

1. (a) Why we need a machine to machine communication protocol? (Marks = 2)
- (b) Why Go-Back-N was invented? Explain Go-Back-N and Selective repeat protocol. ? (Marks = 2)
2. (a) What kind of network topology will you prefer in a campus like Infosys (in front of IIITB campus) with 50 buildings and why? (Marks = 2)
- (b) Why MIME format is important? How the MIME format header is structured? (Marks = 2)
3. (a) Write the difference between circuit switching and virtual circuit switching and packet switching? (Marks = 2)
- (b) If you are downloading a home page of an URL, which has 12 objects by HTTP protocol. How many RTT it will take between client and server by HTTP 1.0 and HTTP 1.1's without pipe line and with pipeline to complete the download? Assumption: transmission and queuing, and processing delay = 0. (Marks = 2)
4. (a) UDP does not support reliable transmission. If an application wants to use UDP for speed but wants the reliability of TCP, then how can they do it? (Marks = 2)
- (b) Node B receiving 100 packets per second. Each packet is of 10000 bits. Transmission speed of the Node B is 500,000 bits/sec. The buffer available at Node B is 5 Mega bits. After how many seconds Node B's buffer will be full? We are considering processing delay equal to 0. (Marks = 2)
5. Find out total delay for a packet from Node A to Node B, where, at Node A: processing time of a packet 500micro sec, assume average queuing delay is 4ms, Packet length is 300KBytes, transmission speed is 3Gigabits per second, nodes A and B are connected by fiber of 20kms length and propagation speed through a fiber between the two nodes is 2×10^8 m/Sec. (Marks = 4)

$$16000 \times 10^{-5}$$
$$0.1 \times 10^{-3}$$

Mid Term Questions :- 2014

- ① Why we need DNS? What are types of DNS?
- ② Why we need MIME format? ~~Mention different~~ what are the MIME Format?
- ③ Latency Modelling of dynamic size window (slowstart)?
- ④ Why GO-BACKN & SELECTIVE REPEAT are Invented? Explain Go-backN and selective repeat.
- ⑤ Why Port No.. & IP address are used when MUX & DEMUX in TCP? explain with figures.
- ⑥ Why TCP is fair?
- ⑦ Why we need sequence no.s in TCP packet?
- ⑧ Explain Tahoe & Reno's algorithms for congestion control. What will you prefer in highly congested N/W?

Class Test – I
NC- 101 Computer Networking and Communication
Total Marks: 20; Duration: 60 Mins

Date: Aug, 31 2012
Answer all the questions

1. (a) Why we need a machine to machine communication protocol? (Marks = 2)
(b) What are the positive points of packet switching over message switching? Explain with example. What is the draw back of packet switching with respect to message switching? (Marks = 2)
2. (a) What kind of topology will you prefer in a campus like IITB and why? (Marks = 2)
(b) Define a guided and unguided medium? What are the advantages and disadvantages of guided as well as unguided medium for communication? (Marks = 2)
3. (a) Write the difference between delay and jitter? (Marks = 2)
(b) If you are downloading a home page of an UPL, which has 15 objects by HTTP protocol. How many RTT it will take between client and server by HTTP 1.0 and HTTP 1.1's without pipe line and with pipeline to download complete the download? Assumption: transmission and queuing, and processing delay = 0. (Marks = 2)
4. (a) What is "Physical topology" and "Logical topology"? (Marks = 2)
(b) Node B receiving 100 packets per second. Each packet is of 10000 bits. Transmission speed of the Node B is 500, 000 bits/sec. The buffer available at Node B is 4 Mega bits. After how many seconds Node B's buffer will be full? We are not considering queuing delay and processing delay = 0. (Marks = 2)
5. Find out total delay for a packet from Node A to Node B, where, at Node A: processing time of a packet 2msec, assume average queuing delay is 4ms, Packet length is 200KBytes, transmission speed is 2.5Gigabits per second, nodes A and B are connected by fiber of 30kms length and propagation speed through a fiber between the two nodes is 2×10^8 m/Sec. (Marks = 4)

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Final Examination
Networking and Communication
Date: 9th Dec, 2014

