INTRODUCTION

The topmost layer is the wireless application protocol (WAP) architecture is made up of WAE which consists of WML scripting language.

WML stands for wireless markup language. WML is an application of XML, which is defined in a document type definition.

Introduction to NMIT 4.1

NMIT stands for nokia mobile internet toolkit. The version is 4.1. It consist of a set of editors that we can use to learn how to create various type of mobile internet content. Phone SDKs are also separately. NMIT detects installed supported phone SDK's at startup and lists them in its SDK control panel.

NMIT editors are WML 1.3 deck (creates a wireless languages document), WML script (adds programming logic to WML deck), WBMP image (creates a wireless bitmap image)

Launching: start > programs > Nokia developer tool > Nokia mobile internet toolkit > NMIT 4.1

Various Tags used in HTML -
Desk and Card elements

1) HTML elements

<!- - ->	Defines a comment
<wml>	Defines wml deck
<head>	Defines head information
<meta>	Defines meta info
<card>	Defines card in deck
<access>	Defines info of access control
<template>	Defines code template for card in deck

2) Text elements

 	Defines line break
<p>	Defines paragraph
<table>	Defines a table
<td>	Defines a table cell
<tr>	Defines table row

3) Text formatting tags

<b>	Defines bold text
<big>	Defines big text
	Defines emphasized text
<i>	Defines italic text

4) Image elements

<img>	Defines an image

5) Anchor element
<a> define an anchor

6) Event elements
<do> defines a do event handler

7) Task elements
<go> represent action of switching to new card

Dualnet architecture :-
It is made up of 2 parts :-
- The first is design where are can set up the terrain, network and functional parameters along with other details.
- The second is visualisation, one can see the data packets flow, dynamic graph in real time statistics.

EXPERIMENT-1

Aim: To study the flow of operation in Qualnet network simulator GUI

Software: Qualnet 5.1

Theory: Qualnet is a software that provides a comprehensive environment for modelling large wired as well as wireless n/w. It uses simulations to predict behaviour and performance of networks to inform their design and operation.

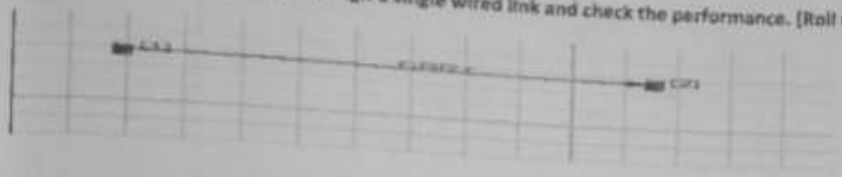
The Qualnet developer graphical user interface consists of different scenarios like scenario design, Qualnet animator, qualnet analyser.

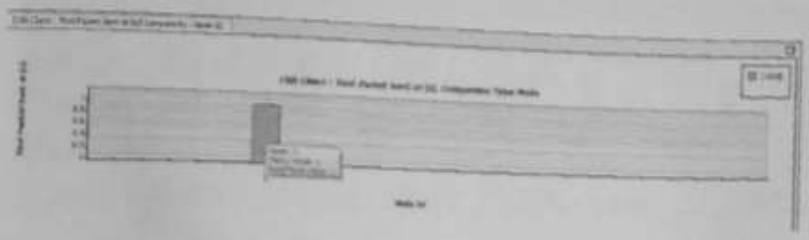
Parameters:-
first packet sent at 1s (node1)
first packet received at 1.00146s (Node2)
last packet sent at 24s (node1)
last packet received at 24.00155 (node2)
throughput of node 1 = 4274 bits/sec
throughput of node 2 = 4274 bits/sec

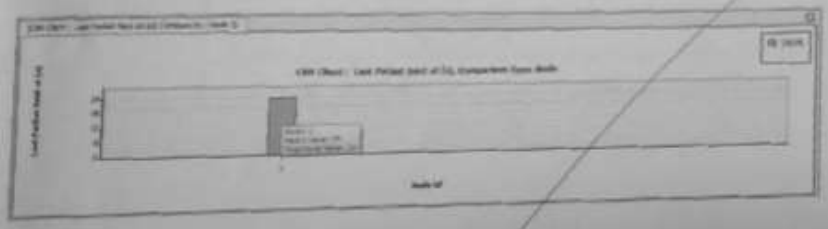
Therefore there is no loss.
Total bytes sents = 12288 bytes

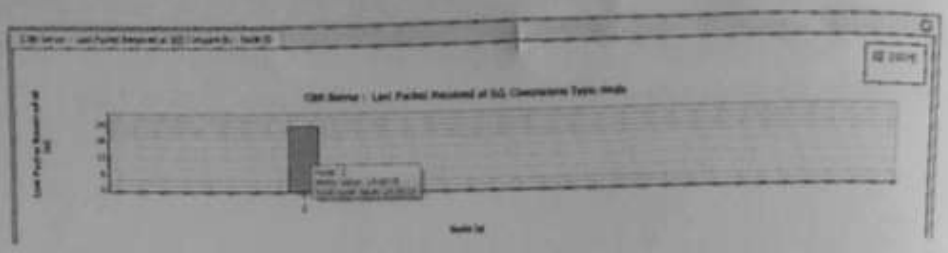
EXPERIMENT-4

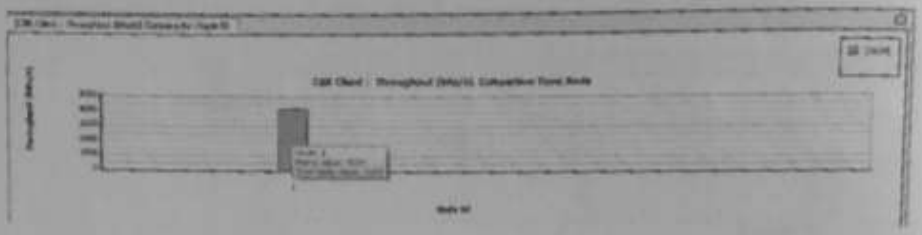
AIM:- Introduction to Qualnet. Design a single wired link and check the performance. [Roll no. 7,14]

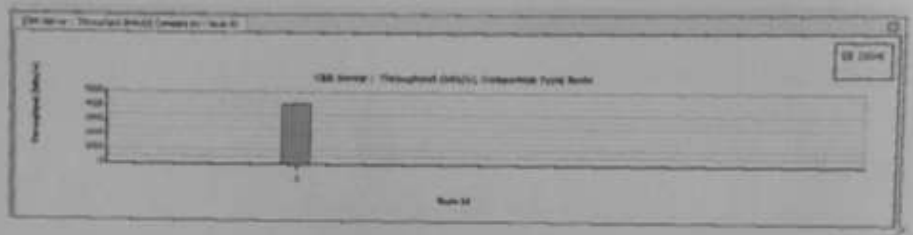


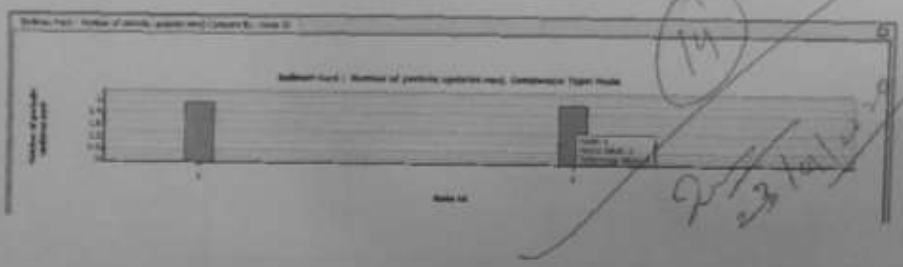












SCENARIO Description :-

no. of nodes = 2
Placement Strategy = Random
Subnets = 1
Application = constant bit rate (CBR)

Conclusions :-

A wired connection was formed b/w 2 nodes. The first packet was sent at 1 sec. The last packet was sent at 24 sec. A total of 1288 Kb bytes were sent. There was no packet loss. Throughput at node 1 and node 2 was Equal.

