29.03.2012- Thursday
9:40 – 11:40

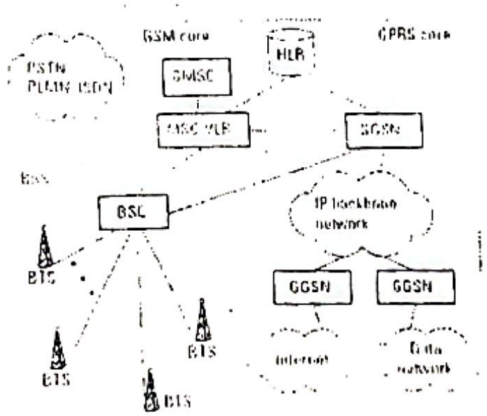
Name Surname :
ID number :

Instructor : Asst. Prof. Dr. Barbaros Preveze
Duration : 120 minutes

ECE 430 MIDTERM EXAMINATION

1) List and explain the working principles of the protocols providing the traffic management in IP. (5p).
2) Why IPv6 is needed? (2p) why doesn't it include some fields that Ipv4 includes (why are they removed) (3p) ? how the jobs of these removed fields are done? (5p)
3) Which routing algorithm do you suggest (5p) to be used if
   - The network is too crowded
   - Data being transmitted in the network is mostly real time transmission
   - We have limited bandwidth and bandwidth constraints
   - Reliablity is desired

   Explain why others are not suggested? (10p)
4) What are "TCP","Integrated Services", "MPLS"and "diffserv " used for? Explain briefly. (10 p)
5) GPRS structure is given below, explain what do each block in the diagram do? (10 p)



GPRS network architecture

6) Write down the properties of IS and explain why "Guaranteed Service" must be provided at each node in the network in use of IS? (10p)
7) Explain why time varying and location dependant bandwidth of wireless networks is a problem in IS? (10 p)
8) The main advantages of MPLS are ;
   Faster forwarding and Efficient Tunneling of packets. Why? (10 p)

9) A list of applications is given below. According to this, classify them according to their UMTS QoS classes. **(8p)**

Application/ Class				
Youtube				
Google				
Skype				
msn messanger				
VoIP				
www.bank.com.tr				
Antivirus updater				
Outlook express				

10) List the relay Routing and selection algorithms, according to given features. **(6p)** Which are more suitable for using in distributed systems **(3p)** and which are more suitable for using in central systems. **(3p)**

Name of routing / relay selection algorithm	Their simplicity of implementation	Connection stability	Route life	Effective bw usage	Reliability

Good Luck ☺

Solutions of ECE 430 Midterm

29.03.2012

1) TCP: Based on acknowledgements of successfully received / transmitted packets (4). Includes error control mechanism of IP Networks (1). Preffered mostly in real time or critical data Transportation (1). can use adaptive data rate.

UDP: Used for fast packet transportation. No acknowledge mechanism is used (2).

2) IPv6 is needed because of insufficient address space of IPv4 (2). Some fields of IPv4 are dropped because, IPv6 has higher header redundancy (3). The removed fields are.

(1) TOS: Priority field inserted instead in IPv6

(1) TTL: Hop limit is placed instead in IPv6

(1) checksum: This job is given to transport layer of the network

(1) options.

(1) { IHL — start seq. no and end seq. no are used in the protocol.
Flos.
Fragment offset. }

3) ATAABR (Associativity Tick averaged Assaciativity Based Routing) should be used. Because,

- Since the network is too crowded it will have high traffic density and high number of packet transmission. Message overhead should be as small as possible

i) ATAABR and ABR are ok. for this condition

ii) since mostly real-time transmission is used, Transmission connectivity is important

AEABR and ATAABR are preferred for this

iii) Since we have limited Bw and Bw usage constraints we mustn't add any extra rows or columns to the headers of the packet for not increasing message overhead

Fastest path, ABR and ATAABR are ok. for this

iv) Since reliability is desired again,

Fastest path ABR, AEABR and ATAABR are ok

According to explanations above

③ ABR: Doesn't satisfy condition ii)

④ AEABR: " " " iii)

✓⑤ ATAABR: Satisfies all the conditions

③ Fastest Path: Doesn't satisfy conditions i and ii)

4) ③ TCP: is used for authentication and error checking mechanism of IP networks

④ Integrated Services: used to support real-time services by reserving resource for every hop in the route

③ MPLS: Used to provide forwarding services by labeling them we use RSVP and LDP to distribute the labels

5) PSTN (Public switched Telephone Network): Provides circuit switched communication between land lines

PLMN (Public land Telephone Network): Mobile telecommunication service.

ISTN (Public Switched Telephone Network): Fixed telephone lines

HLR (Home Location Registry) Keeps the registry of the nodes location in Home Network

VLR (Visitor Location Registry) Keeps the registry of the visitor Nodes

MSC (Mobile switching center): services the connection

BSC (Base station controller): controls the BS's connected to itself

BTS (Base transceiver station): Base station that makes transmission and reception

SGSN (Serving GPRS support Node) Server for GPRS activities

GGSN (Gateway GPRS support Node) Gateway node that supports the GPRS activities

6) IS;

- supports Realtime services in the internet
- Every flow reserves for QoS at every node
- End to end path is established to support per flow traffic management
- Provides
  - Guaranteed Service
  - Controlled load service

} Because, QoS must be provided for each flow from the source point to the destination

7) In IS resource reservation is made from source to Destination using RSVP for this reason requested Bw is necessary to be known But in such a systems that has time varying and location dependant bw it is difficult to know the requested amount of Bw in these networks.

8) Because the routers analyse the packet headers only while forwarding the packet and MPLS uses RSVP and IDP for distributing the labels within the domain to setup LSP's.

