KOMMURI PRATAP REDDY INSTITUTE OF TECHNOLOGY

GhanpurVillage,Ghatkesar (M), R.R.District - 500088

COURSE FILE

ACADEMIC YEAR: 2020-2021

COURSE: IIIB. Tech I SEMESTER

SUBJECT:COMPUTER NETWORKS

FACULTY: NITHIN R
Assistant Professor
Department of Computer Science and Engineering

HOD PRINCIPA

Vision of the Institute

To emerge as a premier institute for high quality professional graduates who can contribute to economic and social developments of the Nation.

Mission of the Institute

Mission	Statement
IM1	To have holistic approach in curriculum and pedagogy through industry interface to meet the needs of Global Competency.
IM2	To develop students with knowledge, attitude, employability skills, entrepreneurship, research potential and professionally ethical citizens.
IM3	To contribute to advancement of Engineering & Technology that would help to satisfy the societal needs.
IM4	To preserve, promote cultural heritage, humanistic values and spiritual values thus helping in peace and harmony in the society.

COMPUTER NETWORKS:(CN): (CS414PC) **A.Y:2020-21**

Students will be able to

C313.1: Understand and Gain the knowledge of the basic computer network technology

(**Understand**)

C313.2: Demonstrate the knowledge of the functions of each layer in the OSI and TCP/IP reference model.
(**Apply**)

C313.3: Obtain the skills of subnetting and routing mechanisms. (**Evaluate**)

C313.4: Familiarity with the essential protocols of computer networks, and how they can be applied innetwork design and implementation.
. (**Understand**)

C313.5: Recognize and get idea about intrernet vedio. (**Understand**)

Mapping Of Course Outcomes With PO'S & PSO'S:

High -3 Medium -2 Low-1

PO,PSO / CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
C313.1	3	3	-	-	-	-	-	-	-	-	-	-	2	3	-
C313.2	2	3		2	-	-	-	-	-	-	-	-		3	-
C313.3	-	3	-	-	-	2	-	-	-	-	-	-	-	2	-
C313.4	3	-	2	3	3		2	-	-	-	-	-	2	3	-
C313.5	3	-	-	-	-	-	2	-	-	-	-	-	-	3	-
C313	2.75	3.00	2.00	2.50	3.00	2.00	2.00	-	-	-	-	-	2.00	2.80	-

CO-PO Mapping Justification

C313.1: Understand and Gain the knowledge of the basic computer network technology (**Understand**)

	Justification
PO1	Students can be able to gain knowledge about networking process
PO2	Students can identify and review different types of layers in networking.

C313.2: Demonstrate the knowledge of the functions of each layer in the OSI and TCP/IP reference model. (**Apply**)

	Justification
PO1	Students can be able to learn about TCP/IP models
PO2	Students can identify the layers and functions
PO4	Students can use their knowledge in new routing techniques

C313.3: Obtain the skills of subnetting and routing mechanisms. (**Evaluate**)

	Justification
PO2	Students will be evaluating the shortest path algorithms and routing algorithms
PO6	Students can evaluate route for vector routing and how to provide quality of service

C313.4: Familiarity with the essential protocols of computer networks, and how they can be applied innetwork design and implementation. (**Understand**)

	Justification
PO1	Students can understand essential protocols used in computer networks
PO3	Students will be able to learn design of networks
PO4	Students will be able to learn new algorithms of routing
PO5	Students can apply appropriate techniques in networking
PO7	Students can understand the impact of risk in routing.

C313.5:.: Recognize and get idea about intrernet vedio. (**Understand**)

	Justification
PO1	Students will be able understand about http and web
PO7	Students can understand how video and audio streaming is done

CO-PSO Mapping Justification

C313.1: Understand and Gain the knowledge of the basic computer network technology (**Understand**)

	Justification
PSO1	Students understand about different layers in TCP/IP MODEL.
PSO2	Students can understand how to each layer perform operations.

C313.2: Demonstrate the knowledge of the functions of each layer in the OSI and TCP/IP reference model. (**Apply**)

	Justification
PSO1	Students get the knowledge and will demonstrate the functions of TCP/IP and OSI model

C313.3: Evaluate the process times and different security issues and evalution of risks on working platform. (**Evaluate**)

	Justification
PSO2	Students will evaluate techniques to overcome risks in routing

C313.4: Familiarity with the essential protocols of computer networks, and how they can be applied innetwork design and implementation. (**Understand**)

	Justification
PSO1	Students will understand entire working of Transport layer
PSO2	Students can have complete knowledge that essentiality and key role of transport layer

C313.5: Recognize and get idea about intrernet vedio. (**Understand**)

	Justification
PSO2	Students will be able to learn about HTTP and streaming of video and audio.