EXPERIMENT - 02

Aim :- To configure an adhoc network scenario in Qualnet simulator GUI

Software :- Qualnet network simulator

- Theory :- An 802.11 scenario works in two modes Adhoc and infrastructure. Here we are using adhoc mode.

1) Adhoc mode :-
Here all the nodes are independent and there is no fixed access point which control whole of the subnet nodes.

2) Infrastructure mode :-
Here we have to define an access point and all the data is transferred through this access point from source to destination. An access point acts a controller of subnet.

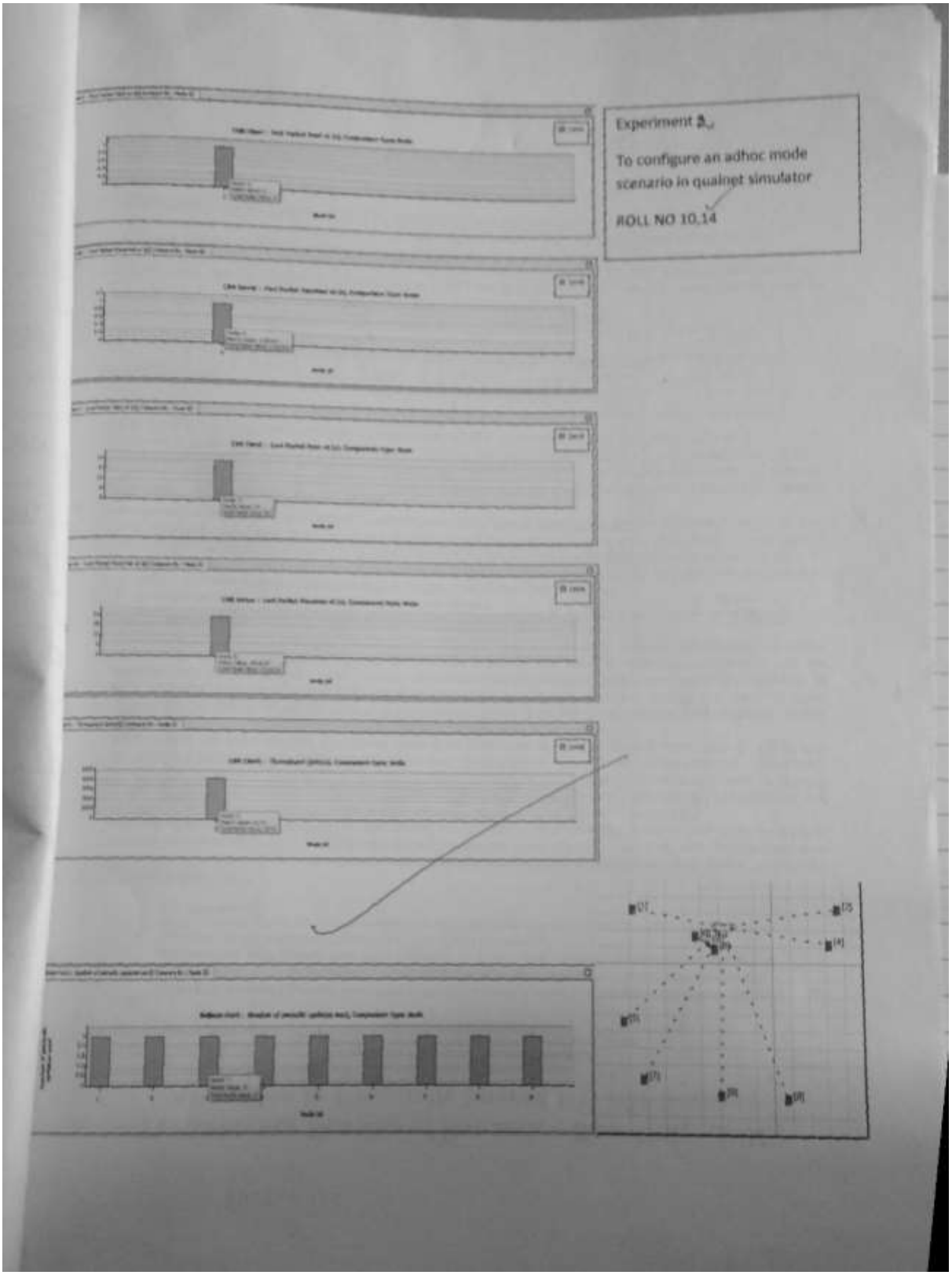
Scenario description :-

No. of nodes = 9
No. of subnets = 1
Placement strategy = Random
CBR between 5 and 6 node.

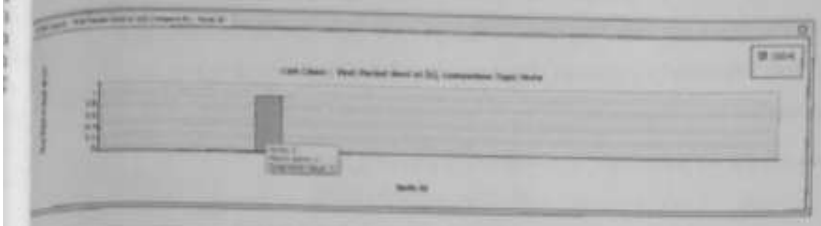
Experiment 3

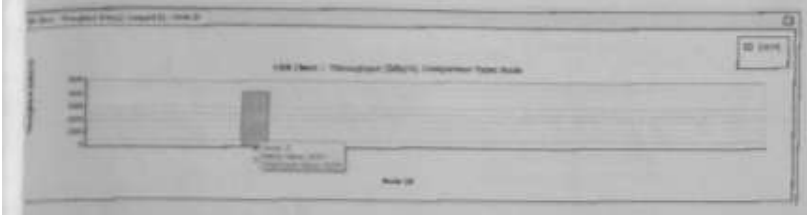
To configure an adhoc mode scenario in qualnet simulator

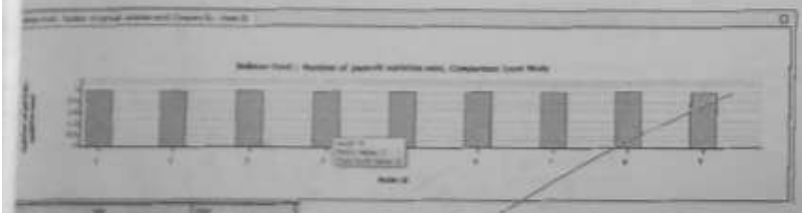
ROLL NO 10.14

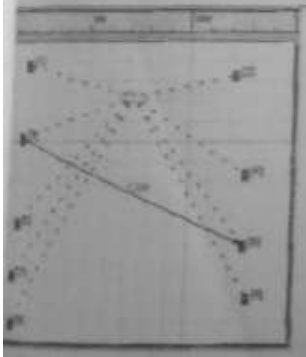


ASE 2









30/01/2020

Result:- Adhoc mode scenario was successfully configured in Qualnet network Simulator.

EXPERIMENT - 3

Aim :- To study input and option tags in WML

Software :- NMIT 4.1

Theory :- WML <select> tag are used to define a selection list and the Options tags are used to define one item in selection list. Items are preceded by radio buttons in WAP browser.