Total Marks: 40

Duration: 2hrs and 30 mins

Answer all the questions

1. Write the MAC protocol taxonomy. What kind of MAC protocol will you prefer in case of users in a local area network for non-real time applications with less load to transmit and why? (Marks = 5)
2. Explain the (a) Link state algorithm and (b) Distance Vector Algorithm. (Marks = 5)
3. Give an example of fragmentation, if the IP packet size is 4200 byte and transmitted over wired Ethernet LAN. Why offset is measured by unit of 8 bytes in case of fragmentation? (Marks = 5)
4. Explain the methodologies used for IPv4 and Ipv6 transition. Explain each methodology's advantage and challenge. (Marks = 5)
5. Consider a BSC with probability of error $p=0.01$. If the application requires a P_b to be less than or equal to 10^{-4} , determine the number of errors (t) that the chosen channel code must correct. The block size (n) is given to be 31. What is the minimum number of parity bits required to satisfy this condition? (Marks 10)
6. The parity bits of a (7,3) block code are defined below. Code structure is $(p_3 p_2 p_1 p_0 b_2 b_1 b_0)$, where first 4 bits are parity bits and last 3 bits are data bits and **all additions are binary (XOR) additions.** $p_3=b_2+b_1+b_0$, $p_2=b_2+b_1$, $p_1=b_1+b_0$ and $p_0=b_2+b_0$ (Marks 10)

Determine the generator and parity check matrix.

How many errors can this code correct?

What is the new probability of bit error with this code, if original uncoded probability of bit error was 0.1?

Midterm Examination
NC-101, Computer Networking and Communication
Date: 5th October, 2012

Total Marks: 25

Duration: 3 hours

Answer all the questions

1. (a) Derive throughput equation for Pure-Aloha and Slotted Aloha medium access control protocol. In which average traffic load Pure-Aloha and Slotted-Aloha provides maximum throughput?

(Marks = 2.5)

(b) Explain at least two methodologies by which Datalink Layer detects erroneous transmission.

(Marks = 2.5)

2. (a) Which properties/functions of IPv4 protocol made it popular (at least two), even though IPv4 has multiple demerits (packet loss, variable delay, jitter, etc.)?

(Marks = 2.5)

(b) Explain the steps for Direct and Indirect IP-based mobility.

(Marks = 2.5)

3. (a) What are the assumptions considered in case of Link State Algorithm and Distance Vector Algorithm? Which routing algorithm will you prefer out of BGP, OSPF, RIP in case of Ring Topology based Autonomous System MAN with 7 nodes and why?

(Marks = 2.5)

(b) The assumption to start with $S/R < RTT + S/R$. Derive latency equation for transferring a complete message of size O between source and destination, for dynamic congestion window size W , where the starting window size is 1 and it increases exponentially with successful transmission (assumed that, no error or packet loss during transmission of any packet). S is number of bits in a packet, R is transmission speed of the source, RTT is the round trip delay between source and destination.

(Marks = 2.5)

4. (a) Why we need a DNS? Write the types of DNS and its function?

(Marks = 2.5)

(b) Why TCP is a fair protocol? Explain Go-Back-N and Selective Repeat Protocol.

(Marks = 2.5)

5. (a) Explain DHCP protocol. Why there are 4-steps in case of DHCP protocol to provide an IP address?

(Marks = 2.5)

(b) What are the main elements of router and explain their functionalities? Write the types of switching fabrics?

(Marks = 2.5)

---Good Luck---

Class Test – II: Networking and Communication (NC-101)

Date: Sep 14, 2012

Total Marks: 10

Duration: 50 Mins

Answer all the questions

1. Find the channel utilization, if one uses Stop and Wait protocol with packet size of 20KBytes, end-to-end propagation delay between two nodes 20ms, transmission speed 2Gbits/sec. Also find out channel utilization, if one uses Go-Back-N with window size 3 and with above same parameters. Assumption: no packet loss/error, no queuing delay, no processing delay, no congestion control, ACK packet transmission delay negligible.

(Marks = 2)

2. Derive latency equation for TCP static window size between two servers for following two cases, (i) $WS/R > RTT + S/R$; (ii) $WS/R < RTT + S/R$; where R = bit rate, W = number of segments, S = number of bits in a segment, O = object size in bits. No transmission error has been considered.

