

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

DATA COMMUNICATION NETWORKING LAB 17ECC88

Program/ Branch	: B. E. / ECE
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Regulation	: R 2017

and

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CO2	S	S	L	-	М	-	-	-	-	L	-	-	S	S	-
CO3	S	S	M	-	-	-	-	-	M	L	L	-	M	S	-
CO4	S	S	L	-	-	-	-	L	L	L	L	L	M	M	-
Syllab	ous														
 Syllabus Study of serial data Communication between two computers. Study of Parallel data Communication between two computers. Study of Network Topologies – Star, Bus & Ring Implementation of stop and wait protocol using simulator. Implementation of Sliding window protocol using simulator. Implementation of Go-Back N protocol using simulator. Implementation of Selective Repeat protocol using simulator. Implementation of Selective Repeat protocol using simulator. Study the performance of the network with CSMA/ CD protocol. Study the performance of the network with CSMA/ CA protocol. Implementation of routing algorithm Distance vector Routing Algorithm Link State Routing Algorithm Encryption and Decryption. Study of Ethernets and Fast Ethernets 															

SYLLABUS

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17ECCC88- DATA COMMUNICATION NETWORKING LAB	0	0	3	2

AIM

To know and understand communication networks using NETSIM Software and LAN Trainer kit.

OBJECTIVES

To study the communication networks characteristics and to analyze various MAC and routing layer Protocols.

LIST OF EXPERIMENTS:

PC to PC/peripherals communication

- 1. Establish RS232 communication
- 2. Establish Parallel port communication

MAC Layer LAN Protocols Observe the behavior & measure the throughput, compare the per-formance with other MAC Layer protocols.

- 3. CSMA/CD at MAC Layer
- 4. Token Bus at MAC Layer
- 5. Token Ring at MAC Layer
- 6. CSMA/CA at MAC Layer

LLC (Logical Link Control) Layer LAN Protocols observe the behavior & measure the throughput of reliable data transfer protocols. Compare the performance with other LLC Layer protocols.

- 7. Stop & Wait at LLC Layer
- 8. Sliding Window Go-Back-N at LLC Layer
- 9. Sliding Window Selective Repeat at LLC Layer

Routing Algorithm Performance Study of Routing Algorithms through simulation

- 10. Distance Vector Routing
- 11. Link State Routing Introduction to Socket Communication in Linux & Windows
- 12. Socket programming concept in Windows & Linux platforms
- 13. File Transfer between PC's through sockets
- 14. Study of Data Encryption & Decryption techniques by using them in a File Transfer

LIST OF EXPERIMENTS

S.NO	EXPERIMENTS
	PC to PC peripheral communication
1	a. Establish RS232 communication
1.	b. Establish Parallel port communication
	MAC Laver LAN Protocols
	a CSMA/CD at MAC Laver b Token Bus at MAC Laver
2.	c. Tokon Bing at MAC Layor d. CSMA/CA at MAC Layor
	C. TOKEN KING at MAC Layer U. COMA/CA at MAC Layer
	LLC (Logical Link Control) Layer LAN Protocols
	a. Stop & Wait at LLC Layer
3.	b. Sliding Window – Go-Back-N at LLC Layer
	c. Sliding Window – Selective Repeat at LLC Layer
	Routing Algorithm
4.	a. Distance Vector Routing b. Link State Routing
5.	Data Encryption & Decryption techniques by using them in a File Transfer
6.	Transmission control protocol

EXPERIMENT: 1

ENCRYPTION & DECRYPTION

OBJECTIVE:

Study of encryption and decryption.

EQUIPMENTS:

L-SIM LAN protocol analyzer and simulator software

PROCEDURE:

- 1. From L-SIM software open sample executable file & program is provided inside program files– LSIM SampleApplication.zip.
- 2. When user extracts this folder he will find cryptography folder inside which cryptography.cpp & cryptography.exe files are provided.
- 3. If user runs the cryptography.exe file screen with browse option for selection of file to be encrypted and enter key for encryption option will get open for user to select the file and enter encryption key.
- Click on Encrypt button a message with Encryption completed will popup. Encrypted file will be stored at the same location from where file for encryption is selected.
- **5.** Select file to be decrypted and enter decryption key.
- 6. When user clicks on Decrypt button a message with Decryption completed will popup. Decrypted file will be stored at the same location from where file for decryption is selected.
- 7. To verify open original file and decrypted file both will be same.



EXPERIMENT 2 (a): Serial Communication -Data transfer between PC's. OBJECTIVE:

To study Serial communication using RS 232C for data transfer between two

PC's.

EQUIPMENTS:

- DCT-03.
- 9 Pin D connector Cables 2 Nos.
- 25 Pin D connector Cables 2 Nos.
- Computers PC 2 nos.
- Connecting Chords.
- Power Supply.

PROCEDURE:

- 1. Connect the power supply with proper polarity to the kit DCT-03 and while Connecting, ensure that it is off.
- 2. Keep all switch fault switches in off position.
- 3. Refer to the fig. and carry out the following connections and settings.
- Connect 9 pin D connector cable between one computer com port and CN3 Connector on DCT-03 kit and second 9 pin D connector cable between another computer com port and CN4 connector on DCT-03 kit.
- 5. Connect the **TD1** post to **RD2** post.
- 6. Connect the **RD1** post to **TD2** post. & **TD1** post to **TD2** post.
- 7. Keep the switch setting of **SW4** towards **ON** position as shown in figure.
- 8. Switch ON the power supply and both the computers.
- 9. Run DCT-03 software and select Serial Communication Software link on both PC's.
- **10**.Select your computer operating system, this will provide link to hyper terminal software. Refer Hyperlink settings.
- 11. Once the connection to hyperlink is established you can type in one of the computers window and can see typed text on another computers window.

Observations:

PC1 – Sender	PC2 – Receiver
	Serial communication data transfer

PC1 – Receiver	PC2 – Sender
Serial communication data transfer	

EXPERIMENT 2 (b): Serial Communication -File transfer between PC's. OBJECTIVE:

To study Serial communication using RS 232C for file transfer between two

PC's.

