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Simulation and Analysis of AODV and DYMO Protocols under CBR in Wireless Sensor Network using Qualnet

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Abstract: One of the major challenges in wireless CBR network is the design of roboust routing protocols .Routing protocol are designed to establish correct and efficient path between source and destination. .Wireless sensor is considered the best technology for the study of the performance parameters. MANET is self configured .All MANETs in wireless is connected through wireless link. AODV and DYMO are made to establish a correct relation between the sender and the receiver. Many protocols have been discovered in last few years. These are two of them. They have different property under the different application. Constant bit rate is used here to define the AODV and DYMO Protocols. In this paper, present the two mobile CBR network routing protocol, i.e. CBR on (AODV), CBR on (DYMO) . The performance analysis is done on the basis of network metric such as End to End delay, Average (jitter), total packet received and throughput.

***Keywords**: - AODV, DYMO, QUALNET*

I. INTRODUCTION

WSN (wireless sensor network) has been known in computer network since the time of Adhoc (Ad hoc on-demand distance vector) and DYMO (Dynamic MANET on-demand). It is low powered and has low cost [1].WSN has small node, which have different quality. These points defined it as a self- configured network.

Each device of WSN senses the data. That is distributed over wide area with pre defined location. They did their work by determine the location of the sender and the receiver [2].

WSN have a large number of applications such as military operation, volcano monitoring, seismic monitoring etc [1].

Use of CBR increase now days due to its advantage.CBR (constant bit rate) for mobile nodes has been designed to reduce the packet loss. Constant bit rate have been used with two protocols AODV and DYMO here.

II. RELATED WORK

Two mainly routing protocols AODV and DYMO are discuss.

A. AODV

It is a new level of the destination sequence distance vector routing protocol. AODV has different mechanism for routing information. It is purely on demand protocol .Important feature of AODV is that it is time based working protocol. . AODV gives demand and destination sequence number on the bases of latest information for the route to destination. AODV takes less time to set up connection [3]. Due to all those advantage, AODV had become popular nowadays.

It works in two steps, one is path discovery and other is path maintence. Path discovery used the PREQs (Route request), PREPs (Route replies), and PERRs (Route errors) message type. In this, source node has a route request. This packet has the source Address, destination IP address, source sequence number, the last destination sequence number, and packet broadcast number and hop count. In path maintence, it maintains the path source to destination [4].

B. DYMO

DYMO(Dynamic MANET on- demand) routing protocol is not a new , but it is improvement form of AODV routing protocol .It can be implement easily .It determines unicast between routers in network and in an on-demand fashion , offering improved convergence in topologies. Its basic operation depends on two, first is route discovery and second is route maintain.DYMO is a reactive routing protocol.

In route discover It has received a PREQ only if it want to route in any particular destination.

In route maintenance Because of dynamic nature of MANET, link breaks can occur that results change in network topology. It maintains the route [4].

CBR (constant bit rate):

It is an application layer protocol. Here, the data is transfer from the sender to receiver without any feedback from destination .It does not communicate in phases and data is transfer with constant bit rate.

It has the following characteristics:-

- **Erratic**: - It is erratic in nature because there are no responsibilities to transfer the data.
- **Unidirectional**: - CBR is unidirectional in nature .It communicate in only one direction.
- **Predictable**: - It offers the unchangeable data.

Here, in AODV, DYMO using CBR in wireless sensor network [6].

MANET has basically nodes which are power operated .In single path had a lot of limitations, so to overcome this multipath routing have been approached.

Multipath routing have its own benefit as, it has been developed. In this, energy consumption is more due to this way. To overcome this, a energy efficient technique is used .That is depend of on how to select of the energy efficient path. So, in the CBR as we increased the traffic, battery gets reduced due to which reduced network lifetime [7].

AODV and DYMO both are using the CBR application path for data transfer.

Random Waypoint mobility model:

Random waypoint mobility model is used for the simulation purposes. The Random waypoint model was first prepared by Johnson and Maltz.When, a user move from one location to another location, this model shown the movement of the user.

This model has the following benefit:-

- Simplicity
- Wide availability
- Nodes move freely without any restriction [8].

Mobility model:-
Mobility model describes the following changes in station:-

- Velocity
- Acceleration

Mobility models can be categorized in two types:-

- Group mobility: - Entity model are independent of each other in this mobility.
- Group models: - The movements of stations are dependent on each other in group models.

DYMO is mainly reactive protocol and works according that [10].

