ST. ANNE'S

COLLEGE OF ENGINEERING AND TECHNOLOGY

(Approved by AICTE New Delhi, Affiliated to Anna University, Chennai)

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ANGUCHETTYPALAYAM, PANRUTI - 607 106

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

EC8563 – COMMUNICATION NETWORKS LABORATORY

Regulation: 2017

Year / Semester: III / V

Jun 2021 - Nov 2021

PREPARED BY

Mrs. E.INDHUMA, M.E.,
AP/CSE

EC8563 COMMUNICATION NETWORKS LABORATORY

LIST OF EXPERIMENTS

1. **Implementation of Error Detection / Error Correction Techniques**
2. **Implementation of Stop and Wait Protocol and sliding window**
3. **Implementation and study of Go back-N and selective repeat protocols**
4. **Implementation of High Level Data Link Control**
5. **Implementation of IP Commands such as ping, Trace oute, nslookup**
6. **Implementation of IP address configuration.**
7. **To create scenario and study the performance of network with CSMA / CA protocol and compare with CSMA/CD protocols.**
8. **Network Topology - Star, Bus, Ring**
9. **Implementation of distance vector routing algorithm**
10. **Implementation of Link state routing algorithm**
11. **Study of Network simulator (NS) and simulation of Congestion Control Algorithms using NS**
12. **Implementation of Encryption and Decryption Algorithms using any programming language**

Total : 60 Periods

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Ex No: 1. Implementation of Error detection/Error correction techniques

AIM:

To implement and check the error detection/error correction techniques in networks using a c program.

APPARATUS REQUIRED:

1. Pc-ino
2. C/c++compiler

THEORY:

Error Detection

- Bit errors occur in frames due to electrical interference or thermal noise.
- Detecting errors is one part of the problem; correcting errors is the other.
- What happens when an error is detected?
- Two basic approaches:
  - Notify the sender that message is corrupt so the sender can retransmit it; (most often used in every day applications)
  - Use an error-correcting code to reconstruct the correct message

Transmission Errors

· External electromagnetic signals can cause incorrect delivery of data

- · Data can be received incorrectly
- · Data can be lost
- · Unwanted data can be generated

· Any of these problems are called *transmission errors*

Error Detection

- Detecting Transmission Errors: basic idea is to add redundant information to a frame that can determine if errors have been introduced.

Error Correction or Error Detection?

- When error is detected, frame is discarded and resent, using bandwidth and causing latency, waiting for its arrival.
- Error correction requires additional bit to be sent with every frame.
- Correction is useful when
  - 1) errors are probable or
  - 2) the cost of retransmission is too high

PROCEDURE:

- Start the process.
- Give the data which is the message.
- Compile and run the program.
- Enter the received hamming code.
- The error is corrected codeword.

PROGRAM FOR CODE GENERATION FOR ERROR DETECTION AND CORRECTION

```
#include <stdio.h>
#include <math.h>
#include <stdlib.h>
int main()
{
int i,j,k,count,err-pos=0,flag=0;
char dw[20],cw[20],data[20];
printf("enter data as binary bit stream(7 bits):\n");
scanf("%s",data);
for(i=1,j=0,k=0;i<12;i++)
{
if(i==(int)pow(2,j))
{
dw[i]='?';
j++;
}
else
{
dw[i]=data[k];
k++;
}
}
for(i=0;j<4;i++)
{
count=0;
for(j=(int)pow(2,i);j<12;j<12;j+=(int)pow(2,i))
{
for (k=0;k<(int)pow(2,i);k++)
{
if(dw[j]=='1')count++;j++;
}
}
if(count%2==0)
dw[(int)pow(2,i)]='0';
else
dw[(int)pow(2,i)]='1';
}
printf("in code word is\n\n");
for(i=1;i<12;i++)
printf("%c",dw[i]);
printf("\n\n enter the received hamming code\n\n");
scanf("%s",cw);
for(i=12;i>0;i--)
cw[i]=cw[i-1];
for(i=0;i<4;i++)
{
count=0;
for(j=(int)pow(2,i);j<12;j+=(int)pow(2,i))
{
```

```
for(k=0;k<(int)pow(2,i);k++)
{
if(cw[j]==’1’)count++;j++;
}
}
if (count%2!=0)
err-pos=err-post+(int)pow(2,i);
}
if(err-pos==0)
printf(“\n\n there is no error in received code word \n”);
else
{
if(cw[err-pos]==dw[err-pos])
{
printf(“\n\n there are 2 or more errors in received code……\n\n”);
printf(“sorry…! hamming code cannot correct 2 or more errors….\n”);
flag=1;
}
else
printf(“in there is an error in bit position %d of received code word \n”,err-pos);
if(flag==0)
{
cw[err-pos]=(cw[err-pos]==’1’)?’0’:’1’;
printf(“\n\n corrected code word is \n\n”);
for(i=1;i<12;i++)
printf(“%c”,cw[i]);
}
}
printf(“\n\n”);
}
```

OUTPUT:

```
Enter data as binary bit stream(7 bits):
1110110
Code word is
11101100110
Enter the received hamming code
10101100110
There is an error in bit position 2 of received code word corrected code word is
11101100110
Enter data as binary bit stream(7 bits)
11101110
Code word is
11101100110
Enter the received hamming code
00101100110
There are 2 or more error in received code…
Sorry…!
```

RESULT:

Thus the error detection/error correction techniques were implemented successfully.

IMPLEMENTATION AND STUDY OF STOP AND WAIT PROTOCOL

MENU BAR

Ex No: 2. Implementation and Study of Stop and Wait Protocoland sliding window protocol

AIM:

To implement and Study the performance of Stopand Wait Protocol using LAN trainer.

APPARATUS REQUIRED:

1. VI-RTSIM software.
2. Personal Computer.
3. LAN connectivity cable.
4. LAN trainer kit.

THEORY:

Stop and Wait:

- The sender in this protocol simply retrieves a packet from the network layer, copies it into a frame, and then transmits it. After transmission, the sender busy waits until an acknowledgment is received from the receiver, then the loop starts over again.
- The receiver simply busy waits a frame received. Once a frame is received it passes the data packet to the network layer and sends an acknowledgment for the frame it just received. It then loops back to busy waiting and the process continues until the End of File is reached.
- In this protocol, there can only be one outstanding frame at a time so no sequence numbers are required and the acknowledgment the receiver sends back to the sender in nothing more than an empty frame, as there is no other possibility then acknowledging the only frame sent. Another frame will not be sent until this acknowledgment is received.
- The Stop and Wait protocol was very easy to implement and runs very quickly and efficiently. It solves the problem of congestion, as only one frame is outstanding at any time, frames cannot be lost due to congestion and the receiver will not be swamped by the sender


XILINX®
DESIGN SOLUTIONS
iMPACT
Release Version: 7.1.02i
Application Version: H.40
Registration ID: UNKNOWN
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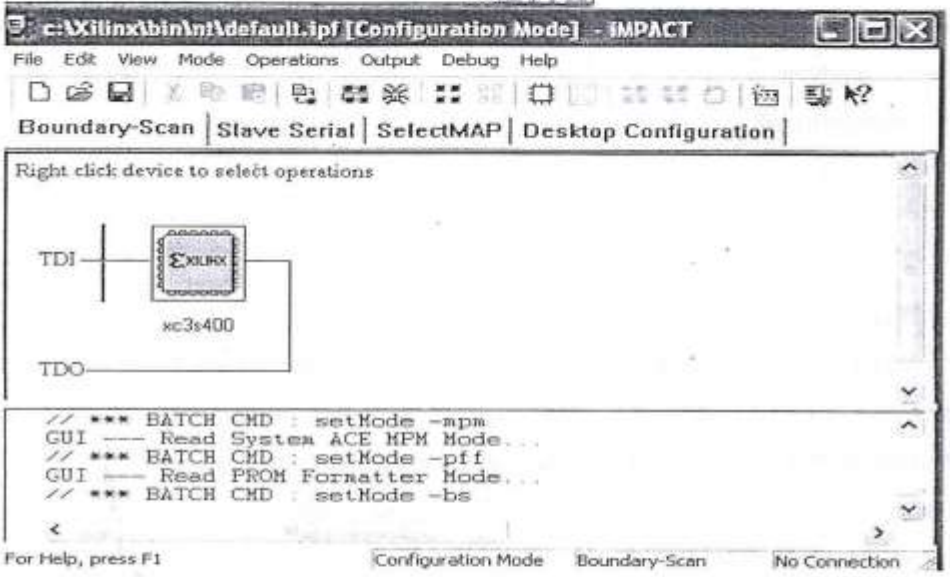
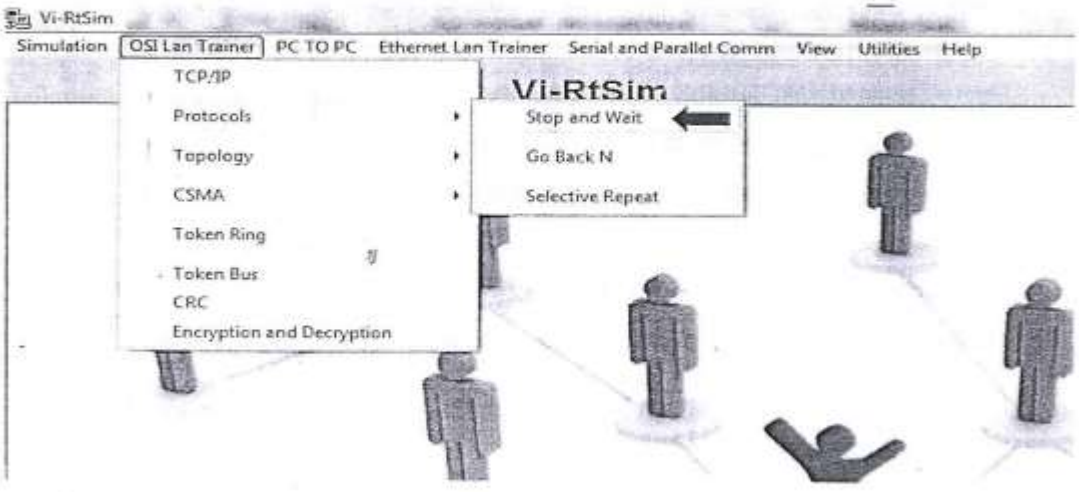

c:\Xilinx\bin\nt\default.ipf [Configuration Mode] - iMPACT
File Edit View Mode Operations Output Debug Help
Boundary-Scan | Slave Serial | SelectMAP | Desktop Configuration
Right click device to select operations
TDI
xc3s400
TDO
// *** BATCH CMD : setMode -mpm
GUI --- Read System ACE MPM Mode...
// *** BATCH CMD : setMode -pff
GUI --- Read PROM Formatter Mode...
// *** BATCH CMD : setMode -bs
For Help, press F1
Configuration Mode
Boundary-Scan
No Connection


Vi-RtSim
Simulation
OSI Lan Trainer
PC TO PC
Ethernet Lan Trainer
Serial and Parallel Comm
View
Utilities
Help
TCP/IP
Protocols
Topology
CSMA
Token Ring
Token Bus
CRC
Encryption and Decryption
Vi-RtSim
Stop and Wait
Go Back N
Selective Repeat

PROCEDURE

Downloading "ARM"

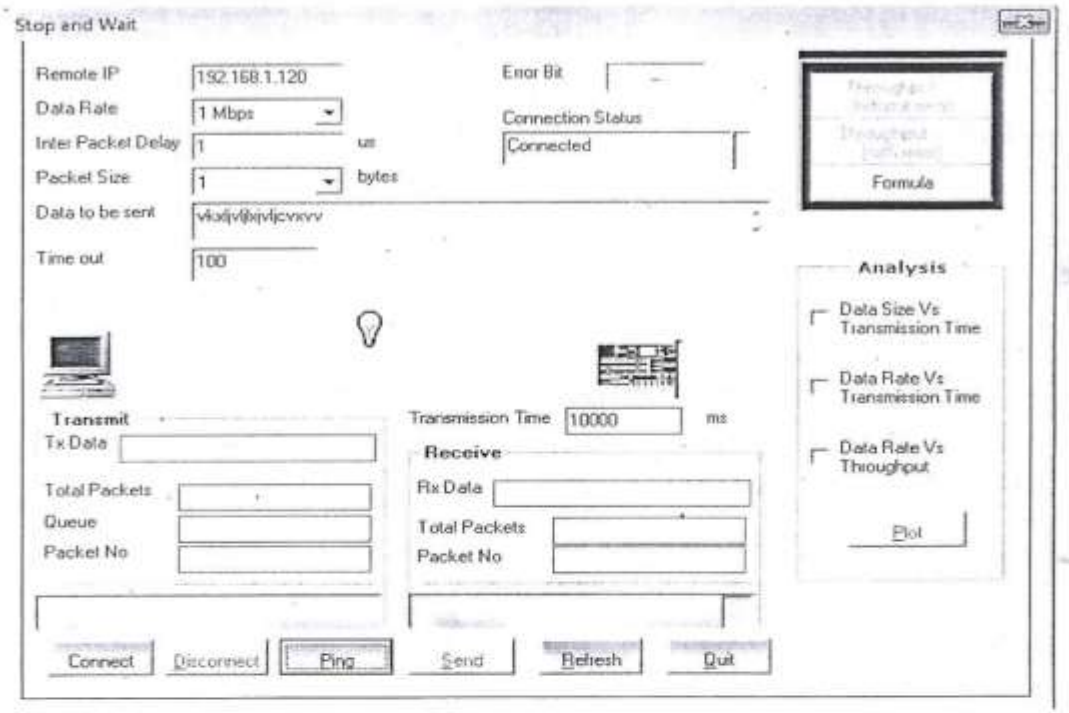
1. Open VI-RTSIM software from desktop
2. Select the ARM Downloader from UTILITIES menu bar to download the ARM.
3. Click Read device ID in the LPC 2000 flash UTILITIES to read the LAN trainer and reset the board at the programming mode and then click OK.
4. Select the TOKENBUS.HEX ARM program to be downloaded to the trainer kit.
5. Click "Upload to flash" button to upload the program to the LAN trainer.
6. After downloading the program we can get the "Program uploaded successfully" message.

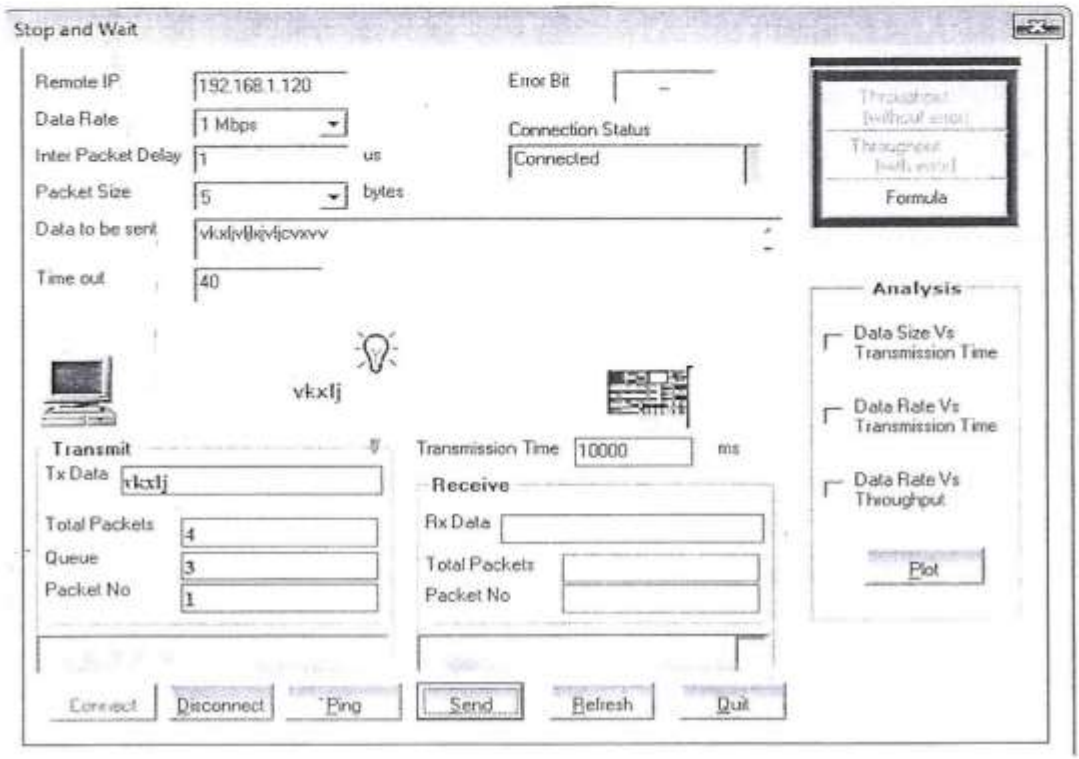
Downloading "FPGA"

1. Now open the software "Impact" to download the FPGA.]
2. Select "Create a new project" and clock on "OK".
3. Select "configure devices using boundary scan (J-TAG) and click "finish" button.
4. Select the TOKENBUS BIT FPGA program to be downloaded to the trainer kit.
5. Right click on the device and "program" to download FPGA program.
6. After downloading the program we can get the "program successfully" message.

Execution of STOPWAIT program:

1. Open VI-RTSIM software from desktop.
2. Select Stop and Wait from OSI LAN Trainer menu bar.
3. Enter the Parameter.
4. At default setting press connect button to conform whether the connection is established or not. After connection is successfully established press start button.
5. Enter the data on the field.
6. After data field is entered, Sender waits for ACK after each frame transmission.


Stop and Wait
Remote IP
192.168.1.120
Error Bit
Data Rate
1 Mbps
Connection Status
Inter Packet Delay
1
us
Connected
Packet Size
1
bytes
Formula
Data to be sent
vkxljvljkjvljcvxvv
Time out
100
Analysis
Data Size Vs Transmission Time
Data Rate Vs Transmission Time
Data Rate Vs Throughput
Transmit
Transmission Time
10000
ms
Tx Data
Receive
Rx Data
Total Packets
Queue
Packet No
Total Packets
Packet No
Plot
Connect
Disconnect
Ping
Send
Refresh
Quit


Stop and Wait
Remote IP
192.168.1.120
Error Bit
Data Rate
1 Mbps
Connection Status
Inter Packet Delay
1
us
Connected
Packet Size
5
bytes
Formula
Data to be sent
vkxljvljkjvljcvxvv
Time out
40
Analysis
Data Size Vs Transmission Time
vkxlj
Data Rate Vs Transmission Time
Data Rate Vs Throughput
Transmit
Transmission Time
10000
ms
Tx Data
vkxlj
Receive
Rx Data
Total Packets
4
Queue
3
Total Packets
Packet No
1
Packet No
Plot
Connect
Disconnect
Ping
Send
Refresh
Quit

RESULT:

Thus the Stop and Wait protocol has been implemented and its performance is analyzed.


Vi-RtSim
Simulation
OSI Lan Trainer
PC TO PC
Ethernet Lan Trainer
Serial and Parallel Comm
View
Utilities
Help
Packet Analyser
Editor
PIC Downloader
ARM Downloader
Calculator


Vi-RtSim
LPC2000 Flash Utility
File
Buffer
Help
PHILIPS
LPC2000 Flash Utility V2.2.3
Flash Programming
Filename:
Upload to Flash
Compare Flash
Erase / Blank
Blank Check
Entire Device
Selected Sectors
Erase
Start Sector:
End Sector:
Communication
Connected To Port:
COM1
Use Baud Rate:
9600
Time Out (sec):
Device
Device:
LPC2106
XTAL Freq. (kHz):
14745
Read Device ID
Part ID:
Boot Loader ID:
Use DTR/RTS for Reset and Boot Loader Selection

Ex No: 3 a) Implementation and Study of GO BACK-N Protocol

AIM:

To implement and Study the performance of GO BACK-NProtocol using LAN trainer.

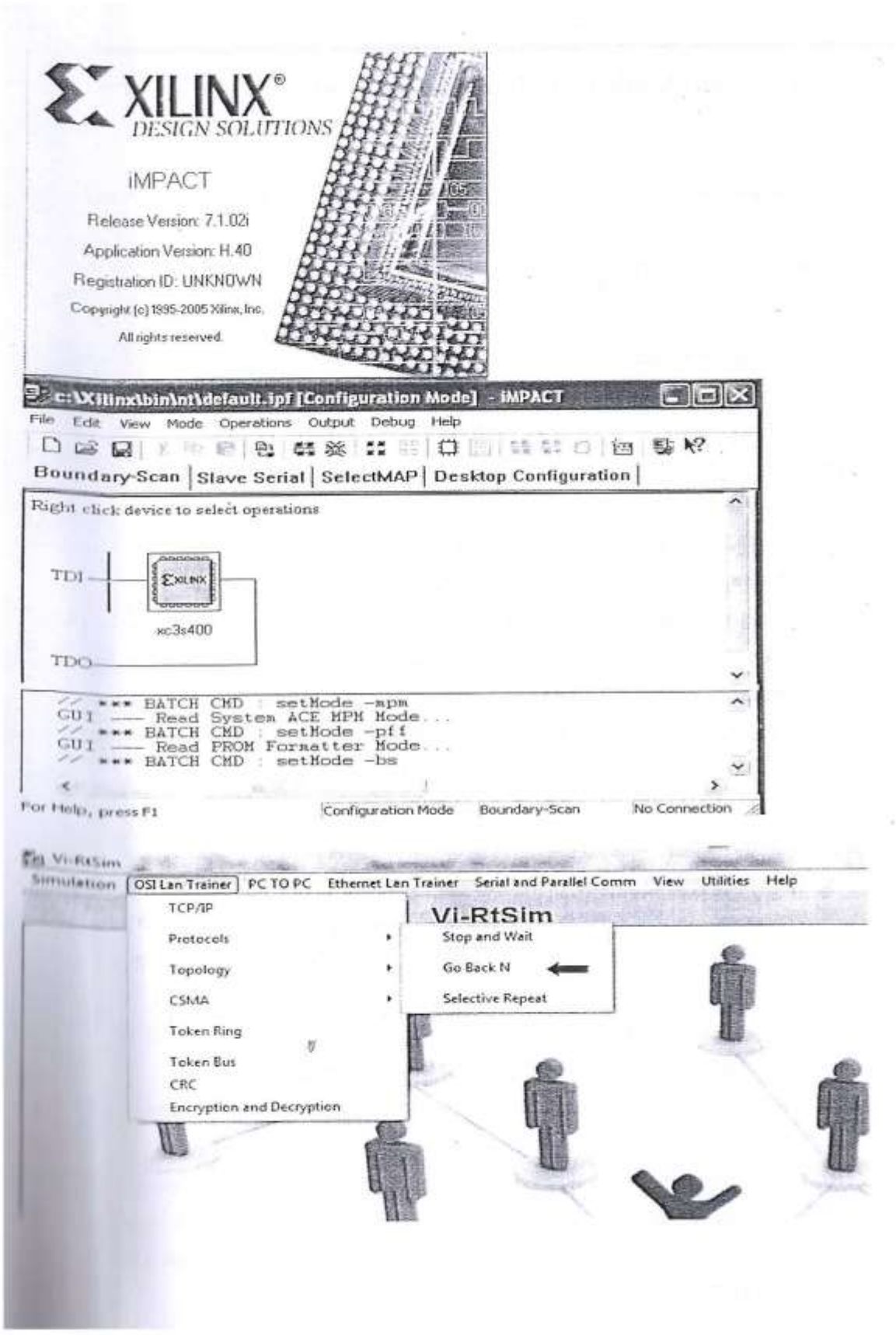
APPARATUS REQUIRED:

1. VI-RTSIM software.
2. Personal Computer.
3. LAN connectivity cable.
4. LAN trainer kit.

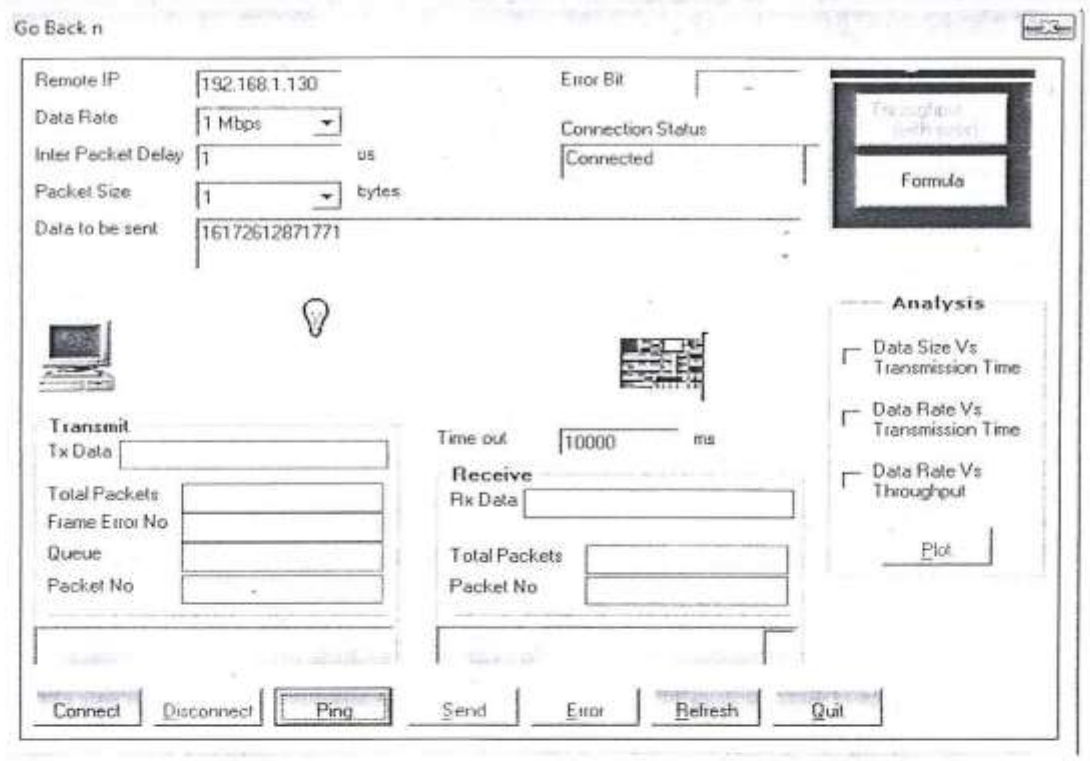
THEORY:

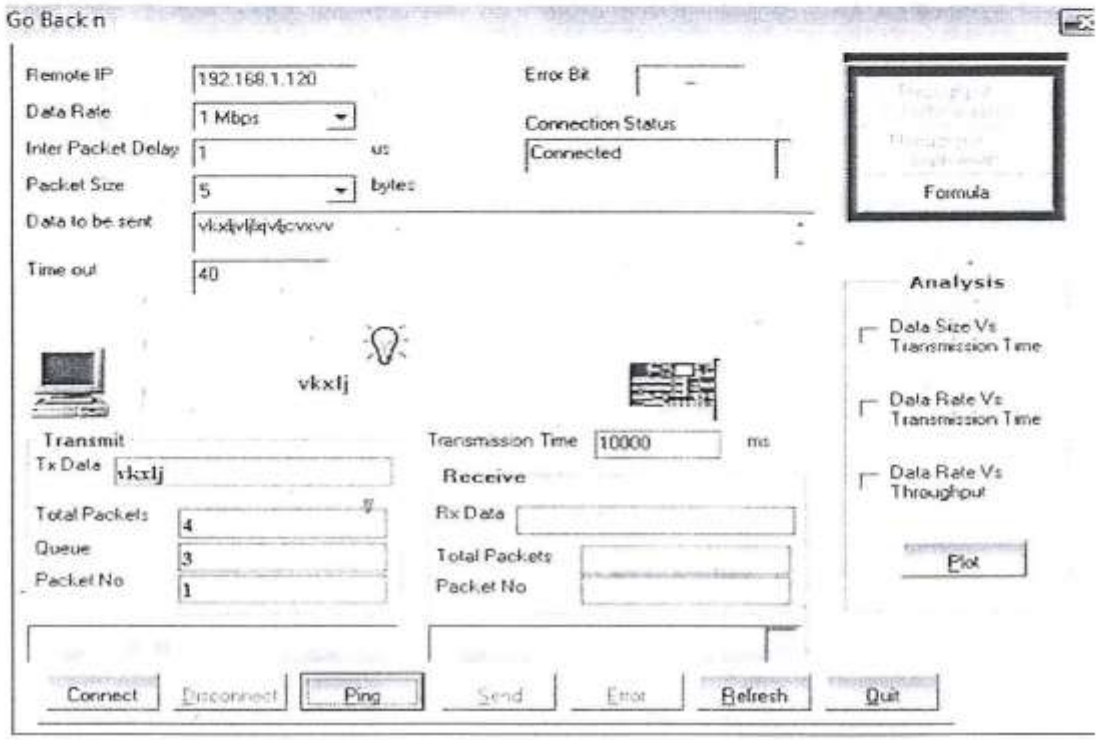
GO BACK-N.

