29.03.2012- Thursday
9:40 – 11:40

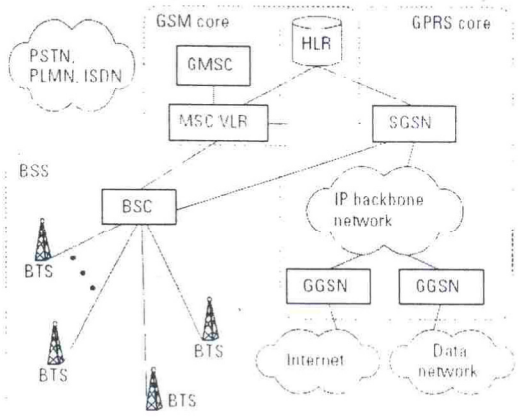
Name Surname :
ID number :

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 acknowladgements of successfully received / transmitted packets. (1) Includes error control mechanism of IP Networks. (1) Prefered mostly with real time or critical data Transportation. (1) can use adaptive data rate.

UDP: Used for fast packet transportation. No acknowladge 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.
Flgs:
Fragment offset.

3) ATAABR (Associativity Tick averaged Associativity 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 preffered 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 explainations 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 packets by labeling them and uses RSVP and LDP to distribute the labels

5) PSTN (Public switched Telephone Network): Provides circuit-switched communication betwen the fixed lines

PLMN (Public land Telephone Network): Mobile telecomunication 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 centre): switches the conversation

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

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

SGSN (Serving GPRS support Node): serves for GPRS activities

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

6) IS;

- supports Real time 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 node 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 LDP 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

16.04.2013

ECE 430 Midterm

(Choose and solve any question combination for which the sum of their allocated points doesn't exceed 100 Points)

1) (20p) Consider a 2G system operting at 900 Mhz, Calculate the maximum number of two-way conversations that can be provided simultaneously.

2) (15p)In GSM 9600 kbps data rate is provided by using TDMA technique, how is this data rate improved upto 57,6 kbps later. Brefly Explain.

3) (15p) 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?

4) (25p) According to the analysis and simulation results of Relay/ Route selection algorithms,

a) (5p) Why does “According to path loss method” generate the worst results?

b) (5p) Why is “Closest to transmitter” relay selection algorithm usefull?

c) (5p) What is the disadvanteges of “Decode And Forward” and Amplify and Forward” methods

d) (10p) In AEABR (Alternative Enhancement of Associativity Based Routing) what is the most important part of the algorithm that causes longer route lifes than other routing algorithms? Why?

5) (10p) Explain the Purpose, working structure and success rate of the AEABR in details.

6) (15p) Which protocol uses Fast retransmission technique in case of packet losses? How does “Fast recovery method” Works? Explain it obviously.

7) (10p) If we have n=1000:100:2200 service providers with n costumers each (1000+1100+1200+…+2200) and assuming maximum half of these costumers use the internet at the same time. write down the number of IP address (for the cheapest design) Classes that we need to provide service to these costumers.

8) (15p)

a) (5p) Which protocol provides transmission by allocating the desired bandwidth from all the nodes on the route. Briefly explain the protocol.

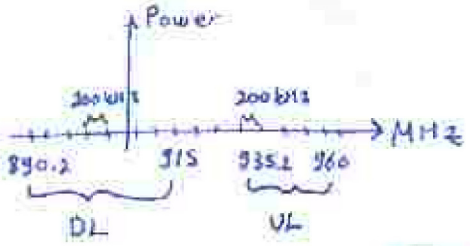
b)(5p) Why does Integrated Services have to provide guaranteed service at each node on the route?

c) (5p) What is the Extended name of the Protocol that uses labels for determining nodes that it should forward the packets

Name Surname : Solution Key 16.04.2013
Student ID number :

ECE 430 Midterm
(Choose and solve any question combination for which the sum of their allocated points doesn't exceed 100 Points)

1) (20p) Consider a 2G system operting at 900 Mhz. Calculate the maximum number of two-way conversations that can be provided simultaneously.



$\frac{(915 - 890.2)\,MHz}{200\,kHz} = 124$ DL

$\frac{(|935.2 - 960|)\,MHz}{200\,kHz} = 124$ UL

Using 8 TDM $124 \times 8 = 992$ conversations //

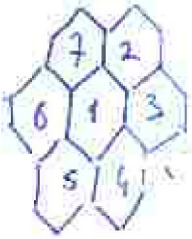
(5) (5) (10)

2) (15p)In GSM 9600 kbps data rate is provided by using TDMA technique, how is this data rate improved upto 57,6 kbps later. Brefly Explain.