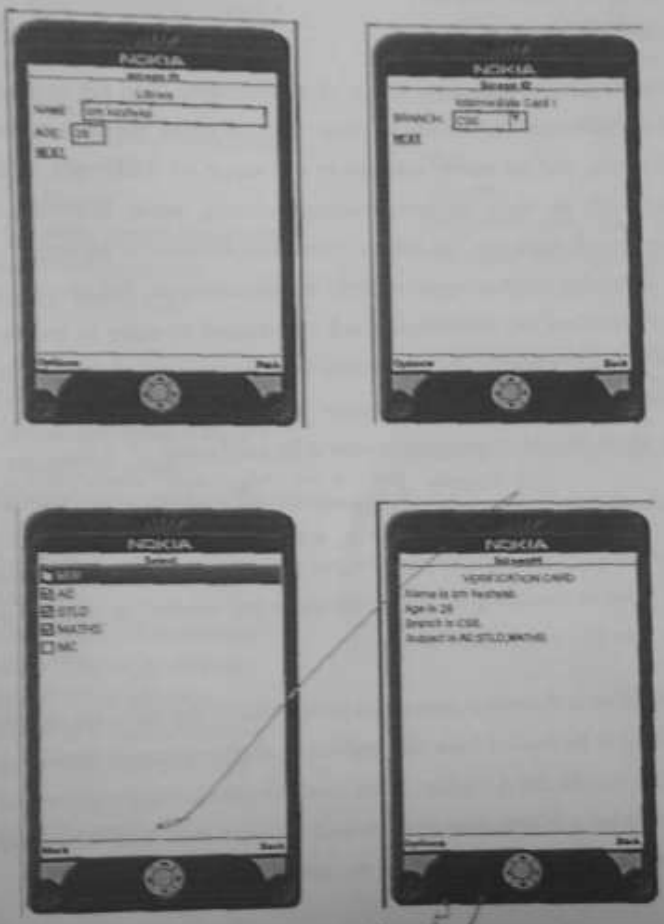
WML <input> element
It is used to create input fields and input fields are used to obtain alphanumeric data from user.

The various tags used are :-

	WML elements	Purpose
(1)	<card>	Defines card in deck
(2)	<do>	Defines a do event handler
(3)	<go>	Represent action of switching new ca
(4)	multiple	Set whether multiple items can be selected or no Default is false.

EXPERIMENT 9 - WAP in WML to show the use of INPUT, OPTION and SELECT tag in deck of 4 cards

Roll No. 001, 014 and 017



```
<?xml version="1.0" encoding="utf-8"?>
<!DOCTYPE wml PUBLIC "-
//WAPFORUM//DTD WML 1.3//EN"
"http://www.wapforum.org/DTD/wml13.dt
d">
<wml>
 <card id="card1" title="screen #1">
  <do type="unknown" label="Next">
   <go href="#card2"/>
  </do>
  <p align="center">Library</p>
<p>NAME :   <input
name="NAME" size="20"
type="text"></input>
AGE:    <input name="AGE"
size="3" type="text"></input>
<a href="#card2">NEXT</a>
</p>
</card>
<card id ="card2" title="Screen #2">
<do type="unknown" label ="Next">
<go href ="#card3" /></do>
<p align ="center">Intermediate Card 1</p>
<p>
BRANCH:   <select
name="BRANCH">
<option value="ECE">ECE</option>
<option value="CSE">CSE</option>
<option value="IT">IT</option>
<option value="EEE">EEE</option>
<option value="ICE">ICE</option>
</select>
<a href="#card3">NEXT</a>
</p>
 </card>
<card id="card3" title="Screen#3">
<do type="unknown" label="Next">
<go href ="#card4"/>
</do>
<p align ="center">Intermediate Card 2</p>
<p>
SUBJECT:   <select name
="SUBJECT" multiple ="true">
<option value="MW">MW</option>
<option value="AE">AE</option>
<option value="STLD">STLD</option>
<option value="MATHS">MATHS</option>
<option value="MC">MC</option>
</select>
<a href ="#card4">SUBMIT</a>
</p>
</card>
<card id="card4" title="Screen#4">
<do type="unknown" label ="NEXT">
<go href="#card1"/>
</do>
<p align="center">VERIFICATION CARD</p>
<p> Name is $NAME.</p><p>Age is
$AGE</p><p>Branch is
$BRANCH.</p><p>Subject is $SUBJECT.</p>
</card>
</wml>
```

Name - names the variable that is set with result of selection

id - a unique id for the element

Conclusion :-

A registration form was created using various HTML tags and attributes. The class in chart was a single value attribute where as department was multivalued attribute where. After submission, a verification chart (card) was displayed which shared off the details of the person.

EXPERIMENT No. 4

Aim: To write a program to show the use of event, timer and image tags using a deck of 3 cards.

Software: NMIT 4.1

Theory:-

EVENT:- is defined as something that has happened WML supports events and we can specify an action to be taken whenever the event occurs WML supports on timer event which is used to trigger an event after a given time period. For eg:- we want to display a message after 3 seconds of loading a card, then we can use this event

- The on timer event is triggered when a card's timer counts down from one to zero, which means timer is initialized to the value required.

<timer> element: A timer is declared inside a WML card with the <timer> tag. No more than one timer can be present in a card.

Attributes :-

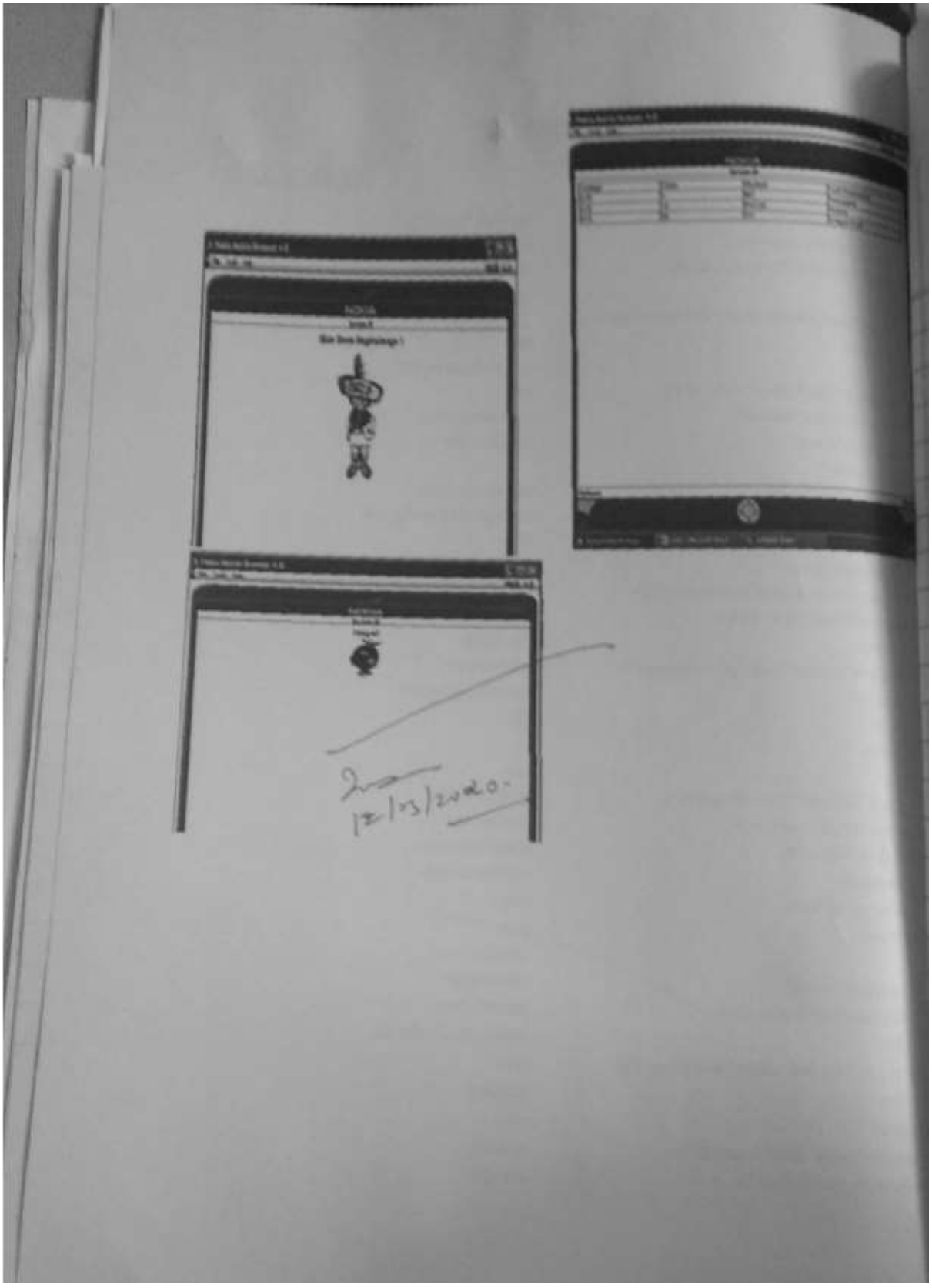
name - sets a name for the element.

