PART B

Experiment 5

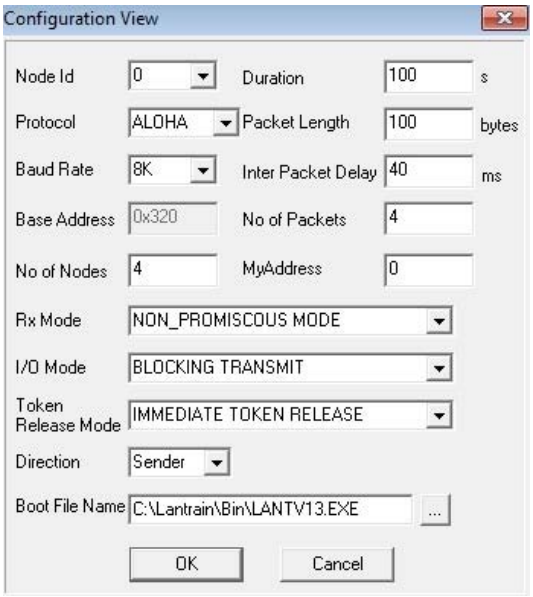
ALOHA Protocol

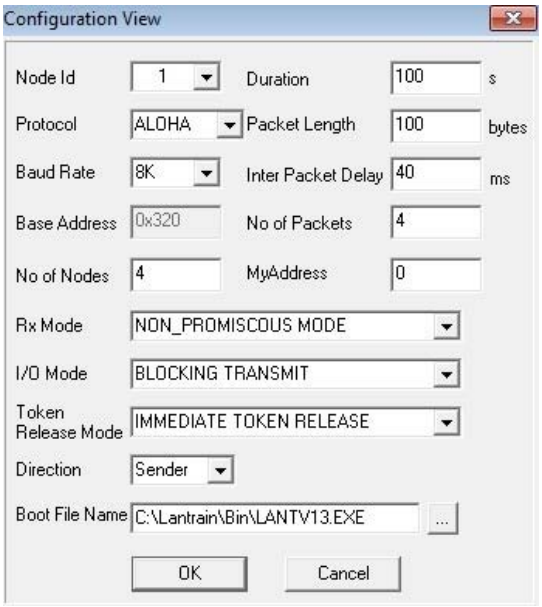
Aim: To implement the ALOHA protocol for packet communication between a number of nodes connected to a common bus.

Procedure:

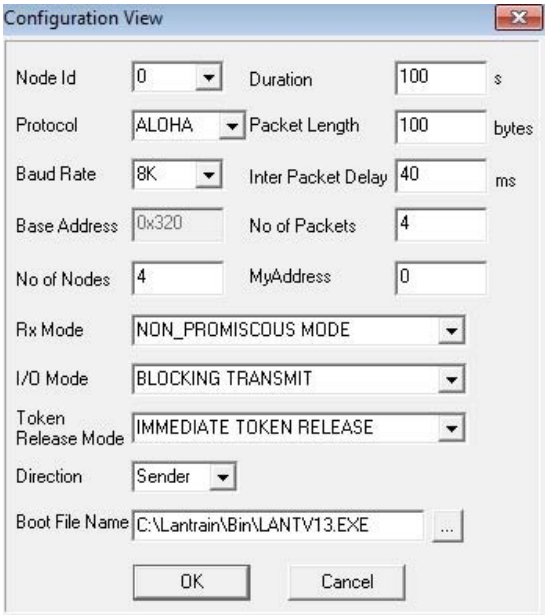
1. Click on the **MAC** icon on the desktop of both PC's.
2. Click **Configuration** button in the tool window in both the PC's.

