A SURVEY ON VARIOUS MANET PROTOCOLS

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Published in IJIRMPS (E-ISSN: 2349-7300), Volume 10, Issue 6, November-December 2022

Abstract: In recent years, mobile technology is popular among the human society which makes the humans connected virtually to both living things [Social Media] and non living things[IOT]. MANET plays a vital role in wireless network infrastructure. Ad-hoc Wireless network consist of a two or more mobile nodes connected wirelessly in a self configured, self-healing network without having a constant framework.Each and every device in MANET was able to move freely in any directions to share the information between each devices or nodes of network.Many routing protocols for such networks have been proposed so far to find optimized routes from source to the destination and prominent among them are Dynamic Source Routing (DSR), Ad-hoc On Demand Distance Vector (AODV), and Destination-Sequenced Distance Vector (DSDV) routing protocols. The characteristics comparison of these protocols should be considered as the primary step to understand the routing protocol in a perfect manner.

Keywords: MANET, Ad-hoc Network, IOT, Wireless Network.

1. Introduction:

A Mobile Ad-hoc Network (MANET) also known as wireless Ad-hoc network or Ad-hoc wireless network. They consist of a set of mobile nodes connected wirelessly in a self-configured, self-healing network without having a fixed infrastructure. Each and every device in MANET was able to move freely in any directions to share the information between each devices or nodes of network. Form the above characteristics makes the mobile ad-hoc network well suitable for military activities, emergency operations,air/land/navy defense, weapons, robots and disaster recovery etc. The main success of MANET strongly depends on its security. Because security is very important service for the wireless network communications. MANET can be defined as an independent system of nodes. All the independent nodes are joined by wireless links. MANET are primarily peer to peer, Multi hop wireless network. In this network the data packets are transferred in store

and forward way from the source to the random destination via the intermediate nodes as shown in the below figure