9) youtube → streaming real time
Google → interactive
Skype → conversational real time
msn messanger → conversational real time
VoIP → conversational real time
www.bank.com.tr → interactive
Antivirus updater → Background
Outlook express → Background

10) 1) AEABR 2) ATAABR 3) ABR 4) Closest to Source
5) minmax 6) Fastest Past 7) Power Threshold

Simplicity : 4 - 7 - 5 - 6 - 3 - 2 - 1

Connection Stability : 1 - 2 - 3 - 5 - 4 - 6 - 7

Routelife : 1 - 3 - 2 - 4 - 5 - 6 - 7

Effective Bw usage : 4 - 5 - 6 - 7 - 3 - 2 - 1 (can change / can change)

Reliability : 1 - 2 - 3 - 5 - 4 - 6 - 7

24.05.2012

ECE 430 FINAL EXAM

(The weights of the questions are equal)

1) Consider a 64 kbps Communication Network System that;
Person A calls person B at every minute and transmits 1280 packets by speaking to him/her. Person C calls person D at every minute and transmits 640 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.

Solution of 1

2) Explain the meanings and the usage areas of given terms and below
   a. route time-out
   b. route update packet
   c. route update time
   d. active state time out
   e. paging-update time

Solution of 2

3) Assume that we have a system with n channels and traffic intensity is measured/calculated in the system as a unit (1 erlang). If the probability of dropping/blocking a packet at a node (blocking probability) is said to be 33.3333.. %, evaluate the condition that packet length should be provided.

Solution of 3

4) List down the scheduling Algorithms used at the intermediate nodes. Briefly explain the advantages and disadvantages of each scheduling algorithm.

Solution of 4

24.05.2012

ECE 430 FINAL EXAM
QUESTIONS

1) Consider a 64 kbps communications system that; person A calls person B at every minute and speaks however and transmits 1280 packets.

Person C calls person D at every minute and speaks however and transmits 640 packets

According to these conditions and for having stable sytem that the packets don't get lost, what is the condition that the packet length should provide.

$R = 64$ kbps (5)

$\lambda = \frac{1280 + 640}{(60)(5)} = 32$ packets/second

(5) $\frac{\lambda L}{R} < 1$ must be satisfied for stability

$\frac{32L}{64} < 1$ $\quad \boxed{L < 2 \text{ kbps}}$ (70)

2) Explain the terms given below

a) route time-out
b) route update packet
c) route update time
d) active state time out
e) paging-update-time

(5) a) route time-out : the determined path by a packet is passed by intermediate B.S. this route is valid for a time called route-time-out

(5) b) The packets (dummy) transmitted by mobile Host for updating the route is called route update packets

(5) c) The intervals of transmitting this packets are called route update time

(5) d) The mobile host which is assigned a channel hasn't transmitted packet for given time called active state time out

(5) e) MH transmits paging update packets to maintain reachability the time period for this is called paging update time

3) Assume that we have a system with n channels and the traffic intensity is measured as 1 and blocking prob. %33.3 to make the system to have blocking probability of how many new channels must be added to be used the system

4) [illegible] known the scheduling algorithms used in/at the internet briefly explain the advantages [illegible]

1) First Come First Serve:

2) [illegible]

3) [illegible] for Queuing

[illegible] (4)	[illegible] (4)
Used all for [illegible] different [illegible] service [illegible] (4)	[illegible] call blocking [illegible] (4)
Used for [illegible] one bus Isolation of [illegible] (5)	Has been [illegible] (4)

3)

$$\frac{\frac{a^n}{n!}}{\sum_{i=0}^{n}\frac{a^i}{i!}} = \frac{\frac{1^n}{n!}}{\sum_{i=0}^{n}\frac{1}{i!}} = \frac{1}{3} \quad (B)$$

for $n=1$; $\frac{\frac{1}{1}}{1+1} = \frac{1}{2} > \frac{1}{3}$ not enough ✗

for $n=2$; $\frac{\frac{1^2}{2!}}{\sum_{i=0}^{2}\frac{1}{i!}} = \frac{\frac{1}{2}}{1+1+\frac{1}{2}} = \frac{\frac{1}{2}}{\frac{5}{2}} = \frac{1}{5} < \frac{1}{3}$ enough ✓

(4)

So the number of channels must be $\boxed{n=2}$ at the beginning for a CB probability less than or equal to $\frac{1}{3}$.

II.

$$\frac{\frac{a^n}{n!}}{\sum_{i=0}^{n}\frac{a^i}{i!}} = \frac{\frac{1^n}{n!}}{\sum_{i=0}^{n}\frac{1}{i!}} = \frac{2}{45} = 0,045 \quad (B)$$ CB probability is desired

for $n=2$ CBP is 0,20 and this condition is not satisfied

for $n=3$;

$$\frac{\frac{1^3}{3!}}{\sum_{i=0}^{3}\frac{1}{i!}} = \frac{\frac{1}{6}}{1+1-\frac{1}{2}+\frac{1}{6}} = \frac{\frac{1}{6}}{\frac{16}{6}} = \frac{1}{16} > \frac{2}{45}$$ not satisfied.

for $n=4$,

$$\frac{\frac{1^4}{4!}}{\sum_{i=0}^{4}\frac{1}{i!}} = \frac{\frac{1}{24}}{1+1+\frac{1}{2}+\frac{1}{6}+\frac{1}{24}} = \frac{\frac{1}{24}}{\frac{65}{24}} = \frac{1}{65} < \frac{2}{45}$$ ✓ satisfied

for $\boxed{n=4}$ (4)

so the number of channels needed to be added is $4-2$ (1)