- The **GO BACK-N** protocol improves by allowing the sender to have more than one outstanding frame at a time by using buffers.
- The sender maintains a buffer of a predetermined size. IF there is room in the buffer it gets a packet stores it in the correct empty slot (seq_nr%WINDOWSIZE) creates a frame with the correct seq_nr and transmits it.
- The corresponding logical timer is then reset to 0. The Upper Bound of the window is then slid up by circularly incrementing the next_frame_to_send.
- At this point or if no buffers are empty, the physical layer is checked to see if an acknowledgment is there.
- If a good frame is received and the acknowledgment number is within the current window then decrement the number of buffers used, reset the logical timer (to a negative value) to indicate an unused slot, and slide the Lower Bound of the window by circularly incrementing the acknowledgment number expected.
- The procedure runs is a loop until ack_expected equals ack_received (this clears the ack_received and the previous frames that haven't been acknoedged yet).
- After this, or if a bad frame or out of window frame arrives, the logical timers are updated. If frame is timed out, it's retransmitted and the timer is reset to 0.
- In this fashion if a frame is timed out because it was lost, no acknowledgment will arrive. So on the next iteration of the loop, the next frame will time out and will be resent. Thus the timed out frame and all the subsequent frames will be transmitted which is the definition of **GO BACK-N**


XILINX®
DESIGN SOLUTIONS
iMPACT
Release Version: 7.1.02i
Application Version: H.40
Registration ID: UNKNOWN
Copyright (c) 1995-2005 Xilinx, Inc.
All rights reserved.
c:\Xilinx\bin\nt\default.ipf [Configuration Mode] - iMPACT
File Edit View Mode Operations Output Debug Help
Boundary-Scan | Slave Serial | SelectMAP | Desktop Configuration
Right click device to select operations
TDI
xc3s400
TDO
*** BATCH CMD : setMode -spm
GUI --- Read System ACE MPM Mode...
*** BATCH CMD : setMode -pff
GUI --- Read PROM Formatter Mode...
*** BATCH CMD : setMode -bs
For Help, press F1
Configuration Mode
Boundary-Scan
No Connection
Vi-RtSim
Simulation
OSI Lan Trainer
PC TO PC
Ethernet Lan Trainer
Serial and Parallel Comm
View
Utilities
Help
TCP/IP
Protocols
Topology
CSMA
Token Ring
Token Bus
CRC
Encryption and Decryption
Vi-RtSim
Stop and Wait
Go Back N
Selective Repeat

- The receiver busy waits until a frame arrives. If a bad frame arrives, it goes back to busy waiting. If a good frame arrives, it checks the sequence number, if its not the sequence number expected it resends an ack for the last correct sequence number received.
- If it's the sequence number expected, it passes the packet to the Network layer, updates the last correct sequence number received variable and circularly increments the next sequence number expected variable.
- An acknowledgement is then created and transmitted for it and then it loops back to the physical layer to retrieve the next frame.
- The logical timer consists of an array of integers. When the value is negative the corresponding slot in the buffer is unused. Anytime after checking the physical layer a loop is run that increments the timers of all the used slots by one, it simultaneously checks if any of the timer values has reached the threshold (which is the timeout time).The value stored in the logical time corresponding to a buffer slot is the number of times the buffered packet has in created in the while loop.
- The Main loop consists of the while loop that gets and sends packets and checks for acknowledgments. Another loop loads all empty slots in the buffer with new packets. The acknowledgment loop clears all previous unacknowledged frames up to the acknowledgment received.
- The timer loop updates the timers and checks for the timeouts and retransmits.
- The receiver's Main Loop checks for frames received in the physical layer. If a frame is received then an acknowledgment is sent for the last correct in sequence frame received.


Go Back n
Remote IP
192.168.1.130
Error Bit
Data Rate
1 Mbps
Connection Status
Inter Packet Delay
1
us
Connected
Packet Size
1
bytes
Formula
Data to be sent
16172612871771
Analysis
Data Size Vs Transmission Time
Data Rate Vs Transmission Time
Data Rate Vs Throughput
Plot
Transmit
Tx Data
Time out
10000
ms
Receive
Rx Data
Total Packets
Frame Error No
Queue
Packet No
Total Packets
Packet No
Connect
Disconnect
Ping
Send
Error
Refresh
Quit


Go Back n
Remote IP
192.168.1.120
Error Bit
Data Rate
1 Mbps
Connection Status
Inter Packet Delay
1
us
Connected
Packet Size
5
bytes
Formula
Data to be sent
vkxljvljlqvljcvxvv
Time out
40
Analysis
Data Size Vs Transmission Time
Data Rate Vs Transmission Time
Data Rate Vs Throughput
Plot
vkxlj
Transmit
Transmission Time
10000
ms
Tx Data
vkxlj
Receive
Total Packets
4
Rx Data
Queue
3
Total Packets
Packet No
1
Packet No
Connect
Disconnect
Ping
Send
Error
Refresh
Quit

PROCEDURE

Downloading “ARM”

1. Open VI-RTSIM software from desktop
2. Select the ARM Downloader from UTILITIES menu bar to download the ARM.
3. Click Read device ID in the LPC 2000 flash UTILITIES to read the LAN trainer and reset the board at the programming mode and then click OK.
4. Select the TOKENBUS.HEX ARM program to be downloaded to the trainer kit.
5. Click “Upload to flash” button to upload the program to the LAN trainer.
6. After downloading the program we can get the “Program uploaded successfully” message.

Downloading “FPGA”

1. Now open the software “Impact” to download the FPGA.]
2. Select “Create a new project” and clock on “OK”.
3. Select “configure devices using boundary scan (J-TAG) and click “finish” button.
4. Select the TOKENBUS BIT FPGA program to be downloaded to the trainer kit.
5. Right click on the device and “program” to download FPGA program.
6. After downloading the program we can get the “program successfully” message.

Execution of GO BACK-N program:

1. Open VI-RTSIM software from desktop.
2. Select **GO BACK-N** from OSI LAN Trainer menu bar.
3. Enter the Parameter.
4. At default setting press connect button to conform whether the connection is established or not. After connection is successfully established press start button.
5. Enter the data on data field, press Send button.
6. After the field is entered, Sender waits for ACK after each frame transmission.

RESULT:

Thus the Go back N protocol has been implemented and its performance is analyzed.


Vi-RtSim
Simulation
OSI Lan Trainer
PC TO PC
Ethernet Lan Trainer
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Help
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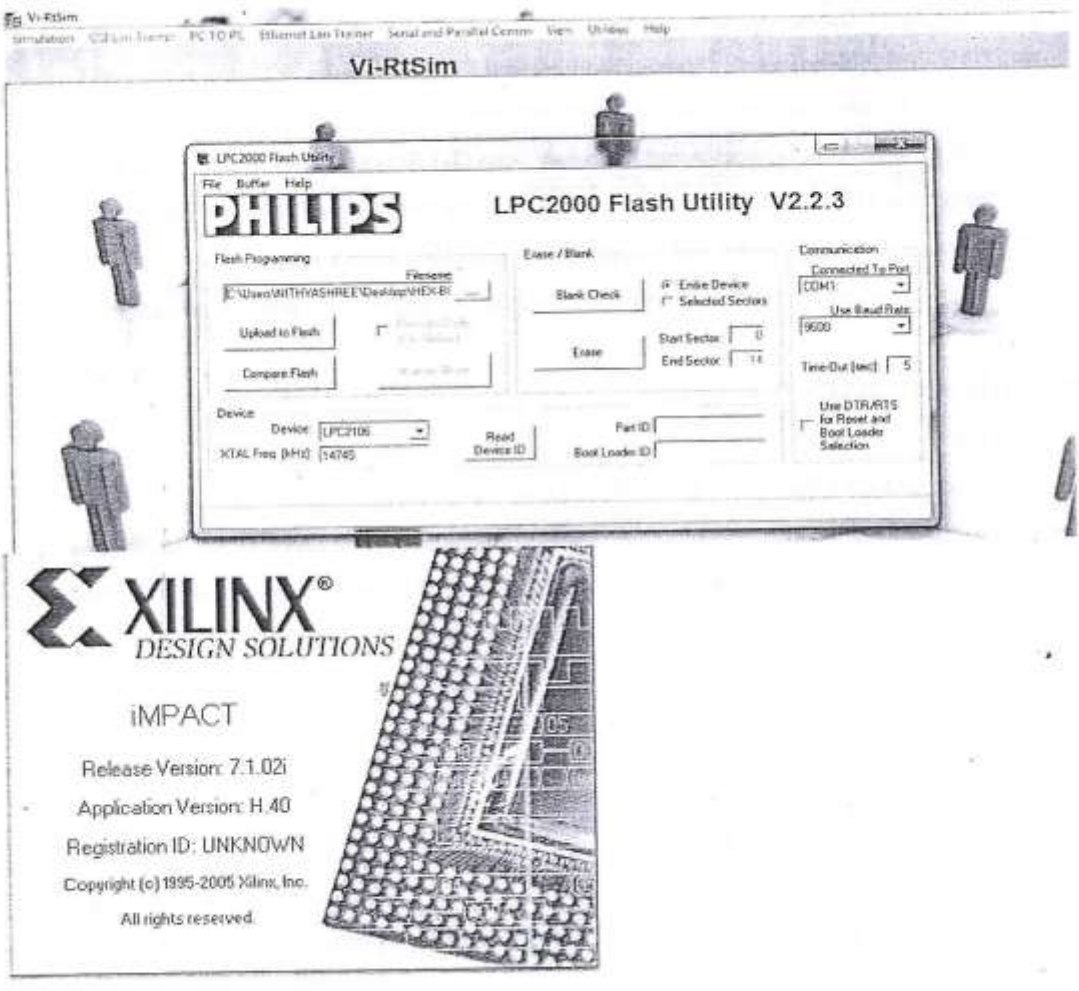
PIC Downloader
ARM Downloader
Calculator


Vi-RtSim
LPC2000 Flash Utility
File
Buffer
Help
PHILIPS
LPC2000 Flash Utility V2.2.3
Flash Programming
Filename:
Upload to Flash
Compare Flash
Erase / Blank
Blank Check
Entire Device
Selected Sectors
Erase
Start Sector
End Sector
Communication
Connected To Port:
COM1
Use Baud Rate:
9600
Time-Out (sec)
5
Use DTR/RTS for Reset and Boot Loader Selection
Device
Device:
LPC2106
XTAL Freq (kHz)
14745
Read Device ID
Part ID:
Boot Loader ID:

XILINX®
DESIGN SOLUTIONS
iMPACT
Release Version: 7.1.02i
Application Version: H.40
Registration ID: UNKNOWN
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Ex No:3 b) Implementation and study of Selective and Repeat Protocol

AIM:

To implement and Study the performance of Selective and RepeatProtocol using LAN trainer.

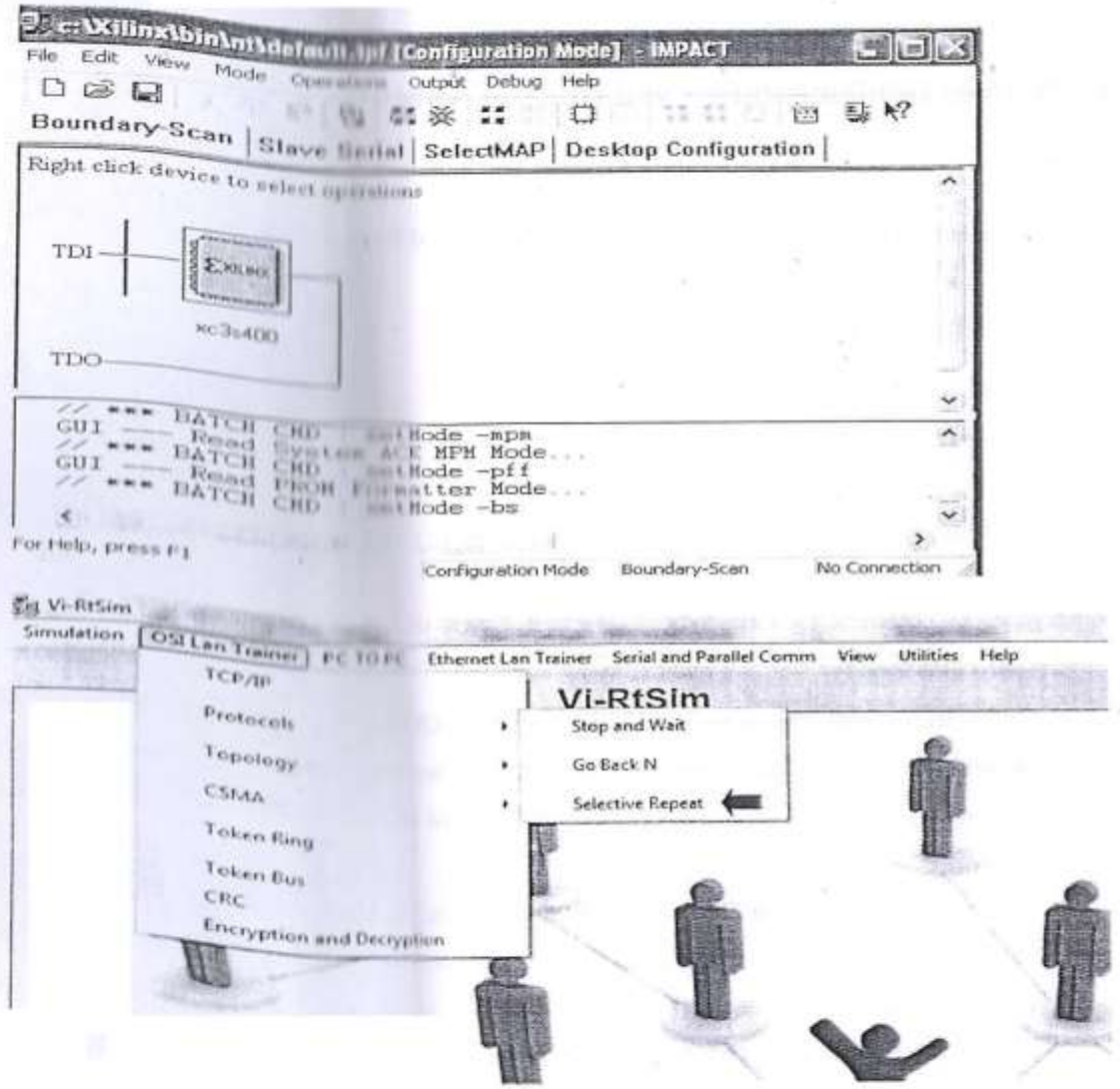
APPARATUS REQUIRED:

1. VI-RTSIM software.
2. Personal Computer.
3. LAN connectivity cable.
4. LAN trainer kit.

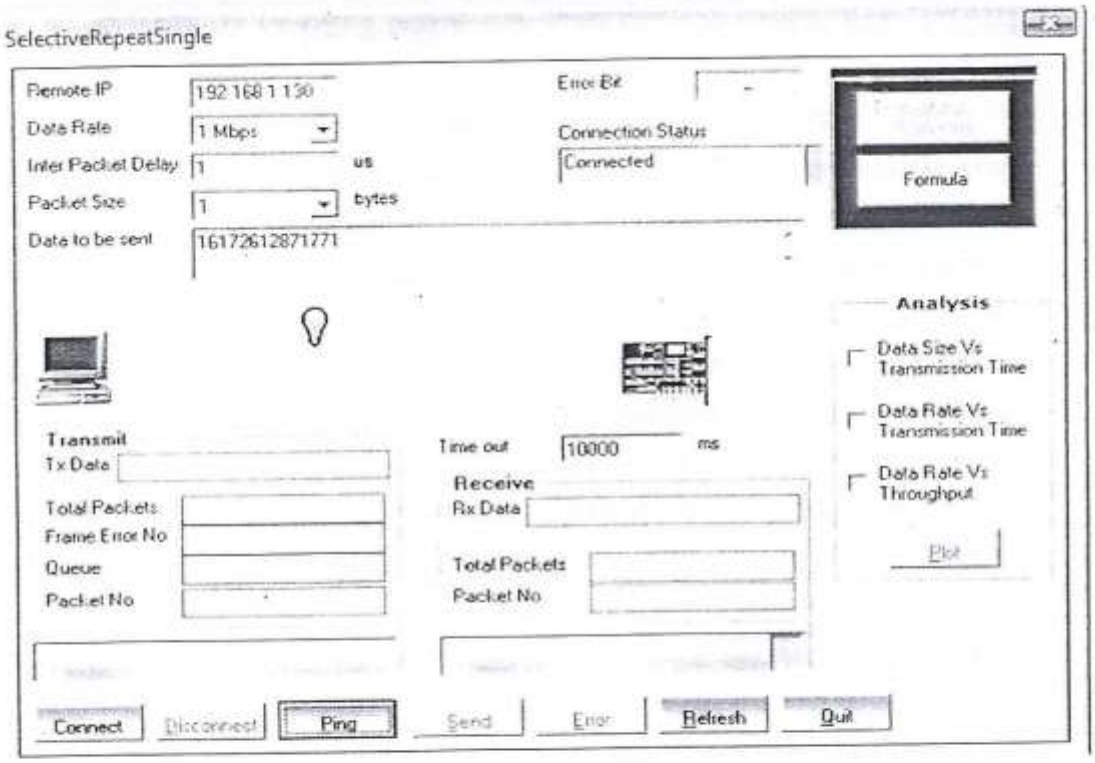
THEORY:

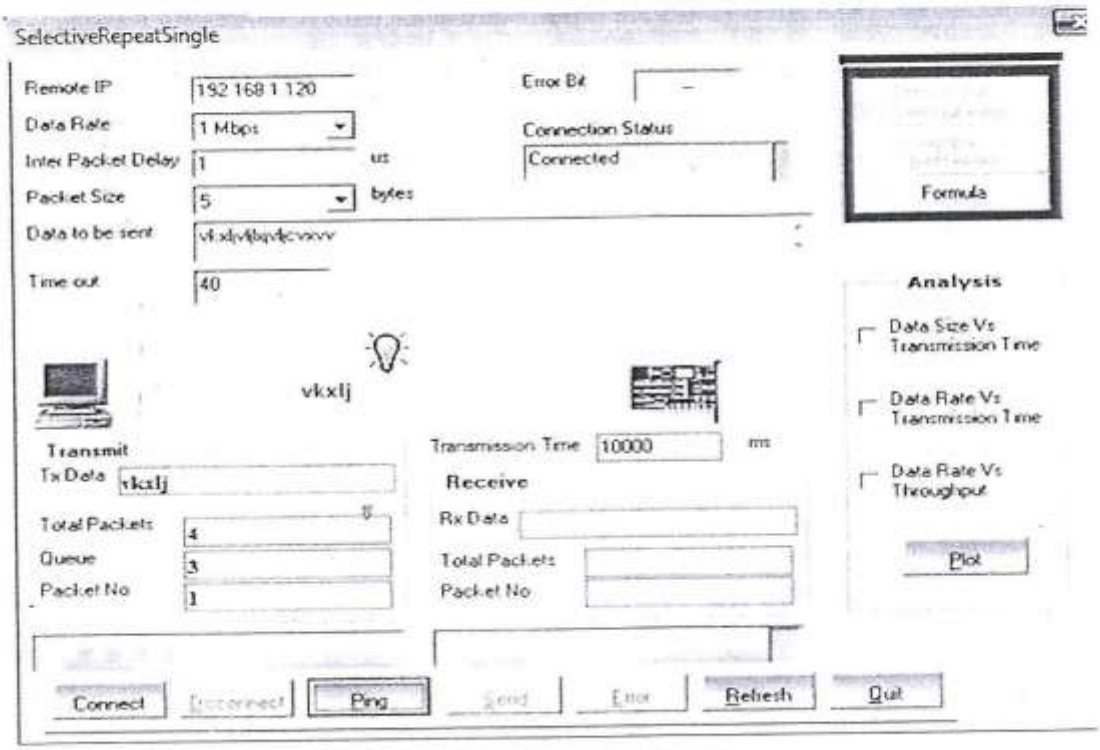
Selective and Repeat:

- The **Selective and Repeat** protocol improves on the GO Back N protocol by having buffers on both the sending and receiving sides. This allows the sender to have more than one outstanding frame at a time and receiver to accept out of order frames and store them in its window.
- Sender for **Selective and Repeat** is only slightly modified from that for **Go Back N.** The Maintenance of buffers and logical timers is exactly the same. The only difference is that if a negative acknowledgment is received, the sender retransmits the corresponding frame identified by the **NAK**. Other than this timeouts, loop iterations and retransmissions are all the same as **Go Back N.**
- This differs from **Go Back N** in that it retransmits only the frame for which a **NAK** is received and not all subsequent frames. As the receiver keeps a window of frames only the timed out frame needs to be retransmitted and not the whole series.
- The receiver busy waits until a frame arrives, if a timeout occurs or if a bad frame arrives, or if an out of sequence frame arrives, and a NAK has not been sent yet then a NAK is sent for the expected sequence number.
- If there is room in the receiver's buffer a packet is stored in the correct slot (sequence number%WINDOWSIZES) and the slot is flagged as used. Loop is run starting at buffer slot for expected sequence number.


[Configuration Mode] - IMPACT
File Edit View Mode Output Debug Help
Boundary-Scan | Slave Serial | SelectMAP | Desktop Configuration
Right click device to select operations
TDI
TDO
xc3s400
setMode -mpm
setMode -pff
setMode -bs
For Help, press F1
Configuration Mode
Boundary-Scan
No Connection
Vi-RtSim
Simulation
OSI Lan Trainer
Ethernet Lan Trainer
Serial and Parallel Comm
View
Utilities
Help
TCP/IP
Protocols
Topology
CSMA
Token Ring
Token Bus
CRC
Encryption and Decryption
Vi-RtSim
Stop and Wait
Go Back N
Selective Repeat

- If this slot is fall the packet is passed to the network layer, a flag is set to send an acknowledgment, buffer slot is reset to empty, the upper bound of the window is increased, and the lower bound expected) is circularly incremented.
- It then loops back to check the buffer slot for expected sequence number. The loop continues till the expected slot is empty.
- In this manner all buffered packets are passed to the network layer in order. If the flag that indicates whether an acknowledgment has to be sent or not (send_ack) is set then an acknowledgment is sent for the last correct in sequence frame received. Then we go back to the main busy waiting loop and start over again.
- The buffers on both ends consist of arrays of packets. The size of these arrays is 4, the range of sequence numbers used is 0-7. The selection c criteria were the same as that used for **Go Back N.**The sender window's Lower Bound is represented by the ack expected and the Upper Bound by the next frame to end.
- The receiver window's Lower Bound is represented by frame expected and the Upper Bound by too far. The Logical Timers are implemented in the same fashion as **Go Back N.**
- Main loop in the sender consists of while loop that gets and sends packets then checks for acknowledgments and other loop loads empty slots in the buffer with new packets. The acknowledgment loop clears all previous unacknowledged frames up to the acknowledgment received.
- If the frame is a NAK instead of entering the loop it retransmits the requested frame. Timer loop updates the timers and checks for timeouts to retransmit.
- Main loop in the receiver consist of a busy wait loop to retrieve frames from the physical layer. Data transfer loop passes buffered packets in order to the network layer when the correct in sequence frame is received.
- Timeouts and bad frames result in naks being sent. Otherwise an acknowledgment for the last correct in sequence frame received. This is necessary to keep the sender and receiver in synchronization when frames and acknowledgments are lost.