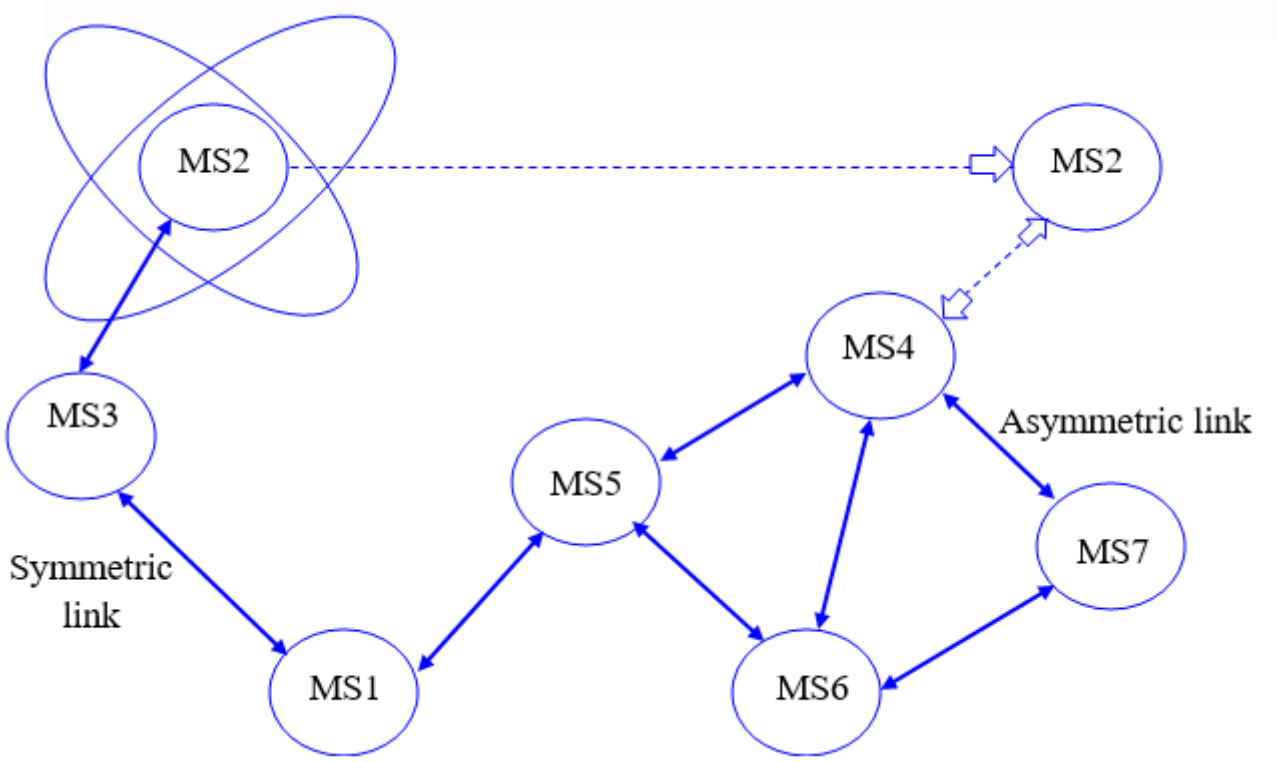

Fig 1: MANET Architecture

The connections may change depends on the node movement and relative locations of the other nodes. The changes in the connections must be passed to the local level and the final information on the topology is updated on the result table.

1.1. CHARACTERISTICS OF MANET

Some of the characteristics of mobile adhoc network (MANET) are as follows:

1.Dynamic Topology:

Generally, network topology is multihop may change randomly and quickly with time.it can form unidirectional or bi-directional links

2. Power contrain:

Mostly the mobile nodes are wireless nodes running on battery power. For that reason, while at designing need to think about special power-saving modes and power management functions.

3. Security:

During transmission no one can able to read the personal data and also track the person.A proper designing a protocol for MANETs proper mechanisms for encryption and user privacy are to be maintained.

4. Robust transmission technology:

Transmission antennas are not unidirectional but Omnidirectional, so, transmission technology must reduce the effects of multiple access, fading, noise, interference conditions, etc.

5. Storage Constraint:

In mobile adhoc network (MANET), mobile nodes have little amount of computing and storage capacity.

1.2 BENEFITS OF MANET:

1. Separation from central network administration.
2. Each node can play both the roles ie. of router and host showing autonomous nature.
3. Self-configuring and self-healing nodes do not require human intervention.
4. Highly scalable and suits the expansion of more network hub.

1.3 APPLICATIONS OF MANET:

- **Military**
  The army will get acquire from adhoc network to keep all the soldiers, vehicles and headquarters
- **Personal area network (PAN) –**
  Each nodes usually conneted with a short range local network.
- **Crisis Condition –**
  Because it is reasonably accessible to create it can be used in time of crisis to dispatch emergency signals.
- **Medical Application –**
  It is use to observe the patient.
- **Environmental Application –**
  It can be utilized to examine weather condition, forest fire, tsunami etc.

2. Review of Literature:

Sah et al. [1],explains the functionality of Bandwidth Reservation Protocol (BRP) for mobile ad-hoc networks in boosting the Quality of Service (QOS). There are two kinds of bandwidth reservation protocols, they are first one namely priority based and second one namely scheduling based. The Priority based bandwidth reservation protocols are used in this current simulation. They are Fair End-to end Bandwidth Allocation (FEBA) and another one is priority based Bandwidth Reservation protocol (PBRP) algorithms. There are two stages in PBRP protocol, they are Bandwidth Request Phase and Bandwidth Reply phase. In the first phase, a Bandwidth Request (BREQ) message is selected from the node that calls for the admission of a new traffic flow to its destination. In the behind phase, a Bandwidth Reply (BREP) note proceeds reverse, hop-by-hop from the End node to the node to the node that started the request along the path laid down by Corresponding BREO Message. The End node precedes the reply according to the Concern of traffic closes and accepts the bandwidth on the reply path. At the End of the result, by using the protocol to achieve high bandwidth utilization and throughput with reduced delay. This simulation can be achieved based on Demand multicast Routing Protocol (ODMRP) by using QUALNET 5.0.

