Name Surname : 30.03.2016

ECE 430 TRAFFIC ENGINEERING

FINAL EXAM

1) **25p Assume that we have 3 channels on a link, and there are 18 calls on average that arrive in an hour where their mean holding time is 113 seconds, in this case what is the probability that a packet call is not blocked?**

2) **25p Assume that packets arrive at rate** $18\ packets/s$ **(3 kbits each) and the link speed is 64 kbps. Calculate the probability that a packet will wait less than 0,2 sec.**

3) **25p Please locate the corresponing numbers of the given Protocol /Algorithm or Application to the layer that it corresponds to,**

   1 .Internet Protocol (IP)
   2. Multiprotocol Label Switching, (MPLS)
   3. Medium access Control Protocol (MAC)
   4. File Transfer Protocol (FTP)
   5. Hypertext Terminal Protocol (HTTP)
   6. Transport Control Protocol (TCP)
   7. Alternative Enhancement of Associativity Based Routing Algorithm (AEABR)
   8. Telnet
   9. Handshaking Protocol

Layer Name	**Protocol /Algorithm or Application**
Application Layer	
Presentation Layer	
Session layer	
Transport Layer	
Network Layer	
Data link layer	
Phisycal Layer	

4) **25p Why do we need micromobility management ?**

Name Surname : **ID:**

03.01.2018

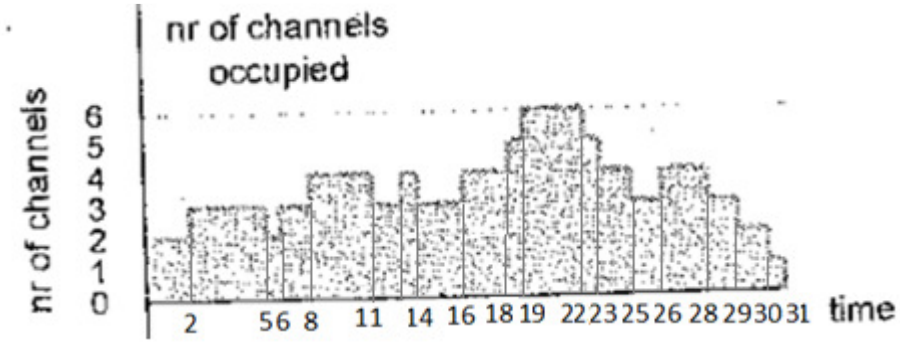
2016-2017

EE 457 FINAL EXAM

1) **(15) Assume that we have 3 channels on a link, and there are 20 calls on average that arrive in an hour where their mean holding time is 4 minutes, Then what is the probability that a packet call is not blocked?**

2) **(15) Assume that packets arrive at rate** $19\ packets/s$ **(2 kbits each) and the link speed is 64 kbps. Calculate the probability that a packet will wait longer than 0,3 sec.**

3) **(15) For the Traffic Process diagram given below for 29 secs period what is the probability of a call generated at a random time being blocket during the whole time duration ?**



4) **(10) What is the main difference between Diff. Serv. and IS.? Briefly Explain**
5) **(15) In Traffic engineering what does 1/ μ stand for ? Explain with a short sentence...**
6) **(15) Why do PSTN networks use 64 kbps communication channels? Show it using equations.**
7) **(15) In a GSM network one of 10 people with 4 khz Human voice each, is sent for 3 minutes by 1800 Mhz with a rate of 64 kbps with 10 bytes packets/10ms. According to these information what is the carrier frequency value of this network. ?**

EE 457 2020-2021 FALL FINAL Examination 20.01.2021

Q1) Seperate the given sentences into their corresponding class among IPv4, IPv6, UDP, TCP, by filling the given table with a cross sign (x) for correct protocol(s) that correspond(s) each of the given sentences...

1. Includes flow control mechanisms and autantication mechanisms. It is created to overcome the address space starvation
2. Uses a header that includes a field that measures the hop count of a packet up to a limit and destroys it at the limit hop number
3. Flow labeling capabilities for the packets belonging to same flow
4. Datagrams are transmitted by fragmentation of long ones
5. Uses adaptive rate algorithm
6. Gives reaction in case of packet losses because of congessions or routers
7. The internet is built over it which is designed for interconnected packet switched Networks
8. Doesn't provide any flow control mechanisms
9. Has two types of retransmissions which are timer driven and data driven retransmissions.
10. Includes ToS field in its header
11. Includes traffic class field in its header