KOMMURI PRATAP REDDY INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Lesson Plan – COMPUTER NETWORKS

Faculty Name: NITHIN R	Year / Sem: III/I	Academic Year: 2020-21

L. No	Name of the Topic	Reference books	Delivery method
1	**Overview of the Internet**	T1-16	Chalk &Talk
2	Protocol	T1-26	Chalk &Talk
3	Layering Scenario	T1-27	Chalk &Talk
T1	Layering Scenario	**T1-27**	Chalk &Talk
4	TCP/IP Protocol Suite	T1-42	Chalk &Talk
5	The OSI Model	T1-29	Chalk &Talk
6	Internet history standards and administration	T1-21	Chalk &Talk
7	Comparioson of the OSI and TCP/IP reference model.	T1-21	Chalk &Talk
T2	The OSI Model	**T1-30**	Chalk &Talk
8	**Physical Layer**	T1-191	Chalk &Talk
9	Guided transmission media	T2-90-93	Chalk &Talk
10	wireless transmission media	T1-192	Chalk &Talk
T3	**TCP/IP**	T1-21	Chalk &Talk
11	**Data Link Layer**	T1-284	Chalk &Talk
12	design issues	T1-284	Chalk &Talk
13	CRC codes	T1-285	Chalk &Talk
14	Elementary Data Link Layer Protocols	T1-324,T2-200-223	Chalk &Talk
T4	**CRC**	T2-184-196	Chalk &Talk

15	sliding window protocol	T1-324	Chalk &Talk
16	**UNIT-II** aloha introduction	T1-365	Chalk &Talk
17	ALOHA,	T1-370	Chalk &Talk
18	Collision free protocols,	T1-377	Chalk &Talk
T5	ALOHA	T1-365	Chalk &Talk
19	Ethernet- Physical Layer	T1-409	Chalk &Talk
Assignment--I			
20	Ethernet Mac Sub layer	T1-410	Chalk &Talk
21	data link layer switching & use of bridges	T1-396	Chalk &Talk
T6	MAC	T1-409,T2-254	Chalk &Talk
22	CSMA	T1-370,W2	Chalk &Talk
23	ALOHA,	**T1-366**	Chalk &Talk
24	learning bridges, spanning tree bridges,	T1-397,T1-451,T2-324	Chalk &Talk
25	Repeaters, hubs, bridges, switches, routers and gateways	T1-446,T2-326	Chalk &Talk
26			
T7	CSMA	T1-370	Chalk &Talk
26	**UNIT-III** Network Layer Design issues	T1-547	Chalk &Talk
27	store and forward packet switching	T1-597	Chalk &Talk
28	Connection less connection oriented networks	T1-582	Chalk &Talk
29	networks-routing alhorithms-optimality principle	**T1-658,T2-352**	Chalk &Talk
T8	Design issues of n/w layer	T1-547	Chalk &Talk
30	shortest path	T1-668,T2-353	Chalk &Talk
31	Flooding, Distance Vector Routing	**T1-667**	Chalk &Talk
32	Control to Infinity Problem	**T2-355,357**	Chalk &Talk
33	Hierarchical Routing,	T1-653,T2-366	Chalk &Talk
T9	Shortest path	T1-668,T2-353	Chalk &Talk
34	Congestion control algorithms	T1-769,W1	Chalk &Talk
35	admission control	T1-765	Chalk &Talk
36	**UNIT-IV** INTERNETWORKING Tunnelling ,	T1-604	Chalk &Talk

	Internetwork Routing		
37	Packet fragmentation	**T1-597**	Chalk &Talk
T10	Congession	T1-769	Chalk &Talk
38	IPv4 Protocol	T1-582	Chalk &Talk
39	IPv6 Protocol	T1-566	Chalk &Talk
40	IP addresses	T1-549	Chalk &Talk
41	CIDR, IMCP	T1-621	Chalk &Talk
T11	IPv4 Protocol, IPv6 Protocol	T1-582,T1-566	Chalk &Talk
42	ARP, RARP, DHCP	T1-620	Chalk &Talk
43	**Transport Layer:** Services provided to the upper layers	T1-723	Chalk &Talk
44	elements of transport protocol- addressing	T1-724	Chalk &Talk
45	connection establishment, connection release, Crash Recovery	**T1-725**	Chalk &Talk
T12	Crash Recovery	T1-728	Chalk &Talk
46	**UNIT - V:** The Internet Transport Protocols UDP -RPC	T1-728	Chalk &Talk
47	Real Time Transport Protocols, The Internet Transport Protocols-introduction to TCP	T1-711	Chalk &Talk
48	The TCP Service Model, The TCP Segment Header	T1721	Chalk &Talk
49	The Connection Establishment, The TCP Connection Release	**T1-723**	Chalk &Talk
T13	TCP-Transmission Control Protocal	T1-721,T1-723	Chalk &Talk
50	The TCP Connection Management Modeling, The TCP Sliding Window	T1-723	Chalk &Talk
51	The TCP Congestion Control, The future of TCP.	T1-765	Chalk &Talk
52	Application Layer- Introduction ,providing services	T1-797	Chalk &Talk
53	Applications layer paradigms, client server model, Standard client-server application-HTTP	**T1-850**	Chalk &Talk
Assignment--II			
54	FTP,electronic mail,	T1-824,840	Chalk &Talk
T14	FTP	T1-840	Chalk &Talk
55	TELNET,DNS,SSH	T1-817,T1-799	Chalk &Talk
Mid Exam—II			