Saravanan et al[3],extant a localization of many nodes in wireless networks. For many sensor network applications localization is a Qualifying technique. In the distribution of network it have many nodes, due to hardware or distributions restriction the network is not fully localizable some of nodes placed as a non-localizable node in the broad range of network area. From that, the server is not aware where the end node has been deployed. It is very hard to transfer data from source to the positioned node that is not in the range of particular network. So the author proposed an improved LAL Approach in this paper.

Karlsson et al[2], Tuanet al[11] and Priya et al[12] reviewed about MANET Connected Internet of Things (IOT) architecture and topology. Routing Protocols for multi hop MANET's are discussed with a Focus on the systemized routing protocol for multihop MANET'S are discussed with a focus on the systemaized routing protocol for low power and lossy network several security threads and risk in Current MANET routing are narrated and security increased Routing protocols and trust model Prevented as

supporting secure routing. At last, the paper identifies some research challenges in the Emerging Domain of MANET_IOT Connectivity.

Ajaz et al [4] demonstrated the architecture and routing protocols for internet of Vehicles From their neighbourhood, the Modern vehicle can able to evaluate large amount of data and information. To satisfy the needs of modern vehicles, the Conventional vehicular ad hoc network (VANET's) are come out of the internet of vehicles (IOV). The IOV will connect all the vehicles with the support of sensors, GPS, Entertainment System and brakes etc. The data of the vehicular devices are stored in cloud. In this paper the author tells about the review of IOV its challenges, characteristics and applications. And also he discuss in detail about routing protocols with its classification and architecture.

Sharma et al[5] elucidate that Machine learning plays a vital role in artificial intelligence (AI). It go through large amount of data and provides customized prediction, which assist the user to deal logically with the overload of data. ML is used to wake up the machines to process the data and make decision by figuring out the pattern without direct programming. Theabove procedure can be attain via multiple techniques; one of the popular technique is to train the machine with large number of datasets called as training dataset by using the dataset to create models to help machines to work with real-time data. ML is a subset of AI, which qualify the machine to learn and adapt automatically from its previous experience without being Explicitly programmed. The main aim of ML to create machine models/software that can learn from experiences as the same way that humans do.

Thakur et al[6] explicated that now a days wireless body area network(WBAN) have huge growth to monitor human health, for clarifying and transferring of data and information. In WBAN, a small sensor like a monitor attached on human body. The sensor collects different information from human body and then sends data to the hospital server by using Internet. By using this type of technology make human life more healthy. WBAS have many tough problems like power, delay and community lifetime which need to be taken into aim inside the design of various routing protocols. These routing protocols play a Critical position in the general system performance in phases of delay like energy consumption and temperature.. This paper also tells about WBAN, medical and non medical application and the author discuss about ad-hoc network routing protocol for WBAN.

Elamparithi et al[8] tells about mobile Ad hoc Network (MANET) have wireless links. Through the link the mobile nodes are communicate with each other. The nodes are positioned unconstrained without any infrastructure in a geographical area. Due to the absence of concentrate administration and prior organizations. MANET are vulnerable to non-identical attacks of malicious nodes. To overcome this attack Differential Evolution algorithm in proposed. It identifies the spiteful node and hold back them to become member of data transmission path. The author's proposed has two phases, the first phase is to get the optimized path and other phase deals with the penalty factor for spiteful node. The most promising algorithm is Differential Evolution. It enhance security with increased network density. The author mentioned that the proposed algorithm is compared with the Existing AOMDV, DSR, Genetic algorithm and ACO

Marina et al[7]and Ramar et al[13-15]developed a protocol named on-demand multipath distance vector for mobile and adhoc networks. Especially they proposed multipath extensions to a thoroughly studied single path routing protocol known as ad hoc on-demand distance Vector (AODV). The following protocol is mentioned as ad hoc on-demand multipath distance Vector (AOMDV). The above protocol calculate multiple loop free & link disjoint paths. Loop freedom is promised by utilize a notation of advertised hop count. By using the property of flooding link-disjoint less of multiple path is achieved.

3. OVERVIEW OF ROUTING PROTOCOLS

In this section, a brief overview of the routing operations performed by the familiar protocols DSDV, AODV and DSR are discussed.

