International Journal of Multidisciplinary Approach and Studies

ISSN NO:: 2348 – 537X

Congestion in Wireless Sensor Networks and Mechanisms for Controlling and Improving Qos

Wasim Yousaf

Computer Science, University of Agriculture, Faisalabad, Punjab, Pakistan

ABSTRACT

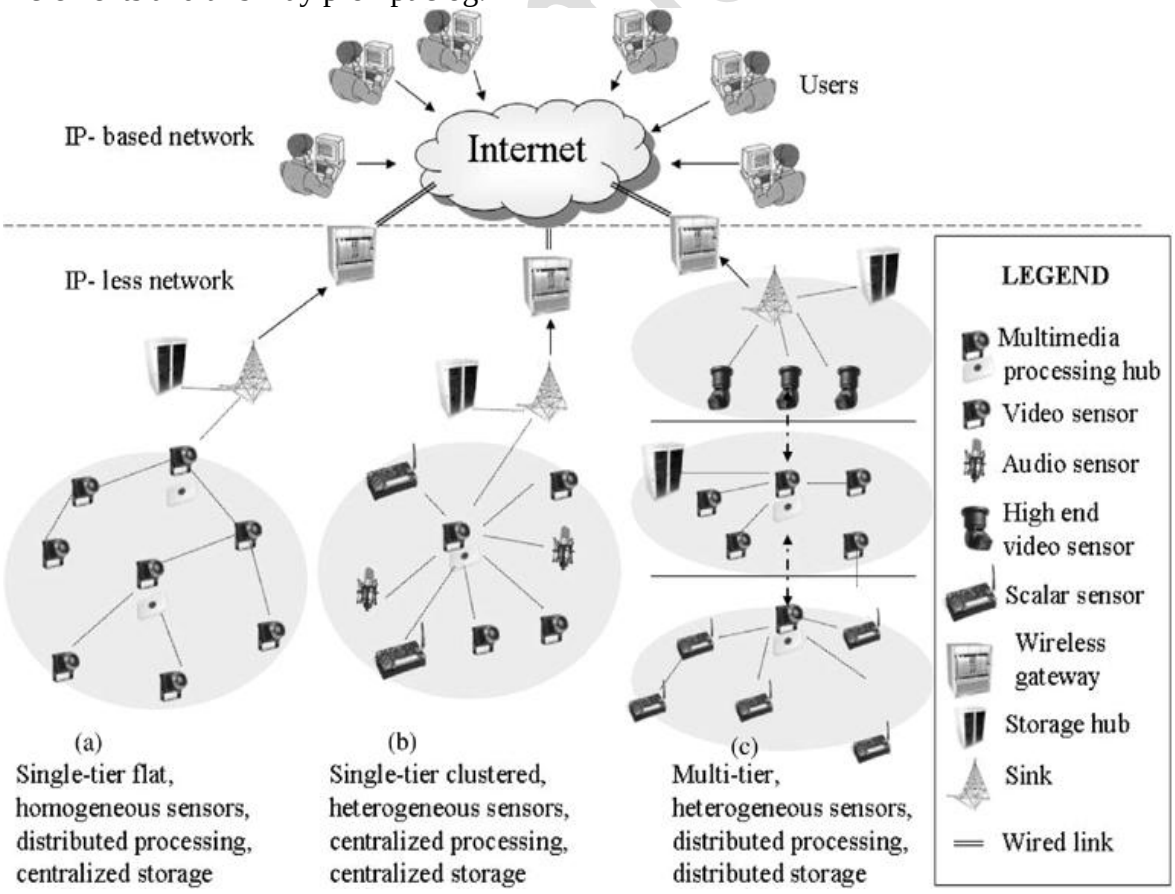
Over the past years we have seen (WMSNs) Wireless Multimedia Sensor Networks have been under development to work in multimedia applications such as, traffic control system using video, industrial process, health look after, surveillance through video. Basic working principle of WMSN is as follow; WMSNs are deployed in physical environments, network consists of sensor nodes, each node contains a very cheap CMOS video camera and a small microphone, these nodes can take, transfer and transmit still photos, videos and voices. To ensure the reliable transfer the multimedia data between network nodes WMSN use special type of transfer protocol. There are many objectives of transport layer in WMSN; one of them is the congestion control. Congestion occurs, when heavy multimedia traffic load becomes bigger than the actual capacity and capability of network. Due to congestion there can be a number of problems in the network such as: performance degradation of network, loss of data packets, and delay in data streaming queues. To overcome this problem we are going to propose a new kind of algorithm for congestion control, as for the new algorithm we will identify any malfunctioning node of our network, stop it from sending and receiving the data for that purpose we will use concept of trust using Fuzzy Logic acknowledgment.

