ISSN-2320-7884 (Online)
ISSN-2321-0257 (Print)

Improving the Load Adjusting Mechanism by Reducing Congestion with Multi Node Routing in MANETS

[1]Tummapudi. Sri lakshmi, [2] B. Bhanu Prathap Reddy.
srilakshmi.tummapudi@gmail.com
[1, 2] Department of Computer Science and Engineering, Universal Engineering College, Andhra Pradesh, India

Abstract—MANET useful for creating the connections among nodes in logical environment and that all are not having physical infrastructure and self-configurable. Here, focus is shifted on cross layer design to overcome the traditional layered architecture. This paper proposed the joining of adjacent layer that are transport layer and network layer. This paper provides complete study about simulation and analysis of TCP OLSR routing protocol with cross layer design. The congestion management is required to reduce packet loss. The simulation work done in network-simulator-2 environments. The simulation results we carried out observations for congestion control under different QoS such that high throughput and low delay in packet transmission.

Keywords: ?

1. Introduction

In this paper we consider the problem of congestion control in mobile ad-hoc networks (MANETs). For the different structure TCP do not work properly with the specific effects occurring in MANETs. This is because TCP has originally been designed for the Internet, a network with different properties. As a consequence, appropriate congestion control is widely considered to be a key problem for MANETs.
A mobile ad-hoc network is a collection of mobile nodes forming an ad-hoc network without the assistance of any centralized structures. These networks introduced a new art of network establishment and can be well suited for an environment where either the infrastructure is lost or where deploy an infrastructure is not very cost effective. The popular IEEE 802.11 "WI-FI" protocol is capable of providing ad-hoc network facilities at low level, when no access point is available. However in this case, the nodes are limited to send and receive information but do not route anything across the network. Mobile ad-hoc networks can operate in a standalone fashion or could possibly be connected to a larger network such as the Internet.
Mobile ad-hoc networks can turn the dream of getting connected "anywhere and at any time" into reality. Typical application examples include a disaster recovery or a military operation. Not bound to specific situations, these networks may equally show better performance in other places. As an example, we can imagine a group of peoples with laptops, in a business meeting at a place where no network services is present. They can easily network their machines by forming an ad-hoc network. This is one of the many examples where these networks may possibly be used.

2. Literature Survey

M. Abolhasan et. al. [3] has discussed different routing protocols based on their proactive, reactive and hybrid nature. The performance comparison of all these routing protocols is also presented in this paper.
D. E. Perkins et. al. [17] have proposed an ad hoc on demand distance vector routing protocol (AODV) for MANETs in which routes are maintained when required with no prior and periodic route advertisements. The overall bandwidth requirement of this protocol is less as compared to others because of its on-demand nature.
A. K. Gupta et. al. [18] shows the performance evaluation of three routing protocols, i.e., AODV, DSR and TORA with respect to two performance metrics, packet delivery ratio and end-to-end delay. The results show that AODV performs best while DSR is preferable for networks with moderate mobility rate and TORA is fit for operation in large mobile networks with dense population of nodes.
S. Yin et. al. [2] discussed multipath adaptive load balancing. Improper balancing of load over the network leads to congestion. So, the main goal explained in this paper deals with distributing traffic among multiple paths based on the measurement of path statistics for better utilization of the network resources.
D.A. Tran et. al. [11] proposed a new protocol named as Congestion–adaptive Routing Protocol (CRP). The author is of the view that congestion is the dominant cause for packet loss in MANETs. So, the proposed protocol prevents the congestion from occurring in the first place by using the bypass concept where a bypass is a sub-path connecting a node and the next non-congested node.
M. M. P Shekhar et. al. [13] introduced a mobile agent aided congestion aware multipath routing protocol (MAMPR). Existing routing protocols proposed for MANETs uses shortest route as a metric to find routes. But MAMPR uses ‘congestion’ as a metric to find

multipath routes based on quality of service. These agents move around the network, thereby, collecting and dispersing the network topology information based on the congestion status of the network.