(Marks = 2)

3. Why we need MIME format to send an email?

(Marks = 2)

4. Why time-out is important? Derive the equation for Time-Out?

(Marks = 2)

5. Can an application have reliable data transfer even though the application runs over UDP? If so, then how?

(Marks = 2)

Class Test – II
NC- 101 Computer Networking and Communication
Total Marks: 20; Duration: 50 Mins

Date: Nov, 28 2014
Answer all the questions

1. Derive (a) throughput equation for Pure-ALOHA MAC and (b) Slotted ALOHA MAC and find out at which average load the throughput will be maximum? (Marks = 5)
2. IPv4 addresses are limited with respect to so many devices. Explain one of the possible solution by which one can try to solve the shortage or miss use of IP address (except IPv6 solution). Give an example. (Marks = 5)
3. Why IPv4 is so popular, even though it has high delay, jitter and has packet loss? (Marks = 5)
4. What kind of routing protocol you will prefer in Intra-autonomous system and inter autonomous system networks and why? (marks = 5)

Class Test – I
NC- 101 Computer Networking and Communication
Total Marks: 20; Duration: 60 Mins

Date: Sept., 23 2014
Answer all the questions

1. (a) Why we need a network protocol? (Marks = 2)
(b) What are the positive points of packet switching over message switching? Explain with example. What is the draw back of packet switching with respect to message switching? (Marks = 2)
2. (a) What kind of topology will you prefer in a city like Bangalore and why? (Marks = 2)
(b) Derive time out equation? (Marks = 2)
3. (a) Write the difference between delay and jitter? (Marks = 2)
(b) If you are downloading a home page of an URL, which has 20 objects by HTTP protocol. How many RTT it will take between client and server by HTTP 1.0 and HTTP1.1's without pipe line and with pipeline to download complete the download? Assumption: transmission and queuing, and processing delay = 0. (Marks = 2)
4. (a) What is "Physical topology" and "Logical topology"? (Marks = 2)
(b) Node B receiving 200 packets per second. Each packet is of 10000 bits. Transmission speed of the Node B is 500,000 bits/sec. The buffer available at Node B is 4 Mega bits. After how many seconds Node B's buffer will be full? We are not considering queuing delay and processing delay = 0. (Marks = 2)
5. Find out total delay for a packet from Node A to Node B, where, at Node A: processing time of a packet 1msec, assume average queuing delay is 3ms, Packet length is 200KBytes, transmission speed is 2.5Gigabits per second, nodes A and B are connected by fiber of 30kms length and propagation speed through a fiber between the two nodes is 2×10^8 m/Sec. (Marks = 4)

Midterm Examination
NCE-501, Networking Communication and Embedded Systems
Date: 27th September, 2013

Total Marks: 25

Duration: 3 hours

Answer all the questions

1. (a) Derive the latency equations for transferring a complete message of size O between source and destination, for $WS/R > RTT + S/R$ and $WS/R < RTT + S/R$, where W is fixed size static congestion window, S is number of bits in a packet, R is transmission speed of the source, RTT is the round trip delay between source and destination? (Marks = 2.5)

(b) Derive latency equation for transferring a complete message of size O between source and destination, for dynamic congestion window size W , where the starting window size is 1 and it increases exponentially with successful transmission (assumed that, no error or packet loss during transmission of any packet). The definition of S , R , RTT are same as above question. (Marks = 2.5)

2. (a) Which properties/functions of IPv4 protocol made it popular (at least two), even though IPv4 has multiple demerits (packet loss, variable delay, jitter, etc.)? (Marks = 2.5)

(b) Derive Timeout equation between a client and a server. Evaluate Timeout, if EstimatedRTT after N th transmission of an ongoing session between a client and server is 15msec and SampleRTT at N th transmission is 16msec. $(N-1)$ th transmission the deviation was 14.5msec. The weightage Y given at N th transmission is 0.25 for evaluating current deviation. (Marks = 2.5)

3. (a) What are the assumptions considered in case of Link State Algorithm and Distance Vector Algorithm? Which routing algorithm will you prefer out of BGP, OSPF, RIP in case of Mesh Topology based multiple Autonomous interconnected Systems WAN with 2013 nodes (large no. of nodes, and you are 2013 batch!) and why? (Marks = 2.5)

