A Review on Routing Protocols in MANAT

Prashant Awasthi[1] Prof. Nirupma Tiwari[2]
[1]PG Student [2]Professor
[1,2]Department of Computer Science & Engineering
[1,2]RGPV University, Shri Ram Collage of Engineering & Management, Gwalior, M.P, India

Abstract— A Mobile Ad hoc network is a special type of wireless network in which a collection of wireless hosts with wireless network interfaces encompasses of a temporary network, without any established infrastructure or centralized administration. If two hosts that want to be communicating outside their Wireless Transmission Ranges, they could communicate only if other hosts between them Ad hoc network are willing to forward packets for them. A un-weighted graph G = (V,E) is used to the represent an Ad hoc network, where V represents a set of Wireless Mobile Hosts and E represents a set of Edges. Currently, if Ad-hoc network are being applied in Home or small Office Networking and collaborative computing with Laptop or computers in small areas like Conference Room, class room and convention center. All the ad-hoc networks may be worked as extension to the Internet, based on ubiquitous IP Networking mechanism and protocols.

Keywords: MANAT, AODV Routing Protocol, Routing Protocols

I. INTRODUCTION

A. MANET Routing Issues

The following is a list of quantitative issues that can be used in order to assess the Performance of any Routing Protocol.

1) End-to-End Data Throughput and Delay:

Statistically measures of a data routing performance (e.g., means, variances, distributions) important. These are measures of a routing policy's effectiveness: how well it does its job; measured from the external perspective of other policies make use of routing.

2) Route Acquisition Time:

A particular approach of external end-to-end delay measurement of the particular concern with "on demand" routing algorithm is the time required to establish route(s) when requested.

3) Percentage Out-of-Order Delivery:

An external measure of the connectionless routing performance of particular interest to the Transport Layer Protocols such as TCP which prefer In-Order Delivery.

4) Efficiency:

If the data routing effectiveness is the external measure of a policy's performance, efficiency is the internal measure of its effectiveness. In order to achieve a given level of data routing performance, two different policies can be expend differing amounts of overhead, depending on their internal efficiency.

II. CLASSIFICATION OF MANET ROUTING PROTOCOLS

The protocols described in this section are listed below.

1) Ad hoc On-demand Distance Vector (AODV)
2) Ad hoc On-demand Multipath Distance Vector (AOMDV)
3) Temporally-Ordered Routing Algorithm (TORA)
4) Dynamic Source Routing (DSR)
5) Zone Routing Protocol (ZRP)
6) Split Multipath Routing (SMR)
7) Optimized Links State Routing (OLSR)
8) Open Shortest Path First (OSPF)

Conventional Ad-hoc routing protocols are classified into following types:

- Topology Management Routing (Proactive or Table Driven) Protocols
- On-Demand Routing (Reactive) Protocols [8].
- Hybrid Routing Protocols [8].

A. Topology Management Routing (Proactive or Table Driven) Protocols

Proactive Routing Algorithm maintains a routing table, which the contains Next Hop information for each node, so routing path between source and destination is always available. Hence every node continuously maintains the complete routing information of the network. When the node needs to forward a packet, the route is readily available. Distance Sequenced Distance Vector (DSDV), Wireless Routing Protocol (WRP), Global State Routing (GSR) and Cluster Head Gateway Switch Routing (CGSR) are examples of Proactive Routing Protocols.

Proactive Protocols suffer from many disadvantages like additional Control Traffic, which are required to update State Route Entries. Since Topology of Ad-hoc network is dynamic, when a link goes down, all paths used by that link are broken and have to be repaired.

B. On-Demand Routing (Reactive) Protocols

Routing information is consisted on demand basis. When a source is desirous to communicate to destination, it initiates the route discovery process for find the path to the destination. On Demand Protocol save from overhead in maintaining unused route at each node, however latency may increases in some application. Several applications are suffering from Long Delay. Example of this type is AODV [10], AOMDV [24], DSR [22] etc.

Reactive routing protocol may not be optimal in terms of bandwidth, Reactive Routing Protocol is suitable for network with high mobility and relatively small number of flows.

III. ROUTING PROTOCOLS

A. AODV Routing Protocol

The Ad hoc On-Demand Distance Vector (AODV) [10] algorithm enables dynamic, self- starting, Multihop routing between participating the mobile nodes wishing to the establish and maintain an ad hoc network. AODV allows mobile nodes to obtain routes quickly for the new destinations and does not require nodes to maintain routes to destinations that are not in active communication. AODV

allows mobile nodes to respond to link breakages and changes in network topology in a timely manner.

The operation of AODV is the loop-free, and by avoiding the Bellman-Ford "counting to infinity" problem offers quick convergence, when the ad hoc network topology changes (typically, when a node moves in the network).