L. Xia et. al. [10] proposed an improved AODV protocol known as AODV-I. In this protocol, congestion processing is added to the RREQ message which avoids selecting the busy nodes automatically during route establishment. If congestion is encountered during route establishment, the route repair mechanism is performed instead of initiating a new route discovery.

T.S. Kumaran et. al. [9] proposed another congestion control protocol for controlling congestion in AODV named as Early Detection Congestion and Control Routing in MANET (EDAODV) which detects congestion at the node. It calculates queue_status value and thus finds the status of the congestion. Further, the non-congested predecessor and successor nodes of a congested node are used by it for initiating route finding process bi-directionally in order to find alternate non-congested path between them for sending data. It finds many alternate paths and then chooses the best path for sending data.

3. Advantages and Disadvantages

DSR uses a reactive approach which eliminates the need to periodically flood the network with table update messages which are required in a table-driven approach. The intermediate nodes also utilize the route cache information efficiently to reduce the control overhead.

The disadvantage of DSR is that the route maintenance mechanism does not locally repair a broken down link. The connection setup delay is higher than in table-driven protocols. Even though the protocol performs well in static and low-mobility environments, the performance degrades rapidly with increasing mobility. Also, considerable routing overhead is involved due to the source-routing mechanism employed in DSR. This routing overhead is directly proportional to the path length.

number of the information received regarding that destination, as originally stamped by the destination. No assumptions about mobile hosts maintaining any sort of time synchronization or about the phase relationship of the update periods between the mobile nodes are made. Following the traditional distance-vector routing algorithms, these update packets contain information about which nodes are accessible from each node and the number of hops necessary to reach them. Routes with more recent sequence numbers are always the preferred basis for forwarding decisions. Of the paths with the same sequence number, those with the smallest metric (number of hops to the destination) will be used. The addresses stored in the route tables will correspond to the layer at which the DSDV protocol is operated. Operation at layer 3 will use network layer addresses for the next hop and destination addresses, and operation at layer 2 will use layer-2 MAC addresses [37].

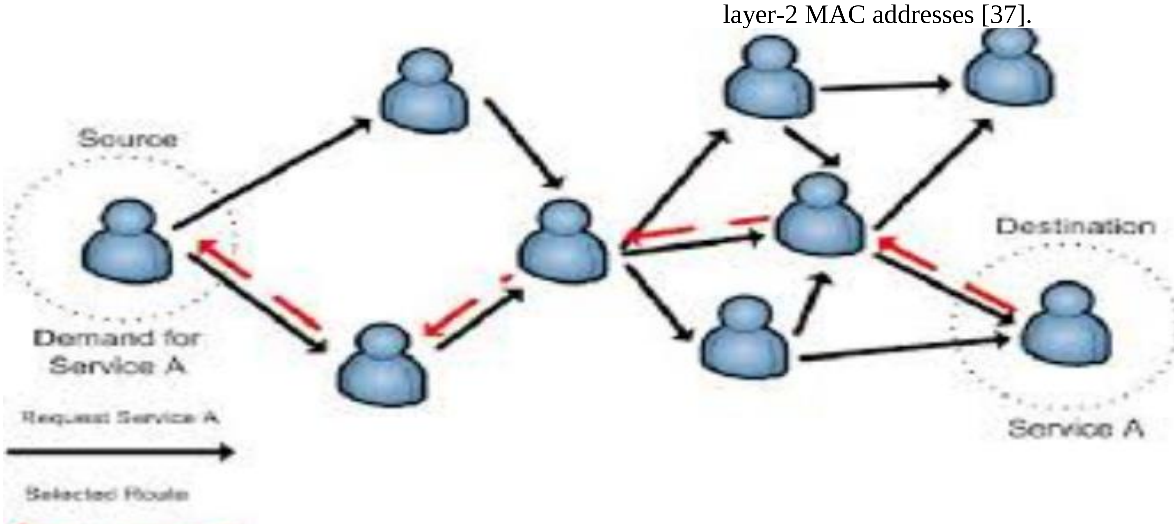


Figure 1: Mobile Ad-hoc Network

4. Hybrid Routing Protocols

Since proactive and reactive protocols each work best in oppositely different scenarios, hybrid method uses both. It is used to find a balance between both protocols. Proactive operations are restricted to small domain, whereas, reactive protocols are used for locating nodes outside those domains [8]. Examples of hybrid protocols are:

Zone Routing Protocol, (ZRP)

Wireless Ad hoc Routing Protocol, (WARP)

Hierarchical Routing Protocols

As the size of the wireless network increases, the flat routing protocols may produce too much overhead for the MANET. In this case a hierarchical solution may be preferable [8].