Destination-Sequenced Distance-Vector (DSDV) Protocol

The Destination-Sequenced Distance-Vector (DSDV) protocol [9] is a dynamic routing algorithm and is a build up version of the distributed Bellman-Ford algorithm. A table is maintained by each node that each node contains the shortest distance and the first node on the shortest path to every other node in the network. It integrates table updates with increasing sequence number tags to find out stale routes and also it stops routing loops. For table stability, routing information is updated on the routing table regularly. The table updates are of two types: incremental updates and full dumps. Incremental updates bring only the altered routing information since the last full dump process. Full dumps carry all accessible routing information. For that reason a node interchange routing tables (fully or partially) with its neighbors, periodically or whenever a change in topology is explored.

Ad Hoc On-demand Distance Vector Routing (AODV) Protocol

The Ad Hoc On-demand Distance Vector Routing (AODV) protocol is a active unicast routing protocol for mobile ad hoc networks [10], in which a route is set uponly when the source node is ready to send the data packets. The routing information of all the nodes is maintained on the routing table. After a certain period of time the data entry on the table is expired. The route node wants to send the data but there is no route available for the source node at that time the route node discovery operation initiates. The source node pours Route Request (RREQ) packets which includes source identifier, the destination identifier, the source sequence number, the destination sequence number, the broadcast identifier and the time to live field.The recent path is identified by the sequence number of the source node. When the terminus or a source node that has a route to the destination receives the RREQ, the destination sequence number is checked by the destination sequence number or the sequence number it already have. To guarantee the inventiveness of the routing details, a route reply (RREP) packet is created and deflect back to the source only if the destination sequence number is identical to or larger than the one specified in RREQ. AODV uses only balanced links and a RREP ensue the opposite path of the respective RREQ. When a middle node receives the RREP, it sets up a progressive path entry to the end in its route table. The needless RREP packets or RREP packets with downgrade destination sequence number will be dripped. Once the source node accepts a RREP it can start using the route to send data packets. When either end or middle node moves, a route error (RERR) message is sent to the damaged source nodes. When source node accepts the (RERR) message, it can rearrange route discovery if the route is still desired. The main superiority of this protocol is that routes are initiated on demand and latest destination is founded by the destination sequence number. Also the connection setup slowdown is less. The drawback is more number of control expenses due to many route reply messages for single route request. Another drawback is that regularly sending the hello message leads to needless bandwidth consumption.

3.3 Dynamic Source Routing (DSR) Protocol

DSR apply source routing and caching [11] where the sender node sends packet to the destination node in which the packets have the packet header and routes. When a node needs to contact with another node to which it does not realize the route, it starts a route finding process by immerseRoute Request (RREQ) packets. Each node and every node getting a RREQ packet duplicate the packet to its nearby node if it has not progressed before or if the node is not the end node, provided the packet's time to live counter has not exceeded. Each RREQ carries a succession number created by the source node and the path it has travelled. When a node gets a RREQ, it evaluates the succession number on the packet before sending it. The packet is onward only if it is not a replica RREQ. The succession number on the packet is used to protect the loop formations and to avoid duplicate transmissions of the same RREQ by an intermediate node that receives it

through multiple paths. Each and every node on the transmission raise RREQ because to construct a route. Once the destination node receives the RREQ it sends the RouteReply(RREP) to the source node. The RREP packet takes the travel way back to the source node established by the RREQ packet. The route created from source to destination is stored in the source node cache for future communication. If any connection of this route is broken, the source node is informed by a Route Error (RERR) packet and this route is discarded from cache.

A comparison of the characteristics of the above three ad hoc routing protocols DSDV, DSR, AODV is given in following table.