EQUIPMENTS:

- DCT-03.
- 9 Pin D connector Cables 2 Nos.
- 25 Pin D connector Cables 2 Nos.
- Computers PC 2 nos.
- Connecting Chords.
- Power Supply.

- 1. Connect the power supply with proper polarity to the kit DCT-03 and while connecting, ensure that it is off.
- 2. Keep all switch fault switches in off position.
- 3. Refer to the fig. and carry out the following connections and settings.
- Connect 9 pin D connector cable between one computer com port and CN3 connector on DCT-03 kit and second 9 pin D connector cable between another computer com port and CN4 connector on DCT-03 kit.
- 5. Connect the **TD1** post to **RD2** post.
- 6. Connect the **RD1** post to **TD2** post.
- 7. Keep the switch setting of **SW4** towards **ON** position as shown in figure.
- 8. Switch ON the power supply and both the computers.
- 9. Run DCT-03 software and select Serial Communication Software link on both PC's.
- **10.** Select your computer operating system, this will provide link to hyper terminal software. Refer Hyperlink settings.
- 11. Once the connection to hyperlink is established you can to do file transfer select a file transfer protocol using hyper link on both
- 12. Put the flow control on XON / XOFF
- 13. Select the receiving file save location and the same protocol as selected in transmitter.
- 14. Click on file transfer button you will see progress of file transfer.
- 15. You will see progress of file receiving in the receiver.

RESULT:

OBSERVATIONS:

PC1 – Sender	PC2 – Receiver
Path: C:\Desktop\Test File.txt	Path: C:\Documents and settings\Program files\Data communication Trainer(DCT-03)\TEST FILE.txt

PC1 – Receiver	PC2 – Sender
Path: C:\Documents and settings\Program files\Data communication Trainer(DCT-03)\TEST FILE.txt	Path: C:\Desktop\Test File.txt

EXPERIMENT 3: Study of Topology.

OBJECTIVE: Study of different types of Topology.

EQUIPMENTS:

- LTS-01 trainer kit.
- 2 Computers with win-2K / XP and Ethernet port available on them
- RJ-45 to RJ-45 LAN connecting cables.
- L-SIM LAN protocol analyzer and simulator software

PROCEDURE:

- 1. Connect 2 computer LAN ports using RJ-45 to RJ-45 LAN connecting cables provided with the system to LTS-01 star topology ports.
- 2. Switch on the LTS-01 & Computers.
- 3. Run L-SIM software on all the computers, one should be server and others client.
- 4. On the server computer select the topology.

Star Topology:

- 1. Select the star topology in the server.
- 2. Select any one of the Protocols.
- 3. Make connections as shown in the figure.
- 4. Remote computer details will appear on the screen, select any one client, and start transmitting any one file.
- 5. File will be transmitted to the particular client who has been selected.
- 6. The file will be stored in the L-SIM received files of the client.
- 7. Repeat the above procedure.
- 8. Now unplug any one of the client and check the flow how it is transferring and note down the effects.

Ring Topology:

- 1. Select the Ring topology in the server.
- 2. Select Token Ring Protocols.
- 3. Make connections as shown in the figure.
- 4. Remote computer details will appear on the screen, select any one client, and start transmitting any one file.
- 5. File will be transmitted to the particular client who has been selected.
- 6. The file will be stored in the L-SIM received files of the client.
- 7. Repeat the above procedure.
- 8. Now unplug any one of the client and check the flow how it is transferring and note down the effects.

Bus Topology:

- 1. Select the Bus topology in the server.
- 2. Select Token Bus Protocols.
- 3. Make connections as shown in the figure.
- 4. Remote computer details will appear on the screen, select any one client, and start transmitting any one file.
- 5. File will be transmitted to the particular client who has been selected.
- 6. The file will be stored in the L-SIM received files of the client.
- 7. Repeat the above procedure.
- 8. Now unplug any one of the client and check the flow how it is transferring and note down the effects.



RING TOPOLOGY



PC1 transmits data to PC3						
PC1	PC2	PC3	PC4	Comments		
Unplugged	Connected	Connected	Connected	PC1 is unpluged. Transimissions Failed Transmitter is not found;		
Connected	Unplugged	Connected	Connected	PC2 is unpluged Transmission occurs;		
Connected	Connected	Unplugged	Connected	PC3 is unplugged Transmission Failed Receiver not found		
Connected	Connected	Connected	Unplugged	PC4 is unpluged Transmission occurs		
Connected	Unplugged	Connected	Unplugged	PC2 and PC3 is unpluged Transmission Failed Channel Broken		

BUS TOPOLOGY :



PC1 transmits data to PC3					
PC1	PC2	PC3	PC4	Comments	
Unplugged	Connected	Connected	Connected	PC1 is unpluged. Transimissions Failed Transmitter is not found;	
Connected	Unplugged	Connected	Connected	PC2 is unpluged Transmission occurs;	
Connected	Connected	Unplugged	Connected	PC3 is unplugged Transmission Failed Receiver not found	
Connected	Connected	Connected	Unplugged	PC4 is unpluged Transmission occurs	

STAR TOPOLOGY



PC1 transmits data to PC3						
PC1	PC2	PC3	PC4	Comments		
Unplugged	Connected	Connected	Connected	PC1 is unpluged. Transimissions Failed Transmitter is not found;		
Connected	Unplugged	Connected	Connected	PC2 is unpluged Transmission failed; Channel Broken		
Connected	Connected	Unplugged	Connected	PC3 is unplugged Transmission Failed Receiver not found		
Connected	Connected	Connected	Unplugged	PC4 is unpluged Transmission occurs		

EXPERIMENT 4: Stop & Wait protocol

OBJECTIVE: To perform Stop & Wait protocol using LAN port interface.