Hierarchical State Routing (HSR) Zone Routing Protocol (ZRP) Cluster-head Gateway Switch Routing Protocol (CGSR) Landmark Ad Hoc Routing Protocol (LANMAR)

Geographical Routing Protocols

There are two approaches to geographic mobile ad hoc networks:

Actual geographic coordinates (as obtained through GPS – the Global Positioning System).

Reference points in some fixed coordinate system.

An advantage of geographic routing protocols [8] is that they prevent network-wide searches for destinations. If the recent geographical coordinates are known then control and data packets can be sent in the general direction of the destination. This trim downs control overhead in the network. A disadvantage is that all nodes must have access to their geographical coordinates all the time to make the geographical routing protocols useful. The routing updates must be done faster in compare of the network mobility rate to consider the location-based routing effective. This is because locations of nodes may change quickly in a MANET. Examples of geographical routing protocols are: GeoCast (Geographic Addressing and Routing)

DREAM (Distance Routing Effect Algorithm for Mobility)

GPSR (Greedy Perimeter Stateless Routing)

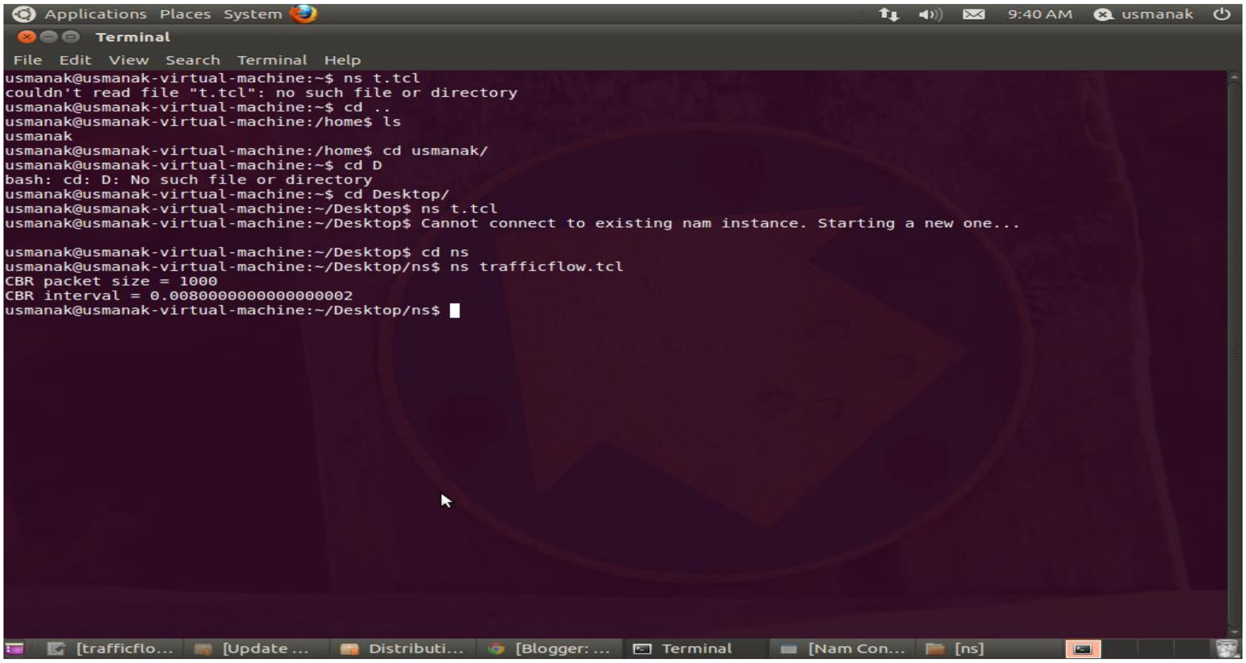
Ad hoc On-demand Distance-Vector Routing (AODV)