Table1. Property Comparison of DSDV, AODV and DSR

Protocol Property	**DSDV**	**AODV**	**DSR**
Reactive	No	Yes	Yes
Routes maintained in	Route Table	Route Table	No
Periodic Broadcast	Yes	Yes	No
Loop Free	Yes	Yes	Yes
Multicast Routes	No	No	Yes
Unidirectional Link Support	No	No	Yes
Multicast	No	Yes	No
Distributed	Yes	Yes	Yes
QoS Support	No	No	No
Route Cache/Table Timer	Yes	Yes	Yes

4. Conclusion:

As it can be seen, there are huge number of distinct kinds of routing protocols in mobile ad-hoc networks, the advantage of a individual routing protocol in mobile ad-hoc network confide upon the factors like size of the network, load, mobility requirements etc.

References:

[1] N. Sah, N. R. Prakash, and D. Bagai “QoS Analysis in Mobile AdHoc Networks Using Bandwidth Utilization Technique," International Journal of Signal Processing Systems, 3(2), Dec 2014.

[2] Karlsson, Jonny, Laurence S. Dooley, and Goran P. Pulkkis. "Secure Routing for MANET Connected Internet of Things Systems." (2018).

[3] P.Saravanan, S.Muthukumar and K.RubaSoundar, “Improving the Location of nodes in Wireless Ad Hoc and Sensor Networks using Improvised LAL Approach”, International Journal for Research in Applied Science and Engineering Technology, special issue no.2, Oct.2014.

[4] Ajaz F, Naseem M, Sharma S, Dhiman G, Vimal S, Shabaz M. Architecture and routing protocols for the internet of vehicles: a review. Int J Ad Hoc Ubiquitous Comput. 2021.

[5] Sharma S, Ahmed A, Naseem M, Sharma S. Machine learning for solving a plethora of internet of things problems. Intelligent Communication and Automation Systems. Boca Raton, Florida: CRC Press; 2021:255-274.

[6] Thakur, M.; Kaur, M. Ad-Hoc Network Routing Protocols for Wireless Body Area Network. In Proceedings of the ICAICR '19: Proceedings of the Third International Conference on Advanced Informatics for Computing Research, Shimla, India, 15–16 June 2019; pp. 1–7.
[7] Marina MK, Das SR. Ad hoc on-demand multipath distance vector routing. WirelCommun Mobile Comput. 2006;6(7):969-988s.
[8] P. Elamparithi, K.RubaSoundar, "Trusted Sensing Model for Mobile Ad HoC Network Using Differential Evolution Algorithm" International Journal of Information Technology and Control, Vol. 49, No. 4, December 2020, pp.556-563.
[9] C. E. Perkins and P. Bhagwat, " Highly Dynamic Destination- Sequenced Distance-Vector Routing (DSDV) for Mobile Computers," in Proceedings of ACM SIGCOMM, pp. 234-244, 1994.
[10] C. E. Perkins, B. Royer and S.R. Das, "Ad hoc On Demand Distance Vector (AODV) Routing," http://www.ietf.org/internet-drafts/draft-ietf-manet-aodv-13.txt, IETF Internet draft, Feb2003.
[11] D. Johnson, D.A. Maltz and J. Broch, "The Dynamic Source Routing Protocol for Mobile Ad hoc Networks,"http://www.ietf.org/internet-drafts/draft-ietf-manet-dsr-10.txt, IETF Internet draft, 19 July2004.
[12] Priya, L.R., Ruba Soundar, K., "LTE: An Enhanced Hybrid Domain Downlink Scheduling", Elsevier journal on Cognitive Systems Research (2018), Vol.52, Dec.2018
[13] C.K.Ramar and K.Ruba Soundar, "A Survey on Data Aggregation Techniques in Wireless Sensor Networks", International Journal Mobile Network Design and Innovation, Inderscience Online Publications, Vol.6, No.2, 2015
[14] Ramar, C.K. and Ruba Soundar, K. (2016), "Spatio Temporal Error Adaptation Model (STEAM) for Energy Efficient Wireless Data Gathering", Asian Journal of Research in Social Sciences and Humanities, Vol.7, No.3, March 2017.
[15] Ramar, C.K. and Ruba Soundar, K. (2016), "Prediction based Energy and Delay Aware Data Aggregation for Wireless Sensor Networks", International Journal of Advanced Engineering Technology, Vol.7, Issue 2, April – June 2016, 1286-1292.