TEXT BOOKS:

T1:Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.

T2:Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education.

REFERENCES BOOKS:

An Engineering Approach to Computer Networks - S. Keshav, 2nd Edition, Pearson Edication.

R1:Understanding communications and Networks, 3rd Edition, W. A. Shay, Cengage Learning.

R2:Introduction to Computer Networks and Cyber Security, Chwan-Hwa (John) Wu, J. David Irwin, CRC Press.

R3:Computer Networks, L. L. Peterson and B. S. Davie, 4th edition, ELSEVIER.

R4:Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, K. W. Ross, 3rd Edition, Pearson Eduction.

Web References:

W1:http://nptel.ac.in/courses/106105080/pdf/M7L5.pdf

W2:http://nptel.ac.in/courses/106105081/19

Signature of faculty **Signature of HOD**

2020-21 Onwards		B.Tech. III YEAR SEM-I		
CS503PC	COMPUTER NETWORKS	L	T	P
Credits: 3		3	-	-

Course objectives: This course provides students to understand the fundamental concepts of computer networking and communications make use of IEEE standards in the construction of LAN, build the skills of subnetting and supernetting, explain the concepts of protocols of Transport Layer, QoS and Congestion control mechanisms and demonstrate different protocols of Application Layer.

MODULE I: Basics of Networking and Physical layer [10 Periods]

Basics of Networking - Components – Direction of Data flow – Networks – Components and Categories – Types of Connections – Topologies –Protocols and Standards – ISO / OSI model, TCP/IP model.

Physical layer - Digital transmission, Multiplexing, Transmission Media, Switching, Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks.

MODULE II: Datalink layer [11 Periods]

Functionalities of Data link layer - Introduction, Framing, Error Detection and Correction – Parity – LRC – CRC- Hamming code, Flow and Error Control, Noiseless Channels, Noisy Channels, HDLC, Point to Point Protocols. Random access, Controlled access, Channelization, Collision Free Protocols.

LAN - LAN - Ethernet IEEE 802.3 - IEEE 802.4 - IEEE 802.5 - IEEE 802.11

MODULE III: Network Layer [09 Periods]

A: Basics of Network Layer - Logical Addressing, Internetworking, Tunneling, Address mapping,

B: Communication Protocols - ICMP, IGMP, Forwarding, Unicast Routing Protocols, Multicast Routing Protocols.

MODULE IV: Transport Layer [09 Periods]

Connection Oriented and Connectionless Protocols -Process to Process Delivery, UDP and TCP protocols, SCTP.

Congestion Control - Data Traffic, Congestion, Congestion Control, QoS, Integrated Services, Differentiated Services, QoS in Switched Networks.

MODULE V: Application layer [09 Periods]

DNS - Domain name space, DNS in internet, Electronic mail

Protocols and Network Security - FTP, WWW, HTTP, SNMP, Network Security, Cryptography.

UNIT- I

Introduction

An interconnected collection of **autonomous** computers is called a computer network. Two computers are said to be interconnected if they are able to exchange the information. If one computer can forcibly start, stop and control another one, the computers are not autonomous. A system with one control unit and many slaves is not a network, nor is a large computer with remote printers and terminals.

In a **Distributed system**, the existence of multiple autonomous computers is transparent(i.e., not visible) to the user. He can type a command to run a program and it runs. It is up to the operating system to select the best processor, find and transport all the files to that processor, and put the results in the appropriate place.

The user of a distributed system is not aware of that there are multiple processors; it looks like a virtual uniprocessor. Allocation of jobs to processors and files to disks, movement of files between where they are stored and where they are needed, and all system function are automatic.

