

BITS, Pilani-Dubai, Campus, Knowledge Village, Dubai  
**IV th Year First Semester 2004-2005**  
**Degree: B.S. Branch: C.S.E**

**COURSE NO. : EA UC451**

**COURSE TITLE :: Internetworking Technologies**

Time : 50 mts

Date : 17-10-2004

Marks: 30 Test: 1

Answer all the questions. All questions carry equal marks  
(Closed book)

Q1.. Consider a monochrome monitor (1024 \* 768) screen having a refresh rate of 30Hz. The total horizontal lines are 768.

- a) Find the required sampling rate. (3 marks)
- b) If the video picture displayed in the monitor is a pure black and white then what should be the storage capacity needed for storing the digitized video that runs for 15 secs. (3 marks)

Q2.a) Using appropriate mathematical calculation find out the number of bits of ADC required for digitization purpose to achieve a signal to noise ratio of 42 db when we digitize audio signal using ADC. (3 marks)

b) I want to digitize the audio signal of duration 10 secs received through telephone line and store the samples. The ADC has 16-bit resolution. Find out the storage capacity needed for a audio clip of 10 secs duration. (3 marks)

Q3. a) Specify what sort of multi media information can be transferred through the internet in the current scenario using the existing internet protocol. (2 marks)

b) Suppose I want to send synchronized video and matching audio across internet. What sort of additional protocols are needed and why? (4 marks)

Q4.a) Specify any three techniques to improve the QOS for multimedia traffic across the internet. Compare briefly their relative merits and demerits. (3 marks)

b) With relevant examples outline the difference between best efforts, deterministic and statistical networks for carrying multimedia traffic. (3 marks)

Q5.a) Outline the difference between http streaming and true streaming of multimedia information via networks. (3 marks)

b) Outline briefly the protocol steps involved in streaming multimedia information from a multimedia server to a player using RTSP protocol. (3 marks)

BITS, Pilani-Dubai, Campus  
Knowledge Village, Dubai  
IV th Year FIRST Semester 2004-2005  
Degree: B.E.(HONS) Branch: C.S.E

COURSE NO. : EA UC451

COURSE TITLE : : Internetworking Technologies

Time : 40 mts  
(Weightage = 10%)

Marks: 16 QUIZ: 1 (Closed book)

Answering scheme

Q1. What is the main difference between RSVP and RSTP?

RSVP used for sending real-time interactive Multimedia by doing BW reservation whereas rstp is used for true streaming of MM from a MM server contents with appropriate interactions between client and server. No reservation of routers is done.

Q2. What factors are used to measure the performance of Multimedia networks?

Jitter, BW and delay

Q3. What is the most appropriate technique that can be used to overcome the effect of jitter in Multimedia traffic using limited BW lines?

Use client side buffering and have playout delay

Q4. What are the classes of QOS in Multimedia traffic?

Hard Qos

Soft Qos

Best effort

Q5. Why UDP is preferred over TCP for MM traffic?

IN UDP there is no acknowledgement for every packet whereas in TCP there is acknowledgement for every packet Thus TCP do not make use of the existing BW as efficient as UDP.

Assume that I am digitizing a colour picture (640 \*480) which is represented using 3 bytes and let each color is represented using 8 bits. What is the total storage capacity of a frame of information

$640 * 480 * 3 * 8 \text{bits}$

Q7. Which message is responsible for actual reservation of routers in RSVP ?  
RESV message from receiver to Transmitter

Q8. Why there is a need for reservation merging in RSVP?  
If there is no reservation merging unnecessarily we have to reserve routers of high bandwidth for the total BW requests of all the receivers.

Q9. What is the significance of policy control succeeds but admission control fails in RSVP ?

Sender has administrative permissions to ask for reservation request but there is insufficient resources in the router for the actual reservation of traffic in the router.

Q10. What is the difference between congestion and flow control ?

congestion happens when traffic is pumped in excess of BW available whereas in the case of flow control BW is sufficient but receivers can not match sender's speed of packet transfer

Q11. What is meant by dynamic membership in case of RSVP ?

In the case of multicasting receivers can dynamically join the network or leave the network based on whether they provide RESV message periodically or not.

Q12. What is the difference in bandwidth seen by TCP/IP and RSVP protocol ?

In the case of TCP/IP the BW will be a fluctuating one, whereas in the case of RSVP the BW will be a constant one.

