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| --- | --- | --- | --- | --- | --- | --- |
| Name**:** |  | | | | Number: |  |
| **On True/False questions cross the right answer.** | | | | Teacher: JF□ NCosta □ NCruz □ RR □ TA □ | | **Duration: 1 Hour** |
| Example: T ⃞ | | F ⃞ |

1. Consider DSL e Cable network Technologies, used on access networks:
   1. DSL uses fiber optics as transmission media F
   2. DSL *Splitter* splits between voice and data frequency bands V
   3. Cable networks use time multiplexing on the access control channel on the downstream (from the ISP to the user) F
   4. The bandwidth for accessing any website on the Internet in ensured by the internet service provider F
2. Consider *Gigabit Passive Optical Network* (GPON):
   1. GPON needs two fiber optic cables on the optical network terminal (ONT) F
   2. The maximum upload and download speed is 1 Gbps F
   3. The GPON *Splitter* splits between *upstream* e *downstream* F
   4. GPON uses time division multiplexing (TDM) on the media access control transmission channel from the ONT to the network V
3. Computer networks have a layer-based architecture:
   1. Interfaces between layers are well defined and allow the independent evolution of protocols among each other V
   2. The TCP/IP protocol stack includes more layers than OSI layer model F
   3. The use of layers introduces latency and possible packet loss F
   4. OSI model presentation layer features are implemented in the TCP/IP model by the network layer F
4. Consider the following statements:
   1. Latency is a measurement that changes throughout the time between any given 2 devices on a network V
   2. When the volume of data increases on a low bandwidth connection, the propagation time increases F
   3. Packet loss is caused by the excess of data at the input interface queue V
   4. Congestion occurs when the data arrival rate is higher than the transmission capacity of a router V
5. Considering the HTTP protocol:
   1. A persistent connection is more efficient than a non-persistent connection if there is more than one request V
   2. The DELETE method allows you to delete the file specified in the “File:” header F
   3. The HTTP protocol allows sending data to the server V
   4. In a 200 OK response to a GET request, the Content-Type header indicates the type of the object that is returned in the body of the message V
6. Regarding DNS:
   1. The root name servers contain information about all authoritative servers in all domains F
   2. An iterative search is more harmful to root name servers than a recursive search F
   3. The resource record CNAME contains the association between an IP address and domain F
   4. The local name servers (forwarders) use a caching system to improve performance in the resolution process V
7. Consider e-mail:
   1. The SMTP protocol permits to find the e-mail address of a user F
   2. IMAP allows a sender to send messages directly to the mailbox while messages sent by POP are send directly to the recipient device F
   3. You can forge the origin of an e-mail using an envelope address different from the one on the “From:” header V
   4. SMTP is only used for sending the message up to the server where the recipient mailbox is located F
8. About CDN, P2P and Video Streaming:
   1. The main objective of a CDN is to centralize the files only in a certain server F
   2. In video streaming over HTTP (DASH) it is common for the video to be encoded with different bitrates V
   3. In a P2P architecture, it is not possible for a peer to simultaneously download and upload F
   4. In video streaming over HTTP, the data is transported over UDP F
9. The following table presents a data transfer between two devices using TCP. Fill in the missing fields on columns ACK, SYN, FIN, SEQ Number, ACK Number and Length.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Source | Destination | ACK | SYN | FIN | SEQ Number | ACK Number | Length |
| 10.0.0.1 | 20.0.0.1 |  | X |  | 1000 | - | 0 |
| 20.0.0.1 | 10.0.0.1 | X | X |  | 99 | 1001 | 0 |
| 10.0.0.1 | 20.0.0.1 | X |  |  | 1001 | 100 | 0 |
| 10.0.0.1 | 20.0.0.1 | X |  |  | 1001 | 100 | 2000 |
| 10.0.0.1 | 20.0.0.1 | X |  |  | 3001 | 100 | 2000 |
| 10.0.0.1 | 20.0.0.1 | X |  |  | 5001 | 100 | 2000 |
| 20.0.0.1 | 10.0.0.1 | X |  |  | 100 | 7001 | 100 |
| 10.0.0.1 | 20.0.0.1 | X |  |  | 7001 | 200 | 100 |
| 10.0.0.1 | 20.0.0.1 | X |  | X | 7101 | 200 | 0 |
| 20.0.0.1 | 10.0.0.1 | X |  |  | 200 | 7102 | 100 |
| 20.0.0.1 | 10.0.0.1 | X |  | X | 300 | 7102 | 0 |
| 10.0.0.1 | 20.0.0.1 | X |  |  | 7102 | 301 | 0 |

1. What is the minimum MSS needed for the transfer?

2000

1. What is the minimum RECEIVE WINDOW field value, **advertised** in each direction, that allows the data transfer?

10.0.0.1 🡪 20.0.0.1 = 6000 20.0.0.1 🡪 10.0.0.1 = 100

1. How many bytes were transferred from 20.0.0.1 to 10.0.0.1?

200

1. About UDP:
   1. UDP protocol ensures the reliable data transfer to the application layer F
   2. UDP uses sequence numbers (SEQ) and acknowledge numbers(ACK) F
   3. UDP allows errors detectionV
   4. UDP is connectionless V
2. About reliable data transfer and retransmission protocols:
   1. When sender host doesn’t receive an ACK segment to a transmitted segment, it means that segment wasn’t delivered to the receiver host F
   2. Stop-and-Wait is an example of a pipelining protocol F
   3. In Go-Back-N protocol all out of order packets are discarded V
   4. In Selective-Repeat protocol sender keeps a timer for each packet in transit without ACK V
3. Take in consideration the TCP Protocol:
   1. It establishes a connection between two hosts before transferring the messages from the upper layer V
   2. On its most recent version, a TCP connection can have more than 2 destinations F
   3. It provides session establishment and congestion control services V
   4. It implements sequence numbers using 14-bits on the TCP Header F
4. Two *routers* with 100 km between themselves are connected with a fiber optics transmission network. The protocol used on the transmission is based on *Go-back-n*, with a bitrate of 1 Gbps, using 2500 bytes frames. The connection has a BER of 10-6 and a propagation velocity of 2x108m/s. Determine the ideal window size in order to optimize efficiency (calculate also the efficiency).

Tp=100/200000=0,5ms,Tix=2500\*8/1000000000=0,02ms,a=Tp/Tix=25,N=1+2a=51,Pf=20000\*0,000001=0,02,U=(1-Pf)/(1+Pf\*(N-1))=(1-0,02)/(1+0,02\*(51-1))=0,49,Umáx=49%