S-72.1130 Telecommunication Systems

Close-books exam on 12th of Jan 2011

NOTE: Correct answer yields +1p, false -1p and unselected answer 0p

Return your answers in the supplied answer sheet

1. If UDP is used as the transport layer protocol, error detection and retransmission are normally used to recover from transmission errors and losses.
2. A transport layer protocol data unit (PDU) is a network layer service data unit (SDU).
3. Consider a source, where the 6 alphabet symbols occur with probabilities 0.32, 0.27, 0.16, 0.15, 0.05 and 0.05. It is possible to find a binary tree code for this source so that the average number of encoded bits per source symbol is less than 2.2.
4. When the efficiency of a typical random access MAC protocol approaches its maximum value, the average frame transfer delay is at its lowest.
5. Non-persistent CSMA is more prone to frame collisions than 1-persistent CSMA.
6. Run-length coding is typically used in the course of the JPEG image coding process.
7. The Huffman algorithm cannot be used at any stage of the JPEG image coding process.
8. If error control is used at the data link layer over each single-hop connection, then error control at the transport layer is still needed.
9. A device in the Internet never needs to have more than one IP address.
10. In some conditions, it is possible that slotted ALOHA is more efficient than CSMA-CD.
11. When Go-Back-N ARQ is used, the number of bits needed for the frame sequence numbers has nothing to do with the round-trip delay of the system.
12. Consider a binary source with symbol probabilities p and 1-p. The source entropy can be more than 1.5 bits/symbol.
13. An HTTP server automatically learns to recognize the most frequent clients.
14. Suppose an application layer entity wants to send an L-byte message to its peer process, using an existing TCP connection. The TCP segment consists of the message plus 20 bytes of header. The segment is encapsulated into an IP packet that has an additional 20 bytes of header. The IP packet in turn goes inside an Ethernet frame that has 18 bytes of header and trailer. If if $L = 200$ bytes, then more than 70% of the transmitted bits in the physical layer correspond to message information.
15. Assume that Selective-Repeat ARQ is used, and the transmission rate is decreased from 2 Gbps to 1 Gbps while all the other parameters, such as the propagation and processing delays and the frame loss probability P_f, stay fixed. Then the efficiency of the protocol will decrease.

16. SONET allows positive or negative byte stuffing to take place at most once every four frames. Calculate the minimum and maximum rates of the payload that can be carried within an STS-1 SPE. This means that the maximum payload rate is 50.128 Mbps and the minimum payload rate 50.096 Mbps
17. Consider the Clos multistage switch with N = 16, n = 4, k = 2. The maximum number of connections that can be supported at any given time is therefore 14.
18. In Time-Share the Crossbar Switch interconnection pattern of space switch is reconfigured for every time slot.
19. Physical carrier sensing is not possible without the network allocation vector.
20. HDLC SAPs are used to separate services as http or ftp .
21. Usage of point coordination function enables contention free service.
22. CRC is used to correct errors in a bit stream or frame. This enables frame to be corrected without retransmission.
23. HDLC supervisory frame can be used to flow control.
24. In bit stuffing extra bits are added to frames to avoid synchronization problems.
25. The process where too large layer n SDUs are divided into several layer n PDUs is known as blocking.
26. DNS server uses the well-known port number 53.
27. If the transmission channels in a communication networks would become virtually error-free, the data link layer would no longer be needed.
28. Pulse stuffing requires that the stuffed bits are evenly distributes in input bit streams.
29. SONET path flows between STS-1 terminals.
30. Usage of exponential back-off in DWFMAC enables congestion reduction if network allocation vector is used.

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Answer sheet, 12th of Jan 2011

Please tick True (T), False (F) or Unknown (U) and return this sheet as your answer.
NOTE: Correct answer yields +1p, false -1p and unselected answer 0p

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