Q13. What is the significance of soft state in routers of RSVP ?

In the case of soft state the RESV message should be periodically sent at regular intervals. Otherwise reservation will not take place.

Q14. Why there is a need for setup command in case of RSTP?  
Using the set up command the media player and the MM server negotiates for the transport mechanism of MM stream

Q15. What is the difference between MM broadcast and MM multicast ?

- IP Broadcast - transmits data from a sender to an entire subnetwork
- IP Multicast - transmits data from a sender to a set of receivers that are members of a multicast group in various scattered subnetworks

Q16. Specify two main differences between HTTP and RTSP protocols.

- HTTP stateless protocol; an RTSP server has to maintain "session states"
- HTTP is asymmetric; in RTSP both client and server can issue requests
- It uses URL, like HTTP

BITS, Pilani-Dubai Campus, Knowledge Village, Dubai  
IV th Year CSE First Semester 2004-2005  
Degree: B.E. (Hons) Branch: C.S.E

COURSE NO. : EA UC451

COURSE TITLE : : Internetworking Technologies

Time : 50 mts

Date : 5-12-2004

Marks: 30 Test: 2

Answer all the questions. All questions carry equal marks  
(Open book - Text book and class notes are permitted)

Q1a) Outline the trade off between the seek time and the Maximum response time that has to be taken into account in disk scheduling policies. (3 marks)  
In the case of servers every request has an associated max response time. If we try to serve each request just based on the basis of First come first served then depending upon the information on the tracks the RW head has to undergo zig zag random motion which may result in excessive seek time. So under steady conditions because of this excess seek time we may not honour the max response time.

b) With necessary diagrams explain the limitations posed by earliest deadline first (disk scheduling) algorithm used with multimedia servers? (3 marks)

In the case of MM servers every request has its associated deadline. So we need to serve the packets for the stream within the deadline. But every stream may be randomly assigned a particular track. So if we consider only the deadline then the read/write head may follow a non-optimised path which may result in excessive time. Under steady conditions because of the excessive time we may not meet the deadlines for the streams.

Q2.a) What is meant by buffer overrun of the data produced by the input device (e.g, microphone, camera) during recording by multimedia server and how that can be avoided? (3 marks)

Microphone or digital camera devices capture the audio or video and digitize the samples. Generally they output the digital samples to an output buffer. Now MM servers try to read and store the samples. They should read and store the samples at a rate equal or faster than the rate outputted by the Microphone or digital camera. Otherwise because of the limited size of the buffer buffer overrun will take place.

b) Why there is a need for buffers at the output of multimedia servers serving multiple clients? (3 marks)

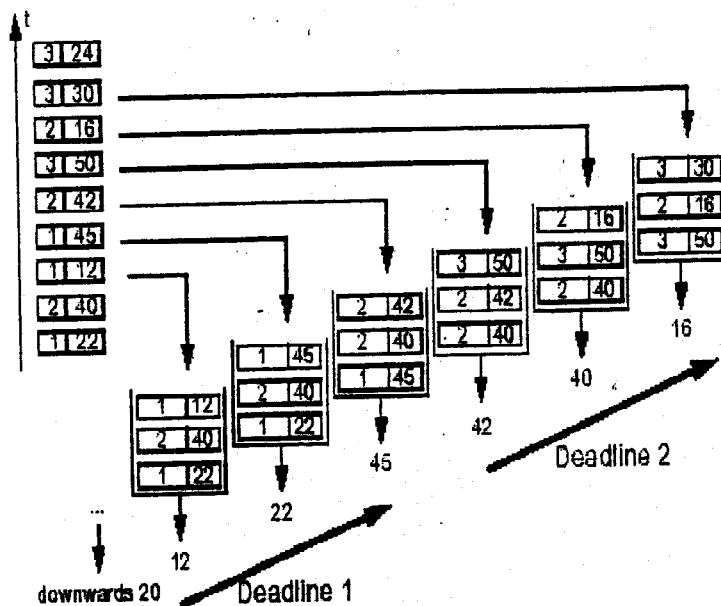
Generally MM server will serve multiple clients via multiple streams. Since a MM server can retrieve information at a high speed than accepted by the MM clients

it is better to have intermediate buffers. So server fetch information for different streams and fill the buffer at a rate at which they get emptied.

