ISSN:0975-9646

To Evaluate Performance of BF, DYMO and ZRP Protocols

Er.Chaitali Malik[1], Dr.Rajiv Mahajan[2]

[1]*M.Tech Scholar , PTU RC GIMET Amritsar*
[2] *Professor in Dept. of CSE, GIMET Amritsar*

Abstract: **Wireless mesh networks are multihop systems in which devices assist each other in transmitting packets through the network, especially in difficult conditions. We can drop these adhoc networks into place with minimal preparation, and they provide a reliable, flexible system that can be extended to thousands of devices. The wireless mesh network topology developed is a point-to-point-to-point, or peer-to-peer, system called an ad hoc, multi-hop network. A node can send and receive messages, and in a mesh network, a node also functions as a router and can relay messages for its neighbors.**

***Keywords*: Wireless Mesh Network, Routing Protocol, BF, DYMO, ZRP Protocols, Network Throughput.**

1. INTRODUCTION:,

Wireless mesh networks are multi-hop systems in which devices support each other in transmitting packets through the network. The wireless mesh network topology developed is a point-to-point-to-point system called a multi-hop network. A node can send and receive messages and also functions as a router and can relay messages for its neighbors. If one link fails for any reason, the network automatically routes messages through alternate paths. In a mesh network, we can shorten the distance between nodes, which dramatically increases the link quality. If we reduce the distance by a factor of two, the resulting signal is at least four times more powerful at the receiver. This makes links more reliable without increasing transmitter power in individual nodes.

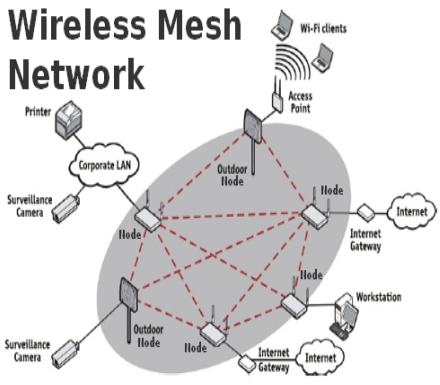

Figure:1 Wireless Mesh Network

2. ROUTING PROTOCOL

An ad-hoc routing protocol is a standard that controls the mechanism by which the nodes decide which way to route packets between computing devices in a mobile ad-hoc network . In ad hoc networks, nodes do not start out familiar with the topology of their networks; instead, they have to discover it. The basic idea is that a new node may announce its presence and should listen for announcements broadcast by its neighbors. The routing can be categorized as:

- Pro-active (table-driven) routing
- Reactive (on-demand) routing
- Hybrid (both pro-active and reactive) routing

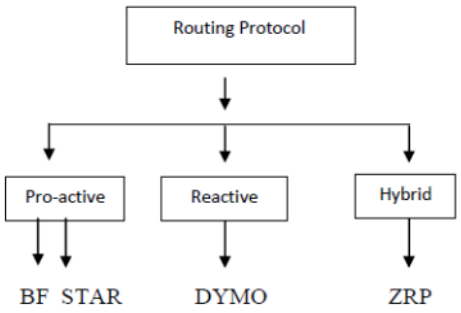

Fig:2 Categorization of routing protocols

2.1.PROACTIVE (TABLE-DRIVEN)ROUTING PROTOCOL

Each node in this routing protocol family maintains a routing table which contains routing information for all nodes in the network. Nodes continually exchange their routing information to put forward consistent up-to-date routing information from each node to every other node in the network. As a result, the number of control messages propagated in the network is increased in order to update the nodes' routing tables. Bellman ford (BF) and STAR protocol belong to this family.

2.1.1 BELLMAN FORD PROTOCOL

Bellman-Ford Routing Algorithm is also known as Ford-Fulkerson Algorithm. Routers that use this algorithm maintain the distance tables, which tell the distances and shortest path to sending packets to each node in the network. The information in the distance table is always updated by exchanging information with the neighboring nodes. The number of data in the table equals to that of all nodes in networks. The columns of table represent the directly attached neighbors whereas the rows represent all destinations in the network. Each data contains the path for sending packets to each destination in the network and distance/or time to transmit on that path.