One distinguishing feature of AODV is its use of an destination sequence number for each route entry. The destination sequence number is created by the destination to be included along with any route information it sends to requesting nodes. Using destination the sequence numbers ensures loop freedom and is simple to programme. Given the choice between two routes to a destination, a requesting node is required to select the one with the greatest sequence number.

1) Overview

Route Requests (RREQs), Route Replies (RREPs), and Route Errors(RERRs) are the message types defined by AODV. For the broadcast messages, the IP limited broadcast address (255.255.255.255) is used. This means that such messages are not blindly forwarded. However, AODV operation does require certain messages (e.g., RREQ) to be disseminated widely, perhaps throughout the ad hoc network.

AODV is a Routing Protocol, and it deals with Route Table Management. AODV uses the following fields with each route table entry:

- Destination IP Address
- Destination Sequence Number
- Valid Destination Sequence Number flag
- Other state and routing flags (e.g., valid, invalid, repairable, being repaired)
- Network Interface
- Hop Count (number of hops needed to reach destination)
- Next Hop
- List of Precursors
- Lifetime (expiration or deletion time of the route)

B. AOMDV Routing Protocol

The main idea in AOMDV is to compute multiple paths during route discovery. It is designed primarily for highly dynamic ad hoc networks where link failures and route breaks occur frequently. When single path on-demand routing protocol such as AODV is used in such networks, a new route discovery is needed in response to every route break. Each route discovery is associated with high overhead and latency. Now, a new route discovery is needed only when all paths to the destination break. All the next hops have the same sequence number. For each destination, a node maintains the advertised hop count, which is defined as the maximum hop count for all the paths.

C. DSR Protocol

The Dynamic Source Routing protocol (DSR) [22] is a simple and efficient routing protocol designed specifically for the use in the multi-hop wireless ad hoc networks of mobile nodes. DSR allows the network to the completely self-organizing and self-configuring, without the need for any existing network infrastructure or administration. The protocol is the composed of two mechanisms of Route Discovery and Route Maintenance, which work together to allow nodes to discover and the maintain source routes to arbitrary destinations in the ad hoc network.

1) Overview

Route Discovery and Route Maintenance, which are the main mechanisms are DSR protocol, allows the discovery and maintenance of source routes in the ad hoc network. DSR works entirely on the on-demand basis. DSR does not rely on functions like periodic routing advertisement, link status sensed or neighbor detection packets and because of the entirely on demand behavior, the number of overhead packets caused by the DSR scales down to zero.

2) DSR Protocol Description

The DSR protocol is composed of two mechanisms that work together to the allow the discovery and maintenance of the source routes in the ad hoc network.

"Route Discovery" is mechanism by a node S wishing to send a packet to a destination node D obtains a source route to D.

"Route Maintenance" is the mechanism which node S is an able to detect, while using the source route to D, if the network topology has changing such that it can no longer use the route to D because a link along is the route no longer works. Route Maintenance is the used only when S is actually sending packets to D.

Route Discovery and Route Maintenance each operated entirely on demand. In particular, unlike other protocols, status sensing, or the neighbor detection packets, and does not rely on these functions from the any underlying protocols in the network.

IV. COMPARISON IN ROUTING PROTOCOLS

Year	Test Method /Technique	Key Findings
2008	PAMAS Protocol	Power aware Multiple Access Protocol was proposed using radio interface of a Node.
2009	Analysis of AODV & DSR protocols	Here selected MANET Reactive Routing protocols, Ad-hoc On-demand Distance-vector (AODV) and Dynamic Source Routing (DSR) Protocol were analyzed in accordance with their finest performance of packets delivery rate, average end-to-end delay, and packet dropping.
2010	Ad-hoc on demand Distance vector routing with path accumulation	This chapter proposes the source route accumulation feature. In Addition a routing Algorithm is proposed which adds a field in request packet which stores trust value indicating node trust on neighbor.
2011	Energy & mobility aware	Passive clustering or GRIDS algorithm (Geographically

	clustering technique	Repulsive Insomnious Distributed Sensors) was used.
2012	AODV-PA : AODV With Path Accumulation	Modify AODV to improve the source route accumulation feature of DSR.
2013	Energy Aware for low energy Ad-hoc sensor networks.	Proposed a new routing protocol that is suitable for low energy & low bit rate networks. Idea is to use the lowest energy path & utilize resources equitably.
2014	Lifetime Prediction Routing	This uses battery lifetime prediction and favors the path whose lifetime is maximum. In Lifetime Prediction Each node tries to estimate its battery lifetime based on its past activity.
2015	Localized Energy-Aware Routing	It achieves a trade-off between balanced energy consumption and shortest routing delay, and at the same time avoids the blocking and route cache problems.
2016	DSR Protocol In DPM	Dynamic power management using DSR routing protocol. In addition a routing Algorithm is proposed which adds a field in request packet which stores trust value indicating node trust on neighbor.
2017	AODV Protocol DPM	Dynamic power management using AODV routing protocol.
2018	EAODV Protocol in wireless sensor network	Energy efficient wireless sensor network using dynamic power management.
2019	Power Reduction using Handoff Technique	Clustering of node power during handoff to increase life time of network

V. Conclusion and Future Work

The proposed algorithm aims at addressing the problem of improving the energy efficiency and thus maximizing the network lifetime of a MANET deployed in a typical military scenario. Current work tries to suggest methods to conserve and increase the battery life by suggesting an energy efficient routing approach for reactive MANETs.