Q3. With relevant diagrams outline clearly why SCAN disk scheduling is not suitable for multimedia servers and how SCAN-EDF solves the above issue? (6 marks)

Draw relevant diagram

### Scan-EDF Disk Scheduling



#### Properties

- apply EDF
- for all requests with same deadline apply SCAN

In the case of SCAN disk scheduling we always try to optimize the scan time by accumulating the requests from the clients and follow a path from inner to outer tracks or outer to inner tracks in a linear manner. But the above concept may result in violation of deadline for MM requests and sometimes late deadline will be served first compared to early deadlines. On the contrary if we adopt scan-edf we first group the requests based on the deadlines. Then within a group of deadline1 we adopt SCAN disk scheduling which will minimize the seek time.

Q4.a) Outline clearly what is meant by dynamic membership in case of RSVP protocol. (3 marks)

Draw a diagram showing multiple receivers connected to a MM sever in a multicast manner.

During connection every receiver in the RSVP protocol has to send periodically the RESV message failing which routers will not be reserved for the particular receiver. So if an existing receiver wants to get out of the network it has to stop sending the RESV message periodically. Similarly when it wants to reenter the

network that makes use of RSVP protocol it can send RESV message again. The flexibility by which a node in a multicast network can get disconnected Or reconnected without bothering the transmitter is called dynamic membership. b)With proper reasoning outline clearly the difference in bandwidth provided by RSVP and TCP? ( 3 marks)

In the case of RSVP protocol routers will be reserved for carrying the traffic between the sender and receiver exclusively. Thus the routers will provide a constant BW traffic. On the contrary in case of TCP/IP they make use of best effort means of transferring the information. So they gradually increase the rate at which packets are sent until packet loss takes place because of congestion. Then they gradually reduce the rate at which packets are sent until there is no loss in packets transmission. The above cycle gets repeated periodically This account for the fluctuating BW provided by TCP/IP.

Q5.a) Outline the need for an agent in a managed device.( 3 marks)

Generally managed devices like routers or gateways cannot understand the SNMP protocol unless they have an SNMP agent software running on them. The SNMP agent will be able to understand and interpret the SNMP commands sent by an NMS and based on that it can provide appropriate response.

b)Assume that there are two networks N1 and N2 managed by two NMS systems NMS1 and NMS2 respectively. Let NMS2 want to know some information about the Number of UDP packets dropped by a router in the network N1. List out the sequence of operations/commands that have to be carried out to achieve the above result using SNMP.( 3 marks)  
First using the GetRequest the NMS1 can get the MIB information from the router in N1. Node N1 will respond with response MIB information. Then using the inform request NMS1 can send the MIB value of router in N1 to NMS2-The counters as MIB objects have to be briefly explained.

BITS, Pilani-Dubai, Campus, Knowledge Village, Dubai  
IV<sup>th</sup> Year, First Semester 2004-2005  
Degree: B.E. (Hons) Branch: C.S.E

COURSE NO. : EA UC451

COURSE TITLE : Internetworking Technologies

Time : 3 hrs Date : 4-1-2005 Marks: 70 Comprehensive examination  
(Closed book)

Part -A

*Answer all the questions. All questions carry equal marks  
(10\*2=20marks)-Answering and evaluation scheme*

Q1. Consider a super VGA (1024 \* 768) screen at a refresh rate of 25Hz.  
The total horizontal lines are 768.

Find the maximum frequency of the analog video signal that can be  
displayed in the above scenario.

Within 1/25 sec no of pixels =  $1024 * 768$

Within 1 sec no of pixels =  $1024 * 768 * 25$  pixels

Required sampling rate =  $1024 * 768 * 25$  Hz

Maximum freq of the analog signal =  $1024 * 768 * 25 / 2$

Q2. Whether packet switching networks using tcp/ip alone can carry  
real-time voice packets? justify.

No. As TCP/IP looks for ack packet for every packet sent from the source  
to the destination- BW available will not be properly utilized-.

Further packet switching networks that use TCP/IP alone do not reserve  
constant BW-They deliver information using best effort-TCP/IP does not  
add timing information needed for real-time packets

Q3. Outline the steps involved in invoking a web service from a client?

Form a soap xml based request message (example should be given)-the  
method that has to be invoked-parameters of the method

In return xml based soap response message-(example should be given)

Q4. What is the main difference between distributed computing using  
RPC calls and messaging?