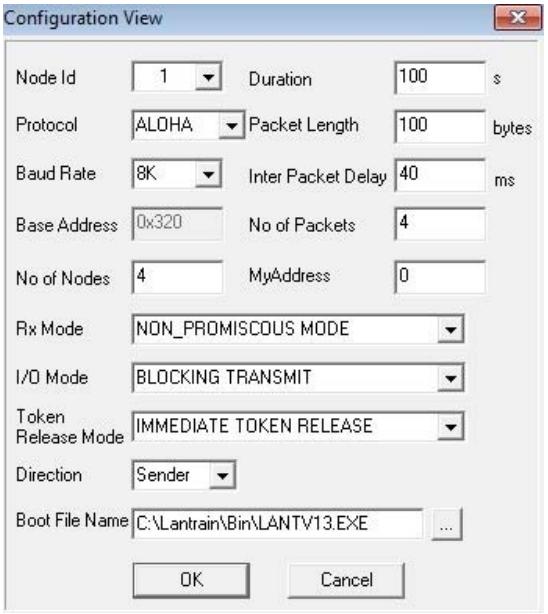
PC 1





PC 2





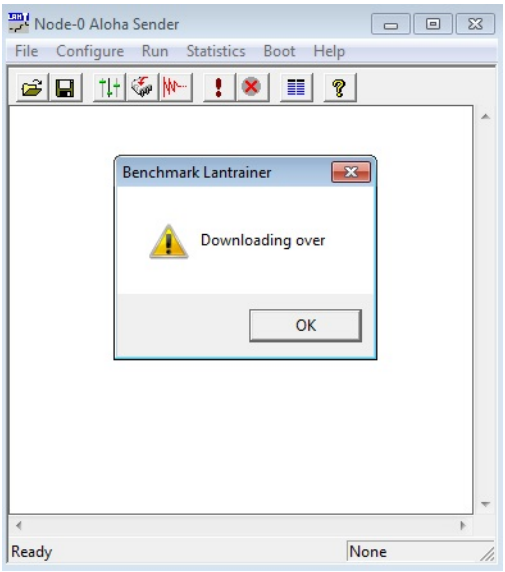
Configuration Setting:

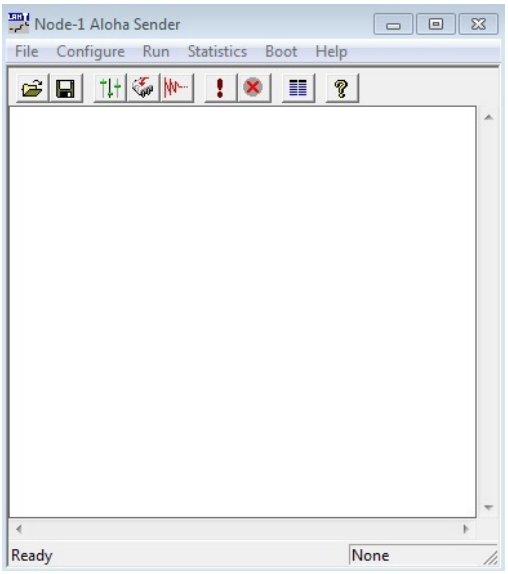
PC 1		**PC 2**	
Node Id	**0** on config menu 1 **1** on config menu 2	**Node Id**	**0** on config menu 1 **1** on config menu 2
Protocol	ALOHA	**Protocol**	ALOHA
Baud Rate	8 Kbps (at both config menu & NEU)	**Baud Rate**	8 Kbps (at both config menu & NEU)
Duration	100 Seconds	**Duration**	100 Seconds
Packet Length	100 bytes	**Packet Length**	100 bytes
Direction	Sender	**Direction**	Sender

Note: All the nodes have to be configured as '**Senders**'. Set the topology as '**Bus**'.

3. Click **OK** button.
4. Download the driver into the NIU. Click **BOOT** tab on the tool window of PC1 and click **OK** button. Booting from any one of the applications is sufficient.