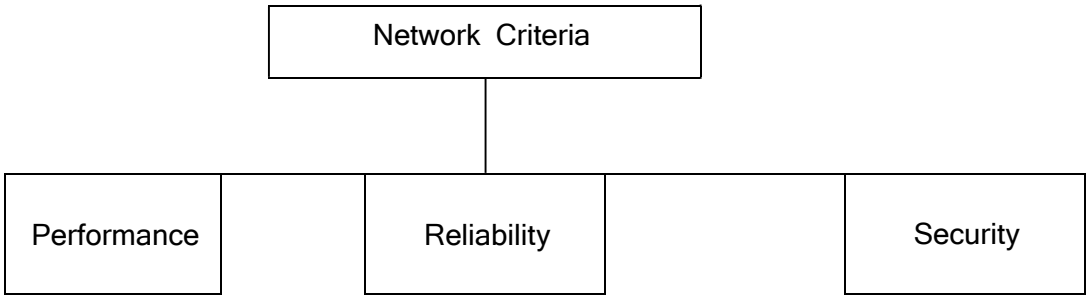
With a network, users must explicitly log onto one machine, explicitly submit jobs remotely, explicitly move files around and generally handle all the network management personally. The distinction between Network and distributed system lies with software (OS) rather than software. In network user invokes, in distributed system the system invokes.

A network is a set of devices connected by media links. Anode can be a computer, printer or any other device capable of sending and receiving data generated by other nodes on the network. The links connecting the devices are often called communication channels.

Networks use **Distributed processing,** in which a task is divided among multiple computers. Advantages of Distributed processing are

- Security/ Encapsulation
- Distributed data bases
- Faster problem solving
- Security through Redundancy
- Collaborative processing

Network Criteria



LINKS : https://www.geeksforgeeks.org/

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Review Questions

1. Which OSI layers are the network support layers?
2. Which OSI layers are the user support layers?
3. What is the difference between network layer delivery and transport layer delivery?
4. List the layers of the OSI model.
5. What is a peer-to-peer process?
6. How does information get passed from one layer to the next?
7. What are the concerns of the Physical Layer?
8. What are the responsibilities of the data link layer?
9. What are the responsibilities of the network layer?
10. What are the responsibilities of the transport layer?
11. The transport layer creates a connection between the source and destination. What are the three events involved in a connection?
12. What are the responsibilities of the session layer?
13. What are the responsibilities of the presentation layer?
14. What are the services provided by the application layer?
15. Name two categories of transmission media.
16. How do guided media differ from unguided?
17. What are the three major classes of guided media.
18. What is the major advantage of shielded twisted pair over unshielded twisted pair?
19. Why is coaxial cable superior to twisted-pair cable?
20. Name the advantages of optical over twisted pair and coaxial cable.
21. What are the disadvantages of optical fiber as a transmission medium?
22. How an IDN differs from ISDN?
23. What type of information can a B channel transmit?
24. What type of information can a D channel transmit?
25. What type of information can a H channel transmit?
26. What is the difference between in band signaling and out of band signaling?
27. What is NT1?
28. What is NT2 ?
29. What is TE1?
30. What is TE2?
31. What are X.25 layers?
32. How does the X.25 layers relate to the OSI model?
33. Name the X.25 frame types?

34. What are the functions of X.25 frame types?

35. What are the frame layer phases involved in the communication between a DTE and a DCE ?

36.How are packets associated with the virtual circuit on which they travel?

37. What is the purpose of an LCN?

38. What type of virtual circuits does X.25 use?

39.List of the fields of a PLP packet types?

