SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

Department of Electronics and Communication Engineering

Laboratory Report Cover Sheet

18ECC303J – COMPUTER COMMUNICATION NETWORKS

EVEN SEM 2022-23

Name :

Register No :

Section :

Venue :

Experiment title :

PARTICULARS	MAX MARKS	MARKS OBTAINED
Pre lab & Post lab	10	
Lab performance	15	
Record	05	
Viva	10	
Total	**40**	

Report Verification

Staff Name:

Signature with date:

6. Implementation and study of Go back N Protocol with and Without BER

6.1 Introduction:

The purpose of this experiment is to introduce you to the basics of error correction, time outs and state machines. In this lab, you will be able to provide reliable data transfer between two nodes over an unreliable network using Go back N and selective repeat protocol.

6.2 Hardware Requirement

- 3PCs with NIU card
- Network Emulation Unit
- Jumper Cables

6.3 Background

Go-Back-N ARQ is a specific instance of the Automatic Repeat-request (ARQ) Protocol, in which the sending process continues to send a number of frames specified by a *window size* even without receiving an ACK packet from the receiver. It is a special case of the general sliding window protocol with the transmit window size of N and receive window sizeof 1.

The receiver process keeps track of the sequence number of the next frame it expects to receive, and sends that number with every ACK it sends. The receiver will ignore any frame that does not have the exact sequence number it expects – whether that frame is a "past" duplicate of a frame it has already ACK'ed [1] or whether that frame is a "future" frame past the last packet it is waiting for. Once the sender has sent all of the frames in its *window*, itwill detect that all of the frames since the first lost frame are *outstanding*, and will go back to sequence number of the last ACK it received from the receiver process and fill its window starting with that frame and continue the process over again.

Go-Back-N ARQ is a more efficient use of a connection than Stop-and-wait ARQ, since unlike waiting for an acknowledgement for each packet, the connection is still being utilized as packets are being sent. In other words, during the time that would otherwise be spent waiting, more packets are being sent. However, this method also results in sending frames

multiple times – if any frame was lost or damaged, or the ACK acknowledging them was lost or damaged, then that frame and all following frames in the window (even if they were received without error) will be re-sent. To avoid this, Selective Repeat ARQ can be used.

6.4 Pre lab questions

1. Explain the mechanism of Go back N ARQ.

2. In sliding window flow control if the window size is 63 what is the range of sequence numbers?

3. For a sliding window of size n-1 (n-sequence numbers) there can be a maximum of ------- frames sent but unacknowledged.

4. Differentiate between bit rate and baud rate.

5. Compare selective repeat and Goback N ARQ schemes.

6.5 Design

Design a network topology to illustrate Go Back N Assume the window size and inter packet delay as 4 and 400ms respectively. Run the simulation for 100 seconds duration and analyze the throughput performance for various time out values.

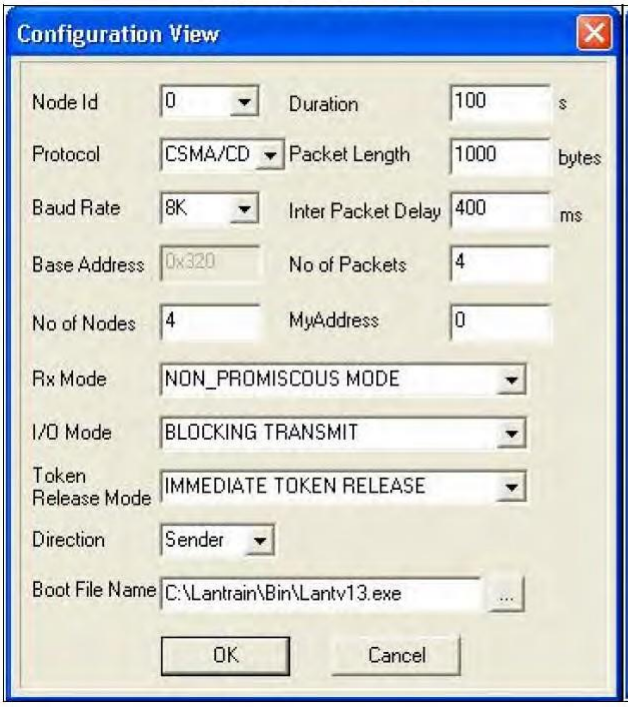
6.6 Procedure:

