Experiment 6

A. CSMA Protocol

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

Procedure:

1. Follow the procedure given in the Experiment 1 (ALOHA)

Setting the Configuration menu:

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	CSMA	**Protocol**	CSMA
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
Bit Delay	10 (at NEU)	**Bit Delay**	10 (at NEU)
Direction	Sender	**Direction**	Sender

Calculations:

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 ($X_{Theoretical}$):

$$X_{Theoretical} = \frac{G(1+G+aG(1+G+\frac{aG}{2}))e^{-G(1+2a)}}{G(1+2a)-(1-e^{-aG})+(1+aG)e^{-G(1+a)}}$$

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

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

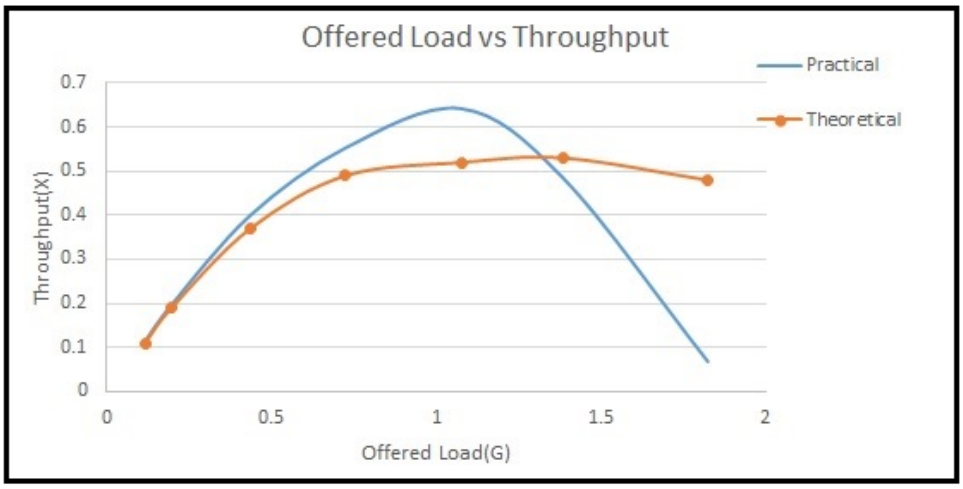
Result Tabulation:

For bit delay = 10

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.

B. CSMA/CD Protocol

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

Procedure:

1. Follow the procedure given in the Experiment 1 (ALOHA)

Setting the Configuration menu:

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	CSMA	**Protocol**	CSMA
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
Bit Delay	0 (at NEU)	**Bit Delay**	0 (at NEU)
Direction	Sender	**Direction**	Sender

Calculations:

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

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

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

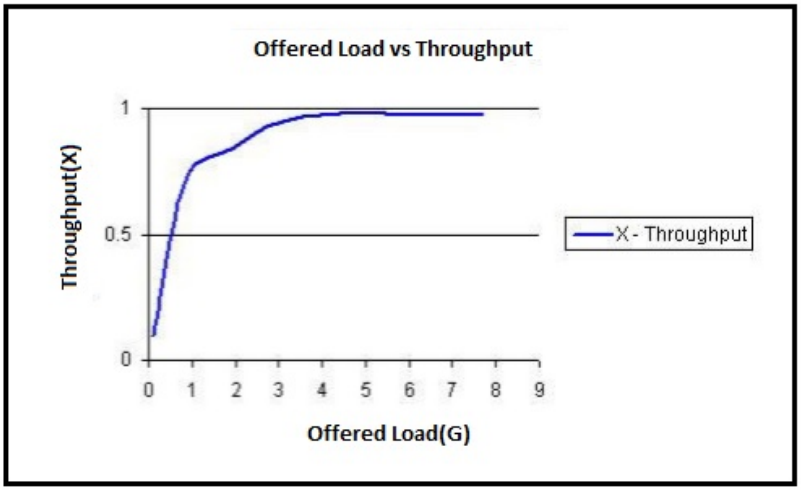
Practical Offered Load ($G_{Practical}$):

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

Result Tabulation:

IPD (mSec)	Tx1	Tx2	Tx3	Tx4	$G_{Practical}$	$X_{Practical}$
4000						
2000						
800						
400						
200						
100						
40						

Expected Graph:



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

C. Token Bus

Aim: To implement the token passing access in BUS-LAN.

Procedure:

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

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	1000 bytes	**Packet Length**	1000 bytes
My Address	0 on config menu 1 and 1 on menu 2	**My Address**	2 on config menu 1 and 3 on menu 2
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 to the NIU. Click **BOOT** tab on the tool window of PC 1 & PC 2 and click **OK** button.
5. Start running the experiment from the lowest priority node. While you do this, **THT** window pops up, enter the *Token Holding Time* (THT) (say 10000 ms) in all nodes and press the OK button first in the node, which has highest value of My Address (i.e., from My Address 3).

Calculations:

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

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

Where, Sum of successfully transmitted packets (displayed on the window) is obtained from the statistics at the end of the simulation.

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

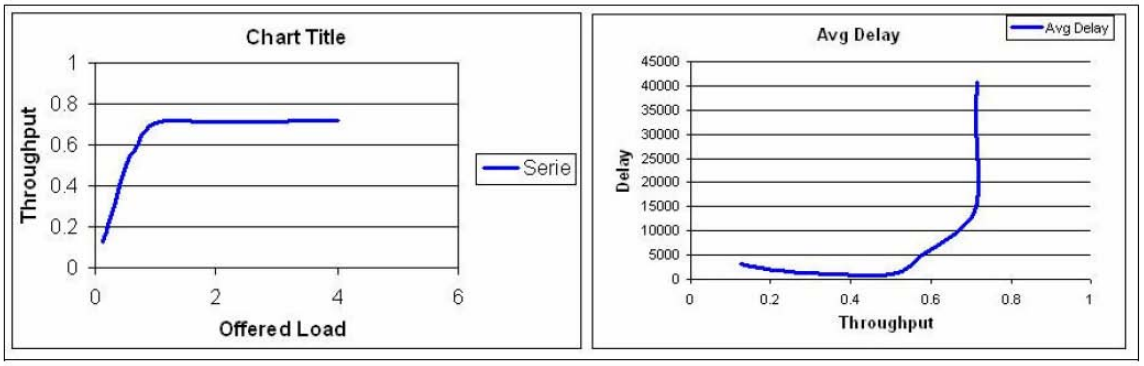
$$G_{Practical} = \frac{N * P * 8}{C * t_a}$$

G – Offered load, N – Number of nodes, P – Packet length in bytes
C – Data rate in bits/sec, t_a – Inter packet delay in milliseconds.

Result Tabulation:

IPD (msec)	Txd1	Txd2	Txd3	Txd4	$G_{Practical}$	$X_{Practical}$	Average Delay
16000							
8000							
4000							
2000							
1000							
100							
40							

Expected Graph:



Exercise:

1. Repeat the experiment for various values of Packet length, Node, Data rate.
2. Repeat the experiment by setting the BER to 10^{-2} in the NEU and also try to stop one of the nodes and observe the behaviour.