value - Specifies the time after which the timer

EXPERIMENT-4

017,012,013,014

```
<?xml version="1.0" encoding="utf-8"?>
   <!DOCTYPE wml PUBLIC "-
//WAPFORUM//DTD WML 1.3//EN"

"http://www.wapforum.org/DTD/wml13.dtd">
  <wml>

 <card id="card1" title="Screen #1">
<onevent type="ontimer">
<go href="#card2"/>
</onevent>
<timer value="50">
</timer>

    <p align="center">
    <big><b>Slide Show Begins</b></big>
<big><b>Image 1</b> </big>
    <br/>
<img src="Mascot70.wbmp" alt="image1"/>
   <br/>
   </p>
</card>

   <card id="card2" title="Screen #2">
<onevent type="ontimer">
<go href="#card3"/>
</onevent>
<timer value="45">
</timer>

    <p align="center">
    <big><b>Image2</b></big>
    <br/>
<img src="Mascot82.wbmp" alt="image 2"/>
    </p>
</card>
<card id="card3" title="Screen #3">
<onevent type="ontimer">
<go href="#card1"/>
</onevent>
<timer value="90">
</timer>

<p>
<table columns="4">
<tr>
<td>College</td>
<td>Class</td>

<td>Student</td>
<td>Fruit Preference</td>
</tr>
<tr>

<td>ECE</td>
<td>4</td>
<td>MIT</td>
<td>Pineapple</td>
</tr>

<tr>
<td>ECE</td>
<td>16</td>
<td>BVCOE</td>
<td>Phalse</td>
</tr>
<tr>
<td>ECE</td>
<td>59</td>
<td>PIT</td>
<td>Dragon Fruit</td>
</tr>
</table>
</p>
</card>
</wml>
```


12/03/2020.

will be expired. Time units are specified in units of a tenth of a second.
id - A unique ID. for the element.

<img> tag :- is used to include an image in a WAP card. WAP enabled devices support only the WBMP image format.
WBMP can only contain two colors - black & white

Attributes :-
align - top, middle, bottom values can be given
alt - gets an alternate text to be displayed if the image is not displayed.
src - A path to .Wbmp image

Result: The use of image, event and time were shown successfully using a deck of 3 cards in WML

EXPERIMENT No. 6

Aim :- To configure an Infrastructure mode scenario in Qualnet network simulator GUI.

Software used :- Qualnet 5.1

Theory : In 802.11 scenario works in two modes - Adhoc & infrastructure. Here we are using infrastructure mode.

Infrastructure mode :-
Here we have to define an access point and all the data are transferred through this access point from source to destination. An access point acts a controller of subnet.

Scenario description :-

No. of nodes = 10
Subnet (i) 1 to 5 (ii) 6 to 10
application (i) 2 → 4 (ii) 9 → 7

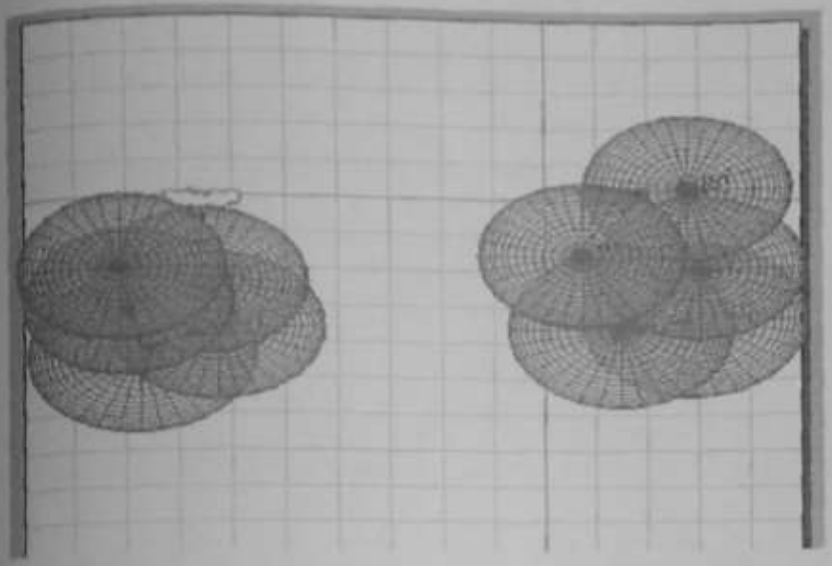
Infrastructure :-
Access point (i) 3 (ii) 10

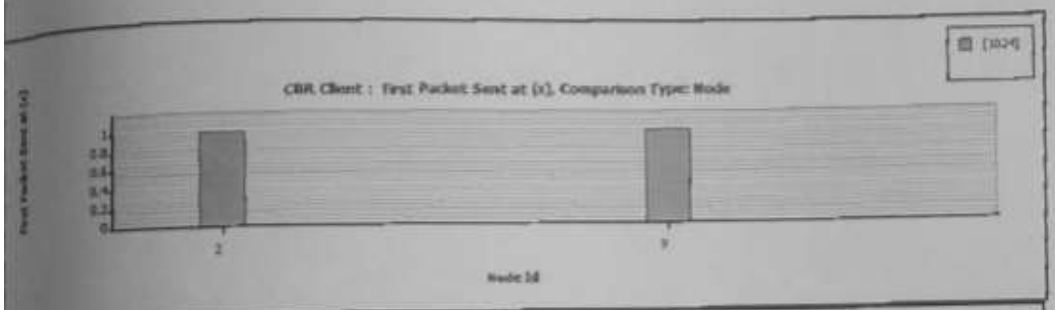
Result :- Infrastructure mode scenario is successfully configured in Qualnet network simulator.