2.1.2 STAR PROTOCOL

In STAR protocol, each node discovers and maintains

topology information of the network, and builds a shortest path tree (source tree) to store preferred paths to destinations. The basic mechanisms in STAR include the detection of neighbors and exchange of topology information (update message) among nodes There are significantly two alternative mechanisms to discover neighbors. When a node receives a hello message from another node that it does not know previously, it discovers a new neighbor. If a node does not receive any message (update or hello) from a neighbor for a certain period of time, it determines that this neighbor is broken or out of its range. STAR doesn't take shortest paths for keeping control messages low. STAR identifies every node with a fix address.

2.2 Reactive (On-Demand) Routing Protocol

In this family, a source node (sender) initiates route discovery when it needs to send a packet to a destination. Once the route is discovered, the node stores it in its route cache in order to use it for sending packets. Comparing to proactive protocols, reactive protocols generate less overhead in maintaining routing information. The following section discusses DYMO protocol as an example of this family.

2.2.1 DYMO PROTOCOL

The Dynamic MANET On-demand (DYMO) protocol is a reactive routing protocol being developed within IETF's MANET working group. Typically, all reactive routing protocols rely on the quick propagation of route request packets throughout the MANET to find routes between source and destination. While this process typically relies on broadcasting,route reply messages that are returned to the source rely on unicasting.

2.3 Hybrid (Both Proactive & Reactive) Routing Protocol

This family is a combination of Reactive and Proactive routing protocols. ZRP is an example of this family.

2.3.1 ZRP PROTOCOL

The Zone Routing Protocol (ZRP) combines the advantages from proactive and reactive routing. It takes the advantage of pro-active discovery within a node's local neighbourhood and using a reactive protocol for communication between these neighborhoods. ZRP divides its network in different zones. The Zone Routing Protocol consists of several components, which only together provide the full routing benefit to ZRP. Even though the hybrid nature of the ZRP seems to indicate that it is a hierarchical protocol, it is important to point out that the ZRP is in fact a flat protocol. ZRP is more efficiency for large networks.

3 Network Throughputs

The throughput of a connection between two nodes is measured as the number of bytes delivered per time unit. Formally, Throughput =Total bytes received

4. Experimental Setup

We evaluate the performance of proactive, reactive and hybrid protocols namely BF, STAR, DYMO and ZRP. The main goals of the simulation study are as follows:

- To evaluate the performance of BF, DYMO, STAR and ZRP protocols in WirelessMeshnetwork (WMN) environments.
- To analyze these protocols performance in Wireless Mesh Network environments using two routing performance parameters named throughput.

5 Results And Discussions

The results from analysis indicate that there is a significant difference between the samples of data and this difference is truly and real. Accordingly, we can be 90% confident on the accuracy of the simulation data and we can rely on it in our simulation analysis study.

Simulation Results for Throughput

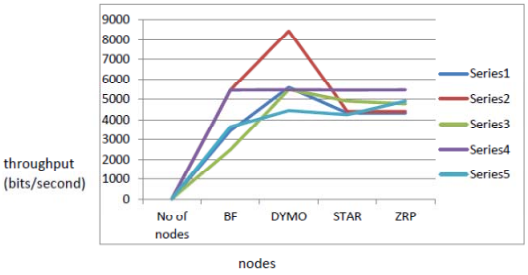

Fig: 3.1 Throughput details in Okumara Hata propagation model

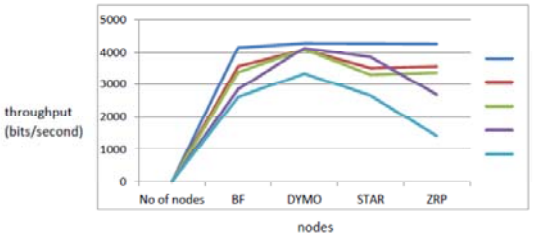

Fig: 3.2 Throughput details in Free Space propagation model

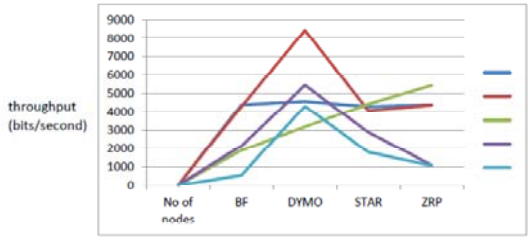

Fig:3.3 Throughput details in two ray model

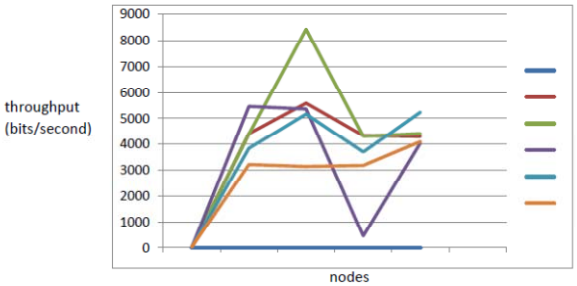

Fig: 3.4 Throughput details Cost 231 W-1 propagation model

The following figures in this section show the network Throughput results obtained from the simulation scenarios. The obtained results are according to the mobility considerations.

