Packet Size Aware Algorithm for Reducing Energy Consumption in Internet of Things

[1]Parijatham.R , [2]Angeline nilofer.J,[3]Aparajitha.P, [4]Dhanasri.T,[5]Madhumitha.S
[1]*Assistant Professor , Department of Computer Science and Engineering*
K.Ramakrishnan College of Technology. Samayapuram, Trichy.
[2,3,4,5]*Students , Department of Computer science and Engineering*
K.Ramakrishnan College of Technology. Samayapuram, Trichy.

Abstract---
In Internet of Things (IoTs) routing protocols are containing many issues such as delay, jitter, bandwidth, overhead, etc… Yet energy consumption is one of the main issues in Internet of Things. In every network send RREQ to its neighbor node to forward the data packets until it reach the destination. However, it take as much of energy while send RREQ to its neighbor node. Hence this paper introduces ETREC: An Efficient Technique to Reduce Energy Efficient Consumption based on Packet Size in Internet of Things. The main objective of this paper is reducing energy consumption based on packet size.

Keywords—*RREQ, ETREC, packet size.*

I. INTRODUCTION

The Internet of Things (IoTs) is an innovative paradigm that promises to offer us enhanced consciousness of our environments through the overview of communication, processing, and sensing abilities in everyday objects. All objects, which is now "Smart" manner, it will support to providing an augmented reality involvement and its machine-to-machine interactions with other smart objects with the web services in the Internet Cloud. IoTs is a new technology and it allows object to be sensed remotely across existing network infrastructure. IoTs enables to connect all the devices in smarter way. The web enabled devices collects, send and act on data in IoTs. To make the IoTs paradigm a reality, an interoperable, efficient and flexible Internet Protocol is a key requirement. The embedded sensors, communication hardware and processors are obtained from the devices around it. IoTs has some disadvantages such as security, economy, development issues, privacy, interoperability, legal, regulatory and rights. IoT routing protocols come across several difficulties akin to bandwidth, delay, jitter, overhead, etc. However, the main key issue is energy consumption. The objective of this paper is reduce energy consumption based on packet size.Accordingly this paper proposes energy efficient technique to increase the lifetime of nodes in the networks.

II. LITERATURE REVIEW

Routing mechanism for network of low power and limited computation capability devices by using leach algorithm[1].

Energy efficient probability routing algorithm.It increases the energy protocol by flooding algorithm[2]

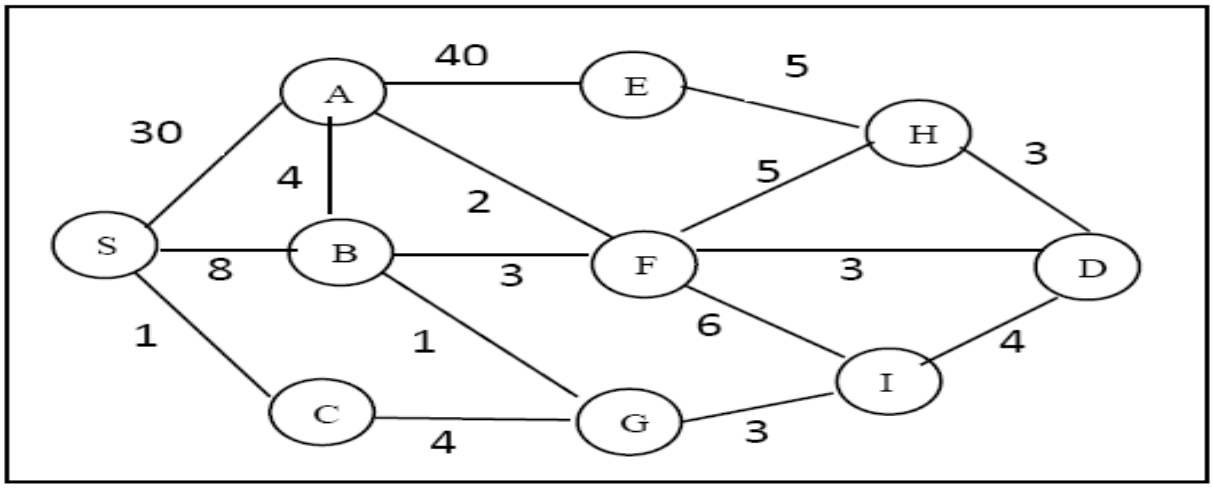
An Energy Efficient Routing protocol Using Message Success Rate in WSN To reduce overhead in cluster by split and message algorithm and it provides efficient way by Cluster based algorithm [3].

A context aware routing protocol based on sea algorithm by using RFID technologies[4].

Cloud computing principles and algorithm for energy consuming algorithms[5].