1. Click on the Sliding Window GBN icon 

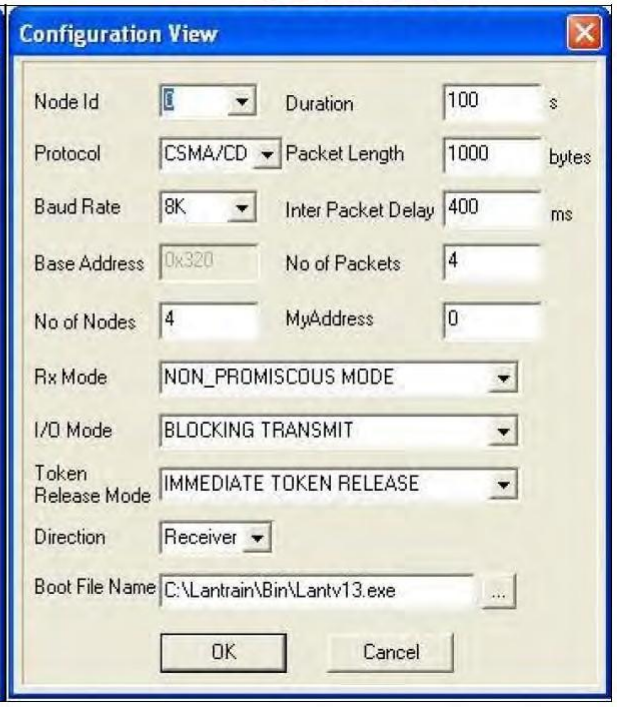
from the desktop on both PCs.

2. Click the Configuration button  in the window in both the Pc's.

PC 1 SENDER



PC 2 RECEIVER



Setting the configuration menu:

PC 1		PC 2	
Node id	**0**	**Node id**	**0**
Protocol	CSMA/CD	**Protocol**	CSMA/CD
Baud Rate	8Kbps (At both the config menu and NEU)	**Baud Rate**	8Kbps (At both the config menu and NEU)
Duration	100s	**Duration**	100s
Packet Length	1000 bytes	**Packet Length**	1000 bytes
Bit Delay	0(at NEU)	**Bit Delay**	0(at NEU)
Direction	Sender	**Direction**	Receiver
No of packets	4	**No of packets**	4

Note: The No of Packets parameter defines the window size.

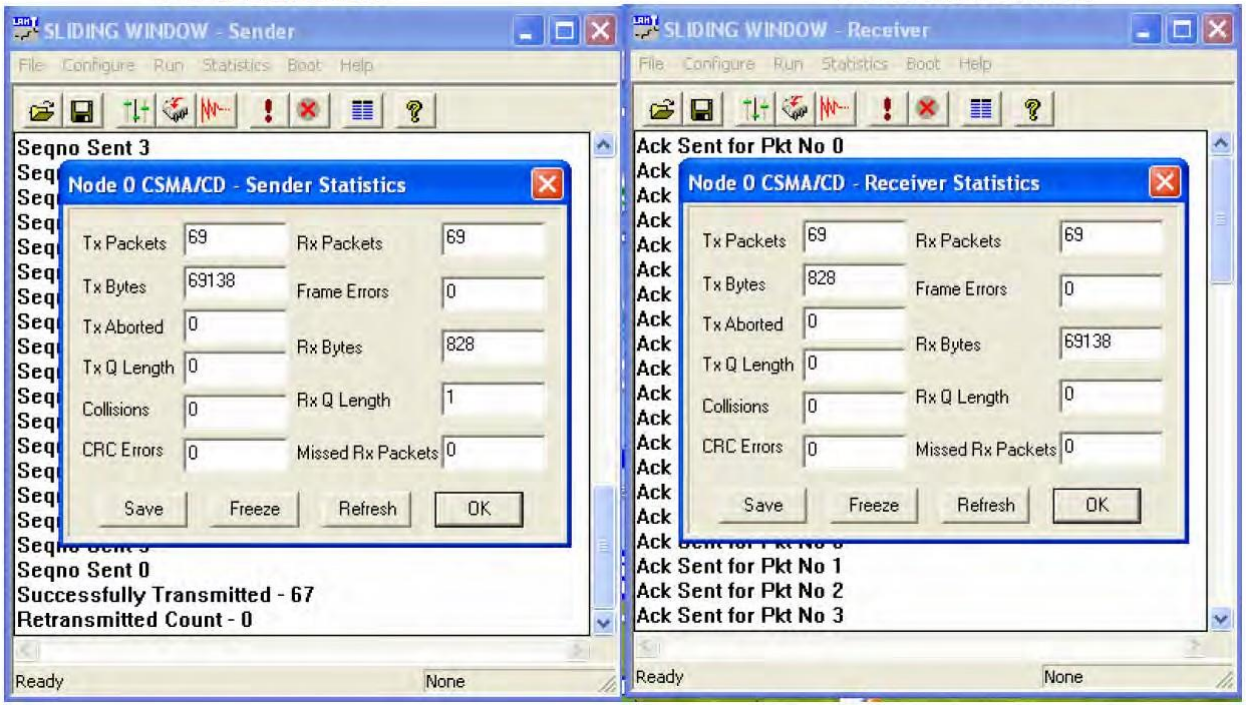
3. Set the Inter Packet Delay to 400msecs

4. Click OK button and Download the driver to the NIU using the BOOT  button command.Booting from any one of the applications is enough.

