EEL 895 Broadband Communication

Major Exam

May 9,2007
Time 2 Hrs
Max Marks 40

Q1 A number of users are connected by Slotted ALOHA and generate a total of 120 requests per sec, including both original and retransmissions. The slot size for each request is of 12.5 msec.

a) What is the normalized total traffic on the channel?
b) What is the probability of a successful transmission on the first attempt?

Q2 A network has 24 equal power terminals that share a frequency band using CDMA system. Each terminal transmits information at a rate of 10 Kbps with Direct Sequence and Spread Speetrum, BPSK modulated signal. Calculate the minimum chip rate of the PN code generator in order to maintain a BER of 10^{-3}. Assume that the receiver noise is negligible with respect to the interference form the other users.

Q3 Show scrambling and de-scrambling scheme for a ISDN network with a suitable hardware. You may use a polynomial of degree five to be assumed by you.

Q4 A bus network is configured such that the typical propagation speed in LAN cables is 200 m/ μS. A CSMA/CD bus uses a packet size of 200 bits including a header of 50 bits. The data rate required to be supported on the bus is 20 Mbps. What is the maximum distance that the bus can span so that collisions are detected?

Q5 a) Give format of MSU in SS7 for ISDN. Indicate in tabular form Commands and Responses for error control using basie method of Go-Back-N ARQ.
b) Show graphically a two way data exchange using above for the case of two consecutive errors.

Q6 Calculate the average probability of error in a Frequency Hopped SS system if 200 frequency hops are available and the interference power of a single-tone jammer, measured at the receiver, exceeds the received carrier power of the desired frequencies by 5 dB? Assume that a) one chip per bit is used, b) 5 chips (hops) per information bit are transmitted and that a majority decoding algorithm in which three out of five chips being correct lead to the right decision, is implemented.

Q7 a) Draw the switching fabric of a three stage Clos switch for nine inputs/ outputs. Show the paths connecting input 6 to output 1 and input 7 to output 8 if they are not conflicting.
b) Compare the blocking performance of the Clos switch with a switch which is non-internally blocking.

Q8 a)In a tabular form define ten important QOS parameters giving the Parameter, Acronym and Meaning.
b) Form the above list explain graphically the three Cell Delay parameters.

Q9 An ATM network uses Genetic Cell Rate Algorithm for traffic control to meet the QOS requirements., however, the rule the expected timc of the next cell is different. Usual rule is that if a cell arrives early the next one is due at t1 + 2T. Suppose that the rule is made different, namely that the next cell was expected at t2 + T and the sender makes use of this rule. What maximum PCR could then be achieved? Given T = 10 μsec and L= 2 μsec, give the original and new values of PCR respectively.

Q10 The Signalling Points/ Switching Office (SPs) and Signalling Transfer Points (STPs) in the SS7 (Signalling System Number 7) architecture are connected by links that are defined by the following function table. Complete the blanks in the table.

Designation	Connection	Use
A	SP to STP	Provides access to the signalling network from a switching office
B	STP to STP at same level of a hierarchy	Primary routing of messages from one SP to another via multiple STPs.
C	STP to mated STP	
D		
E	SP to STP	
F		Provides direct access between switching offices with a high community of interest