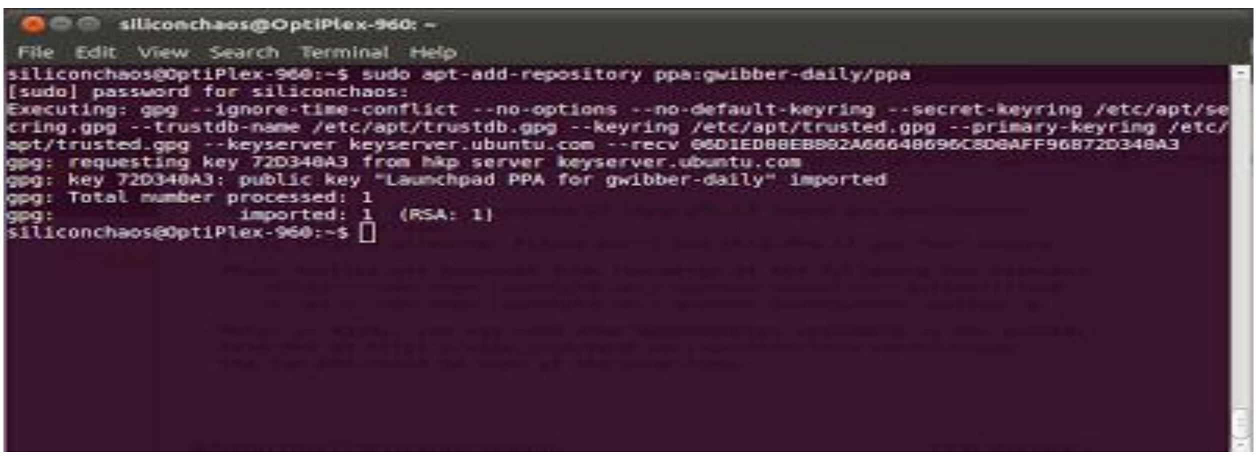
Ad hoc On-Demand Distance Vector (AODV) routing is a routing protocol for mobile ad hoc networks and other wireless ad-hoc networks. It is jointly developed in Nokia Research Centre of University of California, Santa Barbara and University of Cincinnati by C. Perkins and S. Das. It is an on-demand and distance-vector routing protocol, meaning that a route is established by AODV from a destination only on demand [24]. AODV is capable of both unicast and multicast routing [17]. It keeps these routes as long as they are desirable by the sources. Additionally, AODV creates trees which connect

5. Methodology

The simulation study is done by using widely recognized and improved network simulator NS-2 version 2.29.3 for Mobile Ad-hoc Networks (MANETs). NS-2 is powerful for simulating ad-hoc networks. In NS-2 the user has to imagine of a scenario, the number of nodes to be placed in the scenario, and then write the TCL scripts (*.tcl* file) specifying the node configurations parameters and some other *ns* commands required to start and stop *ns*. The user has also to create the movement and connection files that together represent the scenario. The output of the simulation is a trace file (.tr), which is logged with each and every event that took place during the simulation. This file can than be used for obtaining measures such as mobility, throughput, end-to-end delay, and packet loss measurement. An optional output is the NAM [15] supported file (.nam) that logs the necessary events to help visualize the scenario using the NAM. The NAM is a post simulation process that shows how the nodes moved and how they were connected during the simulation. Another optional output is xgraph [15], which shows a graphical output for a specific measurement. The AODV, DSR and DSDV protocols are also provided as part of the NS-2 installation. The TCP congestion control techniques were implemented by editing patch files in the NS2 codes.