EQUIPMENTS:

- LTS-01 trainer kit.
- 2 Computers with win-2K / XP and Ethernet port available on them
- RJ-45 to RJ-45 LAN connecting cables.
- L-SIM LAN protocol analyzer and simulator software

- 1. Connect 2 computer LAN ports using RJ-45 to RJ-45 LAN connecting cables provided with the system to LTS-01 star topology ports.
- 2. Switch on the LTS-01 & Computers.
- 3. Run L-SIM software on all the computers, one should be server and others should be clients.
- 4. On the server computer select type of network as LAN.
- On the server computer select the topology as STAR, select protocol as Stop & Wait click on create network button.
- 6. Remote computer details will appear on the computers connected in network, server will be able to see all clients and all clients can see only server.
- Select the computer to which data file is to be transferred, from the load button; previously stored, selected file information can be loaded or select any file, which is to be transmitted.
- 8. File size will appear in the software window, select the packet size, inter packet delay and click OK.
- 9. Total packets formed for that file will be indicated on computers & same details of file will appear on remote computer to which file is to be transmitted.
- 10. Click on file transfer button.
- 11. During transfer process, insert errors into data packets being transmitted.
- 12. See the effect of Bad packet error, Packet negative acknowledgment error or auto errors on file transfer.
- 13. Select BAD PACKET error and click on Generate button in the transmitter

window say 7th packet is in the transmission state.

- 14. The 7th packet in the receiver window will be marked as bad packet.
- 15. 7th packet will be retransmitted from transmitter.
- Retransmitted 7th packet will be received correctly this time & other packets will be transmitted.
- 17. Similarly note down all the effects created by other errors.

L-SIM: File Transmitter Stopen-Wait	
File path: L'ADocuments and Settings/Administrator/Desktop/New Text Docume Browse Load	To send
File size: 12700 Packet size: 128 Delay: 1000 Save No. of packets: 22 Frame size: 146 Window size: 1 OK	Acknowledged ACK Lost
Current tansmitting packet: 1 Error Generator: Status: Image: Constraint of the status	Bad Packet Resend/Discard
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 21 22 Image: Comparison of the transmission started of the transmission s	18 19 20



EXPERIMENT 5: GO BACK N PROTOCOL

OBJECTIVE: To perform *Go Back N protocol* using LAN port interface.

EQUIPMENTS:

- LTS-01 trainer kit.
- 2 Computers with win-2K / XP and Ethernet port available on them
- RJ-45 to RJ-45 LAN connecting cables.
- L-SIM LAN protocol analyzer and simulator software

- 1. Connect 2 computer LAN ports using RJ-45 to RJ-45 LAN connecting cables provided with the system to LTS-01 star topology ports.
- 2. Switch on the LTS-01 & Computers.
- 3. Run L-SIM software on all the computers, one should be server and others should be clients.
- 4. On the server computer select type of network as LAN.
- 5. On the server computer select the topology as STAR, select protocol as Go Back N click on create network button.
- 6. Remote computer details will appear on the computers connected in network, server will be able to see all clients and all clients can see only server.
- 7. Select the computer to which data file is to be transferred, from the load button; previously stored, selected file information can be loaded or select any file, which is to be transmitted.
- 8. File size will appear in the software window, select the packet size, inter packet delay and click OK.
- 9. Total packets formed for that file will be indicated on computers & same details of file will appear on remote computer to which file is to be transmitted.
- 10. Click on file transfer button.
- 11. During transfer process, insert errors into data packets being transmitted.
- 12. See the effect of Bad packet error, Packet negative acknowledgment error or auto errors on file transfer.
- 13. Select BAD PACKET error and click on Generate button in the transmitter window say 15th packet is in the transmission state.

- 14. The 15th packet in the receiver window will be marked as bad packet.
- 15. 15th, 16th & 17th packet will be retransmitted from transmitter.
- 16. Retransmitted 15th, 16th & 17th packets will be received correctly this time.
- 17. Receiver will discard 15th, 16th & 17th packets and only 15th packet is accepted.
- 18. Similarly note down all the effects created by other errors.

File path C. Documents	and Settings\staff\Desktop\K7	tst	Browse Load	To send
File size: 5016 No. of packets: 22	Packet size: 128 Frame size: 150	Delay 1000 Window size: 5	Save OK	Transmitting Acknowledged ACK Lost
urrent tansmitting packet tatus: Transmit File	0 Pause	Error Generator:	Generate Exit	Bad Packet Resend/Discard Collision
2 3 4 21 22	5676	ОК	14 15 16	17 18 19 2

L-SIM	File Tra	d Settinge (statistic	ack-n		Brow		aad	To send
File size: No. of packets	2785	Packet size: Frame size:	128	Delay:	1000 e: 5		ave DK	Transmitting Acknowledged ACK Lost
Current tansmitt Status:	ing packet:	22 Pause	Frame D	Error Genera Ack lost	vpt/Decrypt	Gim	rate D	Bad Packet Resend/Discard Collision
Transmit F		Pause	Frame D	etails Enc	ypt/Decrypt		Exit	Collision
2 21 22	3 4	5 6 7	8	10 11	12 13	14 1	5 16	17 18 19 20
		10 11						
	0 9							

L-SIM: File Receiver Go-back-n	×
File path: C:\K7.txt Browse Load	To send
File size: 2785 Packet size: 128 V Delay: 1000 V Save	Transmitting
No. of packets: 22 Frame size: 150 Window size: 5 OK	Acknowledged
Current recieving packet: 22 Error Generator: Status: Generate	Bad Packet
Transmit File Pause Fr	Collision
1 2 3 4 5 6 7 File received successfully 14 15 16 1 21 22 OK OK	7 18 19 20
7 8 9 10 11	

EXPERIMENT 6: SELECTIVE REPEAT PROTOCOL

OBJECTIVE: To perform Selective Repeat protocol using LAN port interface.