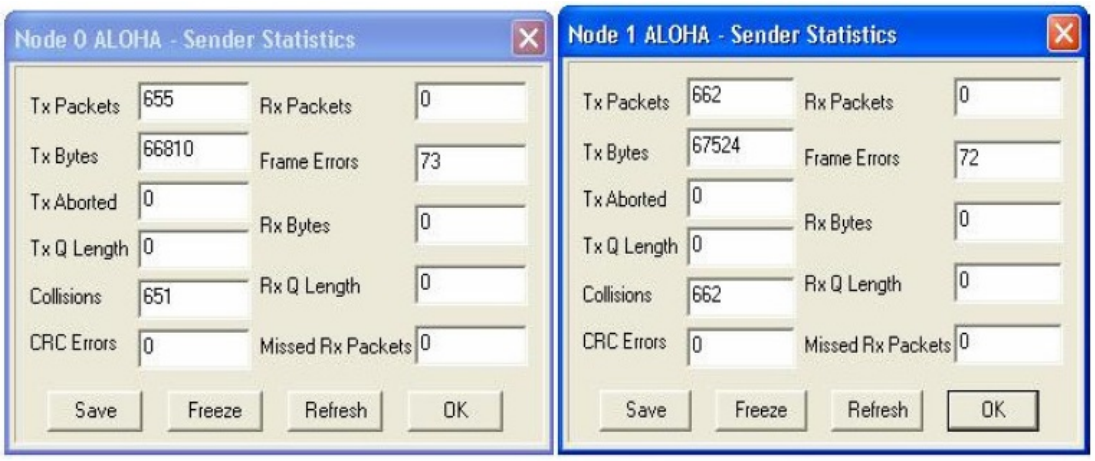
PC 1



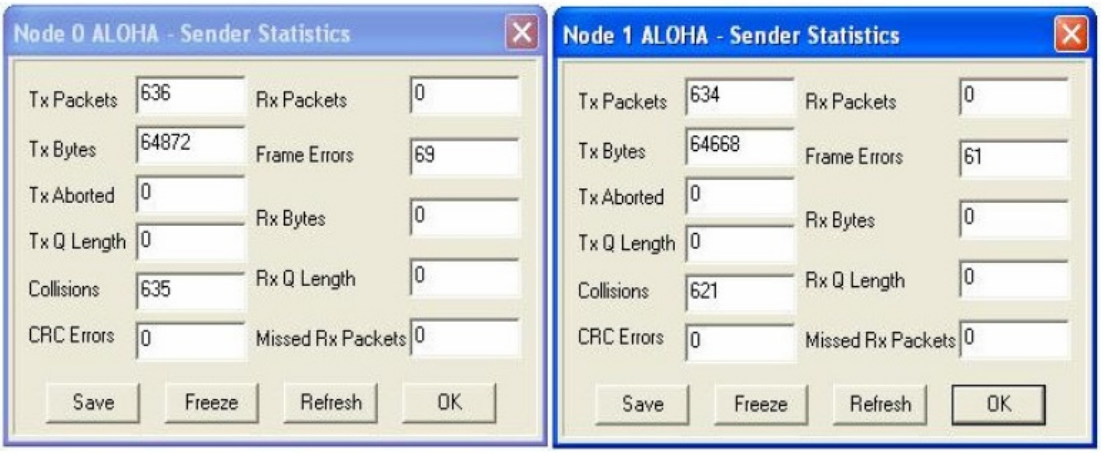


5. Repeat **step 4** for PC2.
6. Run the experiment: Click **RUN,** then S**tart** from each application.
7. View the statistics window for results. Click **Statistics** button on the window. Only Txd packets and collision count are taken into account for MAC calculation.
8. Note down the readings once the experiment is completed.
9. Repeat the above steps for various values of $\mathbf{t_a}$.
10. Calculate the Practical offered load from the below given formula and plot the graph for the practical Offered load v/s Throughput.

PC 1



PC 2



Calculations:

Theoretical Offered Load ($G_{Theoretical}$): $G_{Theoretical} = \frac{N*P}{C*t_a}$

G – Generated load in the network.

N – Number of nodes participating in the network. For example: 4 nodes (Using 2 computers)

P – Packet length expressed in bits; say 100 bytes (800 bits).

C – Data rate normally set as 8Kbps, which is selected in the NEU.

t_a – Inter Packet Delay (IPD) expressed in milliseconds; the time interval between two consecutive packets generated.

Let us assume $\mathbf{t_a}$= 40 milliseconds and substitute the above mentioned parameters in the above equation which leads to G =10. Likewise assume various values for $\mathbf{t_a}$ to generate offer loads in the range of 0.1 to 10. Substitute the value of $\mathbf{t_a}$ in the configuration menu.

Practical Throughput ($X_{Practical}$) from the obtained readings:

Successfully transmitted packet by a node = Txd Packets - Collision Count

$$X_{Practical} = \frac{Sum\ of\ successfully\ Txd\ packets\ in\ all\ nodes * Packet\ Length * 8}{Duration\ of\ experiment\ in\ msec * Data\ rate}$$

Theoretical Throughput ($X_{Theoretical}$): $X_{Theoretical} = G_{Theoritical} e^{-2G_{Theoritical}}$

Practical Offered load ($G_{Practical}$):

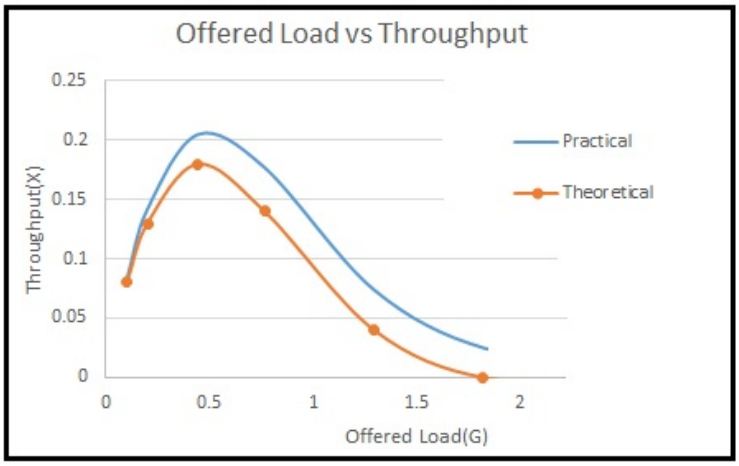
$$G_{Practical} = \frac{Sum\ of\ transmitted\ packets\ in\ all\ nodes * Packet\ Length * 8}{Duration\ of\ experiment\ in\ msec * Data\ rate}$$

Result Tabulation:

IPD (m sec)	Packets Transmitted by each node				Packets Transmitted Successfully			
	Txd1	Txd2	Txd3	Txd4	Txd1	Txd2	Txd3	Txd4
4000								
2000								
800								
400								
200								
100								
40								

IPD (mSec)	Sum of Transmitted packets in all nodes	Sum of Successfully Transmitted packets in all nodes	$G_{Theoretical}$	$G_{Practical}$	$X_{Theoretical}$	$X_{Practical}$
4000						
2000						
800						
400						
200						
100						
40						

Expected Graph:



Exercise: Repeat the experiment for various values of Packet length, Node, Data rate.