6. Results and Discussions:


Applications Places System
9:40 AM usmanak
Terminal
File Edit View Search Terminal Help
usmanak@usmanak-virtual-machine:~$ ns t.tcl
couldn't read file "t.tcl": no such file or directory
usmanak@usmanak-virtual-machine:~$ cd ..
usmanak@usmanak-virtual-machine:/home$ ls
usmanak
usmanak@usmanak-virtual-machine:/home$ cd usmanak/
usmanak@usmanak-virtual-machine:~$ cd D
bash: cd: D: No such file or directory
usmanak@usmanak-virtual-machine:~$ cd Desktop/
usmanak@usmanak-virtual-machine:~/Desktop$ ns t.tcl
usmanak@usmanak-virtual-machine:~/Desktop$ Cannot connect to existing nam instance. Starting a new one...
usmanak@usmanak-virtual-machine:~/Desktop$ cd ns
usmanak@usmanak-virtual-machine:~/Desktop/ns$ ns trafficflow.tcl
CBR packet size = 1000
CBR interval = 0.0080000000000000002
usmanak@usmanak-virtual-machine:~/Desktop/ns$
[trafficflo... [Update ... Distributi... [Blogger: ... Terminal [Nam Con... [ns]


siliconchaos@OptiPlex-960: ~
File Edit View Search Terminal Help
siliconchaos@OptiPlex-960:~$ sudo apt-add-repository ppa:gwibber-daily/ppa
[sudo] password for siliconchaos:
Executing: gpg --ignore-time-conflict --no-options --no-default-keyring --secret-keyring /etc/apt/secring.gpg --trustdb-name /etc/apt/trustdb.gpg --keyring /etc/apt/trusted.gpg --primary-keyring /etc/apt/trusted.gpg --keyserver keyserver.ubuntu.com --recv
gpg: requesting key 72D340A3 from hkp server keyserver.ubuntu.com
gpg: key 72D340A3: public key "Launchpad PPA for gwibber-daily" imported
gpg: Total number processed: 1
gpg: imported: 1 (RSA: 1)
siliconchaos@OptiPlex-960:~$

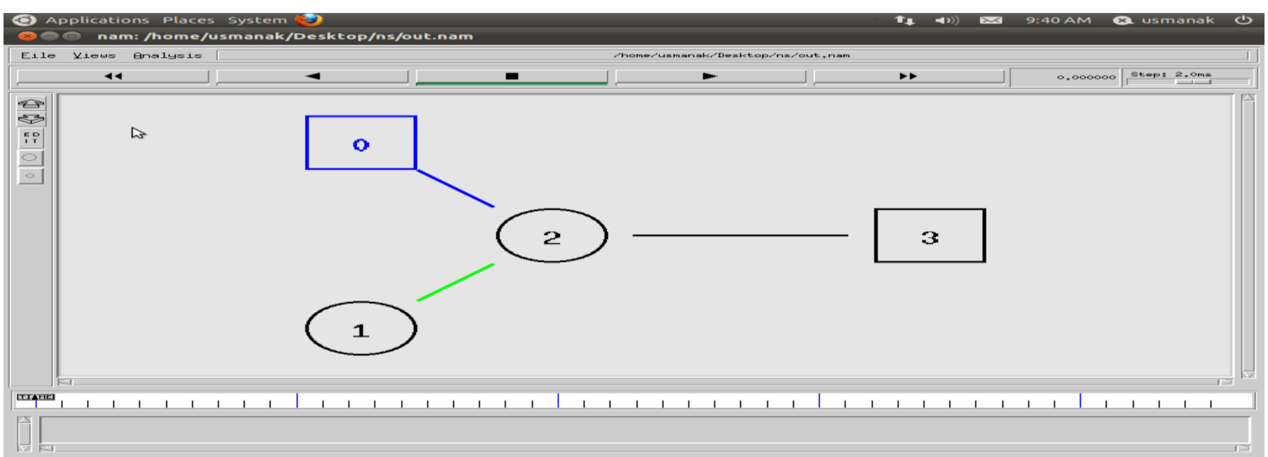

Applications Places System
9:40 AM usmanak
nam: /home/usmanak/Desktop/ns/out.nam
File Views Analysis
/home/usmanak/Desktop/ns/out.nam
0.000000
0
2
3
1
[traffic... [Updat... Distrib... [Blogge... Terminal [Nam C... [ns] nam: /h...