SelectiveRepeatSingle
Remote IP
192.168.1.130
Error Bit
Data Rate
1 Mbps
Connection Status
Inter Packet Delay
1
us
Connected
Packet Size
1
bytes
Data to be sent
16172612871771
Formula
Analysis
Data Size Vs Transmission Time
Data Rate Vs Transmission Time
Data Rate Vs Throughput
Plot
Transmit
Tx Data
Time out
10000
ms
Receive
Rx Data
Total Packets
Frame Error No
Queue
Packet No
Total Packets
Packet No
Connect
Disconnect
Ping
Send
Error
Refresh
Quit


SelectiveRepeatSingle
Remote IP
192.168.1.120
Error Bit
Data Rate
1 Mbps
Connection Status
Inter Packet Delay
1
us
Connected
Packet Size
5
bytes
Data to be sent
vlxdvlbqvfjcvxvv
Time out
40
Formula
Analysis
Data Size Vs Transmission Time
Data Rate Vs Transmission Time
Data Rate Vs Throughput
Plot
vlxlj
Transmit
Tx Data
vlxlj
Transmission Time
10000
ms
Receive
Rx Data
Total Packets
4
Queue
3
Packet No
1
Total Packets
Packet No
Connect
Disconnect
Ping
Send
Error
Refresh
Quit

PROCEDURE

Downloading "ARM"

1. Open VI-RTSIM software from desktop
2. Select the ARM Downloader from UTILITIES menu bar to download the ARM.
3. Click Read device ID in the LPC 2000 flash UTILITIES to read the LAN trainer and reset the board at the programming mode and then click OK.
4. Select the TOKENBUS.HEX ARM program to be downloaded to the trainer kit.
5. Click "Upload to flash" button to upload the program to the LAN trainer.
6. After downloading the program we can get the "Program uploaded successfully" message.

Downloading "FPGA"

1. Now open the software "Impact" to download the FPGA.
2. Select "Create a new project" and clock on "OK".
3. Select "configure devices using boundary scan (J-TAG) and click "finish" button.
4. Select the TOKENBUS BIT FPGA program to be downloaded to the trainer kit.
5. Right click on the device and "program" to download FPGA program.
6. After downloading the program we can get the "program successfully" message.

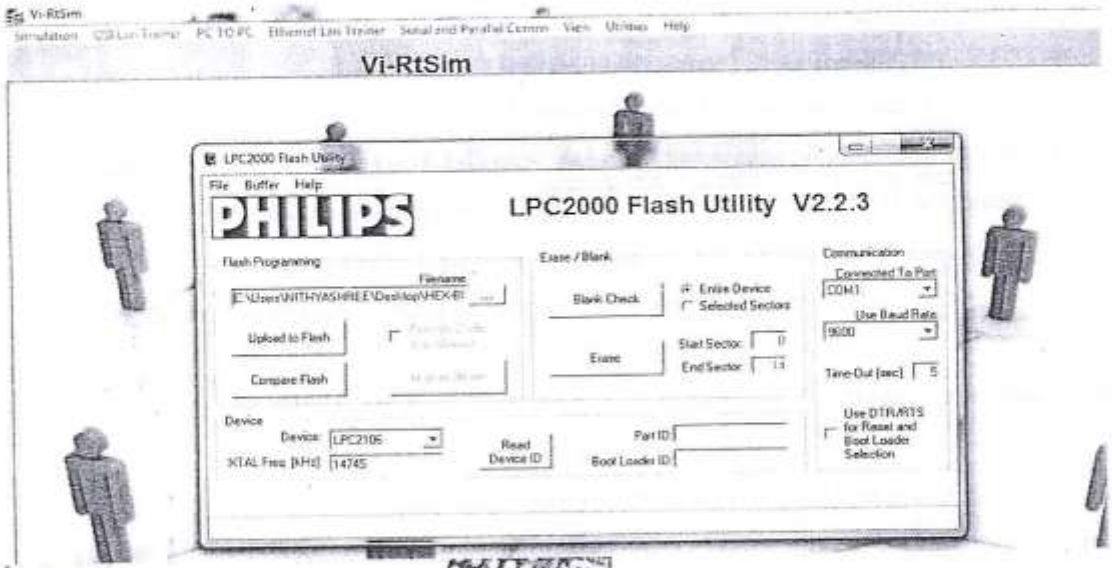
Execution of Selective and Repeat program:

1. Open VI-RTSIM software from desktop.
2. Select Selective and repeat from OSI LAN Trainer menu bar.
3. Enter the Parameter.
4. At default setting press connect button to conform whether the connection is established or not. After connection is successfully established press start button.
5. Enter the error button, If error button pressed, Error window is displayed on LCD (Hardware unit). Where to create the frame error or Bit error.
6. Enter the data on data field, press Send button new data is moving to destination.
7. Sender receives the NAK when error data received at receiver during transmission.
8. After the transmission completed NAK data is retransmitted.

RESULT:

Thus the selective repeat protocol has been implemented and its performance is analyzed.

Implementation of high level data link control



Ex.No: 4 Implementation of high level data link control

Aim:

- To implement and test the high level data link control

Apparatus Required:

1. Vi-Rt sim software
2. C, C++ software
3. Pc-1 No

Theory:

- High-level Data Link Control (HDLC) is a bit-oriented protocol for communication over point-to-point and multipoint links.
- It is designed to support both half duplex and full duplex.
- Systems using HDLC can be characterized by their station types, their configurations , and their response modes.

Station types:

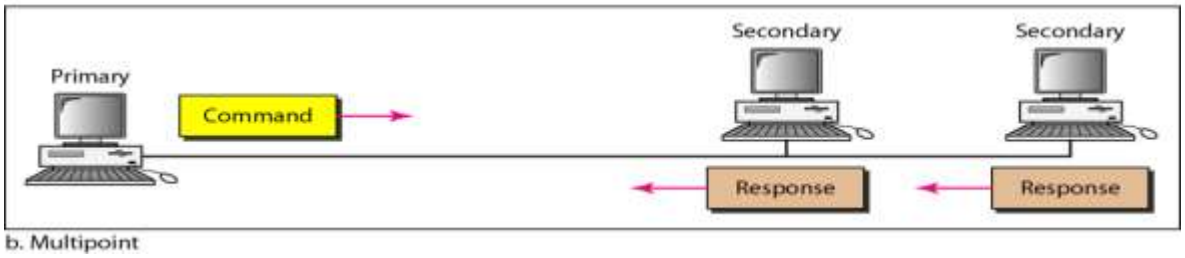
- Stations in HDLC are of three types: primary, secondary, and combined.
- The primary send commands to the secondary station. The secondary station sends response. A combined station sends commands and response

Configuration:

- The work configuration refers to the relationship of hardware devices on a link.
- Primary, secondary and combined stations can be configured in three ways: ***Unbalanced, symmetrical and balanced***
- Any of these configuration supports both half duplex and full duplex transmission

Unbalanced configuration :(master/slave configuration):

a. Point-to-point



b. Multipoint

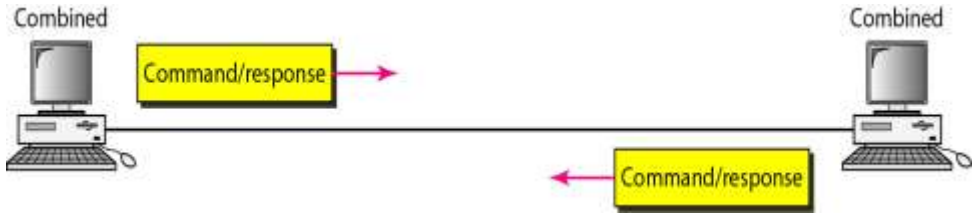
- In this device, one device is primary and other device is secondary.
- Unbalanced configuration can be point to point if only two devices are involved; more often they are multipoint, with one primary controlling several secondaries.

Symmetrical configuration:

- Here each physical station on a link consists of two logical stations, one a primary and other a secondary.
- A symmetrical configuration behaves like an unbalanced configuration expects that control of the link can shift between the two stations.

Balanced configuration:

- A balanced configuration is one in which both station in a point to point topology are of the combined type.
- The stations are linked by a single line that can be controlled by either station.
- HDLC does not support balanced multipoint.



Modes of communication:

- A mode in HDLC is the relationship between two devices involved in an exchange the mode describes who control the link.
- HDLC supports three modes of communication between stations.

(i) Normal response mode.(NRM)

(ii) Asynchronous response mode(ARM)

(iii)**Asynchronous Balanced mode(ABM**)

Normal response mode. (NRM):

- In normal response mode (NRM), the station configuration is unbalanced.
- We have one primary station and multiple secondary stations.
- A primary station can send commands; a secondary station can only respond.
- The NRM is used for both point-to-point and multiple-point links

Asynchronous response mode (ARM):

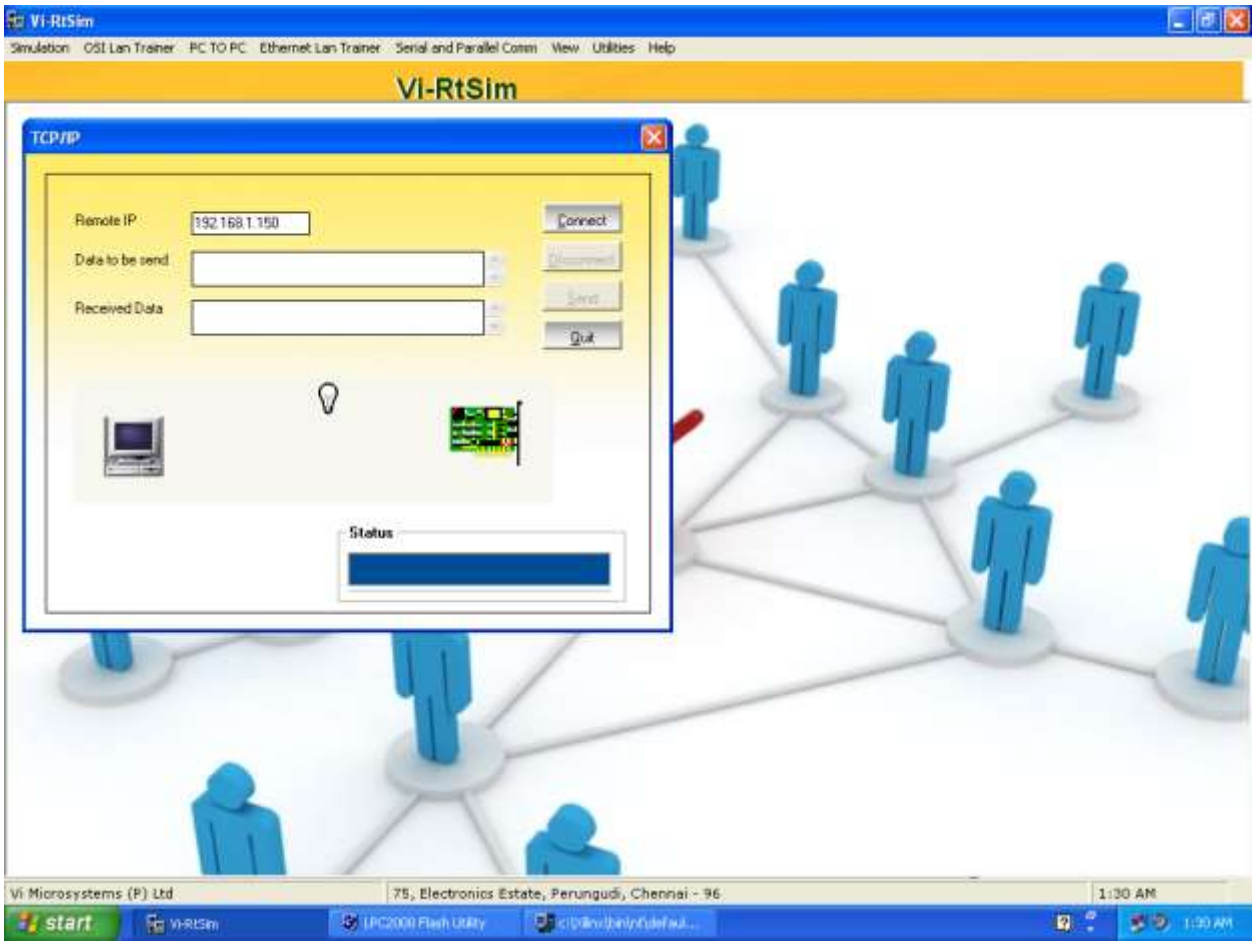
- In ARM, a secondary may initiate a transmission without permission from the primary whenever the channel is idle.
- ARM does not alter the primary and secondary relationship in any other way

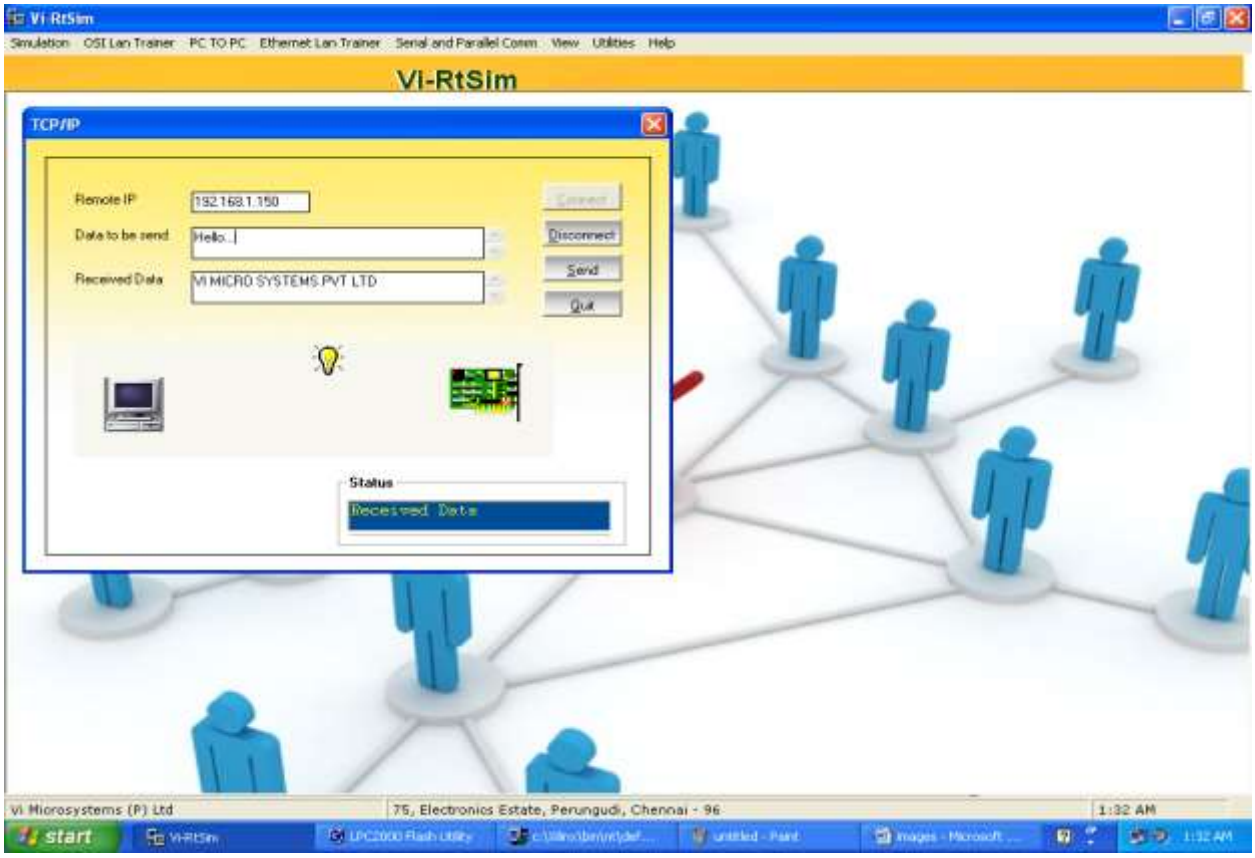
- All transmission from a secondary must still be made to the primary for relay to a final destination.

Asynchronous Balanced mode (ABM):

- In ABM, all stations are equal and therefore only combined stations connection in point to point are used.
- Either combined station may initiate with the other combined station without permission

	(NRM)	**(ARM)**	**(ABM)**
Station type	Primary and secondary	Primary and secondary	combined
Initiator	Primary	either	any




Vi-RtSim
Simulation OSI Lan Trainer PC TO PC Ethernet Lan Trainer Serial and Parallel Comm View Utilities Help
Vi-RtSim
TCP/IP
Remote IP 192.168.1.150
Data to be send Hello..
Received Data VI MICRO SYSTEMS PVT LTD
Connect
Disconnect
Send
Quit
Status
Received Data
Vi Microsystems (P) Ltd
75, Electronics Estate, Perungudi, Chennai - 96
1:32 AM
start


Vi-RtSim
Simulation OSI Lan Trainer PC TO PC Ethernet Lan Trainer Serial and Parallel Comm View Utilities Help
Vi-RtSim
TCP/IP
Remote IP 192.168.1.150
Data to be send Hello...
Received Data
Connect
Disconnect
Send
Quit
Hello...
Status
Completed Data Transmission
Vi Microsystems (P) Ltd
75, Electronics Estate, Perungudi, Chennai - 96
1:33 AM
start

Procedure:

- Start the process
- Write a program to free up all packet queue of HDLC channel
- Creat a HDLC channel
- Destroy the creat HDLC channel
- Reset the HDLC packet encoder function
- Write the HDLC packet decoder function
- Stop the process

Result:

- Thus the high data link control has been implemented successfully

Ex.No.5 . Implementation of IP Commands such as ping, Traceroute, nslookup.

(i) Java program to ping an IP address

Ping is a networking utility program or a tool to **test** if a particular host is reachable. It is a diagnostic that checks if your computer is connected to a server. **Ping**, a term taken from the echo location of a submarine, sends data packet to a server and if it receives a data packet back, then you have a connection

Aim:

To write the java program for simulating ping command.

Algorithm:

1.Start the program.
2.Get the frame size from the user
3.To create the frame based on the user request.
4.To send frames to server from the client side.
5.If your frames reach the server it will send ACK signal to client otherwise it will send NACK signal to client.
6.Stop the program

Program:

//pingclient.java

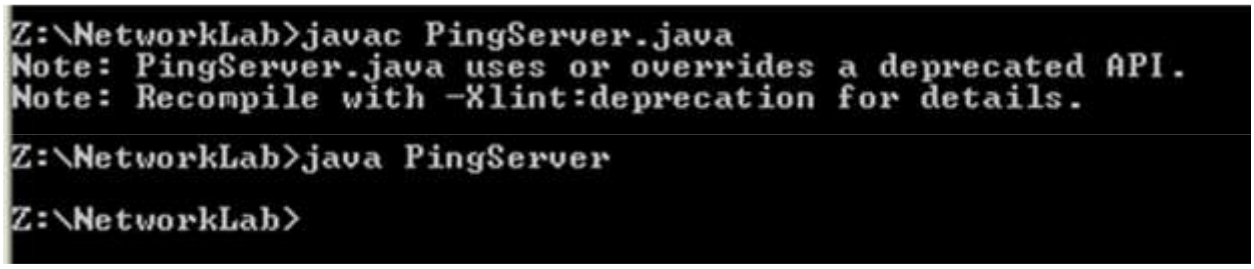
```
import java.io.*;
import java.net.*;
import java.util.Calendar;
class pingclient
{
public static void main(String args[])throws Exception
{
String str;
int c=0;
long t1,t2;
Socket s=new Socket("127.0.0.1",5555);
DataInputStream dis=new DataInputStream(s.getInputStream());
PrintStream out=new PrintStream(s.getOutputStream());
while(c<4)
{
t1=System.currentTimeMillis();
str="Welcome to network programming world";
out.println(str);
System.out.println(dis.readLine());
t2=System.currentTimeMillis();
System.out.println(";TTL="+(t2-t1)+"ms");
c++;
}
s.close();
} }
```

//pingserver.java

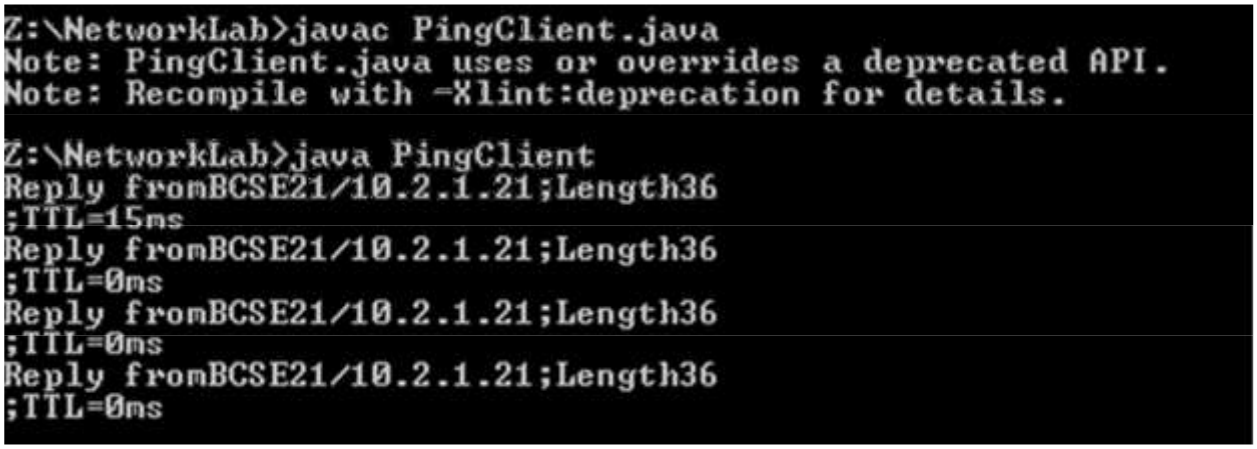
```
import java.io.*;
import java.net.*;
import java.util.*;

import java.text.*;
class pingserver
{
public static void main(String args[])throws Exception
{
ServerSocket ss=new ServerSocket(5555);
Socket s=ss.accept();
int c=0;
while(c<4)
{
DataInputStream dis=new DataInputStream(s.getInputStream());
PrintStream out=new PrintStream(s.getOutputStream());
String str=dis.readLine();
out.println("Reply from"+InetAddress.getLocalHost()+";Length"+str.length());
c++;
}
s.close();
} }
```

Output:

ServerSide:



ClientSide:



(i) Java program to traceroute an IP address

Traceroute is a **command** which can show you the path a packet of information takes from your computer to one you specify. It will list all the routers it passes through until it reaches its destination, or fails to and is discarded. In addition to this, it will tell you how long each 'hop' from router to router takes. Traceroute is a computer network diagnostic tool for displaying the route (path) and measuring transit delays of packets across an Internet Protocol (IP) network.

Aim:

To write the java program for simulating traceroute command.

Program :

```
import java.lang.*;
import java.io.*;
import java.net.*;
class Traceroute
{
   public static void main(String args[]){

   BufferedReader in;

      try{
         Runtime r  =  Runtime.getRuntime();
         Process p  =  r.exec("tracert www.google.com");

         in  =  new BufferedReader(new InputStreamReader(p.getInputStream()));

         String line;

         if(p==null)
            System.out.println("could not connect");

         while((line=in.readLine())!=null){

            System.out.println(line);

            //in.close();
         }

      }catch(IOException e){

      System.out.println(e.toString());

      }
   }
}
```

Output:

Tracing route to www.google.com [74.125.28.106]
over a maximum of 30 hops:

```
 1    70 ms    55 ms    70 ms  10.228.129.13
 2          87 ms    84 ms  10.228.149.14
 3    82 ms    85 ms          116.202.226.145
 4    95 ms    94 ms   136 ms  10.228.158.82
 5                    Request timed out.
 6    53 ms    55 ms    59 ms  116.202.226.21
 7    85 ms    74 ms    82 ms  72.14.205.145
 8    76 ms    75 ms    71 ms  72.14.235.69
 9   124 ms   114 ms   113 ms  216.239.63.213
10   181 ms   194 ms   159 ms  66.249.95.132
11   285 ms   247 ms   246 ms  209.85.142.51
12   288 ms   282 ms   283 ms  72.14.233.138
13   271 ms   283 ms   274 ms  64.233.174.97
14                    Request timed out.
15   269 ms   273 ms   283 ms  pc-in-f106.1e100.net [74.125.28.106]
```

Trace complete.

(ii) Java program to implement nslookup command

Theory:

nslookup is a **network** administration **command**-line tool available in many computer operating systems for querying the Domain Name System (DNS) to obtain domain name or IP address mapping, or other DNS records.The nslookup (which stands for name server lookup) command is a network utility program used to obtain information about internet servers. It finds name server information for domains by **querying** the Domain Name System. Most computer operating systems include a built-in command line program with the same name.

NSLookup is a command line utility that, given an IP address, returns the corresponding host name and vice versa. NSLookup can be found in most Unix/Linux systems and in some Microsoft Windows systems. This article explains how to write an NSLookup clone in Java.

InetAddress

The java.net.InetAddress class included in the Java Development Kit (JDK) contains all the methods we need to clone nslookup. Especially handy is it's getByName() method. getByName() takes a String object as it's sole parameter, either the host name or a String representation of the host's IP address must be passed in this parameter. InetAddress.getByName()returns an instance of InetAddress for this host. Once we have an instance of InetAddress obtained this way, we can call it's getHostByName() and getHostAddress() methods, which return the host name and IP address for the host, respectively.