III. PROPOSED WORK

The paper proposes a method called ETREC, which is An Efficient Technique to Reduce Energy Consumption based on Packet Size in Internet of Things. Energy reduction is one of the main issues while send the RREQ to its neighbor node, Hence this method is used to reduce energy consumption using parameter such as packet size and, ETREC is increase the lifetime of nodes in the networks.



DESCRIPTION OF ALGORITHM:
Procedure

Energy Aware Algorithm:

Step 1:Determine the path from S to D to forward the data packets.
Step 2:Compute the Nodes Energy (NE), Paths Energy (PE) and Size of Packets among the available paths.
Step 3. Classify the size of packets in terms of low, medium, maximum.
Step 4. Set path = low (for low packet size) Set path = medium (for medium packet size) and Set path = high (for maximum packet size)
Step 5. similarly find all possible paths between S and D using RREQ and RREP
Step 6: Repeat the steps 2-5 until the data packets are transferred.

Energy Algorithm

If (node is source) **Then**
Broadcast RREQ to its neighbors
Else (Rebroadcast the RREQ until it reaches the D)
Then
If(NE<Size_of_Pkts&&PE<Size_of_Pkts&& priority == Low)
Then
{
Forward data packets through low energy consumption path
}
Elseif (NE<Size_of_Pkts&&PE<Size_of_Pkts&& priority =Medium)
Then
{
Forward data packets through medium energy consumption path
Else if (NE <Size_of_Pkts&&PE<Size_of_Pkts&&priority == Maximum)
Mathematical formula for Energy:
Then
{
Forward data packets through maximum energy consumption path
}
(NE<Size_of_Pkts&&PE<Size_of_Pkts&&priority== Maximum/Medium/Low) **Then**
{
Forward the data packets through maximum energy consumption path
}
Endif
End
Where,
RREQ – Route Request
RREP – Route Reply
NE – Node Energy
PE – Path Energy
Size_of_Pkts – Size of Packets