6 CONCLUSIONS

After studying the throughput of these proactive, reactive and hybrid protocols, we notice that DYMO protocol helps in obtaining high throughputs in the transmission of data packets does not make this proactive protocol reliable for urban wireless mesh networking for long distances. The Bellman Ford protocol is best suited for lower node densities and STAR/ZRP protocols are appreciable more on intermediate or higher node densities. As for the propagation model is concerned, we can conclude that reactive and/or hybrid routing can be best suited for Okumara-Hata model. In case of Free Space model, proactive and/or reactive routing may perform well. For Two Ray propagation model, proactive, reactive and/or hybrid routing can achieve good results and so in the case of Cost 231 W - I model.

REFERENCES

[1] T. Rappaport, "Wireless Communication: Principles and Practice", Prentice Hall, 2002

[2] I.F. Akyildiz and X. Wang, "A Survey on WMNs", IEEE Communication Magazine, September 2005

[3] G. Askoxylakis and N. Mechin, "Usage Scenarios and Application Requirements forWireless Mesh Networks", IEEE proceedings, 978-1-4244-4439, March 2009

[4] V. Mynampati, D. Kandula, R. Garimilla and K. Srinivas, "Performance and Security of Wireless Mesh Networks" Blekinge Institute of Technology, June 2009

[5] http://en.wikipedia.org/wiki/Firetide

[6] D. Bisen, P. Suman, S. Sharma and R. Shukla, "Effect of Pause Time on DSR, AODV and DYMO Routing Protocols in MANET '', RGPV University, November 2009

[7] D.O. Jorg, "Performance Comparison of MANET Routing Protocols in Different Network Sizes", Computer Science Project, Institute of Computer Science and Applied Mathematics,Computer Networks and Distributed Systems (RVS), University of Berne, Switzerland, 2003

[8] S. Karthik, S. Kannan, M.L. Valarmathi, V.P. Arunachalam and T. Ravichandran, "A Performance Analysis and Comparision of Multi-hop Wireless Ad-hoc Network Routing Protocols in MANET", International Journal of Academic Research, vol. - 2, no.- 4. July 2010

[9] N.S. Yadav and R.P.Yadav, "Performance Comparison and Analysis of Table- Driven and On-Demand Routing Protocols for Mobile Ad-hoc Networks", International Journal of Information Technology, vol. - 4, no. - 2, 2008

[10] M. Oh, "A Hybrid Routing Protocol for Wireless Mesh Networks", IEEE networks, Oct2004

[11] C.S.R. Murthy and B.S. Manoj,"Ad-Hoc wireless networks: architectures and protocols", Prentice Hall Communications Engineering and Emerging TechnologiesSeries. Prentice-Hall, May 2004

[12] www.ietf.org, August 2007

[13] A.B. Malany, V.R.S. Dhulipala and R.M. Chandrasekaran, "Throughput and Delay Comparisions of MANET Routing Protocols", International Journal Open Problem Compt. Math., vol.- 2, no.- 3, September 2009

[14] J. J. Garcia and M. Spohn, "Source-Tree Routing in Wireless Networks," Proceedings of 7th International Conference on Network Protocols, 1999

[15] A. Rahman, S. Azad and F. Anwar, "Performance Analysis of On-Demand Routing Protocols in Wireless Mesh Networks", Informatica Economică, vol. - 13, no. - 2, September 2009

[16] N. Sivakumar and S.K. Jaiswal, "Comparison of DYMO protocol with respect tovarious quantitative performance metrics", Malardalen University, May 2007

[17] http://www.tct.hut.fi/opetus/s38030/k02/Papers/08-Nicklas.pdf

[18] J. Schaumann, "Analysis of the Zone Routing Protocol", December 2002