(b) You have studied till now Application, Transport and Network Layers in this course. If a HTTP 1.1 with pipelining has been invoked between a client and a webserver, and what are the places you can visualize delays a packet may face? Explain at least 3 possible delays a packet may face in above layers and why these delays? (Marks = 2.5)

4. (a) What is the difference between Flow control and Congestion control? How the flow control information communicated between sender and receiver? How the flow control is estimated by sender? (Marks = 2.5)

(b) Explain Tahoe and Reno congestion control algorithm. If network is highly congested and packet loss is very high, then which one will you prefer to implement between Tahoe and Reno and why? Why TCP is a fair protocol? (Marks = 2.5)

5. (a) Explain DHCP protocol. Why there are 4-steps in case of DHCP protocol to provide an IP address? (Marks = 2.5)

(b) Why Go-Back-N was born? Explain Go-Back-N and Selective Repeat Protocol. (Marks = 2.5)

(Note: If possible donot spend more than 30 mins per question $X 5 = 2\text{hrs } 30\text{mins} + 30\text{mins}$)

Revision = 3hrs

---Good Luck---

Midterm Examination
NCE-501, Networking Communication and Embedded Systems
Date: 27th September, 2013

Total Marks: 25

Duration: 3 hours

Answer all the questions

1. (a) Derive the latency equations for transferring a complete message of size O between source and destination, for $WS/R > RTT + S/R$ and $WS/R < RTT + S/R$, where W is fixed size static congestion window, S is number of bits in a packet, R is transmission speed of the source, RTT is the round trip delay between source and destination? (Marks = 2.5)

(b) Derive latency equation for transferring a complete message of size O between source and destination, for dynamic congestion window size W , where the starting window size is 1 and it increases exponentially with successful transmission (assumed that, no error or packet loss during transmission of any packet). The definition of S , R , RTT are same as above question. (Marks = 2.5)

2. (a) Which properties/functions of IPv4 protocol made it popular (at least two), even though IPv4 has multiple demerits (packet loss, variable delay, jitter, etc.)? (Marks = 2.5)

7.5
7.25
0.5
0.8 7.5
(b) Derive Timeout equation between a client and a server. Evaluate Timeout, if EstimatedRTT after N th transmission of an ongoing session between a client and server is 15msec and SampleRTT at N th transmission is 16msec. $(N-1)$ th transmission the deviation was 14.5msec. The weightage Y given at N th transmission is 0.25 for evaluating current deviation. (Marks = 2.5)

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(b) Why Go-Back-N was born? Explain Go-Back-N and Selective Repeat Protocol. (Marks = 2.5)

(Note: If possible donot spend more than 30 mins per question $X 5 = 2\text{hrs } 30\text{mins} + 30\text{mins}$
revision = 3hrs)

---Good Luck---

Midterm Examination
NC-501, Computer Networking and Communication
Date: 12th October , 2015

Total Marks: 25

Duration: 3 hours

Answer all the questions

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1. (a) What are the properties (at least two points) of Transport layer that make the Internet unique and why (explain briefly) with major demerits of Internet protocols (high delay and jitter, packet loss, etc.)? (Marks = 2.5)
- (b) What are the properties (at least two points) of Network layer that make the Internet unique and why (explain briefly) with major demerits of Internet protocols (high delay and jitter, packet loss, etc.)? (Marks = 2.5)
2. (a) Explain Stop and Wait Protocol. Why Go-Back-N and Selective repeat was invented? (Marks = 2.5)
- (b) Write the assumptions of Link-State and Distance Vector routing algorithms. Why such assumptions in case of the above two algorithms? (Marks = 2.5)
3. (a) Which routing algorithm will you prefer out of BGP, OSPF, RIP in case of Mesh Topology based Autonomous System MAN with 8 nodes and 14 links and why? All the routers have enough memory. (Marks = 2.5)
- (b) The assumption to start with is $S/R < RTT + S/R$. Derive latency equation for transferring a complete message of size O between source and destination, for dynamic congestion window size W , where the starting window size is 1 and it increases exponentially with successful transmission (assume that, no error or packet loss during transmission of any packet). S is number of bits in a packet, R is transmission speed of the source, RTT is the round trip delay between source and destination. (Marks = 2.5)
4. (a) Explain Tahoe and Reno algorithm. In case of acute congestion in backbone which one will you prefer and why? (Marks = 2.5)
- (b) What is CIDR? Why we need it? (Marks = 2.5)
5. (a) Explain DHCP protocol. Why there are 4-steps in case of DHCP protocol to provide an IP address? (Marks = 2.5)
- (b) Derive the equation for Timeout in Internet TCP data packet connection? (Marks = 2.5)