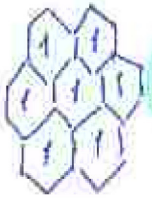
Standard data rate of GSM is given as 9600 kbps. In HSCSD multiple channels are used by a single user simultaneously, and by use of up to 4 of 8 channels in a single TDMA frame and improving the GSM datarate from 9.600 kbps to 14,4 kbps, $14,4 \times 4 = 57,6$ kbps is evaluated

(5) (10)

3) (15p) 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?



Freq. reuse Number is 7



(5)

Freq. reuse Number is 1

(5)

Having less number for FRN is better because it means the intersymbol interference problem is already solved by the system. (5)

4) (25p) According to the analysis and simulation results of Relay/ Route selection algorithms.

a) (5p) Why does "According to path loss method" generate the worst results?

Because it always has to change the the selected route from source to destination by movement of the nodes in the network. it causes the lower life times for the selected routes

b) (5p) Why is "Closest to transmitter" relay selection algorithm usefull?

Because by this way the probability of distortion of the signal from source to intermediate node will be smaller. The signal will not be corrected incorrectly or amplified with the errors at this intermediate node.

c) (5p) What is the disadvanteges of "Decode And Forward" and Amplify and Forward" methods

DAF: The intermediate node decodes and forwards the signal. But if the node is far away from the source the signal may be distorded and corrected incorrectly

AAF: Amplifies the noise also...

d) (10p) In AEABR (Alternative Enhancement of Associativity Based Routing) what is the most important part of the algorithm that causes longer route lifes than other routing algorithms? Why?

it checks the power changes received from all other nodes. By this way the relative speeds between the nodes are taken into consideration and routes with longer lifes are constructed.

5) (10p) Explain the Purpose, working structure and success rate of the AEABR in details.

(3) Purpose: To provide Longer Lifes for the routes

(2) Success Rate: Best of all other route/relay selection algs

(5) Working principle: Uses tables and assoc. ticks to check the lifes of all the neighbour nodes in the network. If a node disappears it's tick is reseted else it's tick is increased at each time interval. The routes using the nodes having big ticks and less power charges gives the longer lifes.

6) (15p) Which protocol uses Fast retransmission technique in case of packet losses? How does "Fast recovery method" Works? Explain it obviously.

TCP uses. Sliding window is used in Fast recovery method. After receiving 3 duplicated acks.

(15)

1) Set ssthresh to half of current send window
2) Retransmit the missing segment
3) set cwnd = ssthresh + 3
4) Each time the same duplicated ACK arrives set cwnd++. Transmit a new packet if allowed by cwnd
5) if non duplicated ack arrives, set cwnd = ssthresh and continue with a linear increase of cwnd.

7) (10p) If we have n=1000:100:2200 service providers with n costumers each (1000+1100+1200+...+2200) and assuming maximum half of these costumers use the internet at the same time. write down the number of IP address (for the cheapest design) Classes that we need to provide service to these costumers.

We have $1000+1100+1200+\dots+2200 = 100(10+11+12+\dots+22)$

$= 100\left(\frac{22.23}{2} - \frac{9.10}{2}\right) = 100(243-45) = 100(198) = 19800$

users will be working in these companies. Since, n

half of them will be served, $\frac{19800}{2} = 9600$ costu

will be served this can be provided by

(10)

$\frac{9600}{255} = 37.6 = 38$ class C // IP address mask

8) (15p)

a) (5p) Which protocol provides transmission by allocating the desired bandwidth from all the nodes on the route. Briefly explain the protocol.

5 RSVP (Reservation Protocol). it reserves needed bandwidth at each nodes on the route which will be used during transmission and establishes the connection before starting the transmission

b)(5p) Why does Integrated Services have to provide guaranteed service at each node on the route?

Because QoS must be provided for each node from source to destination.

5

c) (5p) What is the Extended name of the Protocol that uses labels for determining nodes that it should forward the packets

MPLS (Multiprotocol Label switching)

5

already solved by the system. 5

Name Surname : 16.04.2015

ID Number :

ECE 430 MIDTERM QUESTIONS

1) 25p Give the names of the protocols for which the main purpose is improving the service quality. How? (explain for each of them)
2) 30p Explain how AEABR provides longer life than ABR?
3) 30p Explain how Min-Max distance relay selection Algorithm works?
4) 15p Which protocol forces a protocol to wait for a small number of dublicate acknowledgements to ve received? Write only the name of it.

