

Quality of Service
QoS metrics

Date: Spring
Duration: 30 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

NIA:

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	A	B	C	D		A	B	C	D
1					9				
2					10				
3					11				
4					12				
5					13				
6					14				
7					15				
8					16				
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	■	■	■			■	■	■	

- 1.- For TCP connections, our main concern is ...
 - (a) the propagation time.
 - (b) the round-trip-time (RTT).
 - (c) the average hop duration.
 - (d) the transmission time.
- 2.- Why it is necessary to offer different tiers of service?
 - (a) To reduce the delay of all packets of the network.
 - (b) Because the applications that use larger volumes of traffic need to be prioritized.
 - (c) Because heterogeneous applications coexist in the same network.
 - (d) To prevent that VoIP packets are transmitted over the same link as Web packets.
- 3.- Which techniques can we use to deal with errors?
 - (a) Forward error correction (FEC), automatic repeat request (ARQ), packet loss concealment (PLC).
 - (b) Cell integrity metric (CIM), error dealing technique (EDT), weighted round robin (WRR).
 - (c) Hierarchical replication code (HRC), strong data protection (SDR), error prevention mechanism (EPM).
 - (d) Binary robust redundancy (BRR), spatial data duplexing (SDD), repeat-until-received (RUR).
- 4.- What is the name of the contract that details QoS guarantees?
 - (a) QoS contract (QSC).
 - (b) Guarantee Provision Society (GPS).
 - (c) High Quality Contract (HQS).
 - (d) Service Level Agreement (SLA).
- 5.- Which measure of bandwidth is common for billing in contracts between ISPs?
 - (a) 95 % percentile bandwidth of averages of 5 minutes.
 - (b) Minimum bandwidth.
 - (c) Average bandwidth.
 - (d) Free bandwidth.
- 6.- What of the following is a good practice (a requirement, actually) in router design?
 - (a) Keep packets of different flows in different queues.
 - (b) Keep the packets of the same flow in the same queue.
 - (c) Keep a separate queue for each flow.
 - (d) Keep packets of the same flow in different queues.

7.- Which of the following is not a positive aspect of a network?

- (a) Short MTTR.
- (b) High $\frac{MTBF}{MTBF+MTTR}$ ratio.
- (c) High availability.
- (d) Short MTBF.

8.- What is the re-ordering ratio of this sequence (1, 2, 3, 4, 7, 5, 6, 8, 9, 10)?

- (a) 0/10.
- (b) 3/10.
- (c) 5/10.
- (d) 10/10.

9.- Why is defining SLA's is tricky? Take the example of bandwidth.

- (a) It is difficult to measure packets that are travelling very fast (the speed of light).
- (b) Bandwidth can be measured in bits per second or bytes per second.
- (c) The bandwidth changes with different operative systems and browsers.
- (d) Bandwidth may have different meanings (line speed, with or without L2 headers, average or maximum, etc.).

10.- Which of the following statements is true?

- (a) Web traffic has stricter delay constraints than VoIP.
- (b) P2P file exchange is not an elastic application.
- (c) Voice packets should be prioritized over video.
- (d) Voice require more bandwidth than video.

11.- Which of the following media is more reliable in terms of bit error rate?

- (a) ADSL over twisted pair.
- (b) Optical fibre.
- (c) WiFi link.
- (d) Satellite link.

12.- Which of the following is not a QoS metric considered in the course?

- (a) Availability.
- (b) Bandwidth.
- (c) Confidentiality.
- (d) Packet order preservation.

13.- What is common packetization interval for VoIP?

- (a) 20 ms .
- (b) 1 ms .
- (c) 100 μ s.
- (d) 200 ms.

14.- A router is performing load balancing using two parallel links ...

- (a) It should use the ECN bit to route the packet.
- (b) It should use the flow sequence number to route the packet.
- (c) It should take a hash of the protocol (UDP or TCP), source and destination address and source and destination port to decide the route of the packets.
- (d) It should take a hash of the QoS field to route the packet.

15.- Which of the following is not a possible cause of packet loss?

- (a) Level 1 errors.
- (b) Scheduling algorithms.
- (c) Device failure.
- (d) Full queues.

16.- Given L the packet length and R the line rate, what is $\frac{L}{R}$?

- (a) The propagation time.
- (b) The processing time.
- (c) The queueing time.
- (d) The transmission time.