LINKS : https://www.geeksforgeeks.org/

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UNIT –II DATALINK LAYER

Introduction

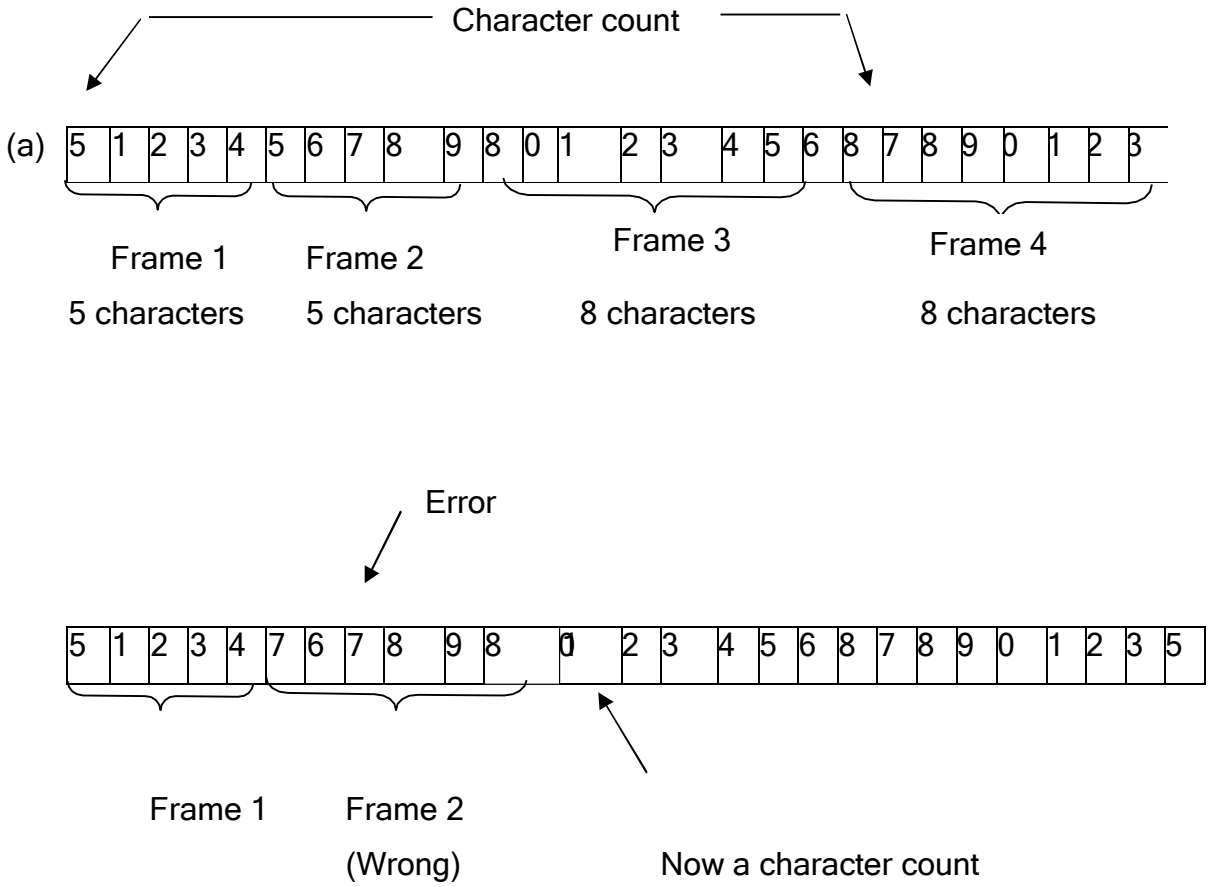
The Data Link Layer break the bit stream into discrete frames and compute the checksum for each frame. When a Frame arrives at the destination, the checksum is recomputed. If the newly computed checksum is different from one computed contained in the frame, the data link layer knows that an error has occurred and takes steps to deal with it.

FRAMING METHODS

1. CHARATER COUNT METHOD
2. STARTING AND ENDING CHARACTERS, WITH CHARATER STUFFING
3. STARTING AND ENDING FLAGS, WITH BIT STUFFING

CHARATER COUNT METHOD:

In this method a field in the header will be used to specify the number of CHARACTERS in the frame. When data link layer at the destination sees the character count, it knows how many characters follow and hence where the end of the frame is.
The trouble with this algorithm is that the count can be garbed by a transmission error resulting the destination will get out of synchronization and will be unable to locate the start of the next frame. There is no way of telling where the next frame starts. For thi s reason this method is rarely used.



A Character Stream (a) Without errors (b) With one error

CHARATER STUFFING METHOD:

In this method each frame will start with a FLAG and ends with a FLAG.

The starting flag is **DLE STX ---- Data Link Escape Start of Text**

The ending flag is **DLE ETX ------- Data link Escape End of Text.**

Ex 1. The given Data ABRFCXDGJHKK12435ASBGXRR

The Data will be sent

DLE STX ABRFCXDGJHKK12435ASBGXRR DLE STX

Ex 2. The given Data **ASHGTRDXZBNHG DLE STX %$#54378**

The data will be sent as

DLE STX ASHGTRDXZBNHG DLE DLE STX %$#54378 DLE ETX

Dis Adv:

1.24 bits are unnecessarily stuffed.

2. Transmission delay.

BIT STUFFING METHOD

In this method every frame will start with a **flag 01111110.**

In the data if there are **FIVE** consecutive ONE 's are there then a ZERO will be stuffed.