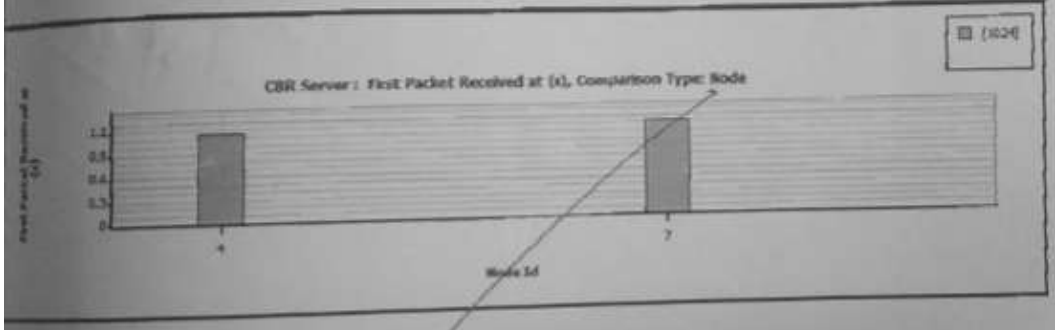
EXPERIMENT No. 5

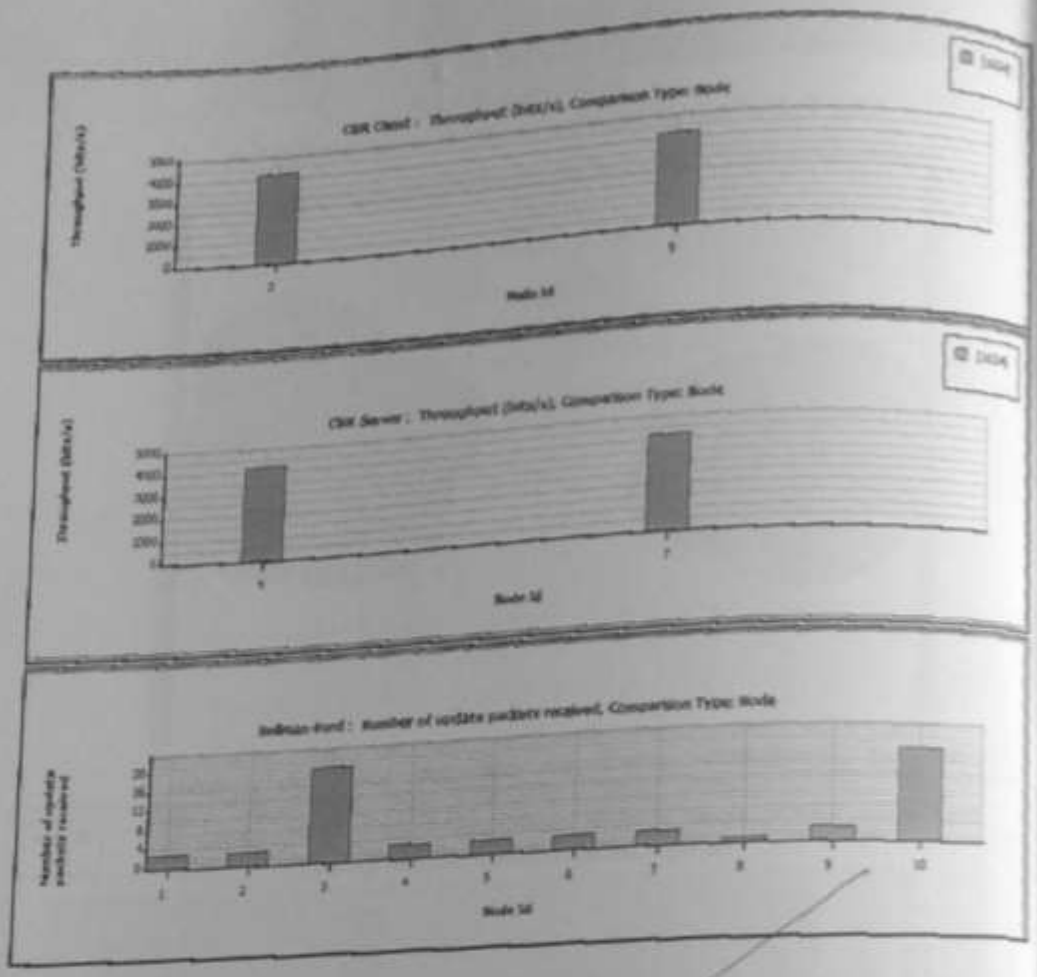
Roll Number 003,014

Aim:- To configure an infrastructure mode scenario in Qualnet.








CBR Client : Throughput (bits/s), Comparison Type: Node
Throughput (bits/s)
Node Id
CBR Server : Throughput (bits/s), Comparison Type: Node
Throughput (bits/s)
Node Id
Number of update packets received, Comparison Type: Node
Number of update packets received
Node Id

12/03/2020.

EXPERIMENT No. 6

Aim: Write the program showing the usage of different text formatting tags and navigation tags in WML

Softwares :- NMIT 4.1

Theory :-

WML	Tags used
<WML>	WML root
<card>	defines a card in a deck
<do>	defines an event handler
<p>	paragraph
<big>	big text
<u>	underlined txt.
<i>	italic text.
<go>	switching the new card
 	break a line
<a href>	for specifying hyperlink
<b>	bold text.

WML architecture used :-

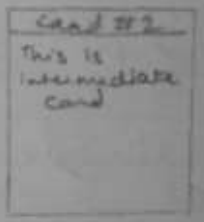
href — to specify the hyperlink
title — to specify the title of the card

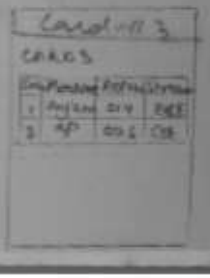
comments added using <!--> tag

EXPERIMENT NO-6

```
<?xml version="1.0" encoding="utf-8"?>
<!DOCTYPE wml PUBLIC "-
//WAPFORUM//DTD WML 1.3//EN"
"http://www.wapforum.org/DTD/
wml13.dtd">
<wml>
<card id="card1" title="Card#1">
<do type="unknown" label="Next">
<go href="#card2"/>
</do>
<p align="center">
<a href="#card2">card2</a>
<br/><br/>
<img src="Mascot94.wbmp"
alt="this is an img" height="1000"/>
</p>
</card>
<card id="card2" title="Card#2">
<do type="unknown" label="Next">
<go href="#card3"/>
</do>
<p align="left">
<a href="#card3">Card3</a>
<table columns="4" align="LCR">
<tr>
<td>SNO</td>
<td>Person</td>
<td>RollNo</td>
<td>Stream</td></tr>
<tr>
<td>1</td>
<td>Anjana</td>
<td>014</td>
<td>ECE</td>
</tr>
<tr>
<td>2</td>
<td>AP</td>
<td>006</td>
<td>CSE</td>
</tr></table>
</p>
</card>
<card id="card3" title="Card
<p align="center">
This is intermediate card
</p></card></wml>
```

Output





The WML pages are called decks
A deck contains multiple cards. Card elements can contain Text, markup links, input files.

Conclusion :-

Cards were created using the various WML tags and attributes. The different text formatting tags were used to display the texts on the cards navigation tags were used to move from one card to another. The result was seen on software development kit.

EXPERIMENT NO. 7

Aim: To compare two routing protocols (AODV & DYMO) in an ADHOC made scenario.

Software: Qualnet network Simulator.

Theory: 1) AODV :- (Adhoc on-demand distance vector)
It is a routing protocol for mobile adhoc network and other wireless adhoc network. It is jointly developed in nokia research center of university of California, Santa barbara and university of cincinnati by C perkins and S Das AODV is capable of both unicast and multicast routing. It is a reactive routing protocol, meaning that it establishes a rate to a destination only on demand. AODV avoids the counting to infinity problem of other distance vector protocols by using sequence numbers on route updates, technique pioneered by DSDV.

2) DYMO :-
It is a successor to AODV protocol and shares many of its benefits. It is easier to implement & design DYMO can work as both a proactive and be a reactive routing protocol.