EQUIPMENTS:

- LTS-01 trainer kit.
- 2 Computers with win-2K / XP and Ethernet port available on them
- RJ-45 to RJ-45 LAN connecting cables.
- L-SIM LAN protocol analyzer and simulator software

- 1. Connect 2 computer LAN ports using RJ-45 to RJ-45 LAN connecting cables provided with the system to LTS-01 star topology ports.
- 2. Switch on the LTS-01 & Computers.
- 3. Run L-SIM software on all the computers, one should be server and others should be clients.
- 4. On the server computer select type of network as LAN.
- 5. On the server computer select the topology as STAR, select protocol as elective Repeat protocol click on create network button.
- 6. Remote computer details will appear on the computers connected in network, server will be able to see all clients and all clients can see only server.
- Select the computer to which data file is to be transferred, from the load button; previously stored, selected file information can be loaded or select any file, which is to be transmitted.
- 8. File size will appear in the software window, select the packet size, inter packet delay and click OK.
- 9. Total packets formed for that file will be indicated on computers & same details of file will appear on remote computer to which file is to be transmitted.
- 10. Click on file transfer button.
- 11. During transfer process, insert errors into data packets being transmitted.
- 12. See the effect of Bad packet error, Packet negative acknowledgment error or auto errors on file transfer.
- 13. Select BAD PACKET error and click on Generate button in the transmitter window say 13th packet is in the transmission state.
- 14. The 13th packet in the receiver window will be marked as bad packet.
- 15. 13th packet will be retransmitted from transmitter.
- 16. Retransmitted 13th packet will be received correctly this time.

17. Similarly note down all the effects created by other errors.

L-SIM: File Transmitter Selective Repeat	X
File path C:\Documents and Settings\staff\Desktop\slect.txt Browse Load	To send
File size: 5576 Packet size: 128 Delay: 1000 Save No. of packets: 44 Frame size: 149 Window size: 5 OK	Transmitting Acknowledged
Current tansmitting packet: 0 Error Generator:	Bad Packet
Status: Generale Transmit File Pause Frame Details Encrypt/Decrypt Exit	Resend/Discard
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 41 42 43 44 LSim X X X X	7 18 19 20 7 38 39 40
File transmission started	

File path: C:\Do	ocuments and Setting	gs\stalf\Desktop\slec	t. txt	Browse	oad To see	nd
File size: No. of packets:	5576 Pac 44 Fra	sket size: 128 ame size: 149	Delay: Window size:		Ackno ACK L	mitting wiledged ost
Current tansmitting Status: Transmit File	g packet 44	Frame E	Error Generator: Auto Error Details Encrypt/E	ecrypt)	Exit Collisio	acket id/Discar on
1 2 3 21 22 2 41 42 4	4 5 6 3 24 25 2 3 44	5 7 8 26 27 28 LSim	9 10 11 17 29 30 31 3	2 13 14 1 2 33 34 3	5 16 17 18 5 36 37 38	19 39
		<u>.</u> "		uccessruity		

L-SIM: File Receiver Selective Repeat	×
File path: C:\slect.txt Browse Load	To send
File size: 5576 Packet size: 128 🔽 Delay: 1000 🔽 Save	Transmitting
No. of packets: 44 Frame size: 149 Window size: 5 💌 OK	Acknowledged
	ACK Lost
Current recieving packet: 44 Error Generator:	Bad Packet
Transmit File Pause Frame Details Encrypt/Decrypt	Resend/Discard
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 41 42 43 44 LSim	18 19 20 38 39 40
File received successfully OK	
7 15 35	

EXPERIMENT 7: TOKEN BUS PROTOCOL

OBJECTIVE: To perform token bus protocol.

EQUIPMENTS:

- LTS-01 trainer kit
- 4 or more Computers with win-2K / XP and Ethernet port available on them
- RJ-45 to RJ-45 LAN connecting cables
- L-SIM LAN protocol analyzer and simulator software

- 1. Connect four or more computer LAN ports using RJ-45 to RJ-45 LAN connecting cables provided with the system to LTS-01 bus topology ports.
- 2. Switch on the LTS-01 & Computers.
- 3. Run L-SIM software on all the computers, one should be server and others should be client. Run the software in the sequence of connection i.e. server first followed by first client to last client.
- 4. On the server computer select type of network as LAN.
- 5. On the server computer select the topology as BUS, select protocol as Token Bus and select token activation time as desired, click on create network button.
- 6. To just observe how token passes from one computer to another computer and effect of token time keep token duration from 5 to 40 seconds and to do actual file transfer keep token duration as 50 or 60 seconds.
- 7. Remote computer details will appear on the computers connected in network, server will be able to see all clients and all clients will be able to see only server.
- 8. Select the computer to whom data file is to be transferred, from the load button, previously stored/selected file information can be loaded or you can select any file, which is to be transmitted.
- 9. File size will appear in the software window, select the packet size, inter packet delay and click OK.
- 10. Total packets formed for that file will be indicated on computers, same details of file will appear on remote computer to which file is to be transmitted.

- 11. Click on file transfer button to transfer file.
- 12. File transfer from one computer to another will take place.
- 13. Remove connection of last client and see the effect on file transfer or token transfer. You will find that token will process till the client who is connected in network.
- 14. Remove connection of client which is in between the server and last client and see the effect on file transfer or token transfer. You will find that token will process till the client who is connected in network from client and will not process from the client got disconnected from network.