As a future work, we increase throughput, end to end delay, life time of network and efficiency of battery increase using AODV protocol. The reliability factor by using a link stability parameter to prevent unstable links from participating in route discovery procedure can be implemented to further improve the energy efficiency, as it would reduce link breakages which cause generation of route error messages leading to fresh route discovery procedure. The work can be extended to see performances with DSR, DSDV, OLSR, hybrid routing protocol and their characteristics be compared.

References

[1] Charles E Perkins, 'Ad-hoc Networking', Pearson Education, Nov-2000, Perkins 47190.
[2] Kartik Chawda and Deepmala Gorana, 'A Survey of Energy efficient Routing Protocols in MANET', IEEE sponsored 2nd ICECS, 2015.
[3] C.Perkins,'Adhoc On-demand Distance Vector (AODV) Routing',RFC3561[S], 2003.
[4] D.Johnson, Y.Hu & D.Maltz, 'The Dynamic Source Routing (DSR) Protocol for Mobile Ad-hoc Networking', RFC 4728, Feb 2007.
[5] Hannan Xiao, 'Energy consumption in Mobile Ad-hoc Networks', National Conf on Recent Trend in Information, Telecommunication and Computing, 2010, pp. 23-27.
[6] Vidyarthi SS, Vijayalakshmi S, Simha GAV and Shekar, 'Energy efficient Enhanced-AODV protocol for Multi-Rover systems', Ultra-Modern Telecommunications and Control Systems and Workshop (ICUMT), 2011 3rd International Con 2011, pp 1-5.
[7] Utkarsh, Mukesh Mishra and Suchismita Chinara, 'ESAR: An Energy Saving Ad hoc Routing Algorithm for MANET',IEEE-Fourth International Conference on Advanced Computing, ICoAC 2012 MIT, Anna University, Chennai, 13-15 December 2012, pp 13-15.
[8] Shivashankar, Golla Varaprasad and Hosahalli Narayanagowda Suresh, 'Implementing a new power aware routing algorithm based on existing dynamic Source routing protocol for mobile ad-hoc networks' IET Networks, 2014, Vol.3,Issue 2, ISSN 2047-4954, pp 137-142.
[9] Shivashankar, Hosahalli Narayanagowda Suresh, Golla Varaprasad Guruswamy Jayanthi,'Designing Energy Routing Protocol with Power Consumption Optimization in MANET' IEEE transactions on Emerging Topics in Computing, Vol. 2, Issue 2, July 2014, ISSN 2168-6750, pp 192-197.
[10] Pallavi S. Katkar and Prof. (Dr.) Vijay R. Ghorpade" A Survey on Energy Efficient Routing Protocol forWireless Sensor Networks" (IJCSIT) International Journal of Computer Science and Information Technologies, Vol. 6 (1) , 2015, 81-83.
[11] Samira Kalantary and Sara Taghipour" A survey on architectures, protocols, applications, and management in wireless sensor networks" Journal of Advanced Computer Science & Technology, 3 (1) (2014) 1-11
[12] Zain ul Abidin Jaffri and Sundas Rauf" A Survey on "Energy Efficient Routing Techniques in Wireless Sensor Networks Focusing On Hierarchical Network Routing Protocols" International Journal of Scientific and Research Publications, Volume 4, Issue 2, February 2014 1 ISSN 2250-3153
[13] Ms.Pallavi R, Shreya Animesh, Preetesh Shivam, Raghunandana Alse Airody and Niraj Kumar Jha" Energy Conservation in Wireless Sensor Networks Using Data Reduction Approaches: A Survey" International Journal of Computational Engineering Research,Vol, 03,Issue, 4 April 2013.

[14] Er. Palwinder kaur and Anand Nayyar" Conceptual representation and Survey of Dynamic Power Management (DPM) in Wireless Sensor Network" International Journal of Advanced Research in Computer Science and Software Engineering Volume 3, Issue 3, March 2013.
[15] Edwin Prem Kumar Gilbert, Baskaran Kaliaperumal, and Elijah Blessing Rajsingh" Research Issues in Wireless Sensor Network Applications: A Survey" International Journal of Information and Electronics Engineering, Vol. 2, No. 5, September 2012.