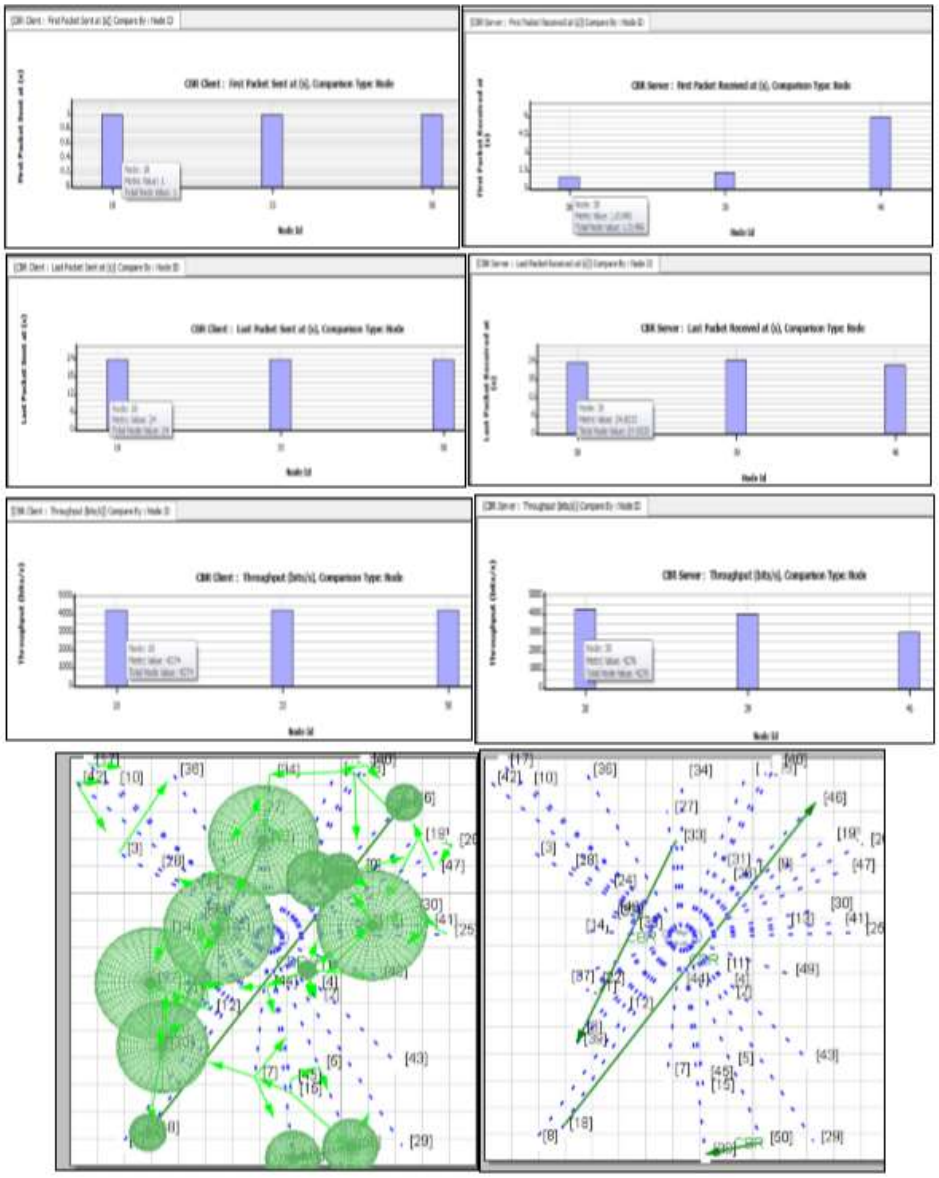
To discover new routes following two steps take place.

ADHOC Scenario of 50 nodes.

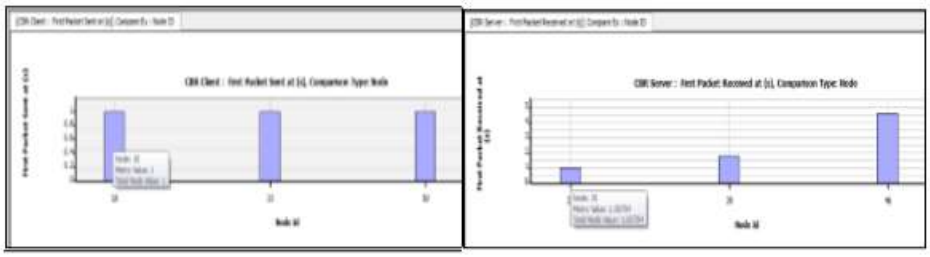
Experiment No- 7

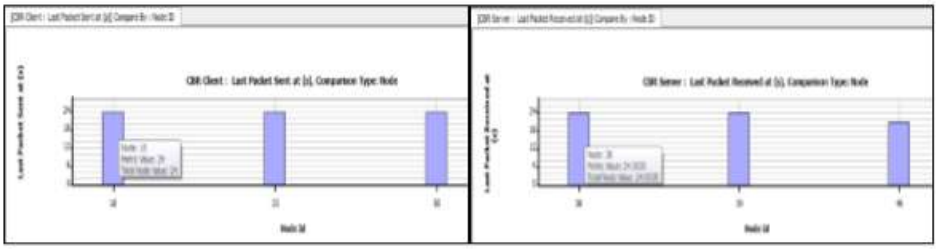
Aim: To compare two routing protocols (AODV and DYMO) in an AD-HOC mode scenario.

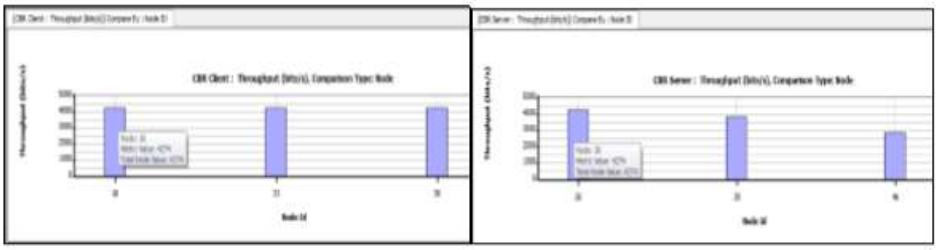
DYMO

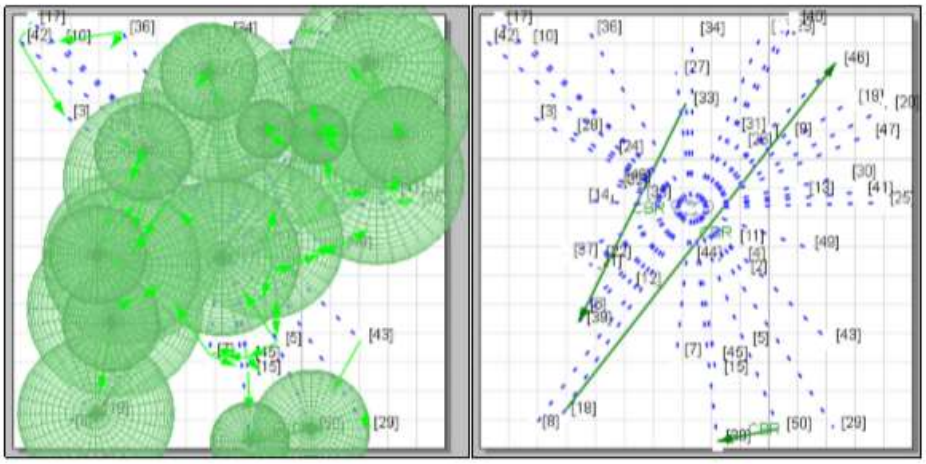


AODV


CBR Client : First Packet Sent at (s), Comparison Type: Node
CBR Server : First Packet Received at (s), Comparison Type: Node


CBR Client : Last Packet Sent at (s), Comparison Type: Node
CBR Server : Last Packet Received at (s), Comparison Type: Node


CBR Client : Throughput (bits/s), Comparison Type: Node
CBR Server : Throughput (bits/s), Comparison Type: Node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1. A special "Route request" (RREQ) messages is broadcast through MANET. Each RREQ keeps an ordered list of all nodes it passed through, so every host receiving an RREQ message can immediately record a route back to the origin of this message.