---Good Luck---

Midterm Examination
NC-501, Computer Networking and Communication
Date: 12th October , 2015

Total Marks: 25

Duration: 3 hours

Answer all the questions

1. (a) What are the properties (at least two points) of Transport layer that make the Internet unique and why (explain briefly) with major demerits of Internet protocols (high delay and jitter, packet loss, etc.)? (Marks = 2.5)

(b) What are the properties (at least two points) of Network layer that make the Internet unique and why (explain briefly) with major demerits of Internet protocols (high delay and jitter, packet loss, etc.)? (Marks = 2.5)

2. (a) Explain Stop and Wait Protocol. Why Go-Back-N and Selective repeat was invented? (Marks = 2.5)

(b) Write the assumptions of Link-State and Distance Vector routing algorithms. Why such assumptions in case of the above two algorithms? (Marks = 2.5)

3. (a) Which routing algorithm will you prefer out of BGP, OSPF, RIP in case of Mesh Topology based Autonomous System MAN with 8 nodes and 14 links and why? All the routers have enough memory. (Marks = 2.5)

(b) The assumption to start with is $S/R < RTT + S/R$. Derive latency equation for transferring a complete message of size O between source and destination, for dynamic congestion window size W , where the starting window size is 1 and it increases exponentially with successful transmission (assume that, no error or packet loss during transmission of any packet). S is number of bits in a packet, R is transmission speed of the source, RTT is the round trip delay between source and destination. (Marks = 2.5)

4. (a) Explain Tahoe and Reno algorithm. In case of acute congestion in backbone which one will you prefer and why? (Marks = 2.5)

(b) What is CIDR? Why we need it? (Marks = 2.5)

5. (a) Explain DHCP protocol. Why there are 4-steps in case of DHCP protocol to provide an IP address? (Marks = 2.5)

(b) Derive the equation for Timeout in Internet TCP data packet connection? (Marks = 2.5)

---Good Luck---

24 2^{24}
16 2^{16}
8 2^8

Final Examination
Networking and Communication
Date: Dec 7, 2015 9:30-12:30 PM

Total Marks: 50

Duration: 3 hours

Answer all the questions

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- ✓ (10) 1. Write the merits and limitations of TDMA and FDMA. Why one prefers Random access MAC over TDMA and FDMA in case of LAN?
- ✓ (10) 2. Write the definition for Pure-Aloha and Slotted Aloha MAC protocol. (ii) Derive the throughput equation for Pure-Aloha and Slotted-Aloha MAC protocols. (iii) Show (with all steps of analysis) at which load these MACs will present maximum throughput? (iv) Why the throughput of Slotted-Aloha increased from Pure-Aloha?
- ✓ (10) 3. Why taking turn MAC protocol was invented? (ii) Explain polling MAC protocol and shows its advantage over TDMA by taking an example (discussed in class).
- (2+2+2+4) 4. Answer the following in detail:
- ✓ a. What is the one most important advantage and disadvantage of CDMA systems over TDMA or FDMA?
 - b. What is noisy channel coding theorem?
 - c. Why are channel codes used in communication systems?
 - d. If a (5,1) code is used for a BSC with $p = 0.1$, what would be the new probability of error?
- ✓ (3+2+5) Q.5 DECT is a system used for Cordless phones. It is based on Time Division Multiple Access (TDMA). The complete data frame is 10ms in duration with 24 slots. The slot consists of 4 parts: 16 bits preamble, 16 bit synchronization word, 64 bits identification field that specifies what the content of data field is and 324 bits of data field. **Actual data (voice) is present only in the data field.**
- What is the time duration of each slot of the system?
 - What is time duration of each bit of the system? (Determine the number of bits in each slot first).
 - What is the efficiency of this TDMA system?