5. Run the experiment by clicking button  or by choosing RUN _ Start from each application.

6. Set the Timeout Value to 1500 ms

PC 1 SENDER **PC 2 RECEIVER**



7. Note down the no of successfully Transmitted Packets.

8. Repeat the above steps for various time out values and plot the graph between timeout Value &Throughput. Find the optimum timeout value from the plot.

9. Explain why the throughput is less compared to CSMACD protocol.

Calculation of Practical Throughput:

$$X = \frac{\text{(Sum of Successfully Tx packets * Packet Length * 8)}}{\text{(Duration of Experiment * Data rate)}}$$

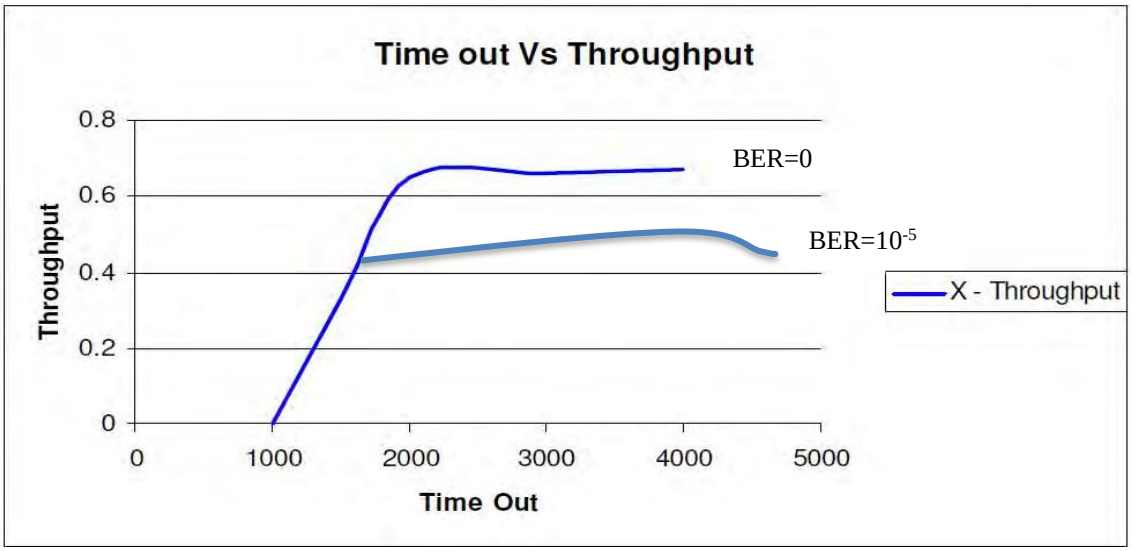
Model Tabulation:

Go-Back N Protocol

Time out value in ms	Successfully Tx packets	Practical Throughput
1000	0	0
1500	33	0.33
2000	65	0.65
3000	66	0.66
4000	67	0.67

Model Graph:

Go-Back N Protocol



TABULATION (WITHOUT BER)

BER=0

Timeout value in ms	Sucessfully Transmitted Packets	Practical Throughput

Procedure for Stop and Wait with BER:

1. Initially the BER is set as Zero , Now Vary the Bit Error Rate in NEU as 10^{-4} and repeat the same process as above.

TABULATION (WITH BER)

BER=10^{-4}

Timeout value in ms	Sucessfully Transmitted Packets	Practical Throughput

6.7 Post lab questions

1. Draw the sender and receiver windows for a system using Go-back-N ARQ given thefollowing.
    a. Frame 0 is sent, frame 0 is acknowledged.
    b. Frames 1 and 2 are sent, frames 1 and 2 are acknowledged.
    c. Frame 3,4 and 5 are sent, NAK4 is received.
    d. Frame 4,5,6 and 7 are sent; frames4 through 7 are acknowledged.

2. A sliding window protocol uses a sliding window of size15. How many bits are needed todefine the sequence numbers?

3. What will be the maximum size of send window if 5 is the number of bits for the sequence number?

4.In Go back N protocol, which modulo arithmetic is used if the size of the sequence number field is 8?

5. In Go back 4, if every 6th packet that is being transmitted is lost and if total number of packets to be sent is 10, then how many transmissions will be required?

RESULT