Keywords: *WMSNs, CMOS, Qos, WRED,RD, RED*

2 INTRODUCTIONS

Wireless sensor Networks WSNs are the most important part made of more than one nodes or a huge number of sensor hubs scatter at one place With combination of data detecting calculation and remote correspondence the sensor hubs can sense physical data process rough data and report obliged data to the node These sensors are little with constrained preparing and registering assets These sensor hubs can feel measure and assemble data from the earth and taking into account some nearby choice procedure they can transmitted into the detected information to the client The basic undertaking of sensor hub is to gather the data the scene of occasion and send the information to a sink hub Remote sensor organize that comprise of various number of sensor hubs and two sink where information is gathered are sent in the detecting WSNS can be utilized as a part of numerous applications for example environment observing security observation target following medicinal application and so on Remote sensor system WSN is a great level of cross disciplinary profoundly incorporated learning on system correspondence and is a bleeding edge research problem area on the planet. A WMSNs an accumulation of sensor hubs that are spatially circulated and sorted out into an agreeable system to screen physical or ecological conditions for example temperature sound vibration weight movement or contaminations WSN serve as a key to accumulate data required by keen situations for example structures utilities industry home and so forth A

portion of the one of a kind qualities of Wireless Sensor Networks incorporate restricted force portability of hubs capacity to withstand brutal ecological conditions capacity to adapt to hub disappointments and versatility A substantial number of sensor hubs sense physical wonder and report the occasion through remote connections to sink The base station goes about as a portal between sensor hub and end client Hubs impart remotely and regularly self-compose subsequent to being conveyed in an adhoc design Every sensor hub involves detecting transmission and preparing capacities memory and RF handset and force source At the point when vast quantities of sensor hubs are dynamic in transmitting the data the heap turns out to be overwhelming and information movement likewise increments and this may prompt blockage A Wireless Sensor Network WSN is gathering of sensor hubs that are spatially appropriated and composed into an agreeable system to screen physical or natural conditions for example temperature sound vibration weight movement or poisons WSN serve as a key to accumulate data required by savvy situations for example structures utilities industry home and so on A portion of the extraordinary qualities of Wireless Sensor Networks incorporate restricted force versatility of hubs capacity to withstand unforgiving natural conditions capacity to adapt to hub disappointments and adaptability An expansive number of sensor hubs sense physical wonder and report the occasion through remote connections to sink The base station goes about as an entryway between sensor hub and end client Hubs convey remotely and regularly self sort out in the wake of being sent in an adhoc design Every sensor hub involves detecting transmission and handling capacities memory and RF handset and force source At the point when extensive quantities of sensor hubs are dynamic in transmitting the data the heap turns out to be substantial and information movement likewise increments and this may prompt clog.



2.1 Congestion Control Techniques

The following basic techniques may be used to manage congestion.

- **End-system flow control:**
  It is not a clog control plan but rather an approach to keep the sender from invading the cradles of the beneficiary
- **Network congestion control:** In this plan end frameworks throttle back keeping in mind the end goal to abstain from clogging the system The system is like end to end stream controls however the aim is to lessen clog in the system not the beneficiary
- **Network-based congestion avoidance:** In this plan a switch distinguishes that blockage may happen and endeavors to back off senders before lines turn out to be full
- **Resource allocation:** This procedure includes planning the utilization of real circuits or different assets maybe for a particular day and age A virtual circuit worked over an arrangement switches with an ensured transfer speed is a type of asset designation This procedure is troublesome however can take out system clog by blocking movement that is in abundance of the system limit A rundown of related points might be found on proper related sections page.