		Toker	n Passing		
L-S	IM: Protoco	Simulator	& Analyzer	Server ⑦ Help	About
Topology Bus	Select Topolog	iv and Protocol to Create Bus 💓 To	Network ken Time: 60 💌		0
	Create Network	Destroy Network	File Transfer	Protocol Analyzer	Network Analyzer
Computer SYSTEM23	IP Address 127.0.0.1] Port 8000] Status Connected	MAC Address 00-21-85-62-8C-0D] OS] WinXP
< .12111					

L-SIM: File Transmitter Token Bus	
File path: C:\Documents and Settings\staff\Desktop\m2an.txt Browse Load	To send
File size: 2028 Packet size: 128 💽 Delay: 1000 💽 Save	Transmitting
No. of packets: 16 Frame size: 148 Window size: 1 CK	Acknowledged
	ACK Lost
Current tansmitting packet: 1 Error Laenerator: Status: Generate Generate	Bad Packet
Transmit File Pause Fr Exit	Collision
1 2 3 4 5 6 7 E OK 14 15 16	

ile path: C:\m2an.txt			Browse Load	To send
ile size: 2028	Packet size: 128 Frame size: 148	Delay.	Sove	Acknowledged ACK Lost
urrent recieving packet tatus: Transmit File	Pause Fr	Error Generator.	Generate	Bad Packet Resend/Discard Collision
2 3 4	5 6 7 6	File received succe	essfully	16
	L			

File path: C:\Documents and Settings\staff\Desktop\m2an.txt Browse Load To se File size: 2028 Packet size: 128 Delay: 1008 Save Trans	end
File size: 2028 Packet size: 128 Telay: 1000 Save Trans	
Advan	smitting
No. of packets: 16 Frame size: 148 Window size: 1 OK	owledged
Current tansmitting packet: 16 Error Generator: Bad F Status: Generate Reser Transmit File Pause F1 Sim Exit Collisi	Packet Ind/Discard
1 2 3 4 5 6 7 File Transmission Completed 14 15 16 OK OK <t< th=""><th></th></t<>	

EXPERIMENT 8: Token Ring protocol

OBJECTIVE: To perform Token Ring protocol

EQUIPMENTS:

- LTS-01 trainer kit
- 4 or more Computers with win-2K / XP and Ethernet port available on them
- RJ-45 to RJ-45 LAN connecting cables
- L-SIM LAN protocol analyzer and simulator software

- 1. Connect four computer LAN ports using RJ-45 to RJ-45 LAN connecting cables provided with the system to LTS-01 ring topology ports.
- 2. Switch on the LTS-01 & Computers.
- 3. Run L-SIM software on all the computers, one should be server and other 3 should be client. Run the software in the sequence of connection i.e. server first followed by first client to last client.
- 4. On the server computer select type of network as LAN.
- 5. On the server computer select the topology as RING, select protocol as Token Ring and select token activation time as desired, click on create networkbutton.
- 6. To just observe how token passes from one computer to another computer and effect of token time keep token duration from 5 to 40 seconds and to do actual file transfer keep token duration as 50 or 60 seconds.
- 7. Remote computer details will appear on the computers connected in network, server will be able to see all clients and all clients will be able to see only server.
- 8. Select the computer to whom data file is to be transferred, from the load button, previously stored/selected file information can be loaded or you can select any file, which is to be transmitted.
- 9. File size will appear in the software window, select the packet size, inter packet delay and click OK.
- 10. Total packets formed for that file will be indicated on computers, same details of file will appear on remote computer to which file is to be transmitted.

- 11. Click on file transfer button to transfer file.
- 12. File transfer from one computer to another will take place.
- 13. To see the effect of ring break state remove any of the client from the hardware and close L-SIM window for that client. Ring broken message will be prompted on server computer and network will get destroyed, you need to reconfigure the network. Since the network is created with logical ring physical removal of computer from hardware will be detected when token completes its cycle and reaches to the client whose connection is removed, hence it will take some time to show disconnection of computer in case of unplugging of computer.



e size: 54 5. of packets: 43	24 F	acket size:	128 👱	Delay:	1000			111				
o. of packets: 43					1000		Save		1	Fransmi	tting	
		Frame size:	149	Window size:	1		ОК		ŀ	Acknow	ledged	
	-			W/.		an 37				ACK Los	st	
rrent tansmitting pa	acket: 1			Error Generator	r.			-		Bad Pa	cket	
itus:			LSim			Ge	nerate		F	Resend.	/Discar	d 📗
Transmit File) Paus	ie (Fr	File Lange and an	· · · · · · · · · · · · · · · · · · ·		Exit) (Collision		
		100 - 1100		File transmiss		95 - 51	e - 19					sel e
2 3	4 5	6 7		ОК] [14	15	16	17	18	19	20
	24 25	20 21	4			34	35	JD	31	38	39	41

L-SIM: File Transmitter Token Ring	×
File path: C:\Documents and Settings\Administrator\Desktop\b.txt Browse Load	To send
File size: 5424 Packet size: 128 V Delay: 1000 V Save	Transmitting
Current tansmitting packet 42 Error Generator:	ACK Lost
Status' Generate	Resend/Discard
1 2 3 4 5 6 7 21 22 23 24 25 26 27 41 42 43 0K 0K 0K	7 18 19 20 7 38 39 40



EXPRIMENT 9:

CSMA-CD PROTOCOL

OBJECTIVE:

To perform the working of CSMA-CD protocol.

EQUIPMENTS:

- LTS-01 trainer kit
- 4 or more Computers with win-2K / XP and Ethernet port available on them
- RJ-45 to RJ-45 LAN connecting cables
- L-SIM LAN protocol analyzer and simulator software

- 1. Connect 3 or more computer LAN ports using RJ-45 to RJ-45 LAN connecting cables provided with the system to LTS-01 star topology ports.
- 2. Switch on the LTS-01 & Computers.
- 3. Run L-SIM software on all the computers, one should be server and others should be clients.
- 4. On the server computer select type of network as LAN.
- 5. On the server computer select the topology as STAR, select protocol as CSMA-CD click on create network button.
- 6. Remote computer details will appear on the computers connected in network, server will be able to see all clients and all clients will be able to see only server.
- 7. Select the server computer to whom data file is to be transferred from one of the client computer; from the load button, previously stored/selected file information can be loaded or you can select any file, which is to be transmitted.
- 8. File size will appear in the software window, select the packet size, inter packet delay and click OK.
- 9. Total packets formed for that file will be indicated on computers, same details of file will appear on remote computer to which file is to be transmitted.
- 10. Click on file transfer button to transfer file.
- 11. During file transfer process try to send file to server from another client computer, file transfer from second transmitter will also gets initiated.
- 12. When packet from second sender collides with first sender it will be indicated as collision packet on server & Client-1.

