
The University of Queensland
School of Information Technology and Electrical Engineering
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COMS3200 – Tutorial 5

Questions

1. State the roles of the Data Link layer. Characterise the control information which is added by the Data Link layer to a packet passed from the Network Layer.
2. The following data fragment occurs in the middle of a data stream for which the character-stuffing algorithm is used: A, B, ESC, C, ESC, FLAG, FLAG, D. Assume that FLAG is used for framing and ESC is used to show that a particular FLAG is part of data not a framing byte. What is the output after stuffing?
3. If the bit string 011110111110111110 is subjected to bit stuffing, what is the output string?
4. Can you think of any circumstances under which error correction codes might be preferable to error detection codes?
5. One way of detecting errors is to transmit data as a block of n rows of k bits per row and adding parity bits to each row and each column. Will this scheme detect all single errors? Double errors? Triple errors?
6. A cyclic redundancy code has 8 message bits and uses the generator polynomial:
$$x^5 + x^4 + x + 1$$
 - a. Deduce the redundant checkbits which would be appended to the following message at the sender side: 11100011
 - b. Verify your answer to a) showing that the receiving side's check of the message extended with the redundant bits succeeds.
7. A 3000 km long T1 trunk is used to transmit 64-byte frames using a Go-back- n protocol. If the propagation speed is 6 μ sec/km, how many bits should the sequence number be? T1 data rate is 1.544 Mbps.
8. Frames of 1000 bits are sent over a 1 Mbps satellite channel. Assume that the propagation delay over a satellite channel is 270 ms. Acknowledgements are always piggybacked onto data frames. The headers are very short. Three bit sequence numbers are used. What is the maximum achievable channel utilisation for
 - a) Stop-and-wait
 - b) Go-back- n
 - c) Selective repeat
9. In a *selective repeat* protocol the maximum sequence number is $2^n - 1$. This condition is desirable to make efficient use of header bits. Is it essential? Does the protocol work correctly if the maximum sequence number is 4, for example?