3 MATERIAL AND METHODS

In this section summarized the tools in the form of tables that are used for congestion control. These techniques are divided into three main parts that is network simulator, network emulator and additional approaches.

Table1. Tools used for congestion control research and development

Tools		
Network Simulator	Open source	Ns-2,Ns-3
		J-Sim
		GTNetS
		Omnet++
		REAL
Network Emulator	NetEm	
	Dummynet	
	NISTNet	
Realtest-beds	Wan-In-Lab	
	Grid’5000	
	PlanetLab	
Others	Web-100	
	NSBM(Network Simulation by Mouse)	
	CAVT(Congestion Avoidance Visualizationtool)	

Table2. Features of Network Simulation Tools

Network Simulator		Features
Open Source	Ns-2	1.object-oriented,discreteeventdrivennetworksimulator 2. uses C++and OTcl Programming 3.separates control path implementations from the data path implementation 4.eventscheduler
	Ns-3	1.notbackward-compatiblewithNS2 2. uses C++and Python programming 3. alignment with real systems 4. support for virtualization
	J-Sim	1.aJava-basedsimulationsystem 2.basedonthecomponent-basedsoftwarearchitecture 3.usesJavaandTclProgramming
	Omnet++	1.component-basedarchitecture 2. compiler for the NED topology description language 3. graphical network editor 4.GUI/Command line interface for simulation execution 5. graphical output vector plotting tool
	REAL	1. study the dynamic behaviour off low and congestion control schemes 2. uses C programming language

Table3. Features of Network Emulation Tools

Network Emulation Tools	Features
NetEm	1. test protocols by emulating the properties of wide area networks 2. enhancement of the Linux traffic control facilities 3. emulates variable delay, loss, duplication an dre-ordering 4. timer granularity is the major limitation 5. system clock(upto1 KHz)or high resolution timers 6.IncludedinLinux2.6
Dummynet	1. live network emulation tool 2. powerful bandwidth management functionality 3. doesn't allow to emulated graded network conditions 4. uses system clock (upto10KHz) 5.Includedin FreeBSD
NISTNet	1. general-purpose tool foremulating performance dynamics in IP networks 3. can emulate the critical end-to-end performance characteristics 4. uses Real time clock 5. availableforLinux2.4and2.6

4 RESULTS AND DISCUSSION

The opnet utilized to direct preparatory recreations and to exhibit the execution of our proposition opnet discrete occasion test system for systems administration inquire about and gives reproduction backing to transport conventions steering and multicast conventions over wired and remote systems. The test situation utilized as a part of the reproduction is appeared in Figure 4.1 reenactment information is sent from the wire hub to the remote hubs 1 and 4 that are bounces far from the entrance point or for them remote hubs to the wired hub by means of the entrance point. Every single remote hub are still in the recreation. All information streams are 10MB FTP streams.