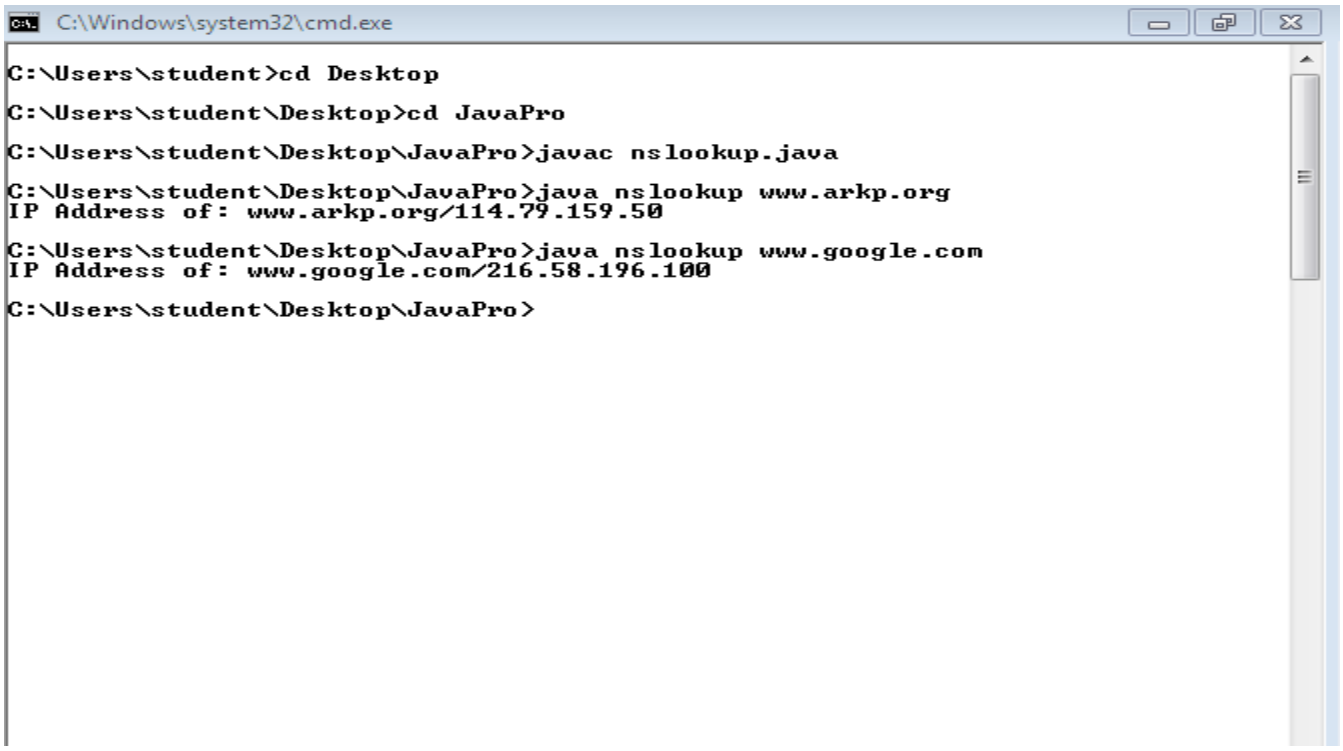
Aim:

To write a Program for nslookup Command in Java

Program:

```
/*nslookup*/
import java.net.*;
import java.*;
class nslookup
{
 public static void main(String args[]) throws UnknownHostException
 {
  String s=args[0];
  InetAddress ip = InetAddress.getByName(s);
  System.out.println("IP Address of: " +ip.toString());
 }
}
```

Output:



Result:

Thus the above program was successfully completed and verified.

Ex.No.6 Implementation of IP Addressing Configuration

Aim: To study about how to configure IP (Internet Protocol) address in my computer.

Theory: Static vs. Automatic IP Addressing

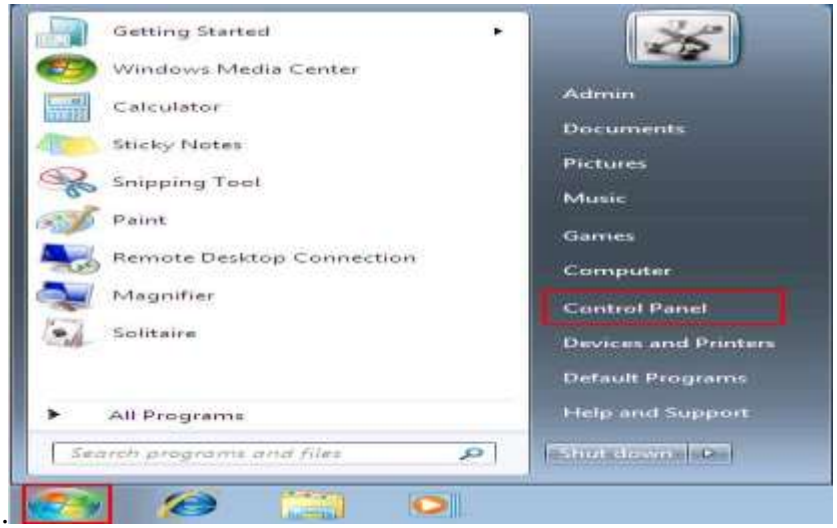
Right now, the IP addresses for your PCs and other devices are probably assigned automatically by your router using a procotol known as Dynamic Host Configuration Protocol (DHCP). It's a handy way for devices to connect to your network more easily, because you don't have to configure IP addressing for each new device yourself. The downside to automatic addressing is that it's possible for a device's IP address to change from time to time.Mostly, that's not a big deal, but there are times that you might want a device to have a static, unchanging IP address. For example:

- You have a device (like a home media server, say) that you want to be able to find reliably and you (or other devices) prefer to locate it by IP address. Using IP addresses is often much handier when troubleshooting your network, for example.
- You have certain apps that can only connect to network devices using their IP address. In particular, many older networking apps suffer this limitation.
- You forward ports through your router to devices on your network. Some routers play nice with port forwarding and dynamic IP addresses; others do not.

Whatever your reason, assigning static IP addresses to devices is not difficult, but you do have a choice to make—whether to do it from the router or on the device itself.

Procedure:

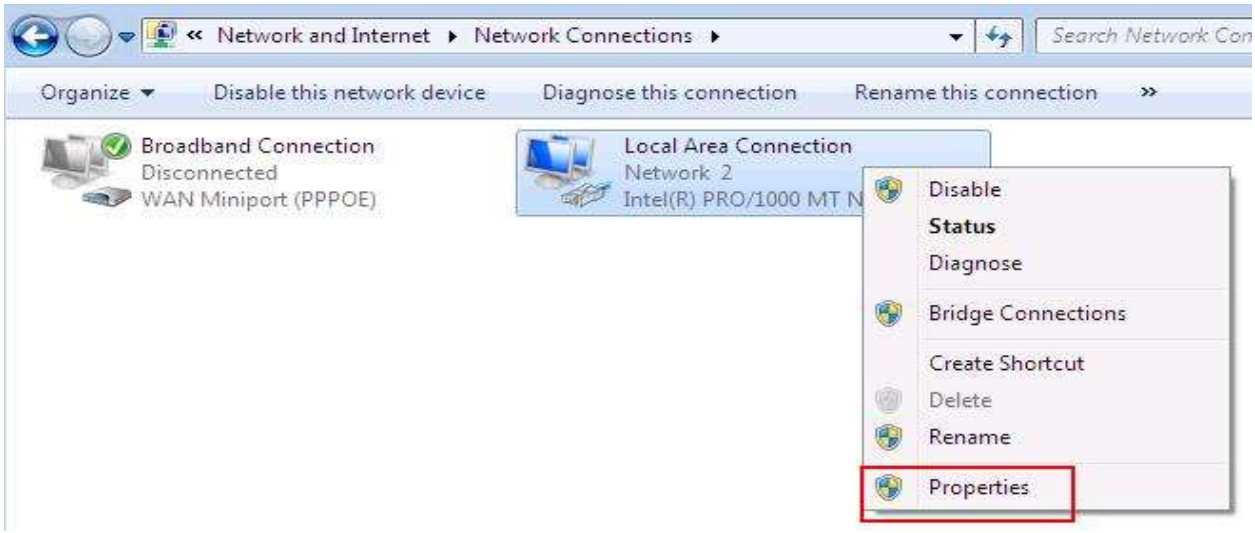
1.) Click the **"Start Icon"** located on the bottom left corner of the taskbar.Click **"Control panel".**



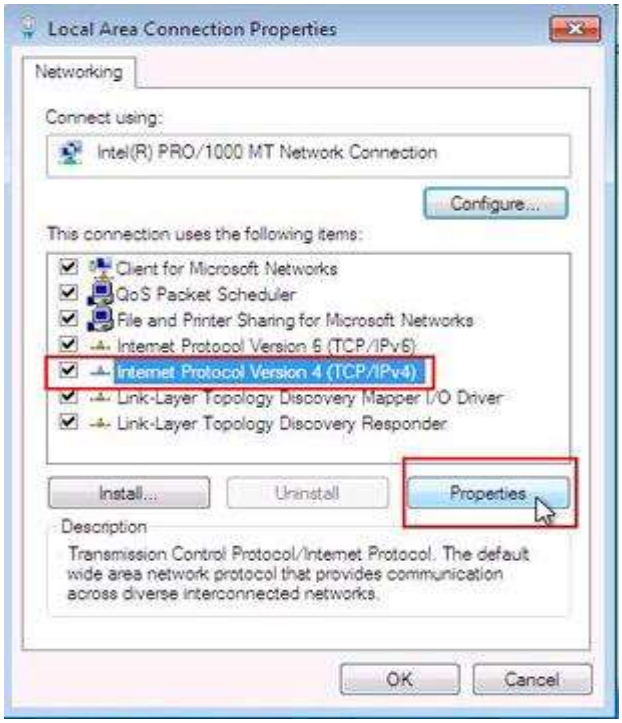
2.) Click **"View network status and tasks"**

3.) When the **"Network and Sharing Center"** window appears, click **"Change adapter settings"**.

4.) The **Network Connections** window opens, right-click **"Local Area Connection"** and click **"Properties"**.



5.) The **Local Area Connection Properties** window opens, click **"Internet Protocol Version 4 (TCP/IPv4)"**and click **"Properties"**.



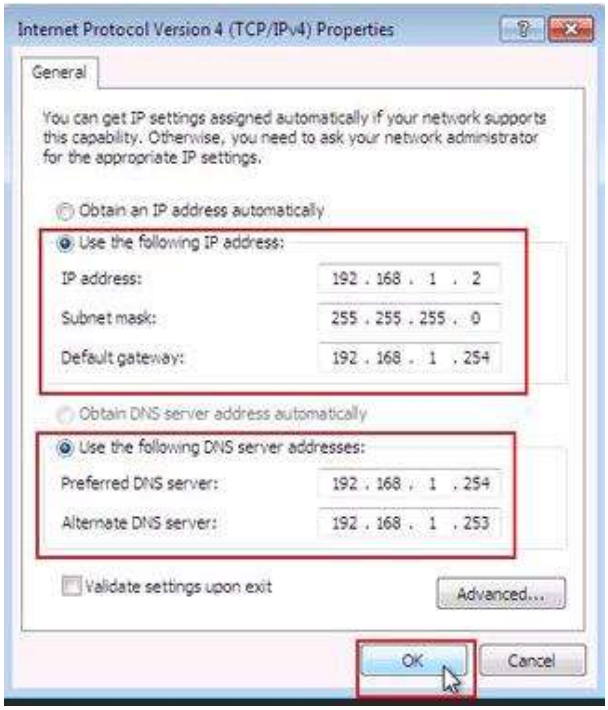
6.) In the next window, click **"Use the following IP address:"** and now you can type in the IP address, Subnet Mask and Default gateway that you want for this device on your network.

You can now configure the **"Preferred DNS server"** and **"Alternate DNS server".**

Remember if you don't want your device to communicate with the Internet or have access outside of your local network, then leave the "Default Gateway" field empty. This would be a great strategy when you have a home server in which you don't want a hacker from the Internet to access it. A little extra security tip :)

Click **"OK"** in the current window and **"OK"** again in the next window.

You have now configured this machine with static **Windows 7** IP settings. Test your default gateway by pinging it in the command prompt or going to a website. Your default gateway IP address is usually your local router. This can be your home Linksys router or any other router.



Result:

Thus the implementation procedure to configure IP address to a device is studied.

Ex. No: 7(a). Study of CSMA/CD using Simulation

AIM:

To Simulation and study the performance of CSMA/CD

APPARATUS REQUIRED:

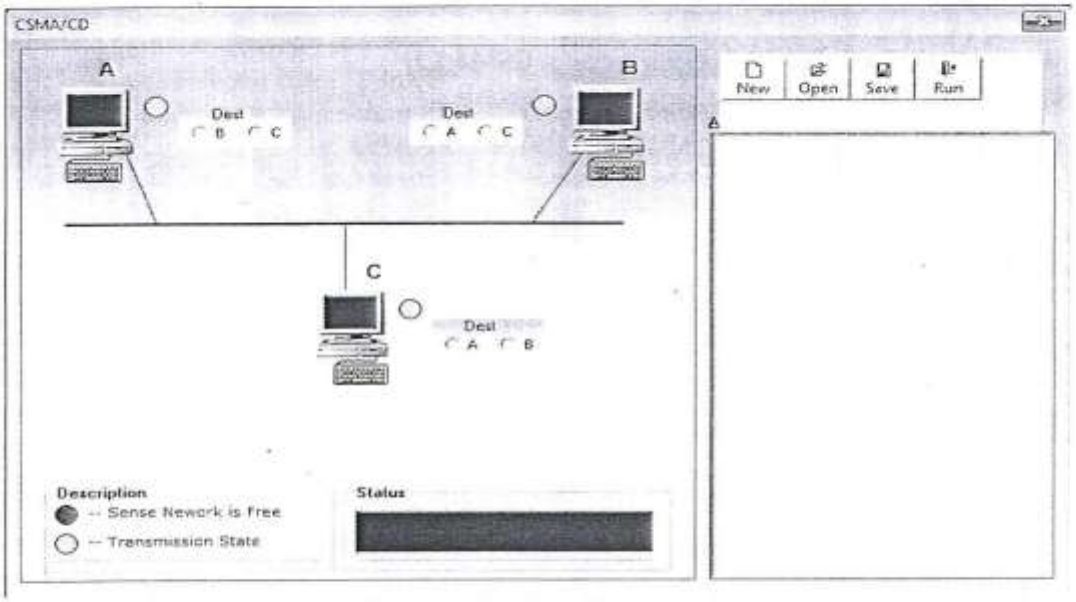
1. VI-RTSIM software.
2. Personal computer

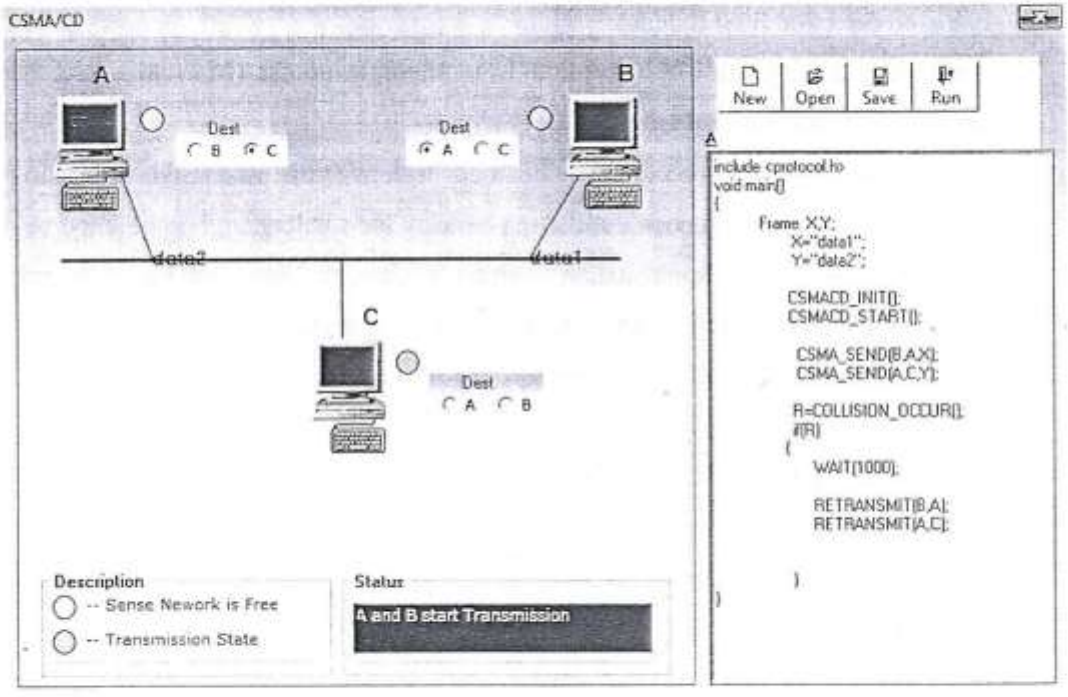
THEORY

CSMA/CD:

- A LAN needs mechanism to co-ordinate traffic, minimize the number of collision that occur and maximize the number of frames that are delivered successfully.
- The access mechanism used in an Ethernet is called carrier sense multiple access with collision detection [CSMA/CE]
- CSMA/CD is the result of evolution from multiple access (MA) to sense the carrier and finally to detect the collision.
- Access to the link was open to any node at any time with the assumption that adds of two devices completely for accesses at the same time were small enough to be important.
- In CSMA system, any work station wishing to transmit must first listen for exiting to traffic on the line. A device listens by checking for a voltage. A CSMA cut down on the no of collision does not eliminate them.
- The final step in the addition of CSMA/CD is collision detection. In CSMA/CD the station wishing to transmit the first listener to make certain time to transmits the link which is free, then transmits its data, then listen again.
- During the data transmission, the station checks the line for external high voltage that indicates collision.
- If a collision is detected, the station quits the current transmission and waits a predetermined amount of time for the to clear, then sends the data again.

PROGRAMMING ENVIRONMENT

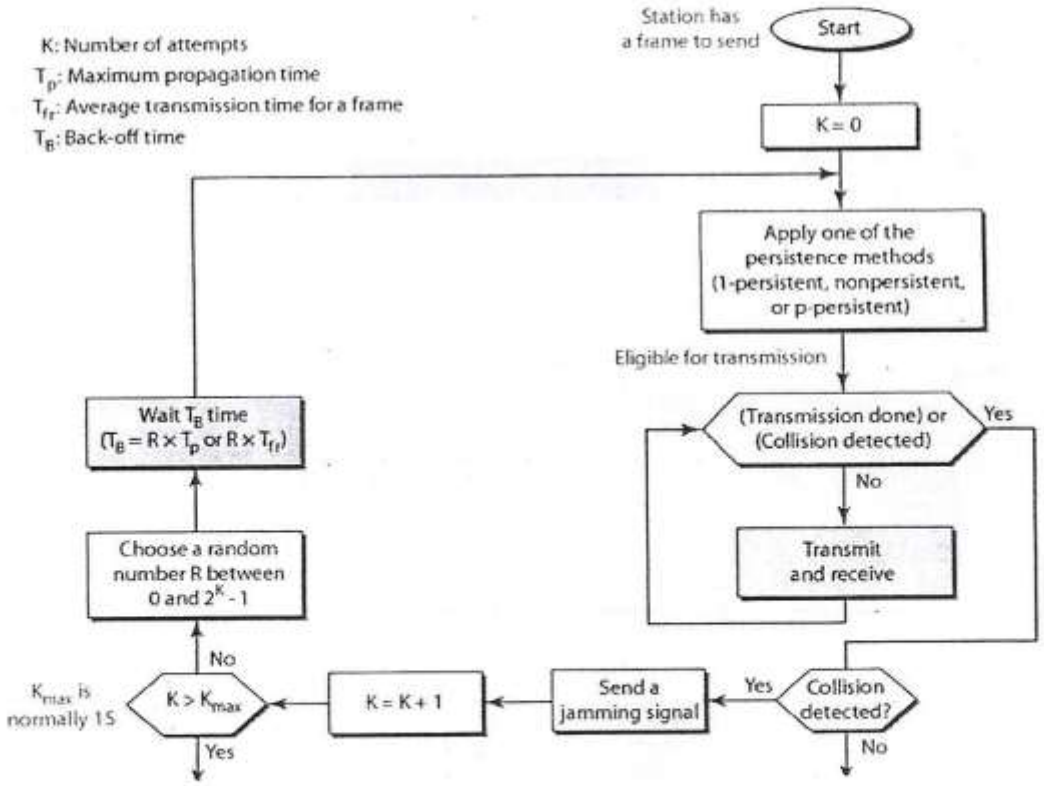




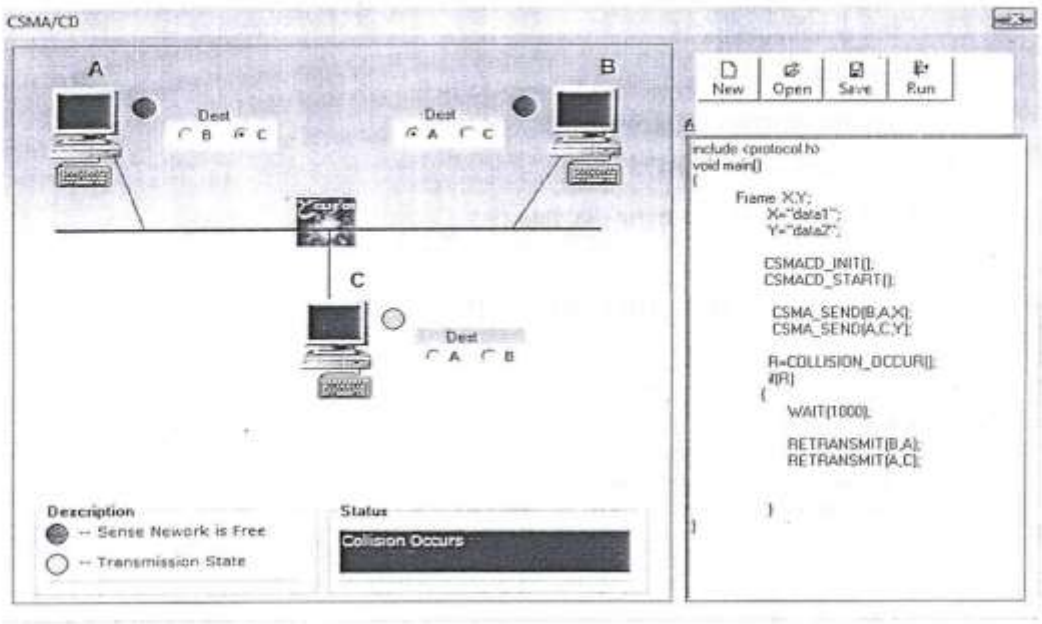
PROCEDURE

1. Open VI-RTSIM software from desktop
2. Click the Simulation menu bar
3. Select the "CSMA/CD" option
4. Type the program for "CSMA/CD"
5. Save the program to RUN.
6. Click the Run Button to run the program.

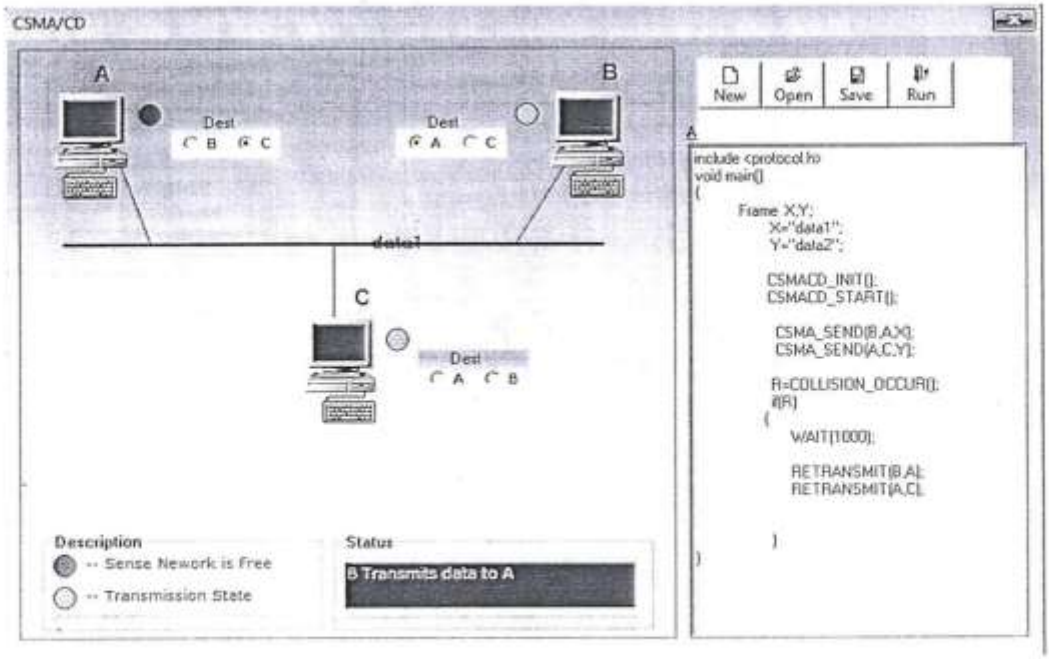
FLOW CHART FOR CSMA / CD

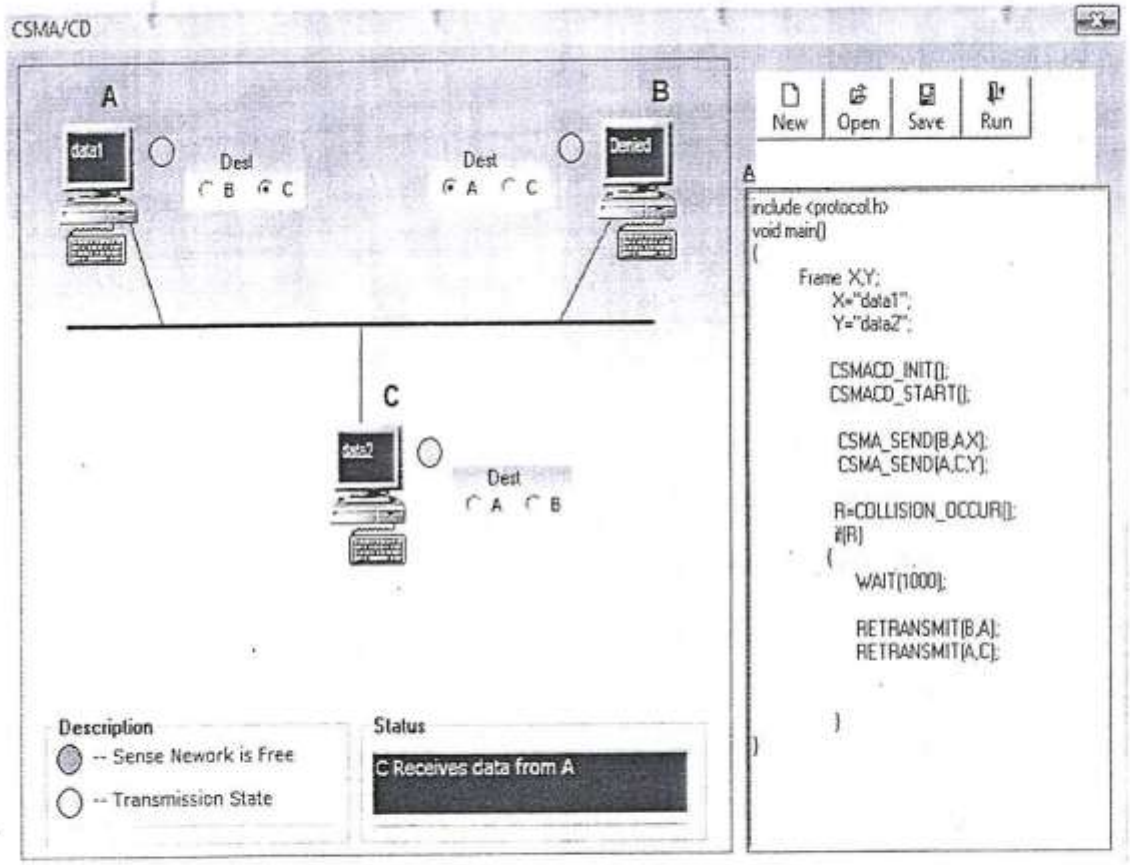


COLLISION OCCURANCE



DATA TRANSFER





Result:

Thus, the CSMA/CD has been simulated and studied.