$E_c(t)=N^Pt * a + N^Pr * b$

N_t = Number of Packets transmitted after t = 210 J

N_r = Number of Packets received after t = 85 mb

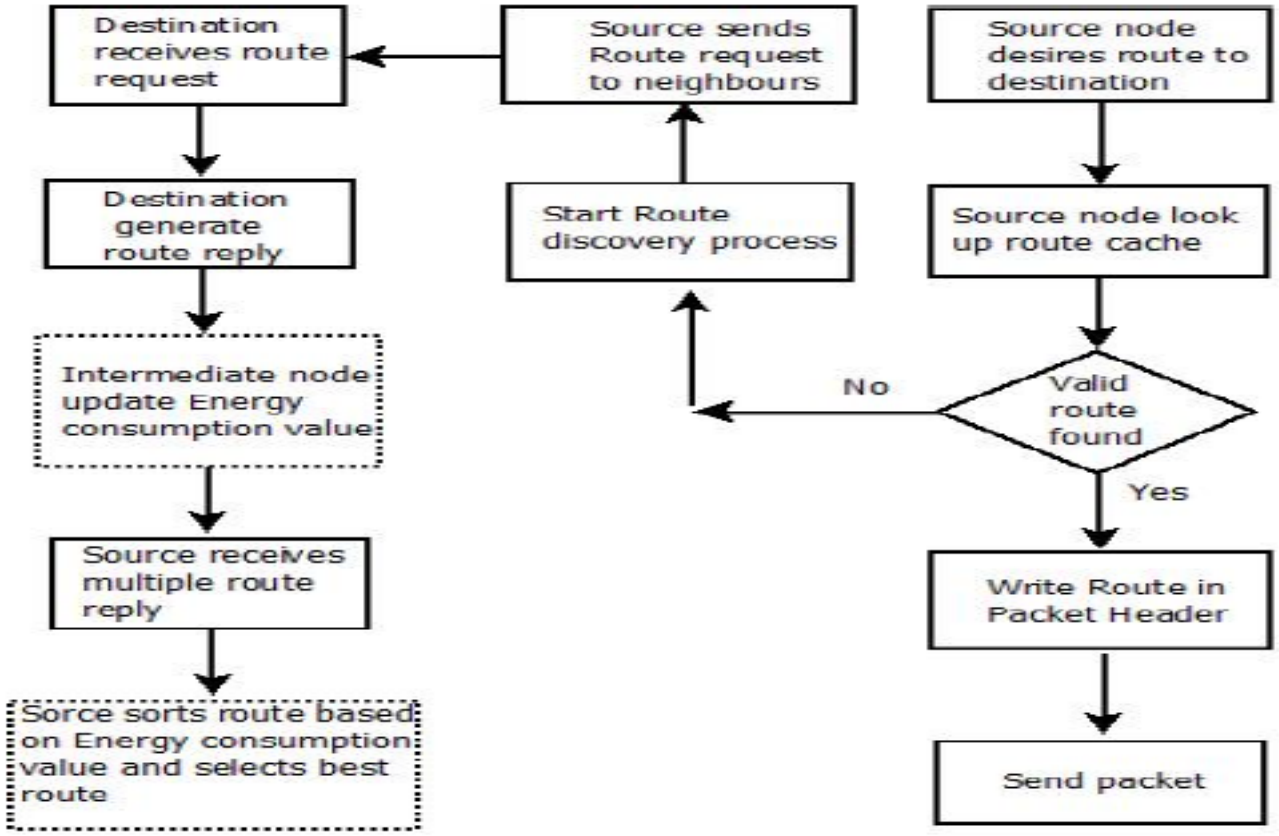
a = 0.8, b = 0.2, a and b is constants

$E_c(t)= 210 * 0.1 + 85 * 0.8$

$= 21 + 68$

$= 89J$

S. No	No. of available paths	Paths in joules
1	S→A→E→H→D	150 J
2	S→A→F→H→D	130 J
3	S→A→B→F→I→D	200 J
4	S→C→G→I→D	120 J
5	S→A→F→I→D	150 J
6	S→B→F→H→D	190 J
7	S→B→F→I→D	210 J
8	S→A→B→F→H→D	180 J
9	S→B→G→I→D	160 J
10	S→B→F→D	140 J
11	S→A→F→D	80J



Bandwidth aware algorithm

Step 1*:* Discover the number of paths availability during MANETs transmission using RREQs.

Step 2: Compute the Available Bandwidth (ABW), Required Bandwidth (RBW), Minimum neighboring nodes and delay of each available paths**.**

Step 3*:* Classify the type of packets in terms of Text, Audio and Video.

Bandwidth Algorithm:
Set priority = low (for text application) Set priority = medium (for audio application) and Set priority = high (for video application)

If (RBW < ABW) && priority = = Low) ***Then*** {

Select path that has low bandwidth among available paths for sending Text Application }

Elseif (RBW < ABW) && priority = =Medium) ***Then***

{

Select path that has medium bandwidth among available paths for sending Audio Application}

Elseif (RBW < ABW) && priority = = High) ***Then*** {

Mathematical formula for Delay:

$$RSS = \frac{TpGtGrHt2Hr2}{d4}$$

Where,
Tp – Transmission Power
Gt – Transmitter Gain
Gr – Receiver Gain
Ht – Height of the Transmitter Antenna
Hr – Height of the Receiver Antenna
d – Distance between Source and destination

Step 4: Set priority = low (for text application) Set priority = medium (for audio application) and Set priority = high (for video application)

Step 5*:* Repeat the steps 2-5 until the data transfer is complete

Step 6: End the process.

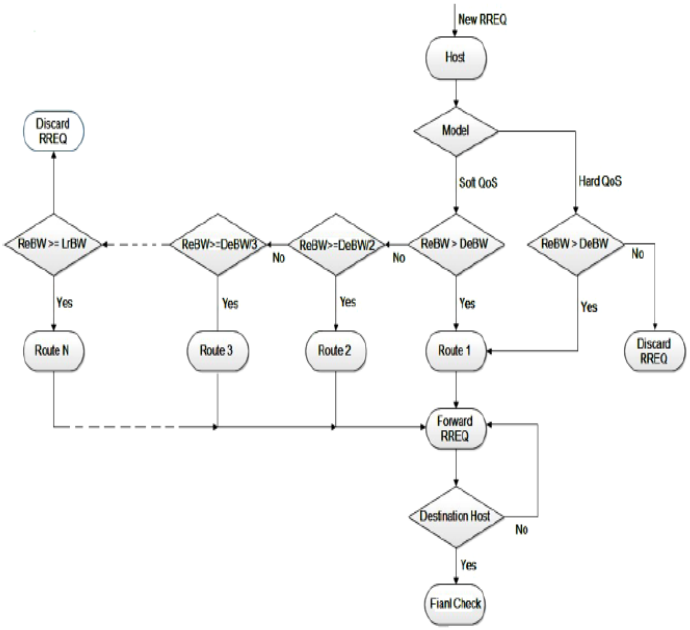
Select path that has high bandwidth among available paths for sending Video Application

}

Elseif (RBW > ABW) && priority = = High/Medium/Low) ***Then*** {Select the path that has high bandwidth among available paths

} ***Endif***

End



Delay Algorithm:

Step 1: Nodes randomly located in

the network.