In RPC based distributed computing both the client and the server should  
be online.

In messaging based distributed computing client can send a message to  
the server even if it is offline- When the server is on that message will be  
delivered to the server using the message provider-In case of java JMS is  
the provider.



Q5.

■ XML Based Language for describing web services and how to access them

■ WSDL describes:

- Interface information describing all publicly available functions
- Data type declarations for all message requests and responses
- Binding information about the transport protocol
- Address information for locating the service

Q6. What is the purpose of having UDDI in the context of web services ?

■ UDDI is:

■ A business registry containing relevant information such as:

- General business information (name, description, etc.)
- Business' Web services (description, invocation methods, etc.)
- Methods to query and publish to the registry via SOAP messages.

Q7. What is the difference between Point to point messaging and topic based messaging?

In the case of point to point messaging message can be sent from entity1 to entity2.

In the case of topic based messaging there is a publisher of the message who publishes message on a topic. There can be more than one subscriber who will subscribe for the message on the particular topic. -both the subscriber can receive the messages published on the topic

Q8. Why scan-edf algorithm scores over edf algorithm in case of disk scheduling for multi media servers?

In earliest first deadline algorithm, the algorithm serves the multimedia client with edf. Due to that sometimes it may happen that the read write head may follow a zig zag path when trying to access information from the hard disk which may result in excessive seek time, rotational delay and poor resource utilization. Due to that at some point of time some of the requests may not be served within the deadline.

On the other hand scan-edf optimizes the seek time by limiting the zig zag time. When several requests having the same deadline arrives their respective blocks are accessed with the scan algorithm and thus optimizing the seek time.

Q9. Identify the difference in delays from the transmitting end for the stored and real-time multimedia objects?

Apply to objects such as audio and video captured in real-time

- In natural form all real-life quantities are analog in nature
- For digital processing must be converted to digital values
- Tsample is the time taken for converting analog to digital value
- Tencode is the time for encoding like compression or encryption
- On the contrary stored objects are ready for transmission
- Stored objects:

Retrieval delays for stored objects:

Tquery is the time taken to process and transform the query into the location of the objects on the storage medium  
 Tseek is the time taken to locate the objects on the storage medium  
 Taccess is the time taken to read and transfer the object from the medium  
 These delays are not applicable to objects captured in real time

Q10. With appropriate examples explain the different quality of services offered for any network traffic?

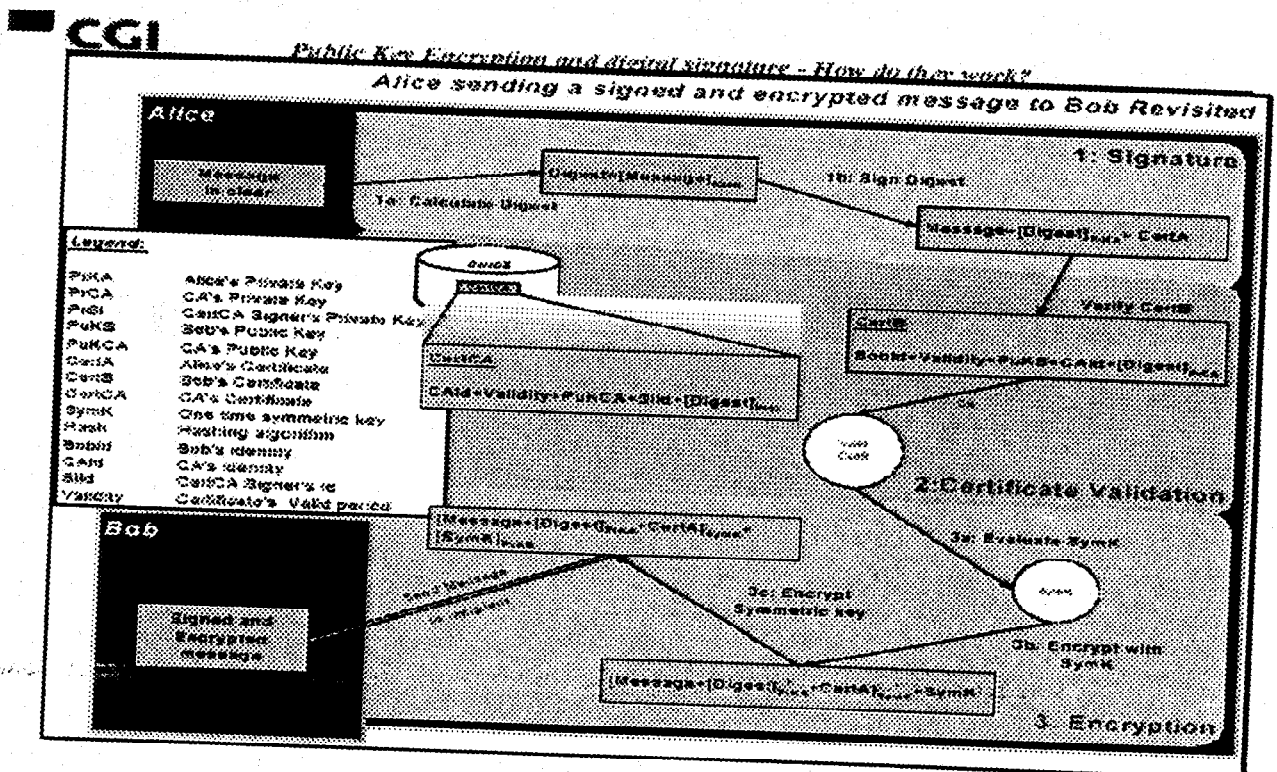
- Best-effort - No guarantees at all
- Soft QoS - differentiated guarantees
- Hard QoS - full guarantees