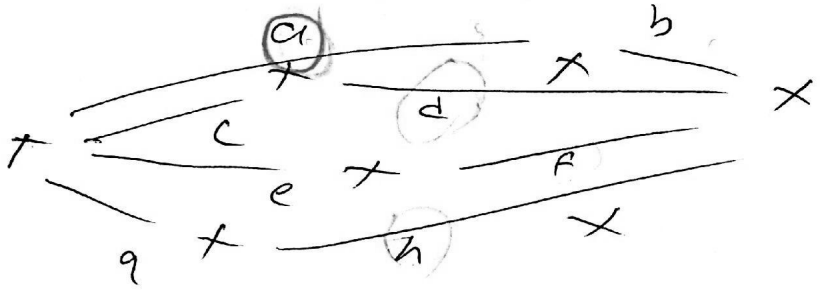
ANSWERS

27.04.2015

ECE 430 SOLUTIONS
Midterm

1) TCP (5)
RSVP (5)
Diffserv (5)
integrated Serv (5)
MPLS (5)

2) By use of power changes fields it recognizes the distance variance of all neighbours. (30)

3) 

minimum distance among not part of all routes (30)

$$\min\left[\max(a,b), \max(c,d), \max(g,h), \max(e,f)\right]$$

4) fast retransmission algorithm under TCP (15)

1) write the paramters that effect the throughput of the network and explain how they effect it?

2) What is streaming class data and real time class data? what is the difference between them?

3) which routing algorithm do we use when we ony want

a) longest route life time?
b) no error amplification
c) minimum power consumption

4) What is the frequency reuse number ? When do we need more F.R.N and when do we need less?

(M) 151

ECE 430
2015-2016 Midterm
Solutions

1) The parameters effecting the throughput are;

(5) - Delay → increases the time passed for transmission
(5) - Jitter → " by waiting for other packets required for sorting
(5) - packet loss rate → increases the time of transmission
(5) - Data generation rate → for optimum data generation rate the number of packets sent
(5) - Hop count → decreases the number of arrival packets if route is determinde by more hops.

2) Real time class data includes both
(25)
- conversational class and
- streaming class

3) (7) a) for longest life time: AEABR is used
(6) b) for shortest transmission time: fastest path
(6) c) for no error amplification: closest to source or minmax
(6) d) for min power consumption: min-max or power threshold is used

4) (10) frequency reuse number is the number of frequency bands required to be used for not having inter symbol interference between adjacent cells.
- more f.r.n needed when FDM is used (7)
- less frn " " CDMA " " (8)

Name Surname :

30 November 2017

2017-2018

EE 457 Midterm Examination

Note : 1 k will be taken as 1000 (not 1024), 1M will be taken as 10^6 ... etc for simplicity in all questions

Q1) What was the most important advantage of circuit switching networks to packet swithing networks ?

a) The higher link speed
b) The less delay
c) The Less Cost
d) The Shorter path length
e) The recoverability of lost data

Q2) What is the most important advantage of all packet switching networks to circuit swithing networks ?

I. The higher link speed
II. The less delay
III. The Less Cost
IV. The Shorter path length
V. The recoverability of lost data

a) Only I b) I and III c) only III d) only IV e) III and V

Q3) In Ipv6 What is the name of the field that is substituded with the field in TTL in Ipv4 ?

a) Flow Label
b) Paykoad Length
c) Next Header
d) Hop Limit
e) This part is provided by IpV6 itself instead of TCP used in Ipv4

Q4) How many number of IP addresses can an administrator assign to the user if he had purcased the Net ID : 95.183.182.224 ?

a) 1 b) 29 c) 31 d) 222 e) 224

Q5) What does handover mean ?

a) Participation to a cell of a basestation
b) Registering a user to HLR
c) Changing the registery of a user from HLR to VLR
d) Changing the basestations for a user
e) Making handshaking operation between 2 users for setting up a cannection

Q6) Where is the "Closest to transmitter" relay selection algorithm usefull?

a) In multihop networks with low noise
b) In multihop networks with high noise
c) In crowded newworks
d) In the networks with high packet loss rate
e) When sourse and destination are so far away from eachother

Q7) Which of the methods below developed to permit multiple users to access the same line at the same time using the same transmission frequency?

a) FDMA b) TDMA c) CDMA d) CSMA/CD e) GSM

Q8) In a GSM structure, which of the following part is responsable from giving desicion to give or not to give servise to the participating user?

a) GGSN b) SGSN c) AUC d) GMSC e) MSC

Q9) In the system using TDMA method and assuming that a loop of 36.88 ms is used for providing the transmissions of n users simultaneously, with the total link speed capacity of 16.66 kbps; in order to provide each of these users the transmission of 153.600 bits/sec data in a second what must the maximum value of n be ?

a) 3 b) 4 c) 5 d) 6 e) 7

Q10) which of the following types of communication has the lowest priority?

a) Watching a film from IPTV using internet
b) Watching an on demand film from youtube
c) Whatsapp messaging of presidents of 2 countries
d) Playing online Football game
e) Conferance conversation between 4 students in the same university but different LANS

Q11) Which Relay/Route selection algorithm is prefferable least in the networks with bandwidth constraints ?