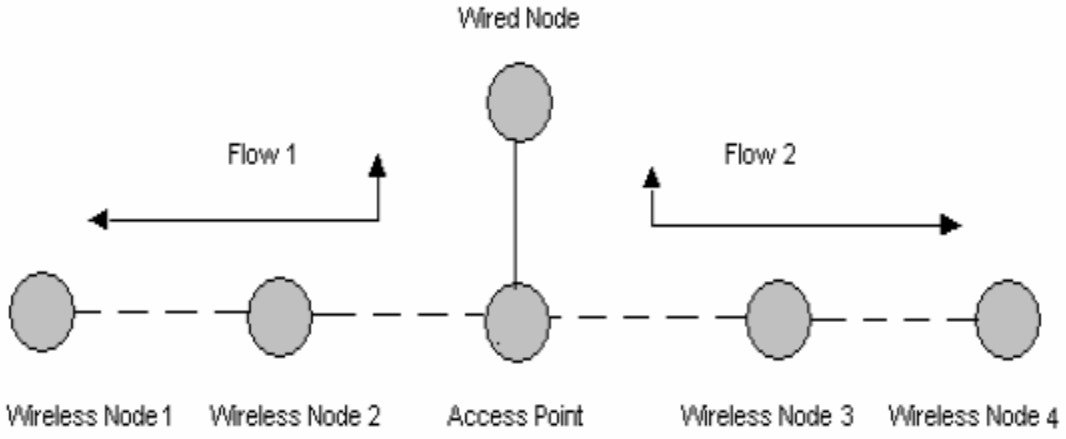


Figure 4-1 Wireless Sensor Access Network

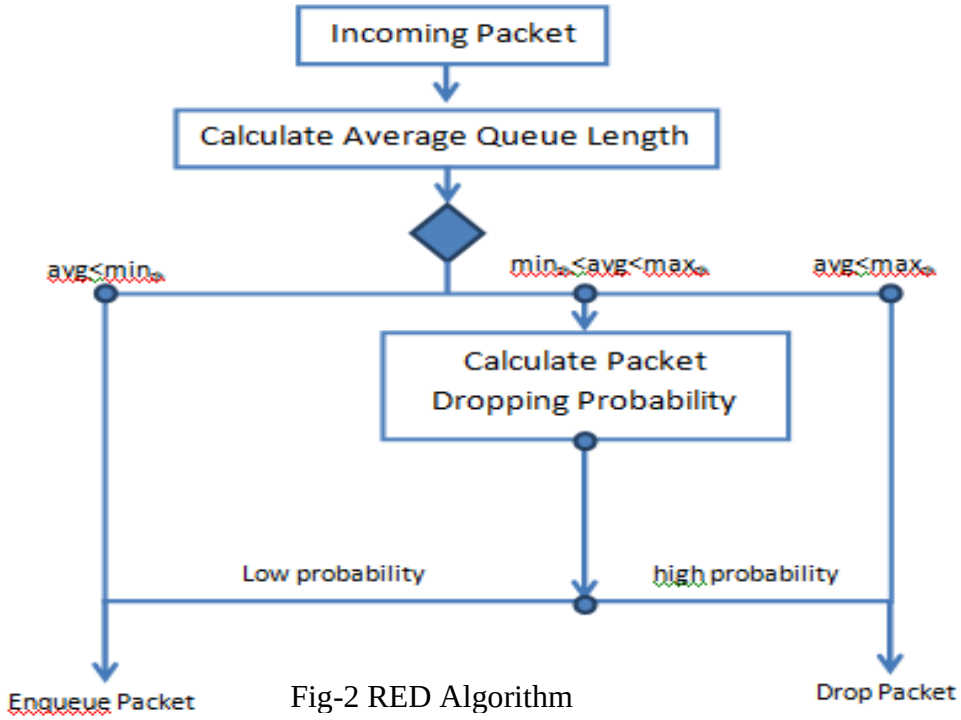


Fig-2 RED Algorithm

The RED algorithm can be shown by either measuring the queue in packets or by packet size. The following algorithm shows the RED gateway when it is measured in packets

avg: average queue size
time: current time
q_time: start of queue idle time
count: packets since last dropped packet
wq: queue weight
minth: minimum queue threshold
maxth: maximum queue threshold
maxp: maximum value for packet dropping probability pb
pa: current packet dropping probability
pb: packet dropping probability
q: current queue size
f(t): linear function of time
m: number of small packets

Initialization:
Avg = 0
Count = -1
for each packet arrival calculate new avg:
if the queue is nonempty
avg = (1 – w_q) avg + w_qq
else
m = f(time – q_{time})
avg = (1 – w_q)^{m}avg
ifmin_{th} ≤ avg ≤ max_{th}
increment count
calculate drop probability p_a :
P_b = max_p(avg – min_{th}) / (max_{th} – min_{th})
P_a = P_b / (1 – count * Pb)
with probability P_a:
if probability P_a:
if probability low
enqueue packet and don't drop
else if probability high
randomly/linearly drop arriving packets
count = 0
else if avg ≥ max_{th}
drop all arriving packets
scount = 0
else count = -1
when queue becomes empty
q_time = time