2. When an RREQ message arrives at its destination, a 'routing reply' (RREP) message will immediately record a route back to the origin of this message.

Scenario Description :-

No. of nodes = 50
placement strategy = Random
Subnet = 1
Application = CBR b/w node is 18 - 46, 30 - 38 & 33 - 39

Varying parameters :-
- first routing protocol DYMO
- 2nd routing protocol AODV

Result :- DYMO is a better routing protocol for this scenario and also generally.
- It was observed that DYMO performs better than AODV, but for larger distances AODV performs better.

EXPERIMENT No. 8

Aim: To see the effect of mobility to the data transfered in an adhoc mode scenario.

Software: Quatnet network Scenario.

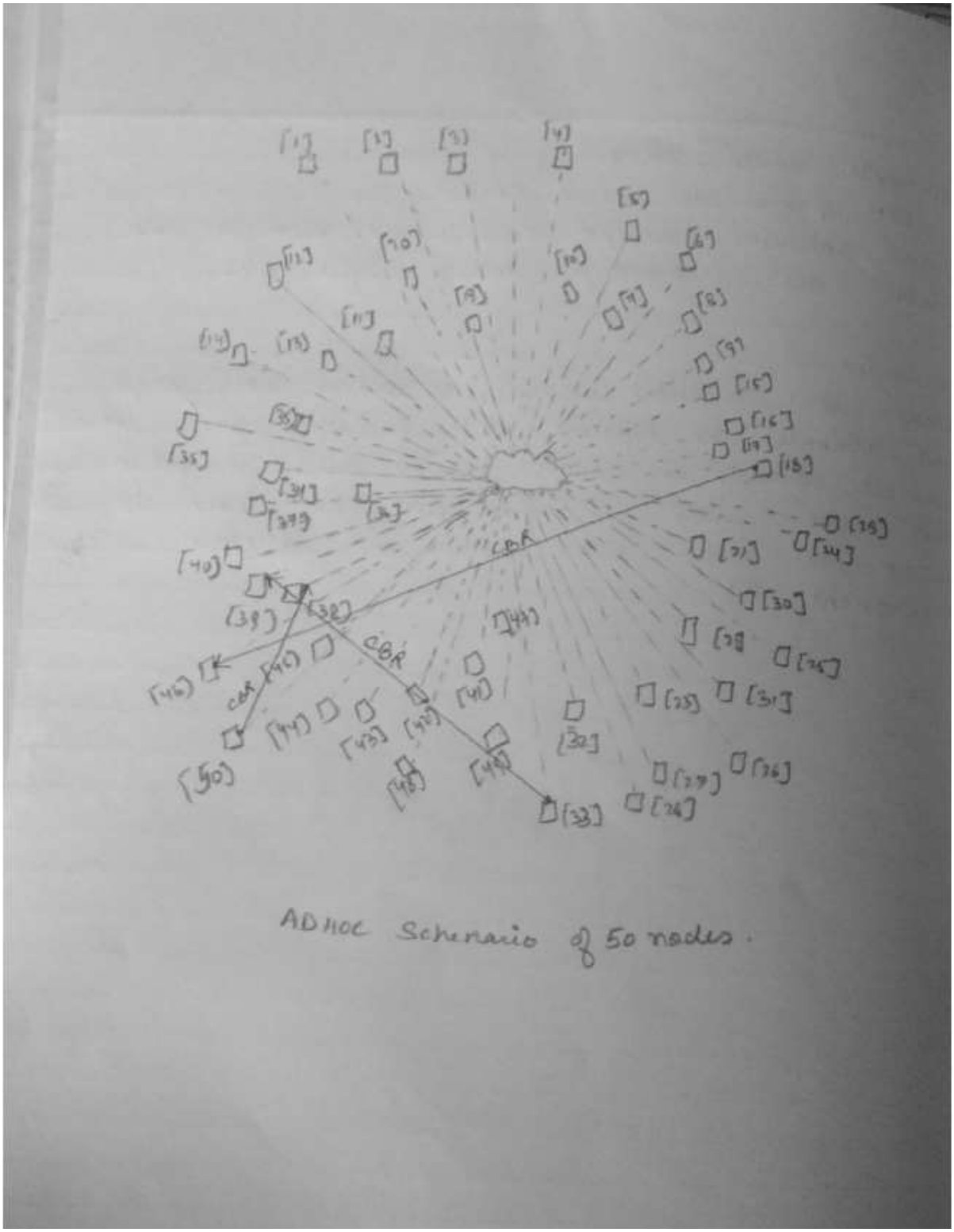
Theory:- Mobility tends to change the network configurations of the adhoc networks and thus got different results for static and mobile networks. Mobility sometimes improves throughput and sometimes decreases the network throughput depending on what kind of network changes takes place due to mobility.

Scenario Description :-

no. of nodes = 50
placement strategy = Dynamic (Random)
Subnets = 1
Application = CBR (constant bit rate)
18-46, 50-38, 33-38

Varying parameter :-
- Mobility - none
- Mobility - Random way point

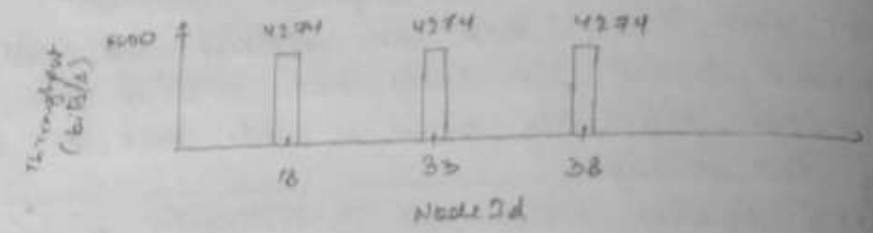
Result: Mobility enabled scenario have different stats than those of static nodes scenario.



ADHOC Scenario of 50 nodes.

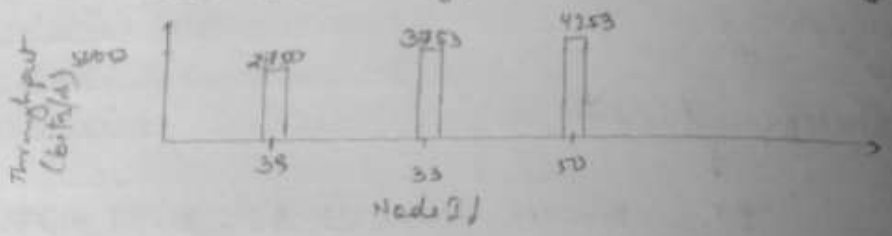
Sent

CBR client : Throughput (bits/s), Comparison type : Node



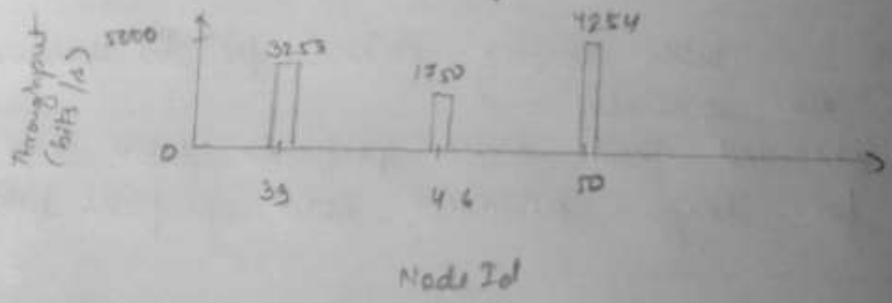
Received (without mobility)

CBR Server : Throughput (bits/s), Comparison type : Node



Received (without mobility)

CBR Server : Throughput (bits/s), Comparison type : Node



Innovation - 1

Aim: To check the effect of bottle neck in a wired scenario.