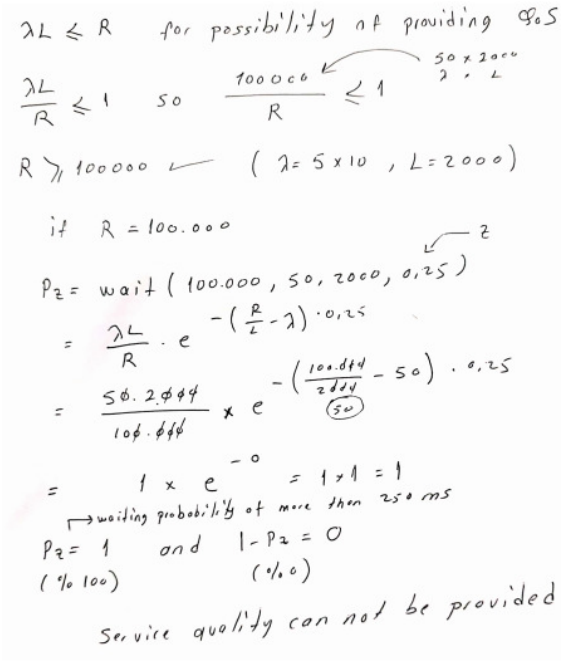
Sentence	IPv4	IPv6	UDP	TCP
1		x		
2	x	x		
3		x		x
4	x		x	
5		x		x
6		x		x
7	x	x		
8	x		x	
9		x		x
10	x			
11		x		

Q2) What does Frequency Reuse Number stand for? Declare whether having less

FRN is beter or having less FRN is beter for a wireless system. Why?

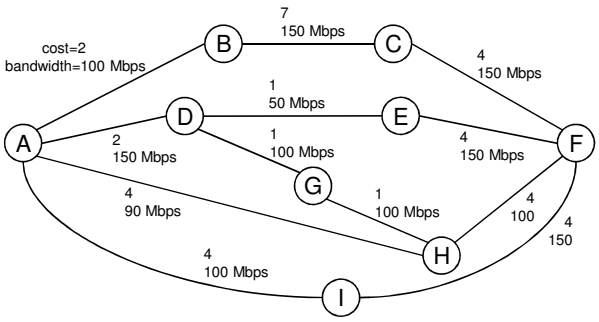
The number of usable frequency within a given area. Less is better because less number of RCN means being capable of using the same freq by different users simultaneously

Q3) Assume we have a network in which there are 5 users and each generates 10 packets per second with average packet length of 2 kilobits, if it is possible to provide 90 % service qualiy, what should the link speed be to provide this ?



Q4) Please briefly explain the trade-off for fragmentation of the packets into smaller or bigger packets.

Q5) Using the Closest Shortest Path First routing algorithm, if we have the constraint of having minimum 90 Mbps link speed, which path should be foloowed from node A to node F?



The alternative paths are

~~**A B C F (minimum link speed is 100 Mbps) has 3 hops eleminated in step 3**~~

~~**A D E F (includes a link <90 Mbps) eleminated in step 1**~~

~~**A D G H F (minimum link speed is 100 Mbps) has 4 hops eleminated in step 3**~~

~~**A H F (minimum link speed is (90 Mbps) is less than min of others) eleminated in step 2**~~

A I F (minimum link speed is 100 Mbps) has 2 hops (min of others)

So the selected path will be

A I F

ECE 430
FINAL EXAM QUESTIONS

1) What is CDMA technique developed for?

2) List down the protocols concerning with the QoS, explain how each of these algorithms concern with QoS.

3) Consider a 64 kbps Communication Network System that;
Person A calls person B at every minute and transmits 1600 packets by speaking to him/her. Person C calls person D at every minute and transmits 320 packets by speaking to him/her.

According to these conditions, what should the packet length used in the network be in order to have a stable (losing no packets) system.

4) Assume that we have 5 channels on a link, and there are 40 calls on average that arrive in an hour where their mean holding time is 3 minutes, Then what is the probability that a packet call is blockied?

SOLUTIONS

1) CDMA is developed in order to be able to use the same frequencies in the adjacent cells and to spread the narrowband into wideband assigning a unique code to each telephone or data cell.

2) Diffderv, : based on class identification while transmitting the packets

MPLS : provides packet transmission using the defined path by labeling

TCP : provide acknowledgement and retransmission of lost packets

RSVP : reserves the route that will be usaed by real time applications

IS : Designed to support real time services

3)

Call arrival rate per minute (λ) is calculated by

$$\lambda = \frac{(1600+320)Packets}{60\,Seconds} = \frac{1920}{60} = 32\,packets/\sec.$$

for stability $\frac{\lambda L}{R} < 1$, so that we conclude as $\frac{32 \times L}{64\,kbps} < 1, \quad l < 2\,kbits$

4) $a = \lambda h = 40 \times \frac{3}{60} = 2\,erlang$

$$Bc = Erl(5,2) = \lambda h = \frac{\frac{2^5}{5!}}{1+2+\frac{2^2}{2!}+\frac{2^3}{3!}+\frac{2^4}{4!}+\frac{2^5}{5!}} = 0,045 \;=\; 4{,}5\ \%$$