EEL 895 Broadband Communication

Major Exam — May 3,2008

All questions carry equal marks — Time 2 Hrs

Max Marks 40

Q1 a) One hundred users employ TDMA to transmit packets of data with each packet consisting of 200 bits. The channel bandwidth is 10 MHz and QPSK is employed. What is the maximum bit rate allowable on the channel? How long does it take to transmit one paeket from each user? This time is called the frame time.
b) If ALOHA is used in above scheme, compare the two parameters calculated above. State any assumptions that you make,

Q2 A sliding window protocol is used for flow control in an ISDN network. a) Draw the timing diagram for the data transmission between two network nodes I and J depicting the casc whcre full link utilisation is to be achieved. Given that 'X' number of frames correspond to thc dclay between the two nodes. b) what is thc minimum window size in terms of the number of frames if full link utilisation is to be achieved as per the timing diagram, given that the link delay is 2 m Sec and the frame size is 200 μ Sec.

Q3 Show scrambling and de-scrambling scheme for an ISDN network with a suitable hardware. You may use two polynomials of order 4 to be assumed by you and show by means of an examplc which of thc two is better.

Q4 A CSMA/CD bus uses a packet size of 250 bits and along with a header of 50 bits. The data rate required to be supported on the bus is 10 Mbps. What is the maximum distance that the bus can span so that collisions are detected? The typical propagation speed in LAN cables is 200 m/ μS.

Q5 a) Give in tabular form LAPD Commands and Responses for Information (I) and Supervisory (S) fields only.
b) Show graphically a two way data exchange using LAPD with time out recovery.

Q6 a) What is the purpose of HEC in the ATM cell frame? Suppose that thc bit error rate of the transmission system is 10**-7 and if the crrors are uniformly distributed, find the probability of error in the header and the probability of error in the data field.
b) What is the overall bit error rate if the header errors are not detected and not corrected?

Q7 a) Draw the switching fabric of a three stagc Clos switch for nine inputs/ outputs. Show the paths connecting input 7 to output 1 and input 8 to output 8 if thcy are not conflicting.
b) Compare the reliability performance of the Clos switch with a switch which is non-internally blocking.

Q8 a) In a SS7 signalling systcm, show with labels transmission of MSUs with error correction for the case of onc error both ways.
b) Calculate the message information capacity of an SS7 link assuming that all messages consist of 3 octets and only MSUs are sent.

Q9 An ATM network uses Genetic Cell Rate Algorithm for traffic control to meet the QOS requirements. The peak cell rate specified is 120 K eells/sec and cell delay variation tolerance is given as 30 μsec. If the data rate on the link is specificd as 155 Mbps, how many cells back to back can a user send before the cells are marked as non-conforming.

Q10 a) Describe the ATM AAL layer which deals with Constant Bit Rate sources.
b) Compare the throughput for ALOHA and CSMA-CA system and find the condition for which ALOHA performs better. What happens to average delay for this particular case?