Study of CSMA/CA using Simulation

Program:

```
include <protocol.h>
void main()
{
        Frame  X;

        X="data1";

        CSMACA_INIT();

        CSMACA_START();

        NODE_LISTEN();

        REQUESTTO_SEND(A,B);

        CLEARTO_SEND(B,A);

        DATATO_SEND(A,B,X);

        ACKNOWLEDGE(B,A);


}
```

MENU BAR

Ex. No: 7(b).Study of CSMA/CA using Simulation

AIM:

To Simulate and study the performance of CSMA/CA protocol.

APPARATUS REQUIRED:

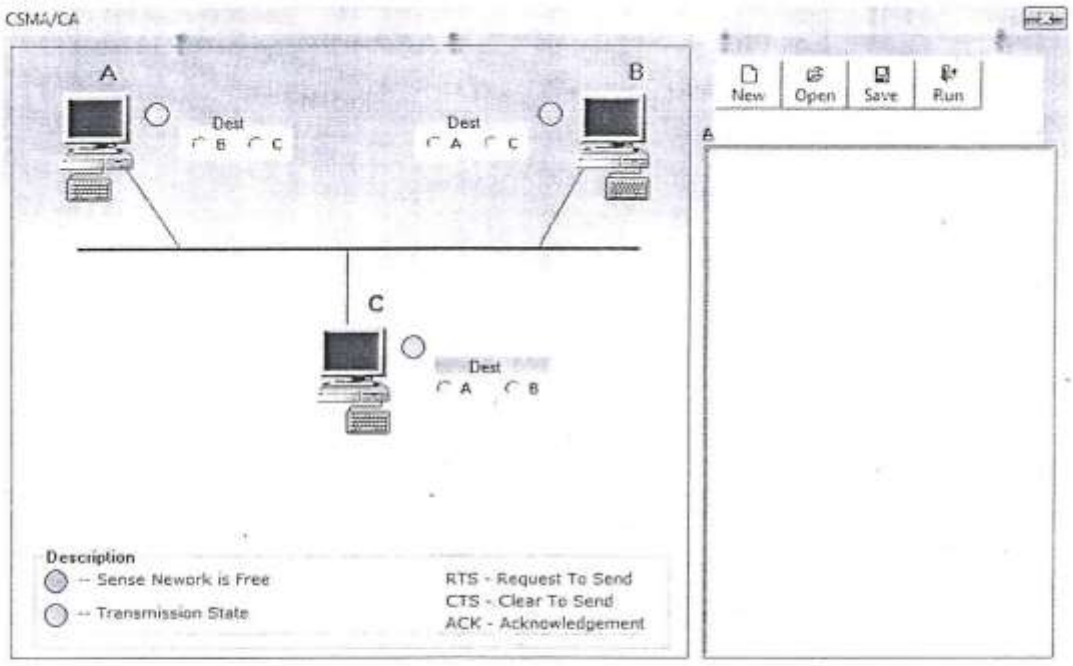
1. VI-RTSIM software.
2. Personal computer.

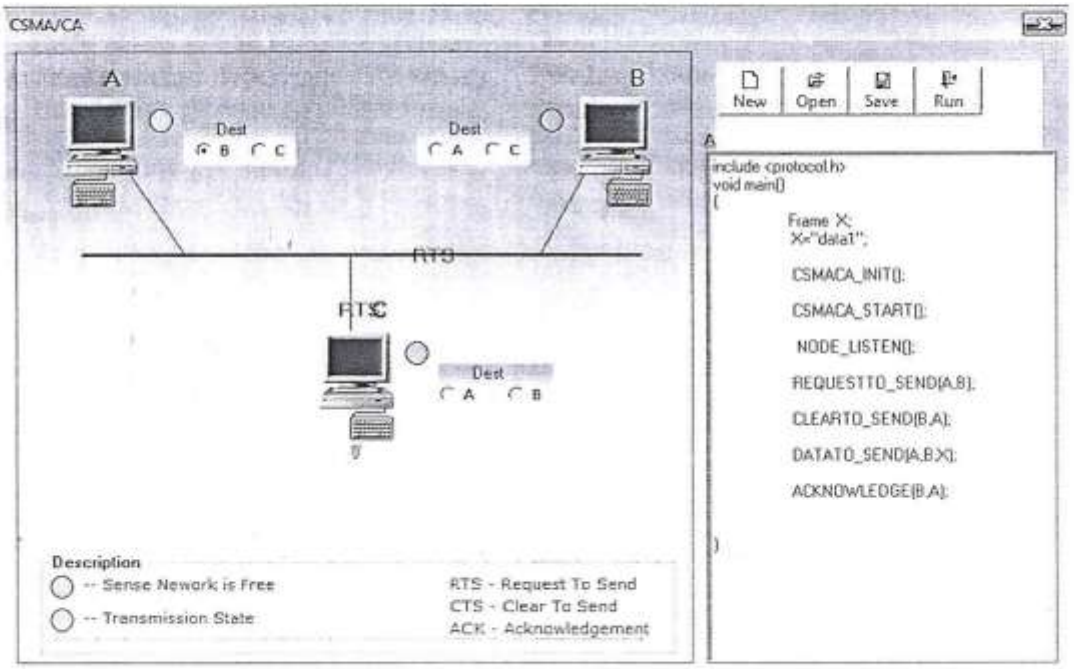
THEORY

CSMA/CA:

- Carrier sense Multiple Access/Collision Avoidance is the channel access mechanism used by most wireless LAN in the ISM bands.
- A channel access mechanism is the part of the protocol which specifies how the node uses the medium; when to listen, when to transmit.
- The protocol starts by listening on the channel (this is called carrier sense), and if it is found to be idle, it sends the first packets in the transmit queue.
- If it is busy (either another node transmission or interface), the node waits the end of the current transmission and then starts the contention (wait a random amount of time).
- When it's contention timer express, if the channel is still idle, the node sends the packet.
- The node having chose the shortest contention delay wins and transmits it's packet. The other nodes just wait for the next contention (at the end of this packet}
- Because the contention is a random number and done for every packets, each node is given an equal chance to access the channel (on average-it is statistic)

PROGRAMMING ENVIRONMENT

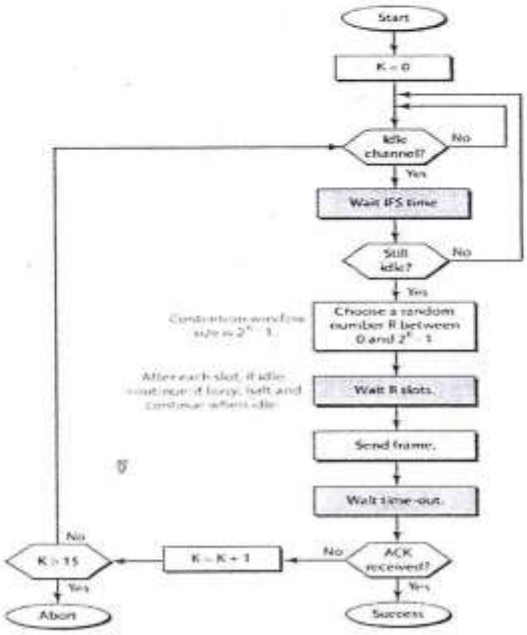


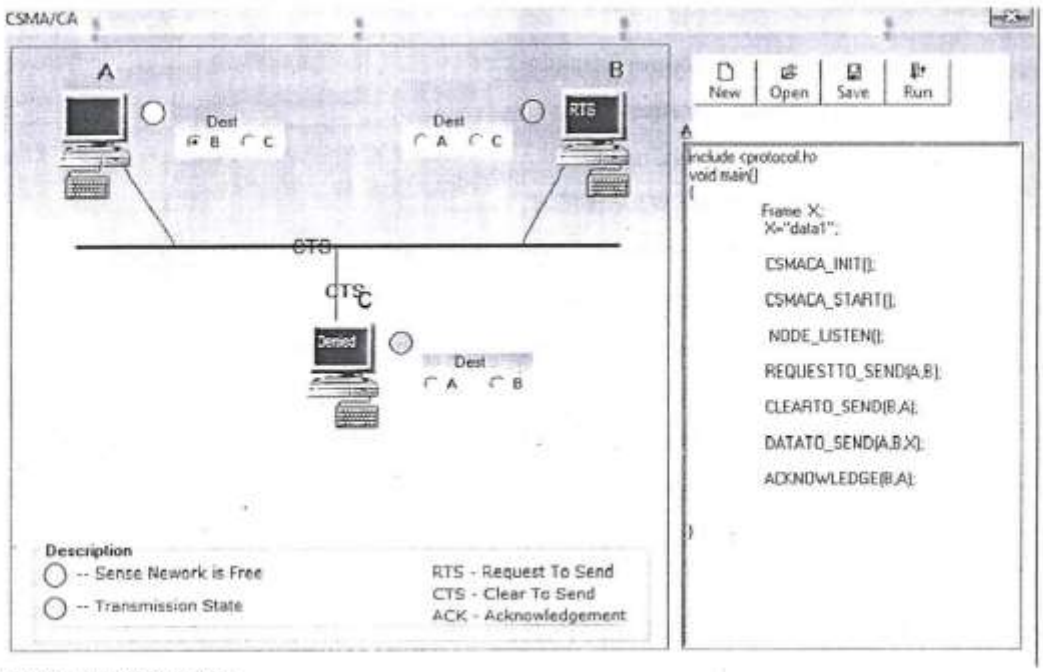


PROCEDURE

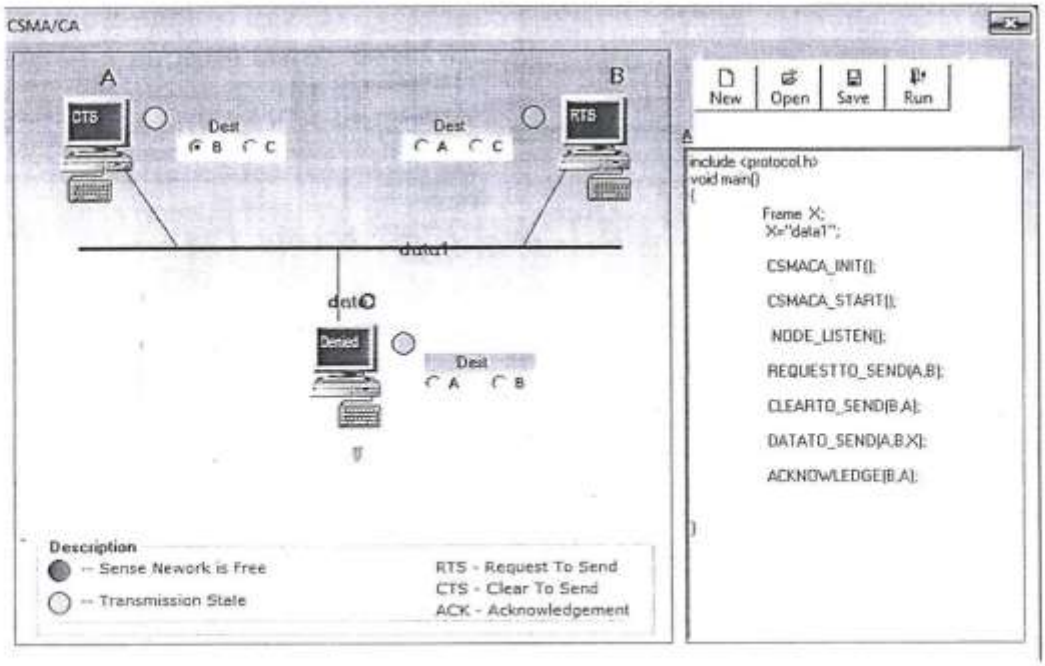
1. Open VI-RTSIM software from desktop
2. Click the Simulation menu bar
3. Select the "CSMA/CA" option
4. Type the program for "CSMA/CA"
5. Save the program to RUN.
6. Click the Run Button to run the program.
7. The source node "A" wants to sends the data to the destination node "B".
8. The source "A" send, Request To Send (RTS) signal to the destination node "B".
9. The destination node "B" send clear to send (CTS) to the source node "A".
10. Now the destination node "B" sends acknowledged "ACK" to source node "A".
11. Thus the data was transmitted successfully from node "A" to node "B"

FLOW CHART FOR CSMA/CA

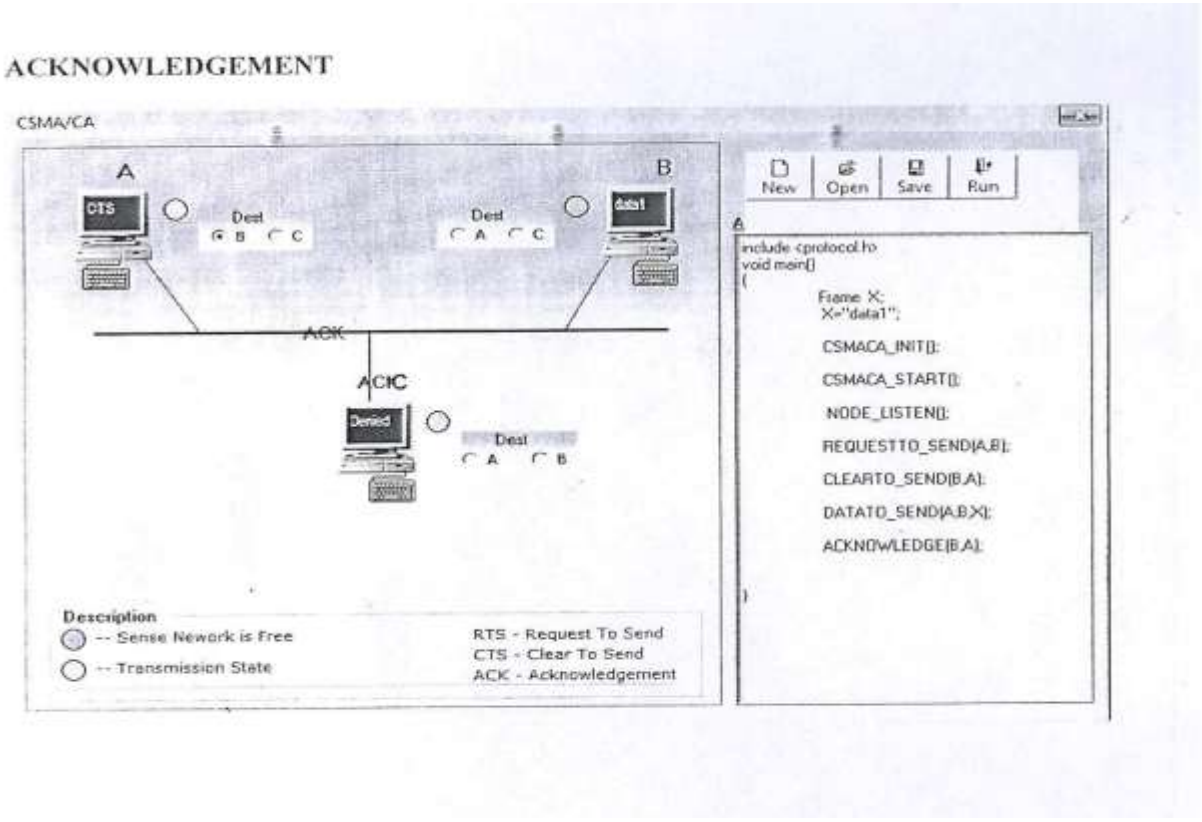




DATA TRANSFER

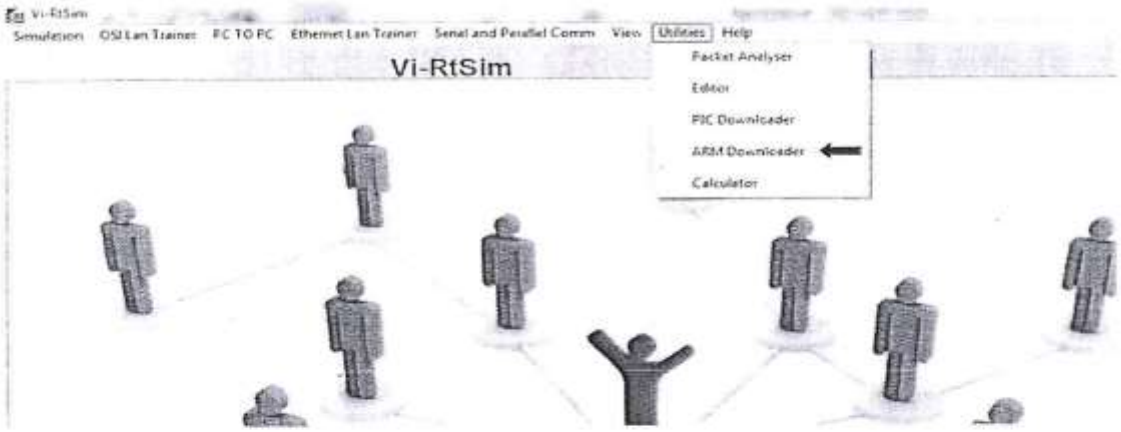


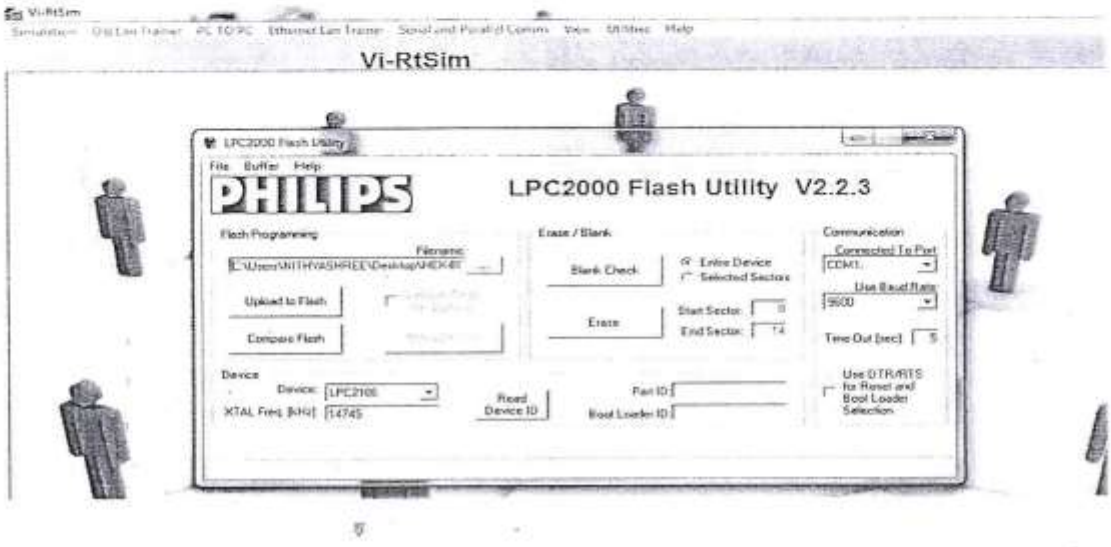
ACKNOWLEDGEMENT



Result:

Thus, the CSMA/CA has been simulated and studied


Vi-RtSim
Simulation OSI Lan Trainer PC TO PC Ethernet Lan Trainer Serial and Parallel Comm View Utilities Help
Vi-RtSim
Packet Analyser
Editor
PIC Downloader
ARM Downloader
Calculator


Vi-RtSim
Vi-RtSim
LPC2000 Flash Utility
File Buffer Help
PHILIPS
LPC2000 Flash Utility V2.2.3
Flash Programming
Filename:
Upload to Flash
Compare Flash
Erase / Blank
Blank Check
Erase
Entire Device
Selected Sectors
Start Sector:
End Sector:
Communication
Connected To Port:
COM1
Use Baud Rate:
9600
Time Out [sec]:
Device
Device:
LPC2106
XTAL Freq. [kHz]:
14745
Read Device ID
Part ID:
Boot Loader ID:
Use DTR/RTS for Reset and Boot Loader Selection

Ex No: 8. Network Topology - Star, Bus, Ring

AIM:

To implement the network topologies star, bus and ring using Vi-Rt sim.

APPARATUS REQUIRED:

1. VI-RTSIM software.
2. Personal Computer.
3. LAN connectivity cable.
4. LAN trainer kit.

THEORY:

NetworkTopologies

Topology refers to the way a network is laid out either physically or logically. Two or more devices connect to alink; two or more links form a topology. It is the geographical representation of the relationship of all the links and linking devices to each other.

1. Mesh
2. Star
3. Tree
4. Bus
5. Ring
6. Hybrid

STARTOPOLOGY:

Here each device has a dedicated link to the central _hub'. There is no direct traffic between devices. The transmission are occurred only through the central controller namely hub.

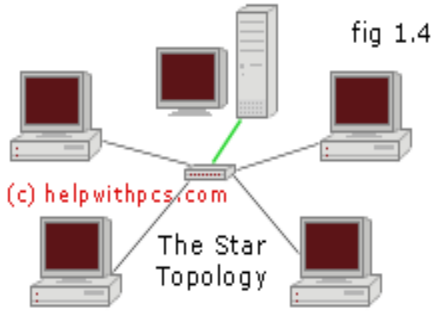


fig 1.4

Advantages:

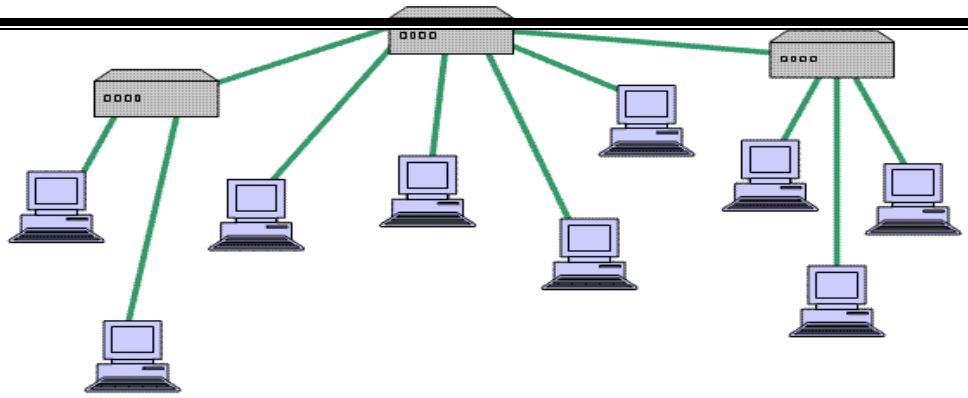
1.Less expensive then mesh since each device is connected only to the hub.
2.Installation and configuration are easy.
3.Less cabling is need then mesh.
4. Robustness.
5. Easy to fault identification &isolation.

Disadvantages:

1. Even it requires less cabling then mesh when compared with other topologies it still large.

TREE TOPOLOGY:

It is a variation of star .Instead of all devices connected to a central hub heremost of the devices are connected to a secondary hub that in turn connected with central hub. The central hub is an active hub . An active hub contains a repeater, which regenerate the received bit pattern before sending.



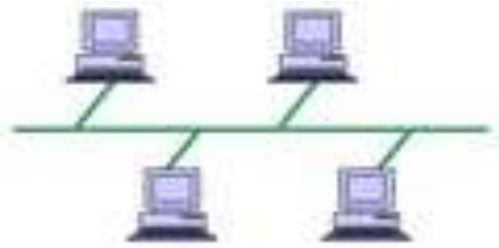
These condary hub maybe active or passive. A passive hub means it just precedes a physical connection only.

Advantages:

1. Can connect morethan star.
2. The distance can be increased.
3. Can isolate and prioritize communication between different computers.

BUSTOPOLOGY:

A bus topology is multipoint. Hereone long cable is act as a backbone to link all the devices are connected to the back bone by drop lines and taps. A drop line is the connection between the devices and the cable. A tap is the splice into the main cable or puncture the sheathing.