- 13. File from first sender will resume after some time and second sender file will be kept on hold till first file transfer gets completed.
- 14. Once the first sender file reached to server its display is refreshed and server will show packet status for second sender.
- 15. Second sender file transfer will also get completed and thus collision of two packets transmitted simultaneously from two senders is detected and cleared.

L-SIM: File Transmitter CSMA-CD	
File path: C:\Documents and Settings\Administrator\Desktop\New Text Docume Browse Load	To send
File size: 2760 Packet size: 128 Delay: 1000 Save No. of packets: 22 Frame size: 154 Window size: 1 OK	Transmitting
Current tansmitting packet: 1 Error Generator: Status: Image: Status in the state in the s	Bad Packet Resend/Discard Collision
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 13 21 22 LSim Image: Colspan="2">Image: Colspan="2" Image: Colspan="2">Image: Colspan="2" Image: Colspan	7 18 19 20

L-SIM: File Transmitter CSMA-CD	×
File path: ocuments and Settings\Administrator\Desktop\New Text Document txt Browse Load	To send
File size: 2760 Packet size: 128 🗨 Delay: 1000 💌 Save	Transmitting
No. of packets: 22 Frame size: 154 Window size: 1 - OK	
Current tansmitting packet: 14 Error Generator:	Bad Packet
Status: Generate	Resend/Discard
Transmit File Pause Frame Details Encrypt/Decrypt Exit	Collision
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 21 22	18 19 20
14	

L-SIM: File Transmitter CSMA-CD	
File path: ocuments and Settings\Administrator\Desktop\New Text Document.txt Browse Load	To send
File size: 2760 Packet size: 128 💌 Delay: 1000 💌 Save	Transmitting
No. of packets: 22 Frame size 154 Window size:	Acknowledged
	ACK Lost
Current tansmitting packet: 22 Error Generator:	Bad Packet
Status: Generate	Resend/Discard
Transmit File Pause Frame Details Encrypt/Decrypt Exit	Collision 🗾
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 13 21 22 ISIM Image: Colspan="2">Image: Colspan="2" Image: Colspan="	7 18 19 20

EXPRIMENT 10:

CSMA-CA PROTOCOL

OBJECTIVE:

To perform the working of CSMA-CA protocol.

EQUIPMENTS:

- LTS-01 trainer kit
- 4 or more Computers with win-2K / XP and Ethernet port available on them
- RJ-45 to RJ-45 LAN connecting cables
- L-SIM LAN protocol analyzer and simulator software

- Connect 3 or more computer LAN ports using RJ-45 to RJ-45 LAN connecting cables provided with the system to LTS-01 star topology ports. Switch on the LTS-01 & Computers.
- 2. Switch on the LTS-01 & Computers.
- 3. Run L-SIM software on all the computers, one should be server and others should be clients.
- 4. On the server computer select type of network as LAN.
- 5. On the server computer select the topology as STAR, select protocol as CSMA-CA click on create network button.
- 6. Remote computer details will appear on the computers connected in network, server will be able to see all clients and all clients will be able to see only server.
- 7. Click on the Send RTS button to get the computer into transmitter mode.
- 8. Select the computer to whom data file is to be transferred, from the load button, previously stored/selected file information can be loaded or you can select any file, which is to be transmitted.
- 9. File size will appear in the software window, select the packet size, inter packet delay and click OK.
- 10. Total packets formed for that file will be indicated on computers, same details of file will appear on remote computer to which file is to be transmitted.
- 11. Click on file transfer button to transfer file.
- During file transfer process try to get access to transmit file by clicking on Send RTS button on other computers, you will be prompted with channel is busy message.
- 13. Thus collision of two packets transmitted simultaneously from two senders is

avoided.

L-SIM: File Transmitter CSMA-CA	
File path: [C:\Documents and Settings\Administrator\Desktop\New Text Docume] Browse Load	To send
File size: 3598 Packet size: 128 🔽 Delay: 1000 💌 Save	Transmitting
No. of packets: 29 Frame size: 162 Window size: 1 OK	
Current tansmitting packet: 1 Error Generator: Status: Image: Constraint of the state of t	Bad Packet Resend/Discard Collision
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 21 22 23 24 25 26 27 28 29 Isin <	7 18 19 20

	Topology a Topology: Star	nd Protocol Selected B			
	10 12 19 1	Protocol:	y Server CSMA-CA	Send RTS	
			File Transfer	Protocol Analyzer	Network Analyzer
Computer] SYSTEM24 11	IP Address 69.254.1.45] Port 8000] Status Connected] MAC Address 00-21-85-6F-47-8E] OS Win XP
		-SIM: Protocol Sir	nulator & Ananlyzer		

L-SIM: File Transmitter CSMA-CA	X
File path: ocuments and Settings\Administrator\Desktop\New Text Document.txt Browse Load	To send
File size: 3598 Packet size: 128 💌 Delay: 1000 💌 Save	Transmitting
No. of packets: 29 Frame size: 162 Window size: 1 CK	Acknowledged
	ACK Lost
Current tansmitting packet: 29 Error Generator:	Bad Packet
	Resend/Discard
Transmit File Pause Frame Details Encrypt/Decrypt Exit	Collision
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 1 21 22 23 24 25 26 27 28 29 I Image: Complexity of the second secon	7 18 19 20

EXPERIMENT 11: IMPLEMENTATION OF DISTANCE VECTOR ROUTING ALGORITHM.

OBJECTIVE: Implementation of distance vector routing algorithm.