a) Closest to transmitter
b) Minmax
c) Shortest Path
d) Power Threshold
e) ABR

Q12) Which parameter is extra used in AEABR to enhance the lifetime of ABR ?

a) Amount of power consumption
b) Relative Speeds of the nodes according to eachother
c) AT number changing frequency
d) Difference between AT and AT threshold values for each node
e) Hop counts

Q13) Which of the OSI layers is resoponsible from determining the full path from source to destination?

a) Session Layer
b) Transport Layer
c) Network Layer
d) Data link Layer
e) Pyhsical layer

Q14 Which of the following ptotocols can not run together ?

a) IP and Fast recovery
b) IP and Diffrerv
c) Diffserv and UDP
d) Fast recovery and UDP
e) Fast recovery and TCP

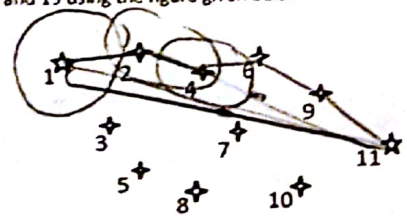
Q15) Which of the following is <u>not</u> an abbreviation of a protocol/system/method that can be used together with IP?

a) DHCP (Dynamic ost Configuration Protocol)
b) OSI (Open System Interconnection)
c) IEEE 802.3 (ethernet protocol)
d) FR (Fast Recovery)
e) SW(Sliding Windows Techniques)

Q16) If Integrated Services have to provide guaranteed service at each node on the route, why?

a) Because this protocol may also serve realtime transmissions
b) Because this protocol may also serve important transmissions
c) Because this protocol may also serve non-real time transmissions
d) Because there may be some lost packets during the trasmission that must be recovered
e) Integrated Services dont have to provide guaranteed service at each node on the route

Answer Questions 17,18 and 19 using the figure given below



Q17) If node 1 wants to send data to node 11 with single hop, using min_max algorithm which relay does it select?

a) 4
b) 5
c) 6
d) 7
e) 9

Q18) If node 1 wants to send data to node 11 with multiple hops, using Fastestpath routing algorithm which relay(s) does it select?

a. 1,2,4,6,9,11
b. 1,3,5,8,10,11
c. 1,7,11
d. 1,3,7,9,11
e. 1,3,7,11

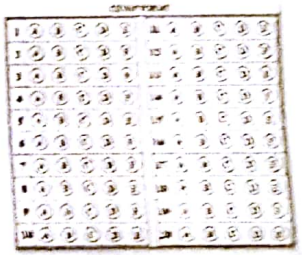
Q19) For the ABR table of RS given below, what should the AT threshold value be for RS?

RS	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11
Availability	0	0	1	0	-	0	1	1	1	1	1
Number of AT	0	0	5	0	-	1	5	7	1	1	1
AT threshold	1.12	0.23	1.14	0.65	-	0.32	0.45	1.37	1.1	1.32	1.14

a) 1.14 b) 1.37 c) 0.3 d) 1.53 e) 0.27

Q 20) If an analog signal digitized using 16000 samples/second sampling rate and Quantized using 128 quantization level is desired to be transmitted over a circuit switching network, what must be the minimum bandwidth of this channel ?

a) 56 kbps
b) 112 kbps
c) 125 bps
d) 224 kbps
e) 2048 kbps



Name Surname :

ID:

17.11.2020

EE 457 Traffic Management of Internet Protocol

2020-2021

Midterm Questions

NOTE : Please dont undesired information in the questions by not exceedin the given Max number of words in your answers otherwise you may lose points from that question.

Q1) (max 20 words) Why is Fourier Series Representation needed while transfering a signal from a source point ?

Q2) (max 40 words) What is the main difference between DiffServ (Differantial Services) and IS (Integrated Services protocols? What is the most important similarity between them?

Q3) (Max 20 words) What are the names of techniques those make it possible to have the Frequency reuse number in a cluster equals 1 ?

Q4) (Max 60 words) In GSM (Global System Mobile) systems and also in PSTN (Public Switched Telephone Networks) why the charging for the costumers is done accordng to the duration of the conversation rather than Bps (Bytes per second) ?

Q5) (Max 50 words) Why Is Real Time Conversation Class more sensitive to latency more than Real Time Streaming Class ?

Q6) (Max 50 words) In AEABR (Alternative Enhancement of Associative Based Routing) what is the purpose of adding 2 extra fields to the header including the power strenghts of last 2 packets , for extending the route life time ?

Q7) (Max 2 words) Which layer of OSI (Open System Interconnection) model is responsable only from hop to its next hop transmission ?

Q8) (Max 40 words) In usage of MPLS protocol, the destination address is also included in the MPLS label even it is already available in IP header , why?