Advantages:

1. Ease of installation.
2. Less cabling.

Disadvantages:

1. Difficult reconfiguration and fault isolation.
2. Difficult to add new devices.
3. Signal reflection at top can degradation in quality
4. If any fault in backbone can stops all transmission

Ring topology

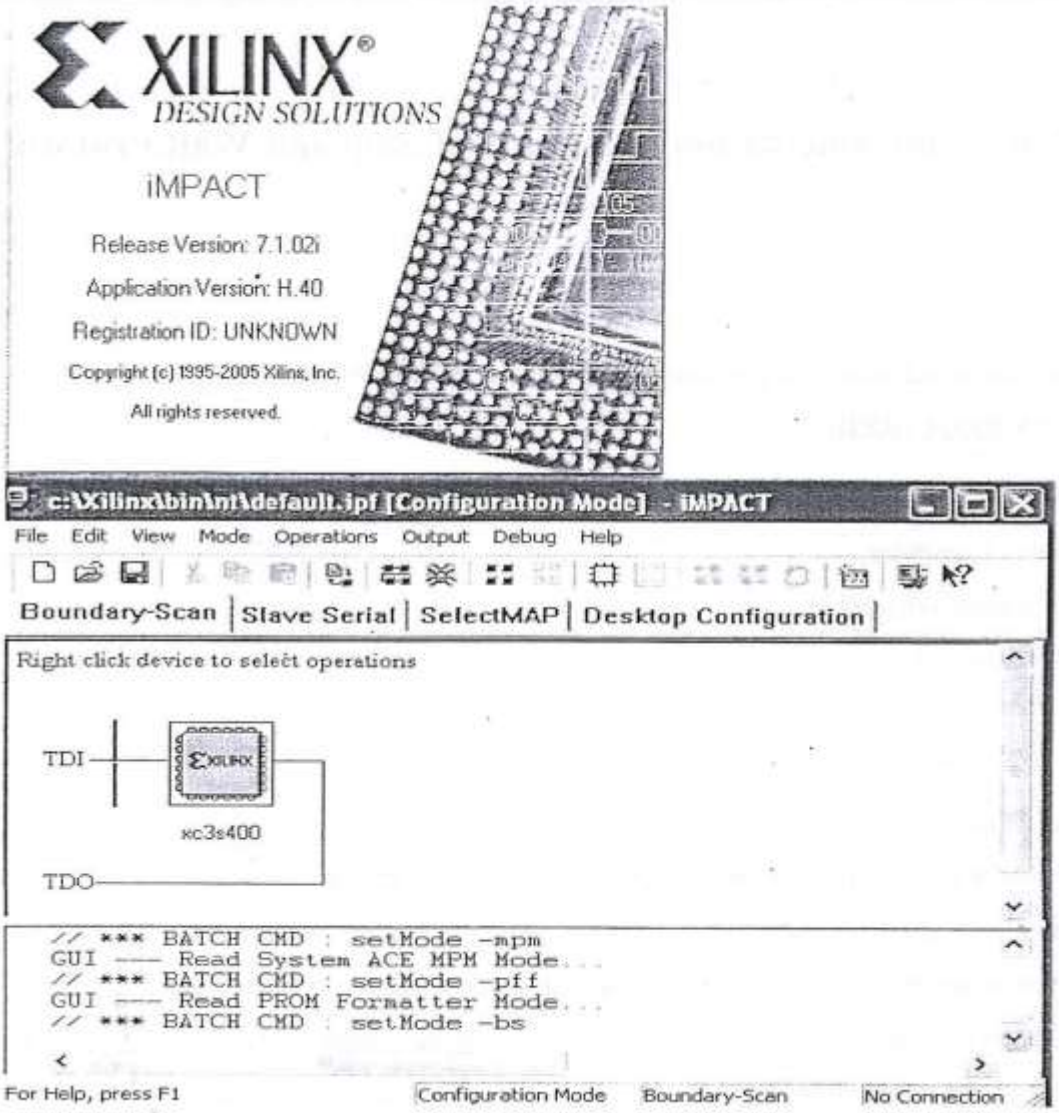
Each node is connected to exactly two other nodes, forming a ring. Can be visualized as a circular configuration. Requires at least three nodes

Advantages:

1. Easy to install.
2. Easy to reconfigure.
3. Fault identification is easy.

Disadvantages:

1. Unidirectional traffic.
2. Break in a single ring can break entire network.


XILINX®
DESIGN SOLUTIONS
iMPACT
Release Version: 7.1.02i
Application Version: H.40
Registration ID: UNKNOWN
Copyright (c) 1995-2005 Xilinx, Inc.
All rights reserved.
c:\Xilinx\bin\nt\default.ipf [Configuration Mode] - iMPACT
File Edit View Mode Operations Output Debug Help
Boundary-Scan | Slave Serial | SelectMAP | Desktop Configuration
Right click device to select operations
TDI
xc3s400
TDO
// *** BATCH CMD : setMode -mpm
GUI --- Read System ACE MPM Mode...
// *** BATCH CMD : setMode -pff
GUI --- Read PROM Formatter Mode...
// *** BATCH CMD : setMode -bs
For Help, press F1
Configuration Mode
Boundary-Scan
No Connection

PROCEDURE

Downloading "ARM"

- Open VI-RTSIM software from desktop
- Select the ARM Downloader from UTILITIES menu bar to download the ARM.
- Click Read device ID in the LPC 2000 flash UTILITIES to read the LAN trainer and reset the board at the programming mode and then click OK.
- Select the TOKENBUS.HEX ARM program to be downloaded to the trainer kit.
- Click "Upload to flash" button to upload the program to the LAN trainer.
- After downloading the program we can get the "Program uploaded successfully" message.

Downloading "FPGA"

- Now open the software "Impact" to download the FPGA.]
- Select "Create a new project" and clock on "OK".
- Select "configure devices using boundary scan (J-TAG) and click "finish" button.
- Select the TOKENBUS BIT FPGA program to be downloaded to the trainer kit.
- Right click on the device and "program" to download FPGA program.
- After downloading the program we can get the "program successfully" message.

Execution of network topologies program:

- Open VI-RTSIM software from desktop.
- Select network topologies such as star,bus and ring from OSI LAN Trainer menu bar.
- Enter the Parameter.
- At default setting press connect button to conform whether the connection is established or not. After connection is successfully established press start button.
- Enter the data on the field.
- After data field is entered, Sender send the data to receiver.

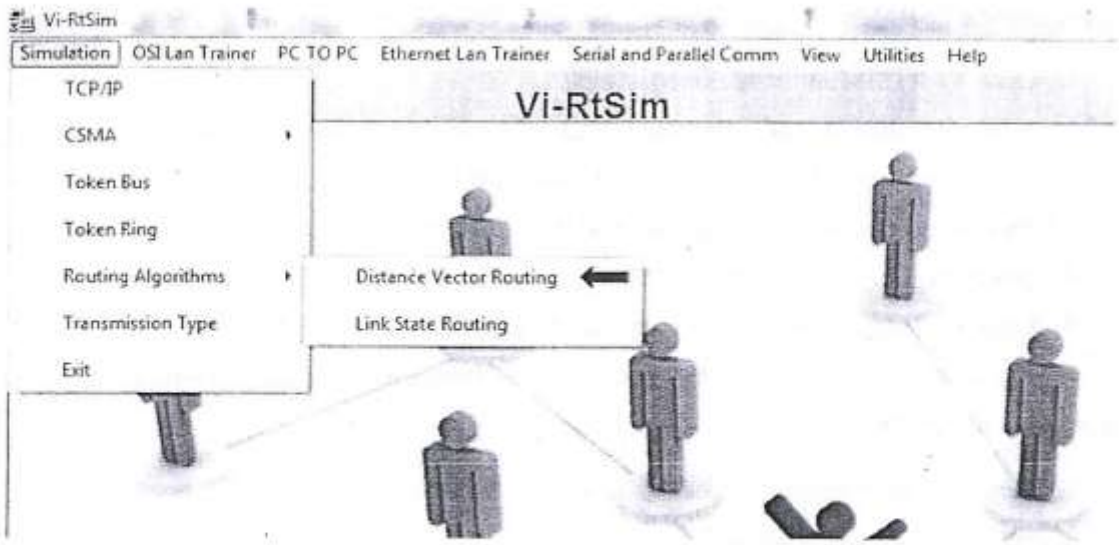

Vi-RtSim
Simulation OSI Lan Trainer PC TO PC Ethernet Lan Trainer Serial and Parallel Comm View Utilities Help
Vi-RtSim
Star Topology
Remote IP 192.168.1.100
Node 2
Data to be sent hai
Connection Status
Connected
Connect
Disconnect
Ping
Send
Refresh
Quit
2 hai
Status
Transmit Data 2 hai
Vi Microsystems (P) Ltd
75, Electronics Estate, Perungudi, Chennai - 96
1:14 AM
start

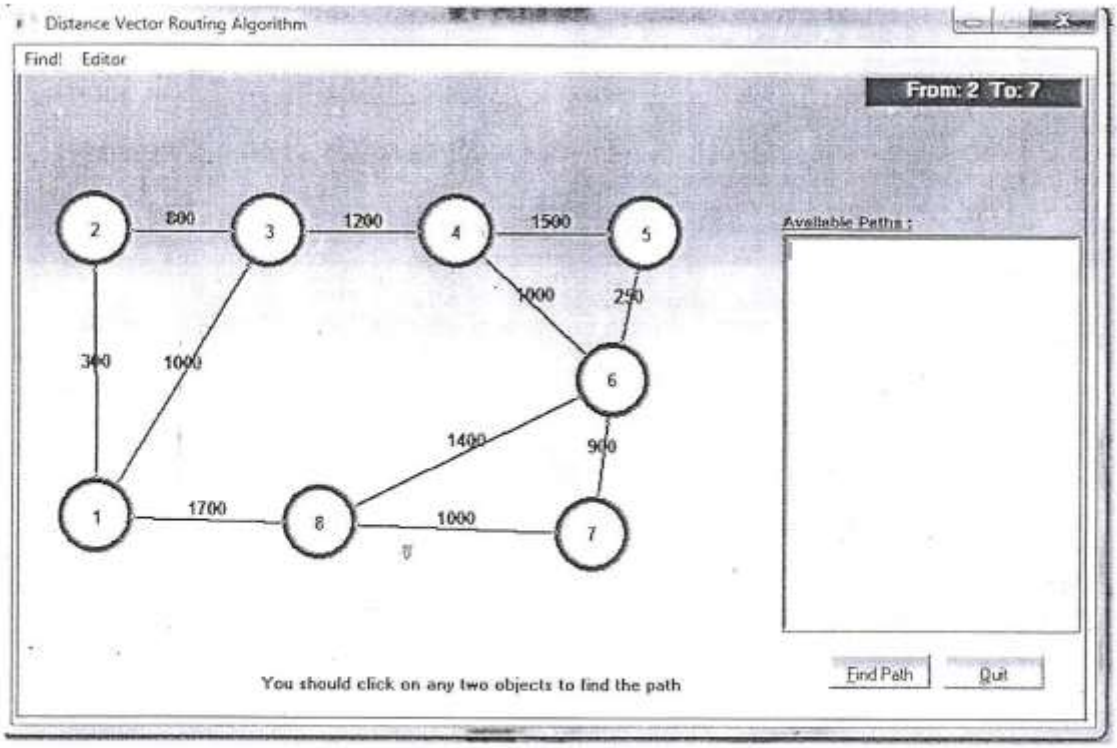

Vi-RtSim
Simulation OSI Lan Trainer PC TO PC Ethernet Lan Trainer Serial and Parallel Comm View Utilities Help
Vi-RtSim
Bus Topology
Remote IP 192.168.1.100
Node 2
Data to be sent hello
Connection Status
Connected
Connect
Disconnect
Ping
Send
Refresh
Quit
2 hello
Status
Transmit Data 2 and
Vi Microsystems (P) Ltd
75, Electronics Estate, Perungudi, Chennai - 96
1:18 AM
start

RESULT:

Thus the network topologies such as star, bus and ring have been implemented and its performance is analyzed.

IMPLEMENTATION OF DISTANCE VECTOR ROUTING ALGORITHM





Ex No: 9. Implementation of Distance – Vector Routing Algorithm

AIM:

To implement the Distance – Vector Routing Algorithm

APPARATUS REQUIRED:

1. VI-RTSIM software.
2. Personal computer.

THEORY:

Distance Vector Algorithm:

- A Distance vector routing, each router periodically share its knowledge about the entire network with it's neighbors.
- The three keys to under this algorithm are
    1. Knowledge about the whole network.
    2. Routing only to neighbor.
    3. Information sharing at regular intervals.

Knowledge about the whole work:

- Each router shares its knowledge about entire network. It sends all of its collected knowledge about the network to its neighbors.

Routing only to neighbor:

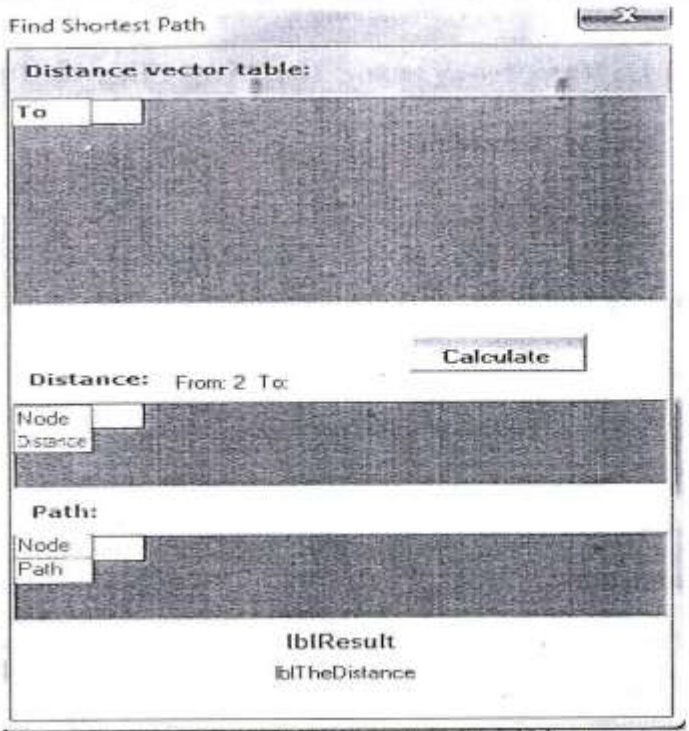
- Each router periodically sends its knowledge about the network only to those routers to which it has direct links. It sends whatever knowledge it has.

Information sharing at regular intervals:

- The every 30 seconds, each router sends its information about the whole network to its neighbors.

Sharing Information:

- LAN's are connected by router, represented by the assuming A, B, C, D, E and F.
- Distance vector routing simplifies the routing process by assuming a lost of one unit for every link.
- The efficiency of transmission is a function only of the number of links required to reach a destination. In this, the cost on hop count.



Find Shortest Path

Distance vector table:

To	1	2	3	4	5	6	7	8
1	0	300	1000	0	0	0	0	170(
2	300	0	800	0	0	0	0	(
3	1000	800	0	1200	0	0	0	(
4	0	0	1200	0	1500	1000	0	(
5	0	0	0	1500	0	250	0	(
6	0	0	0	1000	250	0	900	140(

Calculate

Distance: From: 2 To:

Node	1	2	3	4	5	6	7	8
Distance	300	0	800	2000	3250	3000	3000	2000

Path:

Node	1	2	3	4	5	6	7	8
Path	2	0	2	3	6	4	8	1

The path is: 7 <- 8 <- 1 <- 2

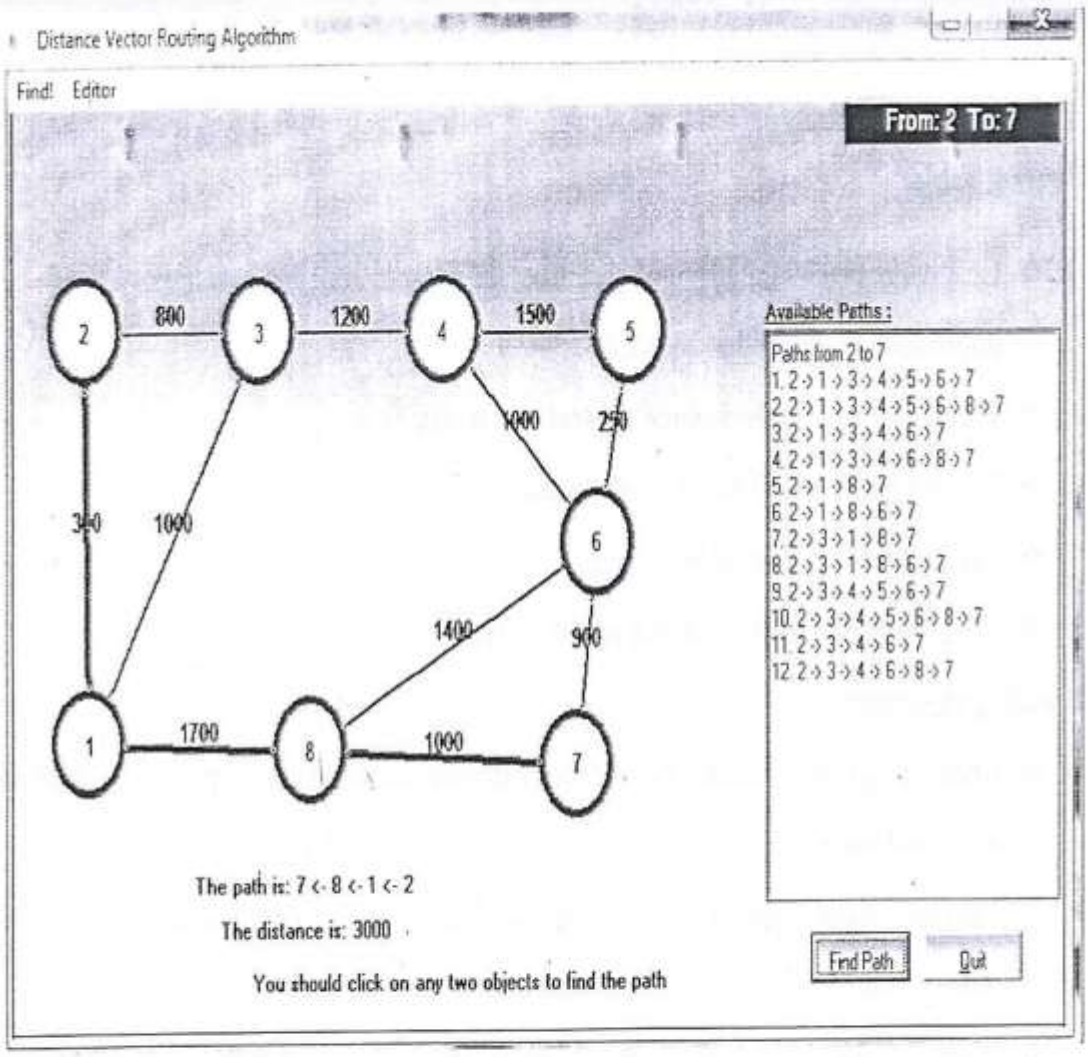
The distance is: 3000

Routing Table:

- Each router gets its initial knowledge about the internet work and how it uses shared information to update that knowledge.
- The routing table has e columns network lost router ID.
- The first block is final destination of packet.
- The second block is no of hop count.
- The third block is that to which a packet delivers must.

Updating algorithm:

- Updating algorithm requires that the router first has one hop to the hop count field for each advertised router.
- The router should apply the below rules to each router, if the advertised destination is not in routing table
- If next hop field is same, router should replace the entry in the table with advertised one.
- If next hop field is same, router should replace the entry in the table with advertised one.
- .If next hop field is not the same, advertised hop count is smaller than the one in the table, the router should replace the entry in the table with new one.
- IF advertised hop count is not smaller, the router should do no routing.


Distance Vector Routing Algorithm
Find! Editor
From: 2 To: 7
2
800
3
1200
4
1500
5
1000
250
340
1000
6
1400
900
1
1700
8
1000
7
Available Paths :
Paths from 2 to 7
1. 2 -> 1 -> 3 -> 4 -> 5 -> 6 -> 7
2. 2 -> 1 -> 3 -> 4 -> 5 -> 6 -> 8 -> 7
3. 2 -> 1 -> 3 -> 4 -> 6 -> 7
4. 2 -> 1 -> 3 -> 4 -> 6 -> 8 -> 7
5. 2 -> 1 -> 8 -> 7
6. 2 -> 1 -> 8 -> 6 -> 7
7. 2 -> 3 -> 1 -> 8 -> 7
8. 2 -> 3 -> 1 -> 8 -> 6 -> 7
9. 2 -> 3 -> 4 -> 5 -> 6 -> 7
10. 2 -> 3 -> 4 -> 5 -> 6 -> 8 -> 7
11. 2 -> 3 -> 4 -> 6 -> 7
12. 2 -> 3 -> 4 -> 6 -> 8 -> 7
The path is: 7 <- 8 <- 1 <- 2
The distance is: 3000
You should click on any two objects to find the path
Find Path
Quit

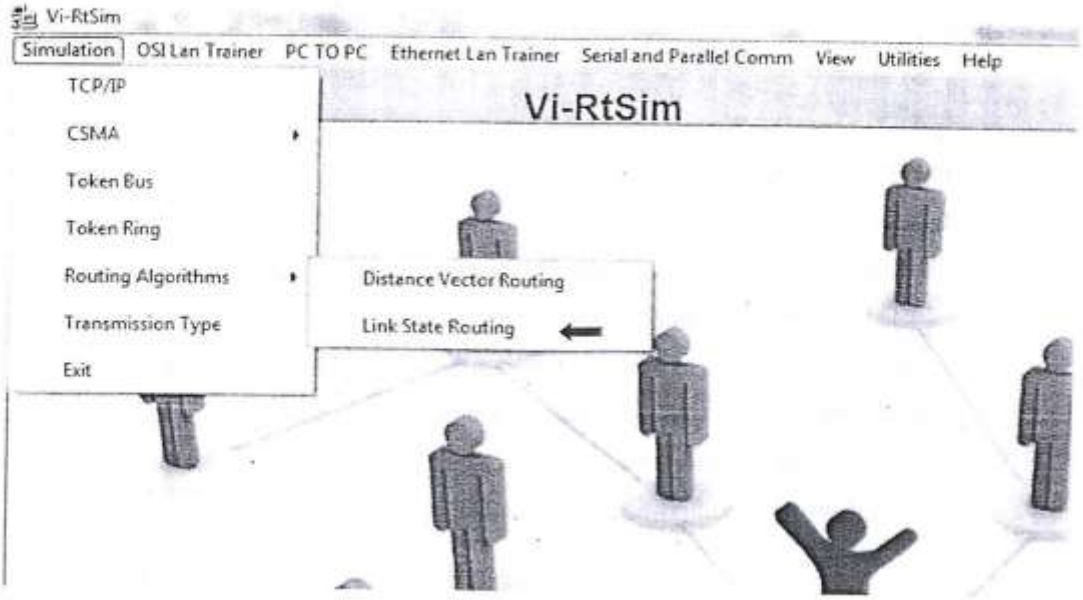
PROCEDURE

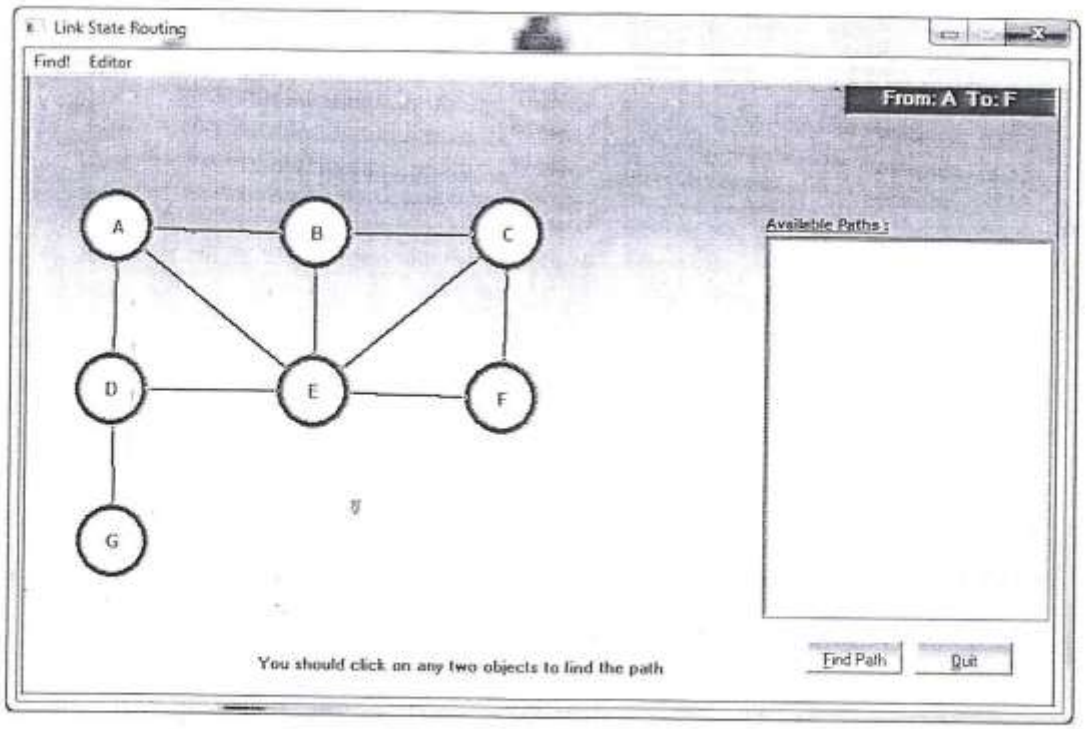
1. Open VI-RTSIM software from desktop
2. Click the Simulation menu bar
3. Select the “Distance – Vector Routing Algorithm” option from Routing algorithm menu bar.
4. Network with routers connected through link is drawn by using option in editor(add router, join link, delete router, delete link, Add caption to link, add caption to router)
5. Select any two nodes to find the shortest distance between them.
6. Click the Find path Button to run the program.
7. Now the shortest paths between the two nodes are calculated.

RESULT:

Thus Distance Vector routing algorithm has been implemented and shortest-path has been circulated.

IMPLEMENTATION OF LINK STATE ROUTING ALGORITHM





Ex No: 10. Implementation of Link State Routing Algorithm

AIM:

To implement the Link State Routing Algorithm

APPARATUS REQUIRED:

1. VI-RTSIM software.
2. Personal computer.

THEORY:

LinkState Vector Algorithm:

- In Link state routing, each router share its information of its neighbors with every other router in the inter-network.

Knowledge about the neighborhood:

- Instead of sending its entire routing table, a router sends information about its neighborhood only.