III. METHODOLOGY

The simulation and analysis is done in QUALNET. It comprises the following steps. It has three phases-

First phase:-

In this phase, architecture is prepared here of the system.

Second phase:

It did execution, visualization and to analyze the created scenario and collect simulation results.

Third phase:-

It analyzes the results.

All these process are done by QUALNET graphical user interface [5].

IV. SCENARIO

1. The scenario 1 architecture as shown in fig.1

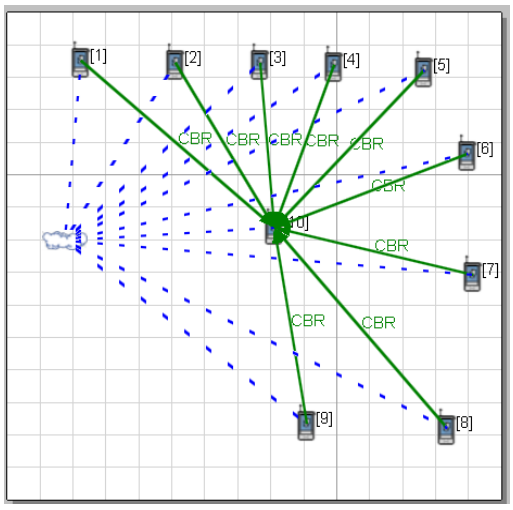


Figure 1 Scenario 1 for simulation of ten nodes

There are 10 nodes that have been made onto the qualnet architecture and the nodes are here node 1 to node 10.Node

10 is the receiver node that collects all information.CBR connection is set between all nodes.

2. The scenario2 architecture as shown in fig2.

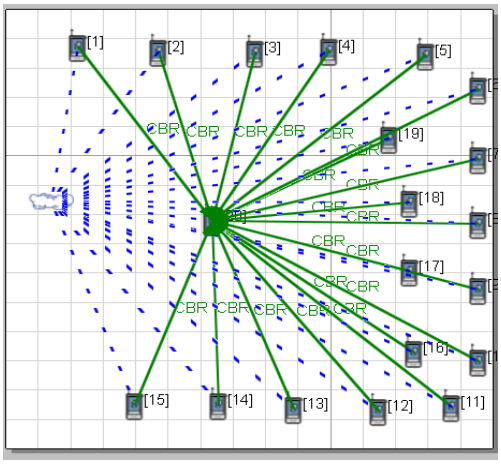


Figure 2 Scenario2 for simulation of twenty nodes

There are 20 nodes that are made onto the qualnet architecture and the nodes are identified node 1 to node 20.Node 20 is the receiver node that collect all information.

3. The scenario 3 architecture as shown in figure 3

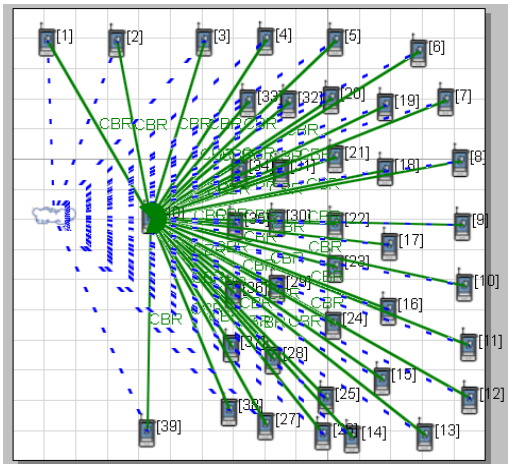
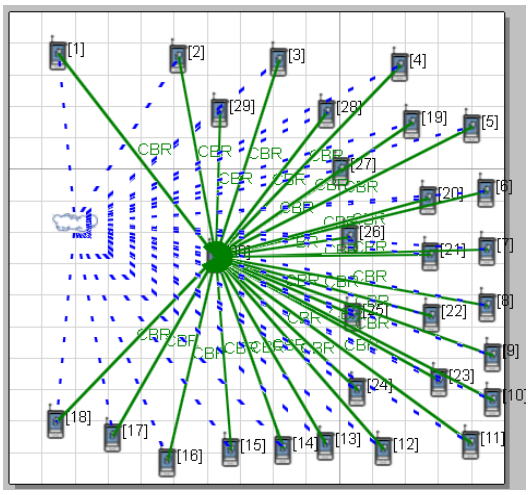


Figure 3 Scenario3 for simulation of twenty nodes

There are 30 nodes that made onto the qualnet architecture and the nodes are identified node 1 to node 30.Node 30 is the receiver node that collect all information. Constant bit rate connection is set between all nodes.