EQUIPMENTS:

- N-SIM
- Computer with win-2K / XP

PROCEDURE:

- 1. Run N-SIM software from your computer.
- 2. To implement the algorithm click on algorithms under menu and click on distance vector routing.
- 3. Add the number of routers, select one by one, maximum 8 routers can be added; all the added routers will appear in the window.
- 4. Click configure button to define the links between pair of routers and define its cost in kilometers.
- 5. Once all the possible pairs have been defined click save button to save the configuration.
- 6. Depending on the configuration all the possible links are implemented and drawn.
- 7. Edit the configuration at any time by clicking on the value of the router number or cost.
- 8. To simulate and find out shortest path select the source and destination routers.
- 9. Click on simulate button to start the algorithm, this will calculate the shortest path and will display the output.
- 10. Click on the result button to see the parameters for shortest path.









EXPERIMENT 12: IMPLEMENTATION OF LINK STATE ROUTING ALGORITHM

OBJECTIVE: Implementation of link state routing algorithm.

EQUIPMENTS:

- N-SIM
- Computer with win-2K / XP

PROCEDURE:

- 1. Run N-SIM software from your computer.
- To implement the algorithm click on algorithms under menu and click on link state routing.
- 3. Add the number of routers, select one by one, maximum 8 routers can be added; all the added routers will appear in the window.
- 4. Click configure button to define the links between pair of routers and define its cost in kilometers.
- 5. Once all the possible pairs have been defined click save button to save the configuration.
- 6. Depending on the configuration all the possible links are implemented and drawn.
- 7. Edit the configuration at any time by clicking on the value of the router number or cost.
- 8. To simulate and find out shortest path select the source and destination routers.
- 9. Click on simulate button to start the algorithm, this will calculate the shortest path and will be shown on the screen.
- 10. Click on the result button to see the parameters for shortest path.









EXPERIMENT 13: PARALLEL PORT COMMUNICATION

OBJECTIVE:

To study Parallel Communication using 8 bit parallel cable.

EQUIPMENTS:

- DCT-03.
- 9 Pin D connector Cables 2 Nos.
- 25 Pin D connector Cables 2 Nos.
- Computers PC 2 nos.
- Connecting Chords.
- Power Supply.

- 1. Carry out the following connections and settings as shown in the diagram.
- 2. Keep all switch fault switches in off position.
- 3. Keep switch **SW6** in PC mode.
- Connect LPT/parallel port of one PC to connector CN1 on left hand side on DCT-03 kit using 25-25 pin D type cable. Similarly connect LPT/parallel port of another PC to connector CN2 on right hand side on DCT-03 kit using 25-25 pin D type cable.
- 5. Keep the switch settings for SW1, SW2 & SW3 in ON position as shown.
- 6. Switch ON the power supply.
- 7. Run DCT software and select Parallel Communication Software link on both PC's.
- 8. Clicking on Port Setting will show you three ports (i.e. LPT1, LPT2, and LPT3); select the port from the user machine through which the data transfer has to occur. For example Clicking on LPT1 will set the LPT1 as the active port on the machine for the data transfer.

- 9. Ensure that the selected ports are in bi-directional mode, this can be checked from the BIOS settings of the computer.
- 10. Clicking on Protocols will show you three protocols namely Stop and Wait Protocol, Go Back N Protocol and Selective Repeat protocol. Select same protocol on both PC. Screen similar to one given below will appear.
- 11. Select one PC in transmit mode and another PC in receive mode.
- 12. Select the file to be sent from the transmitter computer, the screen shown below will appear at transmitter side, with details of file selected number of packets formed using 128 byte per packet size.
- 13. Inter packet delay can be varied from 5 ms to 100 ms.
- 14. Window size for Go back N & Selective Repeat protocols can be selected from 3, 5, and 7.
- 15. Packets to be sent are shown with blue colour.
- 16. Click on Transmit file button.
- 17. On the remote PC click on receive file button.
- 18. Status of file transfer will be indicated on screen with different colour coding depending on the status of packet whether it is sent & acknowledged, sent but not acknowledged, bad packet error in packet.
- 19. After the user has selected the file. The PC shows the No of Packets and Size of the file in the boxes on the top. The Packets with their packet sequence is also shown.
- 20. Once the transfer starts and the client computer acknowledges the packets it sends the signal back to the transmitting PC. Any acknowledge positive or negative with their packet sequence is displayed below the Current Packet No.
- 21. Any positive acknowledge received is displayed as ACK (0) and any negative acknowledge is displayed as NACK (0) along with their packet sequence in brackets.
- 22. Once the packet has been acknowledged and signal shown the next packet is transmitted and so on till the whole file gets transmitted.
- 23. On the right hand top shows frame info. The frame info consists of different color packets. Each color specifies different status of the packet.
- 24. Observe the effect on file transfer by introducing error in data bits use switch SW2 to introduce error for a moment.
- 25. Once the file transfer gets complete you will be prompted by file transfer

successful at transmitter.

- 26. At the receiver a selection window will popup to indicate location for the received file to be saved.
- 27. Verify the received file with transmitted file, this shows end of file transfer with success.
- 28. The receiving packets can be discarded or killed by clicking the Discard button.
- 29. Any acknowledge that is transmitted back can be also made to lost by just clicking lost button. Thus the Transmitter side will not receive any acknowledge.
- 30. The third button NACK/LOST can be clicked to discard and to lose any acknowledge sending back to the Transmitter simultaneously.
- 31. Similarly other Parallel port file transfer protocols can be studied with the effects of fault in packets.



FSTUDY OF DATA COMMUNICATION USING PARALLEL PORT.

EXPERIMENT:

TRANSMISSION CONTROL PROTOCOL

OBJECTIVE:

Implementation of Transmission Control Protocol.

EQUIPMENTS:

- N-SIM
- Computer with win-2K / XP

PROCEDURE:

- 1. Run N-SIM software from your computer.
- 2. To check working of Transmission Control Protocol in the form of animated representation click on **Theory menu** ^[2] **Protocols** ^[2] **TCP**.