RED reproduction demonstrates that as the quantity of association lurked to the passage expand the likelihood that bundles will be dropped likewise increments The reenactment

system in Figure 4 contain four sources every sending 1000 byte bundles connected to the entryway and each with greatest window estimate that extends from 35 to 112 parcels The parameter set as takes after

w_q = 0.002, min_{th} = 5 packets, max_{th} = 15 packets, and max_p =1/50

5 CONCLUSIONS AND FUTURE WORK

WMSN is an extraordinary case of headways of cell innovations since the entire system. This work explores the available tools and techniques used for computer network research and development. Out of the three techniques: simulation, emulation and live testing, network simulation is cheap and provides quick results. However, if a simulation is not properly designed, there is a large difference between simulation result and actual result. On the other hand live testing method is very authentic but lack of reproducibility and cost is the major factors. Network Emulation lies between the above two techniques, because it enables us to design a controlled experiment with high degree of reproducibility and provide a mechanism to work on real system effectively.

REFERENCE

i. E. Lochin, T. Perennou, and L. Dairaine: When should I use network emulation? In: Annals of Telecommunications (Online), pp.1-9,July 2011.

ii. R. Guillier and P. Vicat-Blanc Primet: Methodologies and tools for exploring transport protocols in the context of high-speed networks In: IEEETCSC Doctoral Symposium, May2008.

iii. Ns-2 Network - Simulator:[Online], Available :http://www.isi.edu/nsnam/ns/.

iv. Opnet technologies: 2001. [Online], Available: http://www.opnet.com.

v. L.Peterson, D. Culler, T. Anderson, and T. Roscoe: A blueprint for introducing disruptive technology into the internetIn:1st Workshop on Hot Topics in Networks (HotNets-I), Princeton,NewJersey,USA,October2002.

vi. G. S. Lee, L. L. H. Andrew, A. Tang and S. H. Low: Wan-in-lab: Motivation, deployment and experiments In: PFLDnet'07, February2007.

vii. M. Mathis, J. Heffner, R. Reddy: Web100: extended TCP instrumentation for research, education and diagnosis In: ACM Comput.Commun.Rev.33, pp.69–79,2003.

viii. R.Bolzeetal.:Grid'5000: a large scale and highly reconfigurable experimental grid test bed In: International Journal of High Performance Computing.

ix. R. Guillieretal.: A study of large flow interactions in high-speed shared networks with grid 5000 and gtrcnet-1In: PFLDnet'07, February2007.

x. R. Guillier, S. Soudan, and P. Vicat-Blanc Primet: TCP variants and transfer time predictability in very high speed networks In: Infocom2007 High Speed Networks Workshop, May2007.

xi. M. Carson and D. Santay: NIST Net: A Linux-Based Network Emulation Tool In: ACM Computer Communication Review, 2003.

xii. G. Wang, Y. Xia, and D. Harrison: An NS2 TCP Evaluation Tool Suite In: IETF Internet Draft, [Online], Available: http://www.icir.org/tmrg/draft- irtf-tmrg-ns2-tcp-tool-00.txt,April2007.

xiii. S. Ha, L. Le, I. Rhee, and L. Xu: A Step toward Realistic Performance Evaluation of High-Speed TCP Variants In: Elsevier Computer Networks (COMNET) Journal, Special issue on "Hot topics in transport protocols for very fast and very long distance networks", 2006.

xiv. Y.T.Li, D. Leith, and R.N. Shorten.: Experimental Evaluation of TCP Protocols for High-Speed Networks In: Trans-actions on Networking, June 2006.

xv. R. Guillier and P. Vicat-Blanc Primet: Methodologies and tools for exploring transport protocols in the context of high-speed networks In: IEEETCSC Doctoral Symposium, May2008.

xvi. M. Welzl, M. Ali, and S. Hessler: Network Simulation By Mouse (NSBM): AGUI Approach for Teaching Computer Networks with the ns-2 Simulator In: Proceedings of the International Conference on Interactive Computer Aided Learning (ICL 2006), September 2006.