Ex. The given data is 01111000011111110101001111110 01111101100

The data will be sent as

01111110 01111000011111**0**1101010011111**0**10 01111**0**01100

Stuffed bits

Advantages:

1. Only one bit is stuffed.
2. No transmission delay

ERROR - CORRECTING AND DETECTING CODES

Network designers have developed two basics strategies for dealing with errors. One way is to include enough redundant information along with each block of data sent, to enable the receiver to deduce what the transmitted data must have been .The other way is to include only enough redundancy to allow the receiver to deduce that an error occurred, but not which error, and have it request a retransmission. The former strategy uses **Error – correcting codes** and the latter uses **Error- detecting codes**.

The **Error – correcting and Error- detecting methods are**

1. PARITY METHOD
2. LRC METHOD (Longitudinal redundancy check)
3. CRC METHOD (Cyclic redundancy check)
4. HAMMING CODE METHOD

Expected Questions

1 Briefly explain the functions of Data Link Layer.
2 Discuss different types of Framing Methods.
3 Discuss various Error detecting and correcting methods.
4 Explain CRC method with your own example.
5 Explain Hamming code method with your own example.
6 What is meant by Flow control? Discuss different flow control methods.
7 Discuss various stop and wait protocols.
8 Explain Piggy backing, pipelining techniques.
9 Explain sliding window protocol.
10 Explain Go back 'n' and selective repeat protocols.
11 Prove that the channel utilization is 18% in ALOHA and 37% slotted ALOHA.
12 Discuss the CSMA protocols.
13 Explain different STOP and WAIT protocols.
14 Explain persistence and non-persistence CSMA protocol.
15 Discuss HDLC in detail.
16 What is the difference information fields in an HDLC I – frame and an U –frame.
17 Explain IEEE 802.3
18 Explain IEEE 802.4
19 Explain IEEE 802.5
20 Compare IEEE 802.3, IEEE802.4, IEEE802.5
21 Explain the operation of token bus
22 Explain the operation of token ring.
23 Prove that the channel utilization will be 37% in slotted ALOHA system.
24 Compare and Contrast pure ALOHA and Slotted ALOHA systems.
25 Write short note on CSMA/CD protocol.
26 Explain the collision free protocols.
27 Compare the ALOHA and CSMA protocols.
28 Explain Token bus and its frame format.
29 Explain token ring and its frame format.
30 Explain 802.3 frame format.

31 Explain different connecting devices.

32 Explain different types of Bridges.

33 Give different reasons why a bridge is required.

Link :www.smartworldz.com

UNIT – III
NETWORK LAYER

Functions of Net Work layer

1. Routing 2. Congestion Control

Routing algorithms

The main function of the network layer is routing packets from the source machine to the destination machine. Routing algorithm can be grouped into two major classes. Nonadaptive and Adaptive algorithms.

	Non adaptive	Adaptive
1)	Routing decisions are not based on measurements or estimates of the current traffic and topology.	Routing decisions are based on measurements of the current traffic and topology.
2)	The route is computed well in advance.	The route is computed depends on situation.
3)	When the network is booted the routers are downloaded.	The routers are not downloaded.

Review Questions

2. How is a repeater different from an amplifier?
3. What is the difference between a simple bridge and transparent bridge?
4. What is the function of router?
5. How does a router differ from a bridge?
6. Why is adaptive routing is superior to non-adaptive routing?
7. What is the function of a gateway?
8. How does a multiprotocol router differ from a traditional single – protocol router?

1. HDLC is the acronym for--------

   a. High-duplex line communication. b.high level data link control c.half-duplex digital link combination d. none of the above

2. HDLC is a------- protocol

   a. Character-oriented b.bit-oriented c.byte – oriented d. count-oriented

3. The HDLC--- field defines the beginning and of a frame

   a. Flag bladders c. control d. FCS

4. Polling and selecting are functions of the ----in HDLC protocol

   a. P/F bit b.N(R) c.N (S) d.code bits

5. Which of the following is not an internetworking device?

   a. bridge b. gateway c. router d. all of them

6. Which of following uses the greatest number of layers in the OSI model?

   a. bridge b. gateway c. router d .repeater

7. A simple bridge does the following

   a. filters a data packet b. forwards a data packet c. extends Lans d. all the above

8. The shortest path in routing can refer to --------

   a. the least expensive path b the latest distant path

   b. the path with the smallest number of hops d. any or combination of the above

9 In distance vector routing ,each router receives vectors from----

   a. every router in the network b. every router less than two units away

   b. a table stored by the software d. its neighbor only.