Step2: Source node continuously

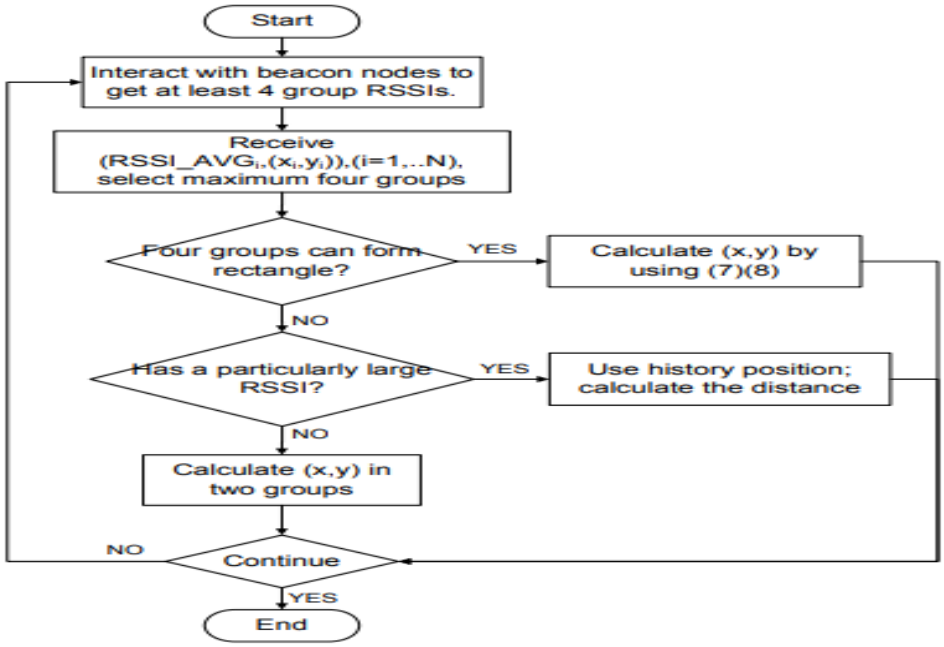
broadcasts RREQ packets to the

neighboring nodes

Step 3: Neighboring nodes check its Signal strength.
Step 4: Nodes compute the signal strength (RSS) of each node in terms of Low, Minimum and High
Step 5: ***If*** above condition is not satisfied Choose which is High as usual

BandwidthAlgorithm
If ((RSS<RSSThresh) == **Minimum**) Store RREQ in nodes buffer for certain interval of time ***Else*** Send RREQ to neighbors ***End If If*** ((RSS < RSSThresh) == **Low**) Drop RREQ packet ***Else***
Rebroadcast the RREQ ***End If***
If ((RSS < RSSThresh) == **High**)
Send RREQ to neighboring nodes until reach the destination

Else Store RREQ in nodes buffer
End If
Else Rebroadcast RREQ packets to start route rediscovery
End If Stop



Flow chart for Delay

CONCLUSION

As comparing to the existing system the required one packet size has been used to reduce the energy, bandwidth, and delay. This has been used in the future level function. The purposed system has been used to reduce the energy, bandwidth and delay by taking the packet size. In the existing they gave random amount of packet size to the nodes. Hence it has been working out with the respected amount of time.

Reference:

[1] Atzori.L,Iera.A and Morabito.G The Internet of Things : A Survey. ComputerNetworks,pages:2787-2805. Year:2010.

[2] Souza,A.M.C.andAmazonas,J.R.A. ANew Internet of Things Architecture year:2015.

[3] Michael,M.P.Architectural Solutions for Mobile RFID Services on Internet of Things.year:2017

[4] Akyildiz,I.F.,Su,W., Sankarasubramaniam, Y. and Cayirci, E.WirelessSensorNetworks:A Survey. Com-puter Networks, 38, pages:393-422.

[5] Jia, X., Feng, Q., Fan, T., and Lei, Q.RFID Technology and Its Applications in InternetofThings (IoT).April 2012, pages:1282-1285.

[6] Bandyopadhyay,S., Sengupta, M., Maiti.S.,andDutta,S.A Role of Middleware for Internet of Things: year:2011.

[7] Hinden,R.InternetProtocol Version 6 Specification, RFC 2460.

[8] Engineers, E.IEEE Standards. "Part 15.4: Wireless Medium Access Control (MAC)and Physical Layer

(PHY)Specifications for Low-Rate Wireless Personal Area Networks.

[9] kamal,J.N.A.A.E.Efficient Virtual-Backbone Routing in Mobile Ad Hoc Networks.year:2008

[10] Vermesan, O. and Friess, P. (2014) Internet of Things—From Research and Innovationto Market Deployment.RiverPublishers, Aalborg.

[11] Antonopoulos, N. and Gillam, L. (2012) Cloud Computing: Principles, Systems andApplications. Springer, London.