To all router:

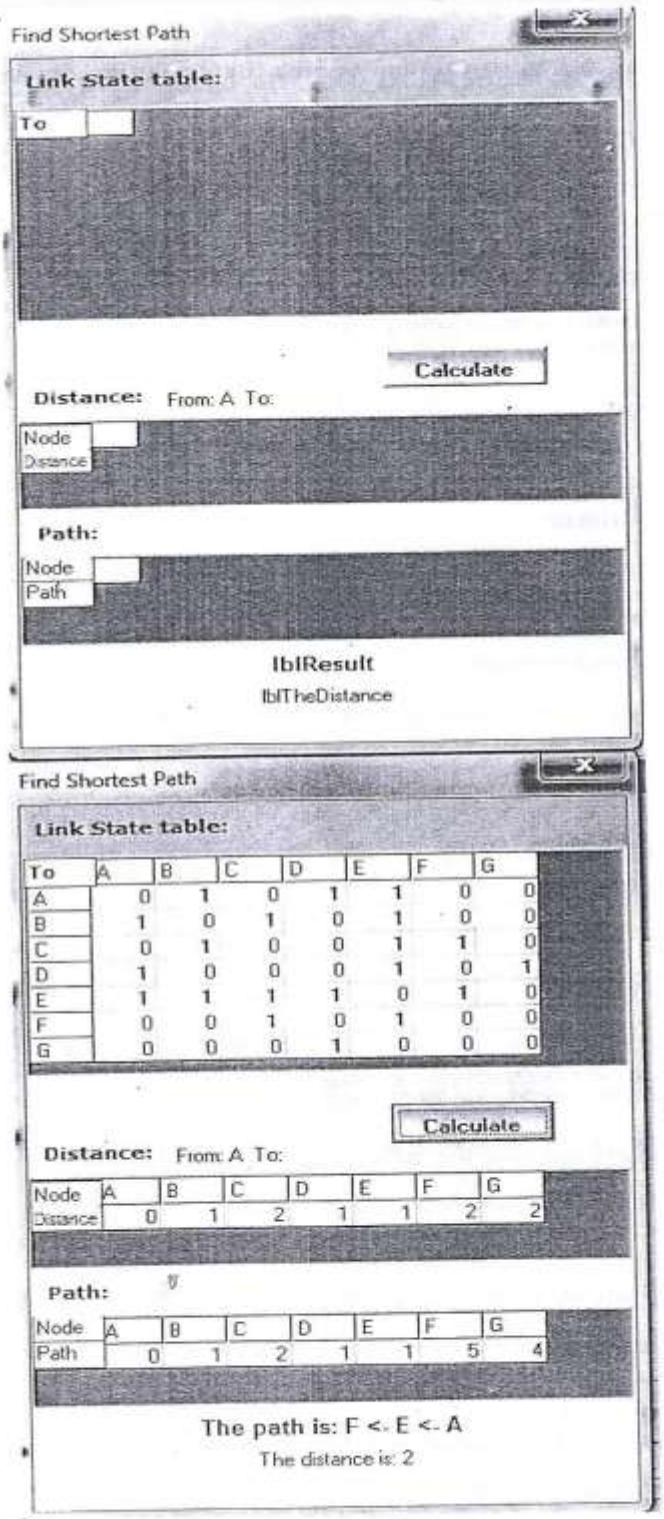
- Each router send this information to every other router on the internetworking, not just to its neighbors.
- If s does so by a process called “flooding” it means that a router sends its information.

Information sharing when there is a Change:

- Each router sends out information about the neighbors when there is a change.

Information sharing:

- Link state routing process use the same internet work as distance vector algorithm.
- Here each other sends its knowledge about is neighbors to every other router in the internet work.
- Cost is applied only by routers and not by any other station on a network, if cost was added by every station, instead of by routers alone, it would accumulate unpredictably.
- Cost is applied as a packet leaves the router rather then as if enters. Most networks are broadcast networks. When a packet is in network every station, including the router, can pick it up, we cannot assign any cost to a packet.


Find Shortest Path
Link State table:
To
Calculate
Distance: From: A To:
Node
Distance
Path:
Node
Path
lblResult
lblTheDistance
Find Shortest Path
Link State table:
To A B C D E F G
A 0 1 0 1 1 0 0
B 1 0 1 0 1 0 0
C 0 1 0 0 1 1 0
D 1 0 0 0 1 0 1
E 1 1 1 1 0 1 0
F 0 0 1 0 1 0 0
G 0 0 0 1 0 0 0
Calculate
Distance: From: A To:
Node A B C D E F G
Distance 0 1 2 1 1 2 2
Path:
Node A B C D E F G
Path 0 1 2 1 1 5 4
The path is: F <- E <- A
The distance is: 2

Link state packet:

- When a router floods the network with information about its neighborhood, it is said to be advertising. The basis of this advertising is a short packet called a link state packet (LSP).

Advertiser	Network	Cost	Neighbor

Getting information about neighbors:

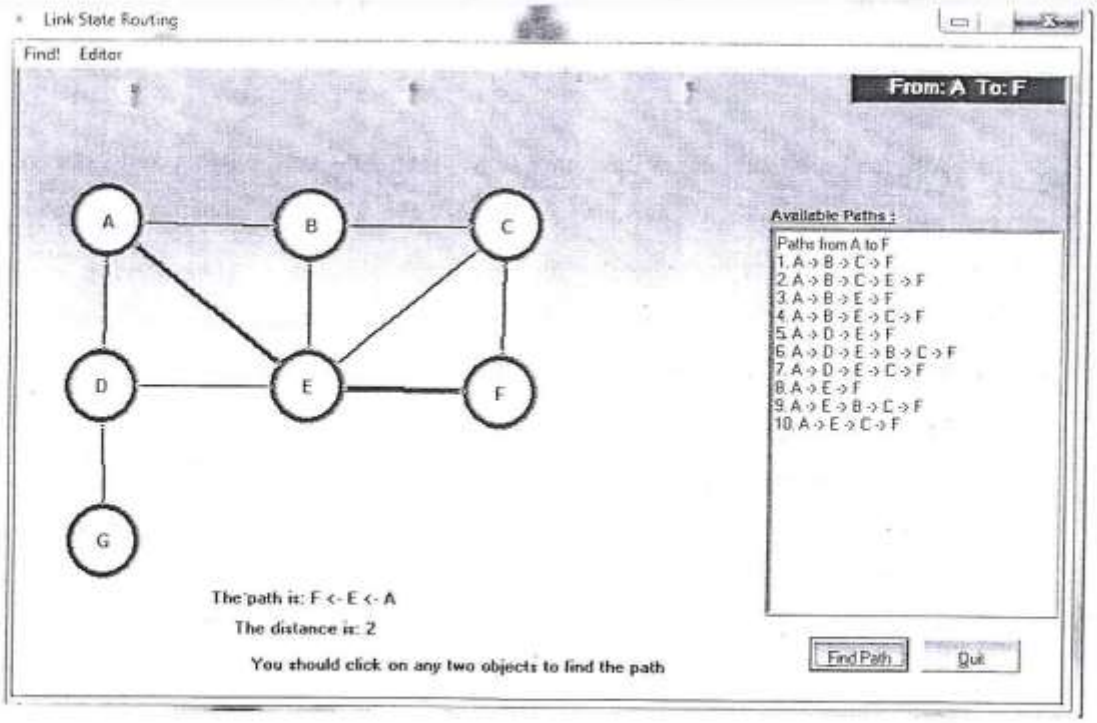
- A router gets its information about its neighbors by periodically sending them a short greeting packet.
- If the neighbor responds to the greeting as expected, it is assumed to be alive and functioning.

Initialization:

- Imagine that all routers in our sample internet work come up at the same time.
- Each router sends a greeting packet to its neighbors to find out the state of each link.

Link – State Database:

- Every router every LSP and puts the information into a link-state database.
- Because every router receives the same LSPs every router builds the same database.
- It stores this database on its disk and uses it to calculate its routing table. If a router is added to be deleted from the system, the whole database must be shared for fast updating.


Link State Routing
Find! Editor
From: A To: F
A
B
C
D
E
F
G
Available Paths :
Paths from A to F
1. A -> B -> C -> F
2. A -> B -> C -> E -> F
3. A -> B -> E -> F
4. A -> B -> E -> C -> F
5. A -> D -> E -> F
6. A -> D -> E -> B -> C -> F
7. A -> D -> E -> C -> F
8. A -> E -> F
9. A -> E -> B -> C -> F
10. A -> E -> C -> F
The path is: F <- E <- A
The distance is: 2
You should click on any two objects to find the path
Find Path
Quit

PROCEDURE

1. Open VI-RTSIM software from desktop
2. Click the Simulation menu bar
3. Select the “Link State Routing Algorithm” option from Routing algorithm menu bar.
4. Network with routers connected through link is drawn by using option in editor(add router, join link, delete router, delete link, Add caption to link, add caption to router)
5. Select any two nodes to find the shortest distance between them.
6. Click the Find path Button to run the program.
7. Now the shortest paths between the two nodes using link state routing algorithm was calculated.

RESULT:

Thus Link-State routing algorithm has been implemented and shortest-path has been circulated

Ex.No:11 Study of network simulation (NS) and Simulation of congestion control algorithm using NS

Aim:

To study about the network simulation NS OPNET and to configure and analyze performance of the congestion control algorithm in TCP using OPNET.

Apparatus Required:

- Personal Computer
- Unio
- OPNET software

Theory:

OPNET is a higher level client based network level simulation at separate packet level originally built for simulation for fixed network .OPNET contain a huge lib of accurate model of commercially available fixed network hardware and protocol how a day.The possibilities for wireless network simulation are also very circle accurate radio transmission pipeline stage for modelling of physical layer.Simulate has a lot of potential but there is exists typically a lock of recent wireless system much.

Structure of OPNET:

OPNET consists of high level user interface which is constructed from C++ source code blocks with a huge liberly of OPNET specific.Network and sub networks ,network topologies geographical co-ordinates mobility.

Various tools of OPNET:

- Network model editor
- Node modeleditor
- Process model editor
- Packet format editor
- OPNET Simulation virvers

Simulation of congestion control algorithm procedure create a project

- ->start reversed module academics editions choose new from file menu.
- ->select project and click of name project top scenario no drop click ok
- ->close pallete
- ->rename objects you added as shown and then save your project

Configure the west socket:

Double click on west subnet mode you get an empty workspace indicating that subnet contain object.

->open object parameter & make source that internet toolbar item selected from ball down.

->Add following item to subnet workspace one scheme serves one internet 4 ships at 100 least.

->Close the pallete to rename object as shown.

->Server west ->route west

->right click on server west node -> edit attributes.

Convert to subnet of IP closed:

->Open object palleteusing two PPP-DS3 bidirectional links connect to last subnet IP & west subnet IP word.

->close pallete.

View the Reset:

Switch to the drop no fast scenario& click

Various menu result in view menu.

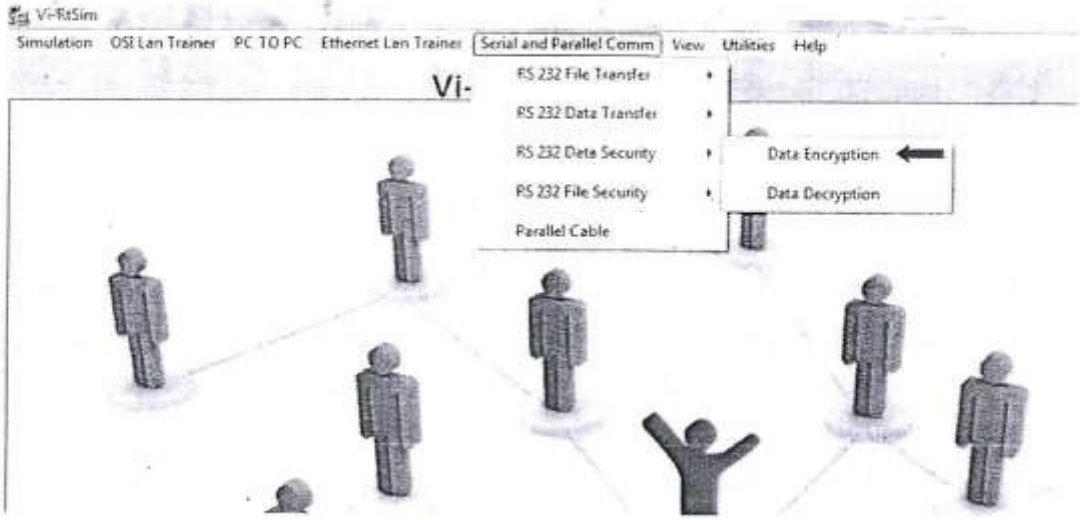
To zoom in an details in graph click and drag on name.

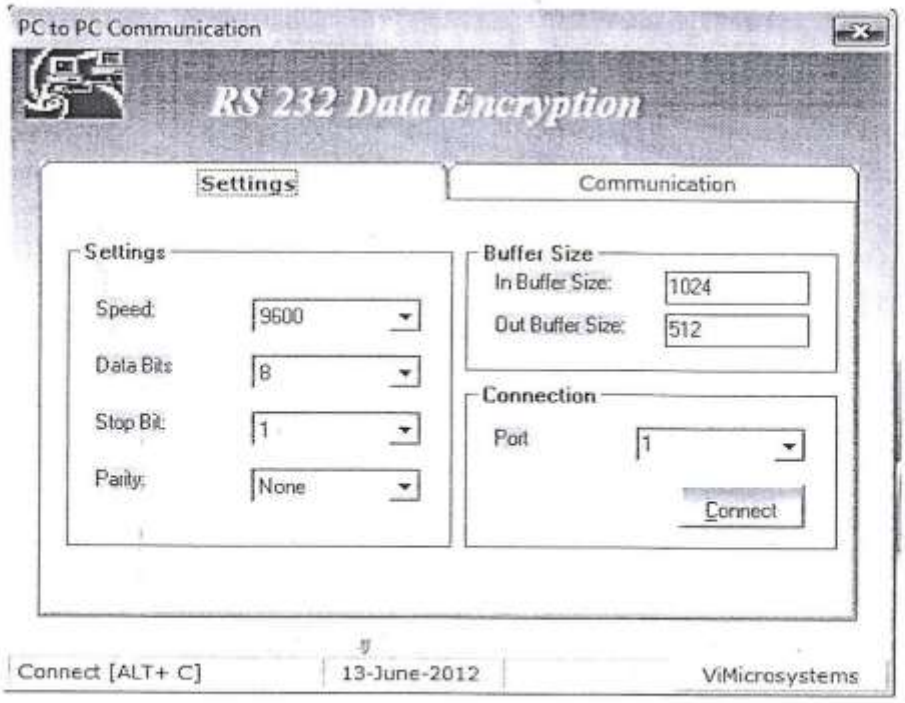
Graph should noted down to resemble fral with every drop close view result dialog box.

Result:

Thus the congestion algorithm in top has been simulated successfully using OPNET.

Implementation of Data Encryption and Decryption.





Ex.No.12 Implementation of Encryption and Decryption Algorithms using any programming language

Aim: To write a C program for Implementing Encryption and Decryption by using Caesar Cipher Algorithms.

Algorithm:

1.Start the program
2. Input the string that you want to encrypt.
3. Choose the key to encrypt the string.
4.Perform encryption by adding the key to each character of the input string.
5. Perform decryption by subtracting the key to each character of the input string.
6.Print the result.

Program:

//SIMPLE C PROGRAM TO ENCRYPT AND DECRYPT A STRING USING CAESAR CIPHER ALGORITHM

```
#include <stdio.h>
int main()
{
  int i, x;
  char str[100];

  printf("\nPlease enter a string:\t");
  gets(str);
  printf("\nPlease choose following options:\n");
  printf("1 = Encrypt the string.\n");
  printf("2 = Decrypt the string.\n");
  scanf("%d", &x);
  //using switch case statements
  switch(x)
  {
  case 1:
    for(i = 0; (i < 100 && str[i] != '\0'); i++)
      str[i] = str[i] + 3; //the key for encryption is 3 that is added to ASCII value

    printf("\nEncrypted string: %s\n", str);
    break;
  case 2:
    for(i = 0; (i < 100 && str[i] != '\0'); i++)
      str[i] = str[i] - 3; //the key for encryption is 3 that is subtracted to ASCII value
    printf("\nDecrypted string: %s\n", str);
    break;
  default:
    printf("\nError\n");
  }
  return 0;
}
```

Output:

#Encryption

```
Please enter a string:  hello

Please choose following options:
1 = Encrypt the string.
2 = Decrypt the string.
1

Encrypted string: khoor

Process returned 0 (0x0)   execution time : 8.564 s
Press any key to continue.
```

#Decryption

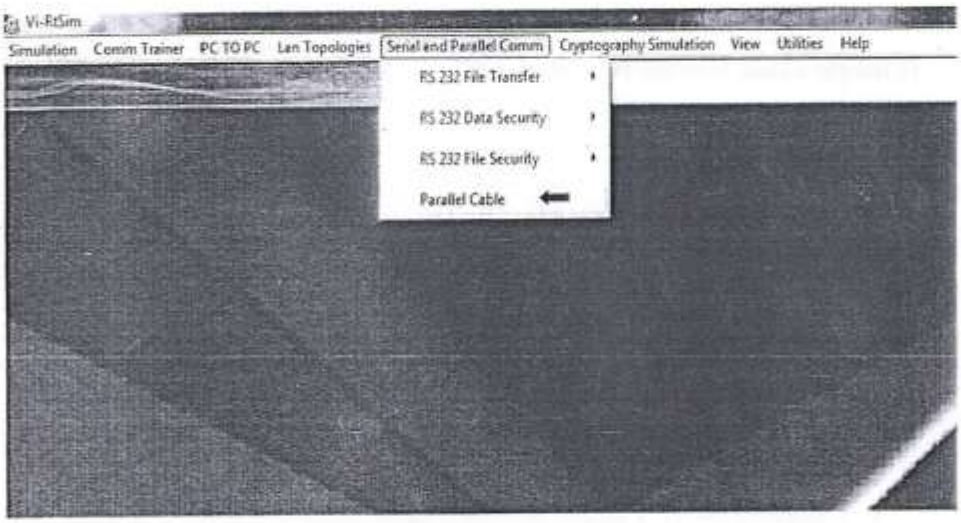
```
Please enter a string:  khoor

Please choose following options:
1 = Encrypt the string.
2 = Decrypt the string.
2

Decrypted string: hello

Process returned 0 (0x0)   execution time : 4.288 s
Press any key to continue.
```

Result:

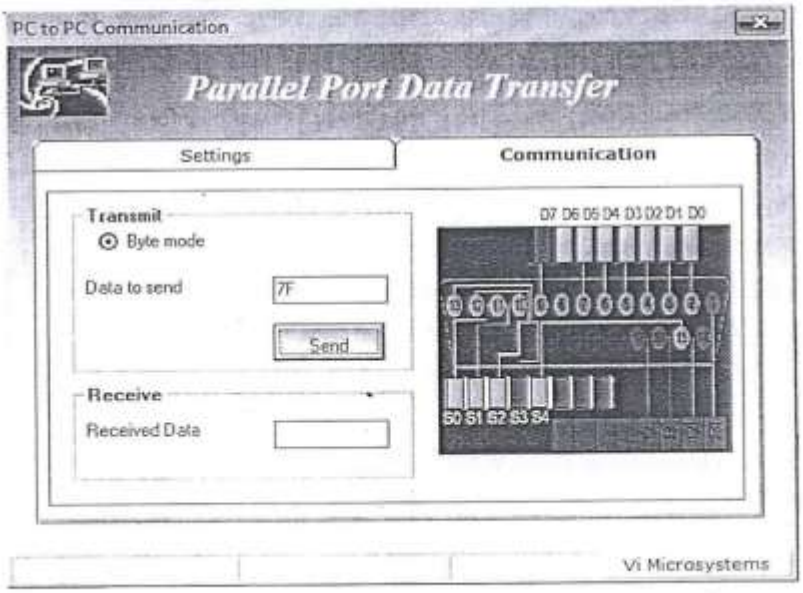
Thus the encryption and decryption of the data while transferring file from one PC to another PC serially using RS232 cable is been performed successfully

. PC to PC **parallel** Communication Using 8-Bit Parallel Cable

MENU BAR



TRANSMITTER SIDE



Ex.No:13 PC to Pc Parallel Communication Using 8-Bit Parallel Cable

AIM:

To transfer a Data, from one PC to another PC using 8-Bit Parallel Cable.

APPARATUS REQUIRED:

1. VI-RTSIM software
2. Personal Computer
3. 8-Bit Parallel Cable

THEORY

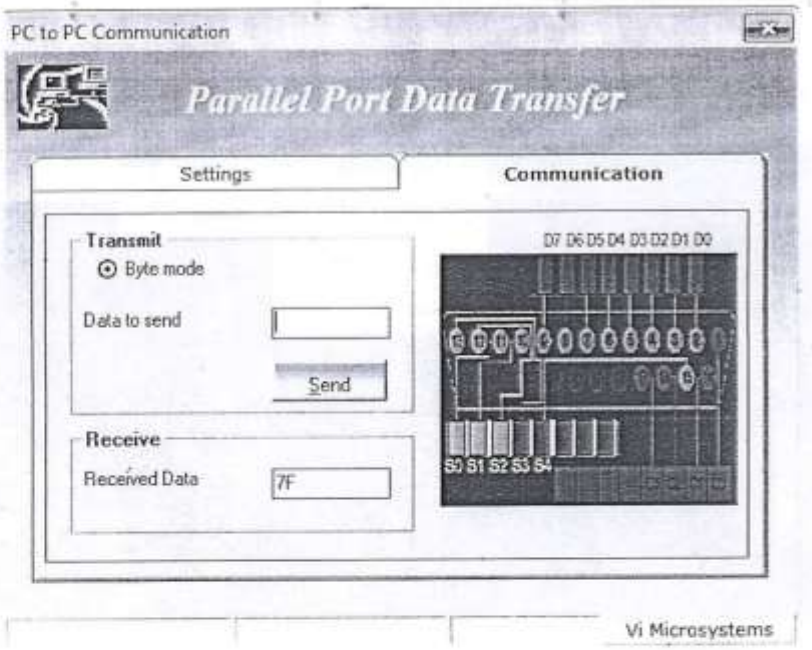
Parallel Communication:

- Binary data consisting of 1's and 0's may be organized into groups of 'n' bits each. A computer produced and consumes data in group of bits much as we conceive of and we spoke language in the form of words than letters.
- Connecting two PC's parallel ports required a special cable. In most cases, the cable will have a 25 pin Male D-sub connector on each end. An ordinary male-to-male D-sub cable won't do, though because the wires on a PC-to-PC parallel cable don't connector straight across, pin for pin.
- In a Pc-to-Parallel link, the host control outputs connect to input on the peripheral, and the host status inputs connect to output on the peripheral. If you connect the parallel ports two PS's straight together, you end up with inputs, and outputs connected to outputs.

PROCEDURE

1. Open VI-RTSIM software from desktop
2. In parallel communication menu bar select parallel Data transfer.
3. In the $T_X$window select "communication".
4. Click the "connect" to connect two PC's.
5. Type the data to Transmit and send the data
6. The Data is transferred successfully from one PC to another.

RECEIVER SIDE

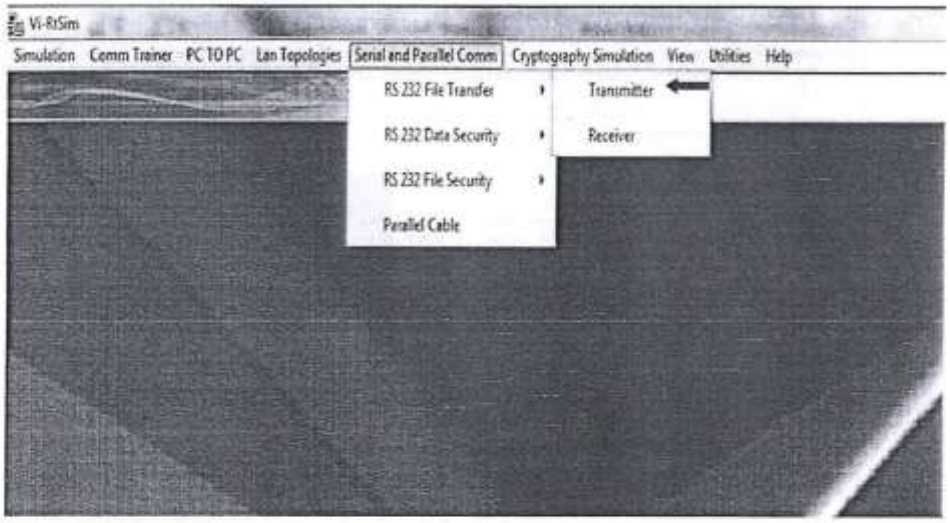


RESULT:

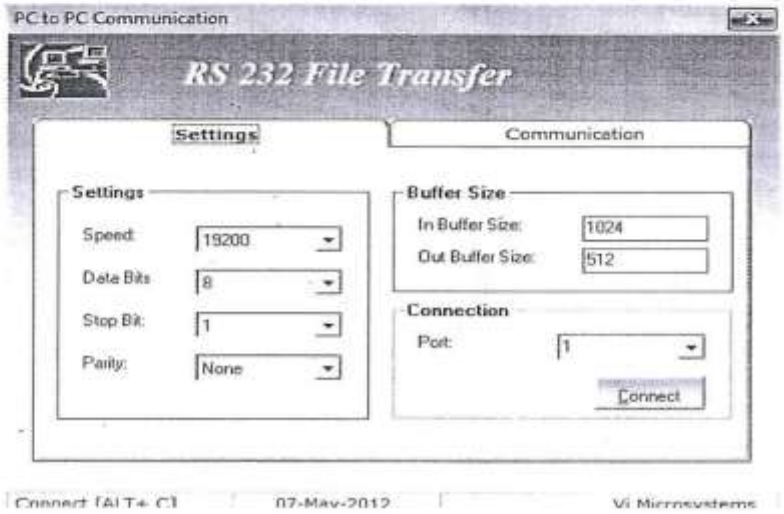
Thus, data is transfer from one PC to another PC by using 8-bit parallel cable communication.