Network Basic I+: General		Transmission Control Protocol
Transmission Media HAV Device Protocols TCP ICMP FTP		A: ACK FLAG S: SYN FLAG
TITP DNS UDP 8 DMCP 8 DMCP 8 Dpr 8 Dpr 8 Dpr 8 EtherNet 8 EtherNet 9 Modula Access Layer 9 Modula Access Layer 9 RetE Studiocol 9 Studies 9 Off Layer 7 TCP/IP	Client	Server
	васк	The Store St

3. To implement working of Transmission Control Protocol click on Subnet 2 Simulate subnet 2 Protocol 2 TCP.



	Network	Selector	
Looking In:	C:\Documents and Settin	ıgs∖Administrator∖Desktop	\SUBNETS
Fai-1			
کی Fal-2			
Fal-3			
Network Name Fa	k1		
	ОК	Cancel	

4. Select one network from the available networks created earlier.



5. List of computers for the selected network will be displayed, Selectone Computer as Client and one as Server & Click on **OK** button.



6. Selected computer details will appear next to client and server.



Start Transmission Control Protocol by clicking on Passive Open and Active Open. Click on Connect button from Client side.



8. Click on Accept button on server.



- 9. Click on **Acknowledge** button on client, TCP connection established message will prompt.
- 10. Client or server can claim send option, let click on **Send** button on client.
- 11. Server **Acknowledge** button will get active, click on **Acknowledge** button to acknowledge the client send.
- 12. Like wise transaction of send acknowledgement can be carried out.
- 13. Click on **Release** button on client.
- 14. Click on **Acknowledge** button on server.
- 15. This is one way release of connection still server can send and client can acknowledge.
- 16. Click on **Release** button on server.
- 17. Click on **Acknowledge** button on client.



18. This is complete release of connection, it is prompted by TCP connection closed message.

			TCP Simulation		
	Windows 2K0005		Windo	ws 2K0002	
	Client			Server	
Su al	briel Name hit		Subnet Name abhit		1
De	vice Name indows 2K0005		Device Name Windows 2K000	12	
lp	Address 192 . 168 . 10 . 5		lp Address 192 1	68 . 10 . 2	
	nt Messages Received Messages		Sert Messages	Received Messages	
	nnection Time		Connection Time		
Re	lease Time All 24 Des		Release Time		
10	tal Session Time(milisecond)		Total Section Tr	e(misecond)	
13			<u>16781</u>		
			Summary	Graph	Close
			Summary	Graph	Close
			Summary	Graph	Close
: Network Sinukation So	tware		Summary	Graph	Close
: Network Simulation Sof Znit Agastina Europe	twore Web - East		Summary	Graph	Close
: Network Statulation Sol zoot: Algorithm Exercise	Ware Mare Est		Summary TCP Simulation	Graph	Close
: Hetwork Statulation Sof Zoott Algorithm Exercise : Send Herrage	twors Post	TCP Simulati	Summary TCP Simulation on Graph	Graph	
: Metwork Simulation Sof zont algorithm Carrow : Sond Mensige : Acknowledgement Message	bours right East	TCP Simulati	TCP Simulation	Graph Total Nurre	Close
: Kelvonik Simulation Sol Zavi zigantera Zanara : Send Mensage Acknowledgement Mensage Serg: 1	twore tot	TCP Simulati	TCP Simulation on Graph	Graph Total Nurd	Close
: Network Staufstein Sof zwei zijnstein Europe Adrowledgemen Message Seq: 1 Seq: 1000 Ack: 2	tvore toto	TCP Simulati	TCP Simulation on Graph	Graph Total Num	er of Messages 3
: Network Structure Concern corr algorithm Concern Sond Message Seq: 1 Seq: 1000 Acit: 2 Seq: 2 Acit: 1001	tware the Eat	TCP Simulati	TCP Simulation on Graph	Graph Total Num	Close
: Network Sinulation Sol zoer algerine Energe Advoorledgenerr Hessage Seq: 1 Seq: 1000 Ack: 2 Seq: 2 Ack: 1001 Seq: 1001 Ack: 3	Wore vege East	TCP Simulati	TCP Simulation on Graph	Graph Total Nurd	Close
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: Metwork Simulation Sol 2001 - Appring Connect Acknowledgeneri Message Seq: 10 Seq: 1000 Ack: 2 Seq: 2 Ack: 1001 Seq: 1001 Ack: 3 Seq: 3 Ack: 1002 Seq: 4 Ack: 1012 Seq: 4 Ack: 1012 Seq: 1002 Ack: 5	Wore My Eat	TCP Simulati	TCP Simulation	Graph Total Nurd	et of Messages 9
: Metwork Simulation Sol 2001 - Appring Connect Acknowledgeneri Message Seq: 10 Seq: 1000 Ack: 2 Seq: 2 Ack: 1001 Seq: 1001 Ack: 3 Seq: 2 Ack: 1002 Seq: 4 Ack: 1002 Seq: 4 Ack: 1002 Seq: 1002 Ack: 5 Seq: 1003 Ack: 5 Seq: 5 Ack: 1004	Wore My Eat	TCP Simulati	TCP Simulation	Graph Total Nurd	or of Messages 9
: Kelwark Sinudoton So zwi: Appethe Conte Send Mensop Ackcooledgener Mensop Seq: 1 Seq: 2 Ack: 1001 Seq: 2 Ack: 1001 Seq: 2 Ack: 1002 Seq: 4 Ack: 1002 Seq: 4 Ack: 1002 Seq: 5 Ack: 1004	Wore No Eat	TCP Simulati	TCP Simulation on Graph	Graph Total Num	or of Messages 9
: Kelwark Sinudollon So zwi: Appethe Cande Ackookeganer Herspe Seq: 1 Seq: 1000 Ack: 2 Seq: 2 Ack: 1001 Seq: 1001 Ack: 3 Seq: 3 Ack: 1002 Seq: 4 Ack: 1002 Seq: 4 Ack: 1002 Seq: 5 Ack: 5 Seq: 5 Ack: 1004	Wore No Eat	TCP Simulati	TCP Simulation on Graph	Graph Total Num	er of Messages 9
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When you click on **Summary** button you will be able to see the log of the activity i.e. TCP connection activity.