Brief explanation and relevant examples for each type of QoS

### Part-B

Answer all the questions - All questions carry equal marks  
 (5\*10=50 marks)

Q1. Outline in detail the various steps involved in transfer of information between a browser and a secured web server using Secured socket layer (10 marks)



BITS, Pilani-Dubai, Campus, Knowledge Village, Dubai  
IV th Year, First Semester 2004-2005  
Degree: B.E. (Hons) Branch: C.S.E

COURSE NO. : EA UC451

COURSE TITLE : **Internetworking Technologies**

Time : 3 hrs Date : 4-1-2005 Marks: 70 Comprehensive examination  
(Closed book)

Part -A

*Answer all the questions. All questions carry equal marks  
(10\*2=20marks)*

- Q1. Consider a super VGA (1024 \* 768) screen at a refresh rate of 25Hz. The total horizontal lines are 768. Find the maximum frequency of the analog video signal that can be displayed in the above scenario.
- Q2. Whether packet switching networks using tcp/ip alone can carry real-time voice packets ? justify.
- Q3. Outline the steps involved in invoking a web service from a client?
- Q4. What is the main difference between distributed computing using RPC calls and messaging?
- Q5. What is the significance of WSDL in the context of web service ?
- Q6. What is the purpose of having UDDI in the context of web services ?
- Q7. What is the difference between Point to point messaging and topic based messaging?
- Q8. Why scan-edf algorithm scores over edf algorithm in case of disk scheduling for multi media servers?
- Q9. Identify the difference in delays from the transmitting end for the stored and real-time multimedia objects?
- Q10. With appropriate examples explain the different quality of services offered for any network traffic?

Part-B

*Answer all the questions-All questions carry equal marks  
(5\*10=50 marks)*

- Q1. Outline in detail the various steps involved in transfer of information between a browser and a secured web server using Secured socket layer (10 marks)

Q2. Why the routers are able to process the IPV6 headers faster compared to IPV4 headers? (3 marks)

Suppose I want to transfer packets whose size is greater than 64K?

How it can be done using IPV6? (3 marks)

Outline what is meant by fragmentation and how fragmentation of packets in IPV6 differs from that of IPV4? (4 marks)

Q3. In a typical scenario, multimedia information involving video as well as associated voice have to be broadcasted lively across the internet maintaining synchronism till it reaches the receiver. Outline using relevant diagrams how Qos for the above can be achieved using two different types of network protocols. (10 marks)

Q4. Outline the difference in streaming of multimedia information using HTTP and RSTP protocol? (5 marks)

List out the interactions involved in streaming multimedia information involving a web browser, media player and multimedia server using RSTP protocol. (5 marks)

Q5. I want to monitor the status of a network consisting of routers, gateways and computer nodes from a central station.

With relevant diagrams explain how to design an appropriate system to achieve the same including the hardware and software chosen as well as organization of information within network elements. (10 marks)