PC to PC Serial Communication Using RS – 232 cables

MENU BAR (TRANSMITTER SIDE)

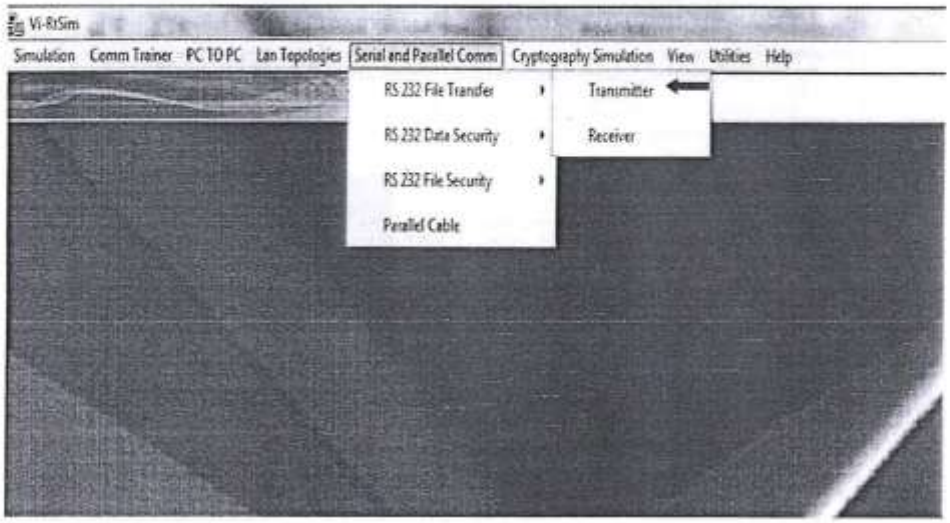


TRANSMITTER SIDE

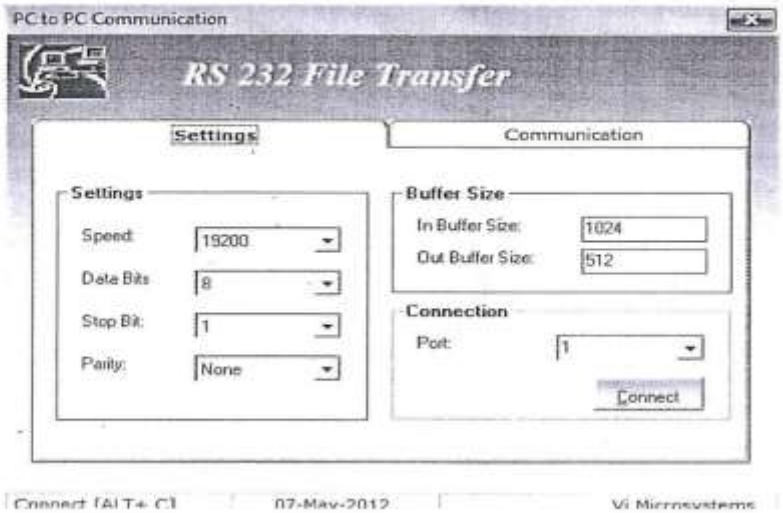


PC to PC Serial Communication Using RS – 232 cables

MENU BAR (TRANSMITTER SIDE)



TRANSMITTER SIDE



Ex. No:14 PC to PC Serial Communication Using RS – 232 cables

AIM:

To transfer a Data, File from one PC to another PC using RS – 232 cable.

APPARATUS REQUIRED:

1. VI-RTSIM software
2. Personal Computer
3. RS – 232 Cable
4. Two Patch Cords

THEORY:

Serial Communication:

- In serial communication, one bit follows another, So we need only one communication channel rather than to transmit data between communication devices.
- In advantages of serial communication over parallel is that with only one communication channel, Serial communication reduces the cost of transmission over parallel by roughly a factor on "n"
- The transmission occurs in two ways and they are Synchronous and Asynchronous transmission.

Asynchronous:

- In this we send one start bit (0) at the beginning and one stop bit (1) at the end of each bit and a gap between each byte.

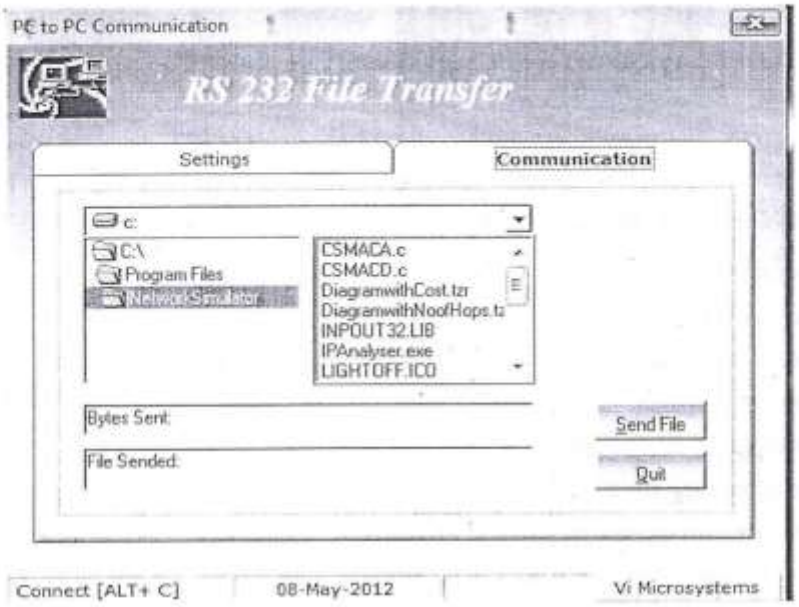
Synchronous:

- In this, we send bit one after other without start and stop bits or gaps. It is the responsibility of receiver to group the bits.

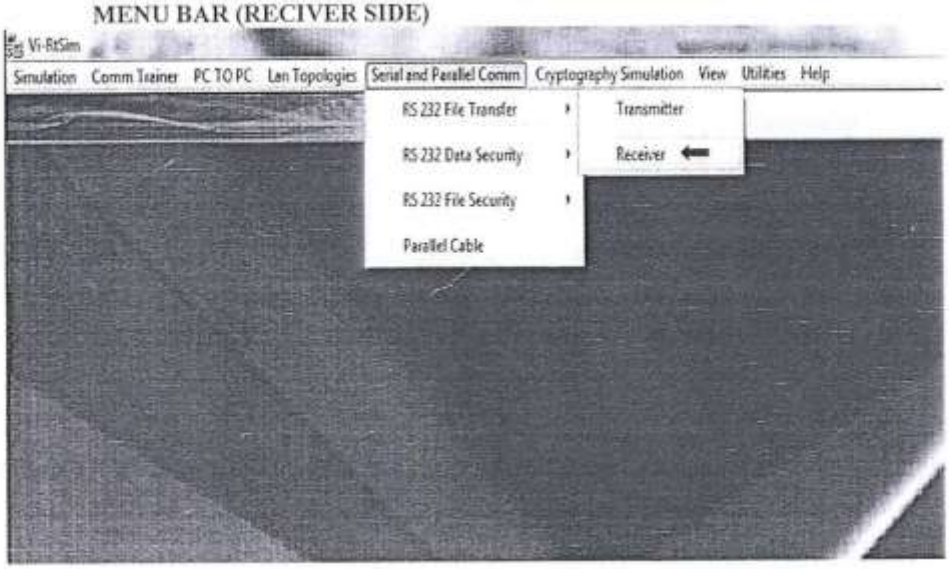
RS-232 Cable:

- Connecting two devices using Rs-232 cable is simplex, usually inputs are connected to input and outputs are connected to output.
- DTE: Data Terminal Equipment.
- DCE: Data Communication Equipment.
- This card contains two 9 pin D – Type connectors for serial communication between tow PC's TXD and RXD lines are terminated at PS/2 connector. CTS and RTS lines are internally connected.

SELECTING A FILE TO TRANSFER



MENU BAR (RECIVER SIDE)

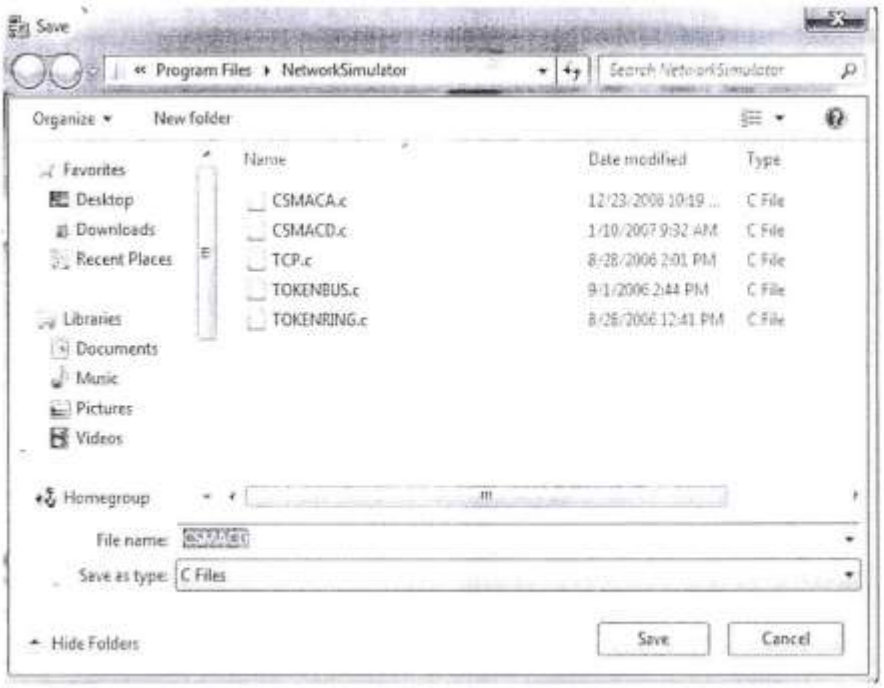


PROCEDURE – FILE TRANSFER

1. Create a new file in the notepad.
2. Type the message and save the file either in “C” or “D” drive.
3. Open VI-RTSM software from desktop.
4. Select serial communication from menu-bar.
5. Connect two PC using serial adapter card as per the figure.
6. In serial communication menu bar select RS-232 file transfer.
7. Select T_X or one PC and select R_X on another Pc.
8. In the Rxwindow select “Communication”.
9. Click the “Connect” to connect two PC’s
10. In the Rxwindow select “Communication”.
11. Click the “Connect” to connect two PC’s
12. Selecting the file to Transmit and send file.
13. The file will be received at the receiver PV, give the name for received file and save it in “C” or “D” drive.
14. The file is transferred successfully from one PC to another.

RECEIVER SIDE

FILE TRANSFERRED AND SAVED AT RECEIVER SIDE



RESULT:

Thus the file and data is transferred from one PC to another PC by serial communication using Rs-232 Cable.

EC8563 COMMUNICATION NETWORK LABORATORY

VIVA QUESTIONS

1) What is a Link?

A link refers to the connectivity between two devices. It includes the type of cables and protocols used in order for one device to be able to communicate with the other.

2) What are the layers of the OSI reference model?

There are 7 OSI layers: Physical Layer, Data Link Layer, Network Layer, Transport Layer, Session Layer, Presentation Layer and Application Layer.

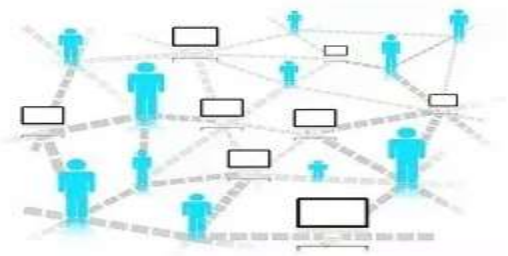
3) What is backbone network?

A backbone network is a centralized infrastructure that is designed to distribute different routes and data to various networks. It also handles management of bandwidth and various channels.

4) What is a LAN?

LAN is short for Local Area Network. It refers to the connection between computers and other network devices that are located within a small physical location.

5) What is a node?



A node refers to a point or joint where a connection takes place. It can be computer or device that is part of a network. Two or more nodes are needed in order to form a network connection.

6) What are routers?

Routers can connect two or more network segments. These are intelligent network devices that store information in its routing table such as paths, hops and bottlenecks. With this info, they are able to determine the best path for data transfer. Routers operate at the OSI Network Layer.

7) What is point to point link?

It refers to a direct connection between two computers on a network. A point to point connection does not need any other network devices other than connecting a cable to the NIC cards of both computers.

8) What is anonymous FTP?

Anonymous FTP is a way of granting user access to files in public servers. Users that are allowed access to data in these servers do not need to identify themselves, but instead log in as an anonymous guest.

9) What is subnet mask?

A subnet mask is combined with an IP address in order to identify two parts: the extended network address and the host address. Like an IP address, a subnet mask is made up of 32 bits.

10) What is the maximum length allowed for a UTP cable?

A single segment of UTP cable has an allowable length of 90 to 100 meters. This limitation can be overcome by using repeaters and switches.

11) What is data encapsulation?

Data encapsulation is the process of breaking down information into smaller manageable chunks before it is transmitted across the network. It is also in this process that the source and destination addresses are attached into the headers, along with parity checks.

12) Describe Network Topology

Network Topology refers to the layout of a computer network. It shows how devices and cables are physically laid out, as well as how they connect to one another.

13) What is VPN?

VPN means Virtual Private Network, a technology that allows a secure tunnel to be created across a network such as the Internet. For example, VPNs allow you to establish a secure dial-up connection to a remote server.

14) Briefly describe NAT.

NAT is Network Address Translation. This is a protocol that provides a way for multiple computers on a common network to share single connection to the Internet.

15) What is the job of the Network Layer under the OSI reference model?

The Network layer is responsible for data routing, packet switching and control of network congestion. Routers operate under this layer.

16) How does a network topology affect your decision in setting up a network?

Network topology dictates what media you must use to interconnect devices. It also serves as basis on what materials, connector and terminations that is applicable for the setup.

17) What is RIP?

RIP, short for Routing Information Protocol is used by routers to send data from one network to another. It efficiently manages routing data by broadcasting its routing table to all other routers within the network. It determines the network distance in units of hops.

18) What are different ways of securing a computer network?

There are several ways to do this. Install reliable and updated anti-virus program on all computers. Make sure firewalls are setup and configured properly. User authentication will also help a lot. All of these combined would make a highly secured network.

19) What is NIC?

NIC is short for Network Interface Card. This is a peripheral card that is attached to a PC in order to connect to a network. Every NIC has its own MAC address that identifies the PC on the network.

20) What is WAN?

WAN stands for Wide Area Network. It is an interconnection of computers and devices that are geographically dispersed. It connects networks that are located in different regions and countries.

21) What is the importance of the OSI Physical Layer?

The physical layer does the conversion from data bits to electrical signal, and vice versa. This is where network devices and cable types are considered and setup.

22) How many layers are there under TCP/IP?

There are four layers: the Network Layer, Internet Layer, Transport Layer and Application Layer.

23) What are proxy servers and how do they protect computer networks?

Proxy servers primarily prevent external users who identifying the IP addresses of an internal network. Without knowledge of the correct IP address, even the physical location of the network cannot be identified. Proxy servers can make a network virtually invisible to external users.

24) What is the function of the OSI Session Layer?

This layer provides the protocols and means for two devices on the network to communicate with each other by holding a session. This includes setting up the session, managing information exchange during the session, and tear-down process upon termination of the session.

25) What is the importance of implementing a Fault Tolerance System? Are there limitations?

A fault tolerance system ensures continuous data availability. This is done by eliminating a single point of failure. However, this type of system would not be able to protect data in some cases, such as in accidental deletions.

26) What does 10Base-T mean?

The 10 refers to the data transfer rate, in this case is 10Mbps. The word Base refers to base band, as oppose to broad band. T means twisted pair, which is the cable used for that network.

27) What is a private IP address?

Private IP addresses are assigned for use on intranets. These addresses are used for internal networks and are not routable on external public networks. These ensures that no conflicts are present among internal networks while at the same time the same range of private IP addresses are reusable for multiple intranets since they do not "see" each other.

28) What is NOS?

NOS, or Network Operating System, is specialized software whose main task is to provide network connectivity to a computer in order for it to be able to communicate with other computers and connected devices.

29) What is DoS?

DoS, or Denial-of-Service attack, is an attempt to prevent users from being able to access the internet or any other network services. Such attacks may come in different forms and are done by a group of perpetuators. One common method of doing this is to overload the system server so it cannot anymore process legitimate traffic and will be forced to reset.

30) What is OSI and what role does it play in computer networks?

OSI (Open Systems Interconnect) serves as a reference model for data communication. It is made up of 7 layers, with each layer defining a particular aspect on how network devices connect and communicate with one another. One layer may deal with the physical media used, while another layer dictates how data is actually transmitted across the network.

31) What is the purpose of cables being shielded and having twisted pairs?

The main purpose of this is to prevent crosstalk. Crosstalks are electromagnetic interferences or noise that can affect data being transmitted across cables.

32) What is the advantage of address sharing?

By using address translation instead of routing, address sharing provides an inherent security benefit. That's because host PCs on the Internet can only see the public IP address of the external interface on the computer that provides address translation and not the private IP addresses on the internal network.

33) What are MAC addresses?

MAC, or Media Access Control, uniquely identifies a device on the network. It is also known as physical address or Ethernet address. A MAC address is made up of 6-byte parts.

34) What is the equivalent layer or layers of the TCP/IP Application layer in terms of OSI reference model?

The TCP/IP Application layer actually has three counterparts on the OSI model: the Session layer, Presentation Layer and Application Layer.

35) How can you identify the IP class of a given IP address?

By looking at the first octet of any given IP address, you can identify whether it's Class A, B or C. If the first octet begins with a 0 bit, that address is Class A. If it begins with bits 10 then that address is a Class B address. If it begins with 110, then it's a Class C network.

36) What is the main purpose of OSPF?

OSPF, or Open Shortest Path First, is a link-state routing protocol that uses routing tables to determine the best possible path for data exchange.

37) What are firewalls?

Firewalls serve to protect an internal network from external attacks. These external threats can be hackers who want to steal data or computer viruses that can wipe out data in an instant. It also prevents other users from external networks from gaining access to the private network.

38) Describe star topology

Star topology consists of a central hub that connects to nodes. This is one of the easiest to setup and maintain.

39) What are gateways?

Gateways provide connectivity between two or more network segments. It is usually a computer that runs the gateway software and provides translation services. This translation is a key in allowing different systems to communicate on the network.

40) What is the disadvantage of a star topology?

One major disadvantage of star topology is that once the central hub or switch get damaged, the entire network becomes unusable.

41) What is SLIP?

SLIP, or Serial Line Interface Protocol, is actually an old protocol developed during the early UNIX days. This is one of the protocols that are used for remote access.

42) Give some examples of private network addresses.

10.0.0.0 with a subnet mask of 255.0.0.0172.16.0.0 with subnet mask of 255.240.0.0192.168.0.0 with subnet mask of 255.255.0.0

43) What is tracert?

Tracert is a Windows utility program that can used to trace the route taken by data from the router to the destination network. It also shows the number of hops taken during the entire transmission route.

44) What are the functions of a network administrator?

A network administrator has many responsibilities that can be summarize into 3 key functions: installation of a network, configuration of network settings, and maintenance/troubleshooting of networks.

45) Describe at one disadvantage of a peer to peer network.

When you are accessing the resources that are shared by one of the workstations on the network, that workstation takes a performance hit.

46) What is Hybrid Network?

A hybrid network is a network setup that makes use of both client-server and peer-to-peer architecture.

47) What is DHCP?

DHCP is short for Dynamic Host Configuration Protocol. Its main task is to automatically assign an IP address to devices across the network. It first checks for the next available address not yet taken by any device, then assigns this to a network device.

48) What is the main job of the ARP?

The main task of ARP or Address Resolution Protocol is to map a known IP address to a MAC layer address.

49) What is TCP/IP?

TCP/IP is short for Transmission Control Protocol / Internet Protocol. This is a set of protocol layers that is designed to make data exchange possible on different types of computer networks, also known as heterogeneous network.

50) How can you manage a network using a router?

Routers have built in console that lets you configure different settings, like security and data logging. You can assign restrictions to computers, such as what resources it is allowed access, or what particular time of the day they can browse the internet. You can even put restrictions on what websites are not viewable across the entire network.

51) What protocol can be applied when you want to transfer files between different platforms, such between UNIX systems and Windows servers?

Use FTP (File Transfer Protocol) for file transfers between such different servers. This is possible because FTP is platform independent.

52) What is the use of a default gateway?

Default gateways provide means for the local networks to connect to the external network. The default gateway for connecting to the external network is usually the address of the external router port.

53) One way of securing a network is through the use of passwords. What can be considered as good passwords?

Good passwords are made up of not just letters, but by combining letters and numbers. A password that combines uppercase and lowercase letters is favorable than one that uses all upper case or all lower case letters. Passwords must be not words that can easily be guessed by hackers, such as dates, names, favorites, etc. Longer passwords are also better than short ones.

54) What is the proper termination rate for UTP cables?

The proper termination for unshielded twisted pair network cable is 100 ohms.

55) What is netstat?

Netstat is a command line utility program. It provides useful information about the current TCP/IP settings of a connection.

56) What is the number of network IDs in a Class C network?

For a Class C network, the number of usable Network ID bits is 21. The number of possible network IDs is 2 raised to 21 or 2,097,152. The number of host IDs per network ID is 2 raised to 8 minus 2, or 254.

57) What happens when you use cables longer than the prescribed length?

Cables that are too long would result in signal loss. This means that data transmission and reception would be affected, because the signal degrades over length.

58) What common software problems can lead to network defects?

Software related problems can be any or a combination of the following:

- client server problems
- application conflicts
- error in configuration
- protocol mismatch
- security issues
- user policy and rights issues

59) What is ICMP?

ICMP is Internet Control Message Protocol. It provides messaging and communication for protocols within the TCP/IP stack. This is also the protocol that manages error messages that are used by network tools such as PING.

60) What is Ping?

Ping is a utility program that allows you to check connectivity between network devices on the network. You can ping a device by using its IP address or device name, such as a computer name.

61) What is peer to peer?

Peer to peer are networks that does not reply on a server. All PCs on this network act as individual workstations.

62) What is DNS?

DNS is Domain Name System. The main function of this network service is to provide host names to TCP/IP address resolution.

63) What advantages does fiber optics have over other media?

One major advantage of fiber optics is that is it less susceptible to electrical interference. It also supports higher bandwidth, meaning more data can be transmitted and received. Signal degrading is also very minimal over long distances.

64) What is the difference between a hub and a switch?

A hub acts as a multiport repeater. However, as more and more devices connect to it, it would not be able to efficiently manage the volume of traffic that passes through it. A switch provides a better alternative that can improve the performance especially when high traffic volume is expected across all ports.

65) What are the different network protocols that are supported by Windows RRAS services?

There are three main network protocols supported: NetBEUI, TCP/IP, and IPX.

66) What are the maximum networks and hosts in a class A, B and C network?

For Class A, there are 126 possible networks and 16,777,214 hostsFor Class B, there are 16,384 possible networks and 65,534 hostsFor Class C, there are 2,097,152 possible networks and 254 hosts

67) What is the standard color sequence of a straight-through cable?

orange/white, orange, green/white, blue, blue/white, green, brown/white, brown.

68) What protocols fall under the Application layer of the TCP/IP stack?

The following are the protocols under TCP/IP Application layer: FTP, TFTP, Telnet and SMTP.

69) You need to connect two computers for file sharing. Is it possible to do this without using a hub or router?

Yes, you can connect two computers together using only one cable. A crossover type cable can be use in this scenario. In this setup, the data transmit pin of one cable is connected to the data receive pin of the other cable, and vice versa.

70) What is ipconfig?

Ipconfig is a utility program that is commonly used to identify the addresses information of a computer on a network. It can show the physical address as well as the IP address.

71) What is the difference between a straight-through and crossover cable?

A straight-through cable is used to connect computers to a switch, hub or router. A crossover cable is used to connect two similar devices together, such as a PC to PC or Hub to hub.

72) What is client/server?

Client/server is a type of network wherein one or more computers act as servers. Servers provide a centralized repository of resources such as printers and files. Clients refers to workstation that access the server.

73) Describe networking.

Networking refers to the inter connection between computers and peripherals for data communication. Networking can be done using wired cabling or through wireless link.

74) When you move the NIC cards from one PC to another PC, does the MAC address gets transferred as well?

Yes, that's because MAC addresses are hard-wired into the NIC circuitry, not the PC. This also means that a PC can have a different MAC address when the NIC card was replace by another one.

75) Explain clustering support

Clustering support refers to the ability of a network operating system to connect multiple servers in a fault-tolerant group. The main purpose of this is the in the event that one server fails, all processing will continue on with the next server in the cluster.

76) What are some drawbacks of implementing a ring topology?

In case one workstation on the network suffers a malfunction, it can bring down the entire network. Another drawback is that when there are adjustments and reconfigurations needed to be performed on a particular part of the network, the entire network has to be temporarily brought down as well.

77) What is the difference between CSMA/CD and CSMA/CA?

CSMA/CD, or Collision Detect, retransmits data frames whenever a collision occurred. CSMA/CA, or Collision Avoidance, will first broadcast intent to send prior to data transmission.

78) What is the importance of Encryption on a network?

Encryption is the process of translating information into a code that is unreadable by the user. It is then translated back or decrypted back to its normal readable format using a secret key or password. Encryption help ensure that information that is intercepted halfway would remain unreadable because the user has to have the correct password or key for it.

79) How are IP addresses arranged and displayed?

IP addresses are displayed as a series of four decimal numbers that are separated by period or dots. Another term for this arrangement is the dotted decimal format. An example is 192.168.101.2

80) Explain the importance of authentication.

Authentication is the process of verifying a user's credentials before he can log into the network. It is normally performed using a username and password. This provides a secure means of limiting the access from unwanted intruders on the network.

81) What do mean by tunnel mode?

This is a mode of data exchange wherein two communicating computers do not use IPSec themselves. Instead, the gateway that is connecting their LANs to the transit network creates a virtual tunnel that uses the IPSec protocol to secure all communication that passes through it.

82) What are the different technologies involved in establishing WAN links?

Analog connections - using conventional telephone lines; Digital connections - using digital-grade telephone lines; switched connections - using multiple sets of links between sender and receiver to move data.

83) What is one advantage of mesh topology?

In the event that one link fails, there will always be another available. Mesh topology is actually one of the most fault-tolerant network topology.

84) When troubleshooting computer network problems, what common hardware-related problems can occur?

A large percentage of a network is made up of hardware. Problems in these areas can range from malfunctioning hard drives, broken NICs and even hardware startups. Incorrectly hardware configuration is also one of those culprits to look into.

85) How does dynamic host configuration protocol aid in network administration?

Instead of having to visit each client computer to configure a static IP address, the network administrator can apply dynamic host configuration protocol to create a pool of IP addresses known as scopes that can be dynamically assigned to clients.

86) What protocols fall under the TCP/IP Internet Layer?

There are 4 protocols that are being managed by this layer. These are ICMP, IGMP, IP and ARP.

87) When it comes to networking, what are rights?

Rights refer to the authorized permission to perform specific actions on the network. Each user on the network can be assigned individual rights, depending on what must be allowed for that user.

88) What is IPv6?

IPv6 , or Internet Protocol version 6, was developed to replace IPv4. At present, IPv4 is being used to control internet traffic, butis expected to get saturated in the near future. IPv6 was designed to overcome this limitation.

89) What is RSA algorithm?

RSA is short for Rivest-Shamir-Adleman algorithm. It is the most commonly used public key encryption algorithm in use today.

90) What is mesh topology?

Mesh topology is a setup wherein each device is connected directly to every other device on the network. Consequently, it requires that each device have at least two network connections.