10. If there are five routers and six networks in an internet work using link state routing, how many routing tables are there?

    a. 1 b. 5 c. 6 d. 11

11. If there are five routers and six networks in an internet work using link state routing, how many data bases are there?

a. 1 b. 5 c. 6 d. 1

12. Gateways function in which OSI layers?

a.the lower three b. the upper four c. all seven d. all but the physical layer

13. Repeaters function in the --- layer

a. physical b . datalink c. net work d. a and b

14.Bridges function in the --------- layer(s)

a. physical b . datalink c. net work d. a and b

Links:notes.specworld.in

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UNIT – IV

TRANSPORT LAYER

Introduction

The transport layer is the core of the OSI model. Protocols at this layer oversee the delivery of data from an application program on one device to an application program on another device. They act as a liaison between the upper-layer protocols (session, presentation, and application) and the services provided by the lower layers.

Duties of the transport layer:

The services provided are similar to those of the data link layer. The data link layer, however, is designed to provide its services within a single network, while the transport layer provides these services across an internetwork made of many networks. While the transport layer controls all three of the lower layers.

The services provided by transport layer protocols can be divided into five broad categories: end-to-end deliver, addressing, reliable delivery, flow control, and multiplexing.

Quality of Service

The transport protocol improves the QoS (Quality of Service) provided by the network layer.

Following are the QoS parameters:

Connection establishment delay:

The connection establishment delay is the amount of time elapsing between a transport connection being requested and the confirmation being received by the user of the transport service. It includes the processing delay in the remote transport entity. As with all parameters measuring a delay, the shorter the delay, the better the service.

Connection establishment failure probability:

The connection establishment failure probability is the chance of a connection not being established within the maximum establishment delay time, for example, due to network congestion, lack of table space somewhere, or other internal problems.

Throughput:

The throughput parameter measures the number of bytes of user data transferred per second, measured over some time interval. The throughput is measured separately for each direction.

Transit delay:

The transit delay measures the time between a message being sent by the transport user on the source machine and its being received by the transport user on the destination machine. As with throughput, each direction is handled separately.

The Residual error ratio :

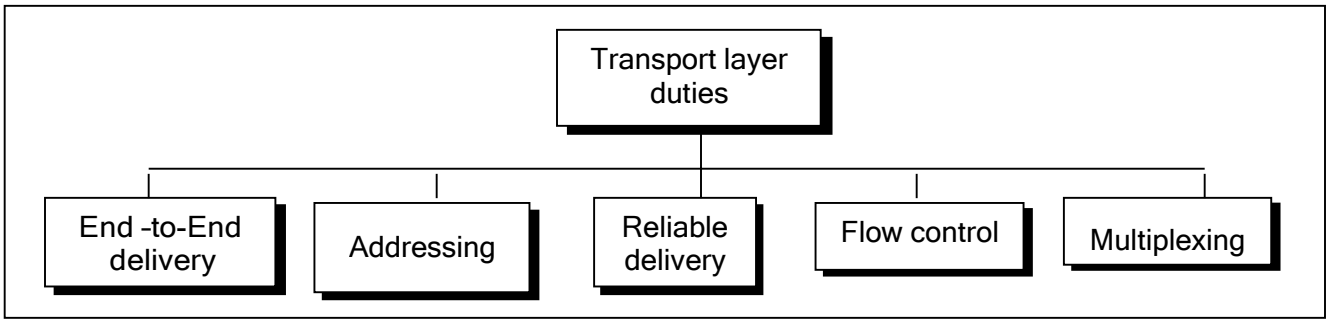
Measures the number of lost or garbled messages as a fraction of the total sent. In theory, the residual error rate should be zero, since it is the job of the transport layer to hide all network layer errors. In practice it may have some (small) finite value.

The Protection parameter provides a way for the transport user to specify interest in having the transport layer provide protection against unauthorized third parties (wiretappers) reading or modifying the transmitted data.

The Priority parameter provides a way for a transport user to indicate that some of its connections are more important than other ones, and in the event of congestion, to make sure that the high-priority connections get serviced before the low-priority ones.

Finally, the Resilience parameter gives the probability of the transport layer itself spontaneously terminating a connection due to internal problems or congestion.

The QoS parameters are specified by the transport user when a connection is requested. Both the desired and minimum acceptable values can be given. In some cases, upon seeing the QoS parameters, the transport layer may immediately realize that some of them are unachievable, in which case it tells the caller that the connection attempt failed, without even bothering to contact the destination. The failure report specifies the reason for the failure.
The transport layer knows it cannot achieve the desired goal (e.g.600 Mbps throughput), but it can achieve a lower, but still acceptable rate (e.g.150 Mbps). It then sends the lower rate and the minimum acceptable rate to the remote machine, asking to establish a connection. If the remote machine cannot handle the proposed value, but it can handle a value above the minimum, it may make a counteroffer. If it cannot handle any value above the minimum, it rejects the connection attempt. Finally, the originating transport user is informed of whether the connection was established or rejected, and if it was established, the values of the parameters agreed upon. This process is called **option negotiation**.



