## Quality of Service QoS tools

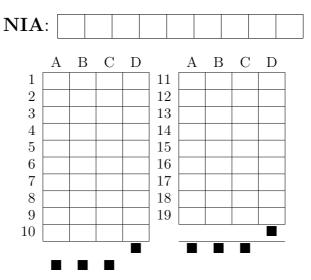
Date: Spring Duration: 15 min.

- There is only one correct answer for each multiple choice question.
- Each correct answer adds 1 point.
- Each incorrect answer has a penalty of  $\frac{1}{3}$  points.
- No score is awarded for unanswered questions, neither positive nor negative.
- Mark out your answers with an "X". Make sure that the "X" reaches the corners of the rectangle. ⊠
- No score is awarded if you mark more than one answer.
- Pad your NIA with 0s on the left to complete the NIA field.

Write your personal data clearly.

Last name:	
First name:	
Group:	

## Permutation: A



- 1.- What is the preferred OSI layer to implement end-to-end QoS?(a) Layer 1.
  - (b) Layer 7.
  - (c) Layer 4.
  - (d) Layer 3.
- (a) With a leaky bucket.
  - (b) With a maximum packet loss.

2.- How are the PIR and CIR defined?

- (c) With a token bucket.
- (d) With a maximum delay.
- 3.- Why is it not possible to offer per IP flow granularity in many data networks?
  - (a) Because it is not possible for a router to identify an IP flow.
  - (b) Because it would increase the queueing time.
  - (c) A core router may handle millions of IP flows and it cannot keep the state of them all and treat them differently.
  - (d) Because a router only pays attention to layer 4 information.
- 4.- Which of the following can be placed in an inbound interface?
  - (a) A shaper.
  - (b) Neither a traffic policer nor a shaper.
  - (c) A traffic policer and a shaper.
  - (d) A policer.
- 5.- When is it appropriate to police the traffic?
  - (a) When the traffic is in contract and we want to increase the delay.
  - (b) When it is exceeding the agreed profile and we want to avoid delay and jitter.
  - (c) When it is desired to prevent packet loss.
  - (d) When we want to absorb a burst and temparily store the additional traffic.
- 6.- Which of the following techniques can be used to implement a traffic shaper.
  - (a) Neither a traffic policer nor a shaper can be used to implement a traffic shaper.
  - (b) Only the leacky bucket is a candidate for the implementation of a traffic shaper.
  - (c) Both a leaky bucket and a token bucket are candidates for a traffic shaper implementation.
  - (d) Only a token bucket is a candidate for the implementation of a traffic shaper.

- 7.- What is not a downside of bandwidth overprovisioning?
  - (a) Lack of protection from the extra bandwidth consumption by virus/worms and other security attacks.
  - (b) Network usage may increase in pair with extra network provisioning.
  - (c) The need to pay for the extra bandwidth.
  - (d) Higher complexity.
- 8.- Where is computationally expensive classification and marking done?
  - (a) In the network core, where the routers are more powerful.
  - (b) At the outgoing interface of core routers.
  - (c) At the incoming interface of core routers.
  - (d) At the edge of the network where traffic is less aggregated.
- 9.- What is the name defined by the IETF to refer to the treatment that a router offers to a class of traffic?
  - (a) Synchronous Optical Networking (SONET).
  - (b) Per Hop Behaviour (PHB).
  - (c) Hierarchical replication code (HRC).
  - (d) Binary Exponential Backoff (BEB).
- 10.- Where can we find a TX-ring
  - (a) Between the scheduler and the transmission line.
  - (b) Between the policer and the shaper.
  - (c) Between the marker and the meter.
  - (d) Between the classifier and the queues.
- 11.- Which techniques would you use to identify and classify P2P traffic?
  - (a) Incoming interface and source IP address.
  - (b) Source port classification and layer 4 protocol.
  - (c) Metering.
  - (d) Deep packet inspection and stateful inspection.
- 12.- What is a Class of Service (CoS)?
  - (a) It is the maximum delay of a token bucket.
  - (b) Is the QoS tool that marks the packets.
  - (c) It is the router that receives high priority traffic.
  - (d) It is one of the different service categories in a QoS-enabled network.

- 13.- What is the usual behaviour in a service with a SLA that includes a PIR and CIR?
  - (a) To mark all packets above the PIR.
  - (b) To mark the packets above the PIR and discard the packets above the CIR.
  - (c) To mark the packets above the CIR and discard the packets above the PIR.
  - (d) To mark discard packets above the CIR.
- 14.- Where is a chain of QoS tools applied?
  - (a) In the router ports.
  - (b) In the router switching fabric. A tool (e.g. a policer) that is configured in a router, will apply to all interfaces and directions.
  - (c) In the routing tables.
  - (d) In the router interfaces, taking into account the direction of traffic (incoming/outgoing).
- 15.- Which of the following is not a typical element in a queue system?
  - (a) A buffer.
  - (b) A scheduler.
  - (c) A dropper.
  - (d) An IP address.
- 16.- Why is QoS more important in case of equipment failure or scheduled downtime?
  - (a) Because the scheduled downtime is usually at night or during the weekend.
  - (b) Because QoS simplifies the configuration and reduces the length of the downtime.
  - (c) Because there might be not enough resources to satisfy all traffic, and it is important to prioritize.
  - (d) Because QoS increases the available bandwidth, making sure that there is plenty of resources even during failure conditions.
- 17.- Which tool smoothes bursty traffic without dropping packets?
  - (a) A classifier.
  - (b) A marker.
  - (c) A meter.
  - (d) A shaper.
- 18.- Which of the following classification methods has the lowest computational cost?
  - (a) IP and port source and destination pairs.
  - (b) QoS markings.
  - (c) Stateful inspection.
  - (d) Deep packet inspection.

- 19.- How many bits are available in the headers for QoS packet marking.
  - (a) 6 in MPLS, 3 in Ethernet and a total of 8 in IP (6 for DSCP and 2 for ECN).
  - (b) 3 in MPLS, 3 in Ethernet and 3 in IP.
  - (c) 8 in MPLS, 8 in Ethernet and 8 in IP.
  - (d) 3 in MPLS, 3 in Ethernet and a total of 8 in IP (6 for DSCP and 2 for ECN).