Illustrate how a voice call is established using the Session Initiation Protocol.
- Sorry, this was a copy and paste mistake
- Question is answered in exercise 9



IntServ and DiffServ

 Q: Briefly compare the IntServ to the DiffServ architecture.

Criteria	DiffServ	IntServ
Based on	Aggregated service classes	Single flow
Level of control	Coarse-grained	Fine-grained
Basic principle	Traffic classification	Resource reservation
States	Edge: per flow Core: none	Every node: per flow
Setup	Per class (long-term)	Per flow
Scalability	Average	Bad



Thank you

Any questions?