Software used :- Qudlnet

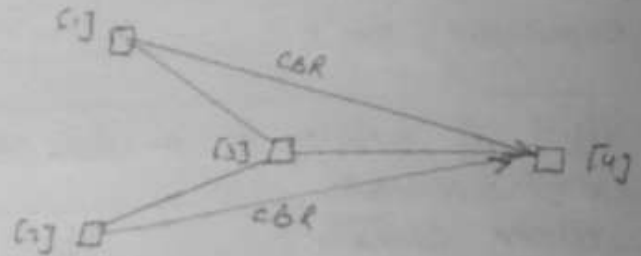
Theory :- Bottleneck is a phenomenon by which the performance or capacity of an entire system is severely limited by a single component. The component is sometimes called a bottleneck point. The term is metaphorically derived from the neck of a bottle, where the flow speed of the liquid is limited by its neck.

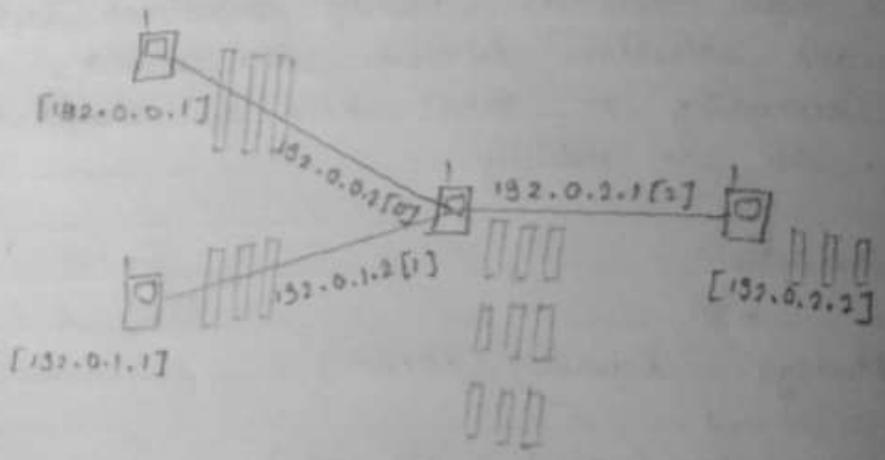
Scenario Description :-

- Node 1 & node 2 are connected to node 3 via 100 Mbps point to point wired link with 1 ms propagation delay.
- Node 3 is connected to node 4 via 10 Mbps point to point wired link with 1 ms propagation delay
- Place nodes in the correct order.

Application - node 1 & node 2 are sending CBR to node 4 Each sends 75 packets (512 B) every 1 ms from 0 to 30 sec

Result :- Bottleneck results in the loss of packets due to packet drop because of excessive queuing





Animator window.

INNOVATION-2

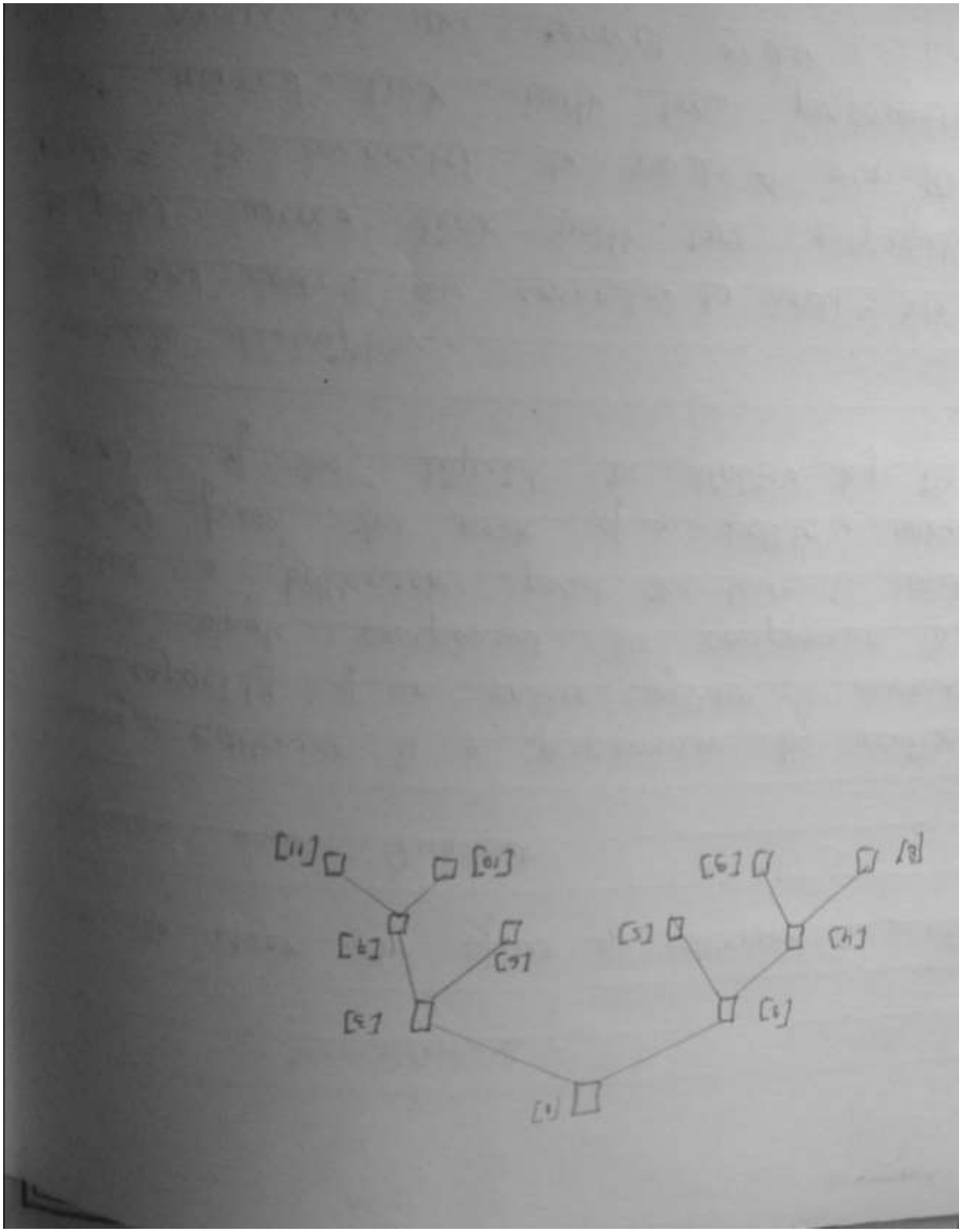
Aim: To configure a multicasting application in a wired scenario.

Software used :- Qualnet network Simulator.

Theory :- The word multicast is used to refer to IP multicast which is often employed for streaming media and internet television applications. In IP multicast the implementation of the multicast concept occurs at the IP routing level, where routers create optimal distribution paths for datagrams sent to multicast destination address spanning tree in real time. At the data link layer, multicast describes one to many distribution, such as ATM.

Scenario description
no. of nodes = 11
link type = wired

Result :- Multicast protocol configured in Qualnet network Simulator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