4. The scenario 4 architecture as shown in figure 4

There are 40 nodes made onto the qualnet architecture and the nodes are identified node 1 to node 40.Node 40 is the receiver node that collect all information. Constant bit rate connection is set between all nodes.



5. Fig 5 shows the simulation of different nodes

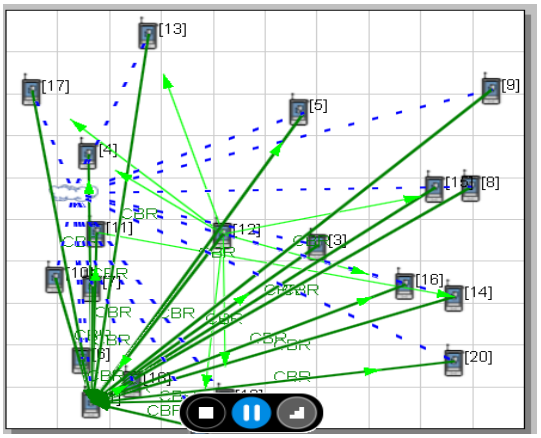


Figure 5 shows the simulation of twenty nodes

It is the simulation time scenario of twenty nodes. In which the sender is moving from one location to the other and message is transfer here.

V. SIMULATION PARAMETERS

The four simulation parameter is used for AODV and DYMO

1) **Throughput-**

It is defined as the total data arrived to the receiver in a given time or the time taken by the packets to reach the destination. It is measured in bits per second (bits/ seconds).

2) **Jitter:-**

It is defined as the variation in the node arriving time, due to congestion and route change. It is measured in seconds.

3) Total message received:-

It is determine the number of messages received here.

4) Average End to end delay:-

It is the average time takes by a data packet to reach the receiver. It is taken in seconds.

VI. CONFIGURED PARAMETERS

Parameter are set here, first of set simulation time. Wireless sensor standard 802.15.4 Ethernet standard. And all the nodes are fully function device and PAN co-coordinator here. One node is base station here. Network protocol IPV4 here:-

a) Network protocol:IPV4
b) Routing protocol IPV4:AODV

Radio type:-IEEE 802.15.14

Packet reception model:-PHY802.15.14

Table shows the parameter and values

Parameter	**Value**
Data rate	1ooo
Simulation time	1000sec
Terrain Range	1500 x 1500
Traffic Type	CBR
Nodes	10,20,30,40
Channel type	Wireless channel
Protocols	AODV,DYMO
Mobility model	Random waypoint
Antenna type	omnidirectional

VII. RESULT and DISCUSSION

1. **Throughput** :-(bits/seconds):- Table 1 shows the value of throughput after varying nodes-

Table 1.value of AODV and DYMO

Nodes	Aodv	DYMO
10	622.481	289.863
20	1876.72	1693.04
30	2025.83	2016.88
40	2216.62	1956.68

On comparing the value of AODV and DYMO, both have the increasing order graph. But AODV has more throughput as compare to the DYMO .The graph start increasing till 40 nodes after that AODV gives more value compare to DYMO.

.As shown in figure1.

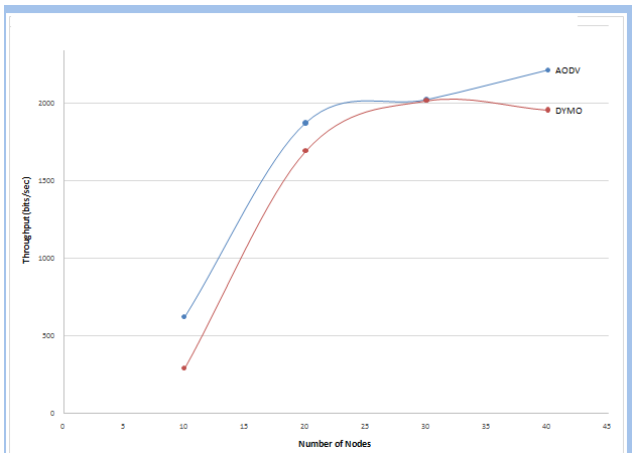


Figure 1.