End –to –end delivery
The network layer oversees the end-to-end delivery of individual packets but does not see any relationship between those packets, even those belonging to a single message.

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Addressing
The transport layer interacts with the functions of the session layer. However, many protocols (or protocol stacks, meaning groups of protocols that interact at different levels) combine session, presentation, and application level protocols into a single packages, called an application. In these cases, delivery to the session layer functions is, in effect, delivery to the application. In these cases, delivery to the session layer functions is, in effect, delivery to the application. So communication occurs not just from end machine to end machine but from end application to end application. Data generated by an application on one machine must be received not just by the other machine but by the correct application on that other machine.
To ensure accurate delivery from service access point to service access point, we need another level of addressing in addition to those at the data link and network levels. Data link level protocols need to know which two computers within a network are communicating. Network level protocols need to know which two computers within an internet are communicating. But at the transport level, the protocol needs to know which upper-layer protocols are communicating.
Reliable Delivery
At the transport layer, reliable delivery has four aspects: error control, sequence control, loss control, and duplication control.

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UNIT 5

Application Layer

Network Security

Security Attacks

Attacks on the security of a computer system or network are best characterized by viewing the function of the computer system as providing information.

There are four general categories of attack:

- **Interruption:** An asset of the system is destroyed or becomes unavailable or unusable. This is an attack on availability. Examples include destruction of a piece of hardware, such as a hard disk, the cutting of a communication line, or the disabling of the file management system.
- **Interception:** An unauthorized party gains access to an asset. This is an attack on confidentiality. The unauthorized party could be a person, a program, or a computer. Examples include wiretapping to capture data in a network, and the illicit copying of files or programs.
- **Modification:** An unauthorized party not only gains access to but tampers with an asset. This is an attack or integrity. Examples include changing values in a data file, altering a program so that it performs differently, and modifying the content of messages being transmitted in a network.
- **Fabrication:** An unauthorized party inserts counterfeit objects into the system. This is an attack on authenticity. Examples include the insertion of spurious messages in a network or the addition of records to a file.

REVIEW QUESTIONS

1.What is a secure communication and what are its features?

2.What is the need of cryptography?

3. Define the following terms

a. plain text b.cipher text c.encryption d.decrytion e.crypt analysis f.cryptology

4. With the help of suitable examples, explain transposition cipher and substitutional cipher.

5.Draw the block diagram of cryptography. Explain it.

6.Write about the services provided by the application layer.

6. Explain DES algorithm.

7.Explain the public key cryptography. Explain the MIT algorithm for public key encryption.

8.Distinguish between private and public key.

9. What is the diffrence between authentication protocol and digital signature?Give an example for each.

10. What is the purpose of DNS, explain?

11. explain e-mail system

12.What are the different types of messages formats used in e-mail?

13.Write short notes on world wide web.

14.Write short notes on multimedia.

16.Write short notes on network security and privacy.

17.Using RSA algorithm with A = 1, B = 2 , ...,Z = 26

taking a.) p =5,q =11 and d =27,find ‘e’ and encrypt ‘ECE

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Links for notes

www.e4xamupdates.in

www.csestudyzone

www.vfu.bg.com

www.python4csip.com

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KOMMURI PRATAP REDDY INSTITUTE OF TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ASSIGNMENT QUESTIONS

Subject: COMPUTER NETWORKS
Year/Semester: III/1
Name of the Faculty:NITHIN R

Assignment-I

1:Explain the TCP/IP reference model ?**(Comprehension level 2)**

2:State does the CRC proves error detection and How is the CRC checks and generated? **(knowledge level 1)**

3:Explain about CSMA/CD operation ?**(Comprehension level 2)**

4:Explain about n-protocal?**(Comprehension level 2)**

5:Explain theModes of data transfer protocals?**(Comprehension level 2)**

Assignment-II

1: State and Explain SMTP?Briefly discuss about email in gateways? **(knowledge level 1)**

2:State and Explain FTP ?explain its purpose? **(knowledge level 1)**

3:Describe congestion control in datagram sheets**(knowledge level 1)**

4:Describethe features of UDP?**(knowledge level 1)**

5:Discuss about TCP connection establishment?**(Evaluation level 6)**

6:Explain Go-Back-N-Protocal?**(Comprehension level 2)**

7:Explain what is prue ALLOHA and slotted ALLOHA?**(Comprehension level 2)**

8: Describe is subnet?**(Knowledge level 1)**

9:Explain Unicast routing?**(Comprehension level 2)**

10:Distinguishbetween IPv4 and IPv6?**(Analysis level 4)**