Figure-9.3 NAM with 4 mobile

7. CONCLUSION

The above comparative simulation study shows that among TCP variants like TCP Tahoe, Reno, New Reno and Vegas, the TCP-Vegas enhances for PDR,

Throughput and Delay. Future work is congestion control with OLSR protocol over cross layer to gain high throughput and less delay using above comparative survey for packet transmitting from one node to another node. Here we will perform the joint optimization of cross-layer approach and OLSR's proactive nature to avoid congestion.

8. REFERENCES

[1] Sneha V. Sangolli, JayavigneshThyagarajan"An Efficient Congestion Control Scheme Using Cross-Layered Approach and Comparison of TCP Variants for Mobile Ad-hoc Networks (MANETs)" from IEEE 2014.
[2] M . Colizza, M . Pratesi, F. Santucci, S. Pollio, G. Rigazzi "Performance of OLSR in MANETs with Cross-Layer Metrics and TCP/UDP flows" IEEE in 2012.
[3] Md. MonzurMorshed,MeftahUr Rahman, Md.Habibur Rahman, Md.Rafiqul Islam, "Performance Comparison of TCP variants over AODV, DSDV, DSR, OLSR in NS-2"IEEE/OSA/IAPR International Conference on Infonnatics, Electronics & Vision in 2012. Wireless Mesh Network"4th ICCCNT 2013 July 4-6, 2013, Tiruchengode, India IEEE.
[4] Narayan D.G, Kumar Sugnani, AbhishekRaichur, Uma M "A Cross Layer Routing Metric for Gateway Aware Routing in
[5] TeerapatSanguankotchakorn, SanikaK.Wijayasekara, Nobuhiko Sugino"A Cross-Layer Design Approach in OLSR MANET using BER and Weighted Connectivity Index".
[6] Srivastava and M . Motani: "Cross-layer design: a survey and the road ahead", IEEE Communications Magazine, Vol.43, No.12, pp. 112-119, December 2005.
[7] P. Jacquet, P. Muhlethaler, T. Clausen, A. Laouiti, A. Qayyum, L. Viennot, "Optimized Link State RoutingProtocol for Ad Hoc Networks", Technology for the 21st Century. IEEE international Conference 2001.
[8] A.A. Hanbali, E. Altman, P. Nain, "A survey of TCP over ad hoc networks", IEEE Communications Surveys & Tutorials, Vol 7, 2005.
[9] Lawrence S. Brakmo, Larry L. Peterson, "TCP Vegas: End to End Congestion Avoidance on a Global Internet"
[10] Mukesh Kumar Dhariwal, Sanjeev Sharma "An Improved Mechanism for Congestion Control in TCP for Ad Hoc Network" International Journal of Computer Applications (0975– 8887) Volume 20– No.2, April 2011.
[11] Dr. Neeraj Bhargava, Dr. Ritu Bhargava, Manish Mathuria, Shilpi Gupta, Kamal Kumar Jyotiyana"Analysis of Different Congestion Avoidance Algorithms"International Journal of Computer Networks and Wireless Communications (IJCNWC), ISSN: 2250-3501, Vol.3, No1, February 2013.
[12] John A. Stine Member, "Cross-Layer Design of MANETs : The Only Option" , IEEE.
[13] Hitesh Gupta and Pankaj Pandey "Survey of Routing Base Congestion Control Techniques under MANET" IEEE International Conference on Emerging Trends in Computing, Communication and Nanotechnology (ICECCN), pg. 241-244 (2013).
[14] Paras P. Kalariya, Jekishan K. Parmar"Wireless Sensor Network Analysis Of Routing Protocols",

International Journal of Advanced Research in Computer and Communication Engineering. Vol. 3, Issue 2, February 2014.