2. **Jitter :-(seconds**):- Table 2.shows the value of Jitter after varying nodes

Table 2.value of AODV and DYMO

Nodes	Aodv	DYMO
10	0.164929	0.677382
20	6.37948	8.32967
30	12.3584	19.7677
40	19.1654	34.789

On comparing the value of jitter by varying nodes, both value increased. But DYMO has more value as compare to

AODV. The graph of DYMO has more slope as compare to AODV.

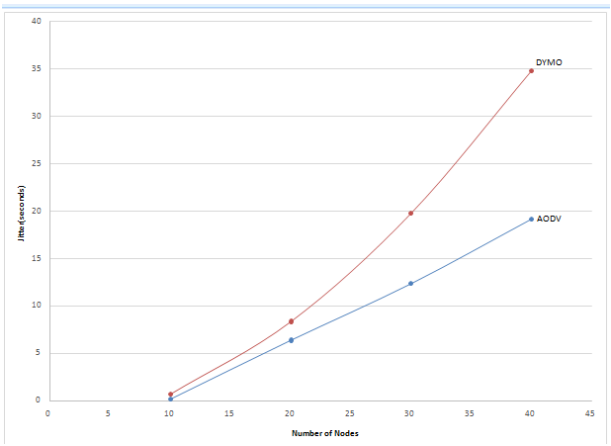


Fig2.

3. Total message received (messages):-):- Table 3.shows the value of total message received after varying nodes.

Table 3.Value of AODV and DYMO

.Nodes	AODV	DYMO
10	1232	572
20	3838	3293
30	4109	3987
40	4560	3860

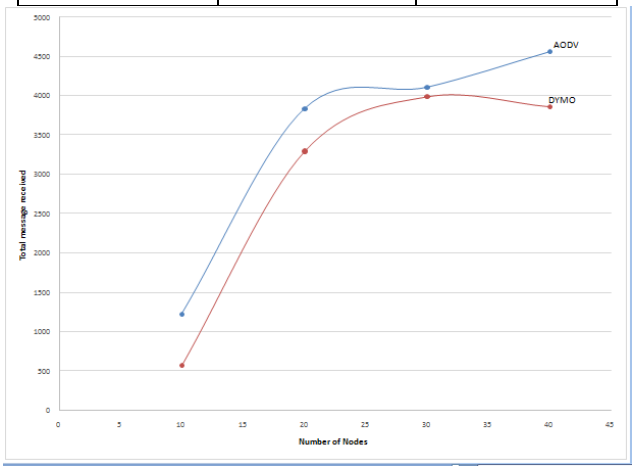


Fig3.

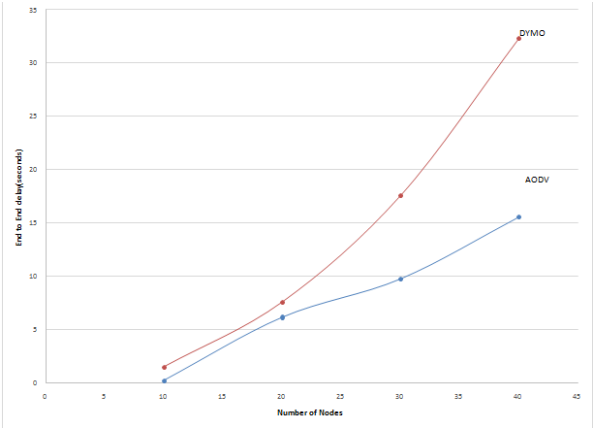
On comparing the message received by the AODV and DYMO, AODV has more messages received as compare to the DYMO. Fig3. shows the graph of both AODV and DYMO.

5. **Average end to end delay :-(seconds**)- Table 4 shows the value of the total delay take place here.

Table shows the value of ADV and DYMO

Nodes	AODV	DYMO
10	0.248598	1.51366
20	6.14841	7.58718
30	9.73455	17.5609
40	15.5204	32.2868

It is measured in secondsOn comparing the value of AODV and DYMO, of the total time delay by varying nodes. As shown in the figure, DYMO has more value as compare to AODV.



VIII. CONCLUSION

In this paper, AODV and DYMO protocols are comparing on the basis of four parameters. The main motive is to determine which of the two AODV and DYMO has the better result under same nodes and parameters. In this throughput of AODV is better of the given nodes. AODV has less jitter value as compare to the DYMO.In case of total message received, AODV has received more messages. And, DYMO has taken more time to transfer the message from source to destination. On the basis of the above results, can say that AODV has better results as compare to DYMO.AODV gives better result as compare to DYMO under same nodes and parameters.

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