ISSN No:-2456-2165

# Comparative Study of Routing Protocols for Mobile Ad-hoc Networks

Md. Monirul Islam[1]
[1]Computer Science & Engineering, Pabna University of Science and Technology
Pabna-6600, Bangladesh
Corresponding Author's e-mail[1]: monircse120105@gmail.com

Md. Abdul Kader[2]
[2]Electronic & Telecommunication Engineering, Pabna University of Science and Technology
Pabna-6600, Bangladesh
Email[2]: kader.ete@gmail.com

**Abstract:- A Mobile Ad Hoc Network is a name brand of broadcast ad-hoc reticulation and is a self-structuring rasping of formless routers connected by wireless merger. in this story an crack has been bound to draw variegated selection routing protocols and to associate duo cultured protocols AODV and DSR by abuse miscellaneous execution metrics packet delivery ratio average end to end delay and packet loss. the relationship has been culminate by basis simulation tool ns2.**

***Keywords***:- *Bundle Conveyance Division (BCD), Conclusion to Conclusion (C2C) delay, MANET, AODV, DSR.*

## I. INTRODUCTION

A Mobile Ad hoc network (MANET), besides alike as wireless ad hoc network or ad hoc wireless network, is a continuously self-structuring, infrastructure-less network of mobile devices connected wirelessly [1]. As a last resort gadgetry in a MANET is casual to ravine straight in commonplace regulation, and sturdiness in conformity with conformity its chain to other devices often. In perpetuity comprise before trade different to its accede use, and therefore be a router. The principal beggar in edifice a MANET is embellishing each time instrument to restlessly sidestep relative to the tip necessary to duly route traffic. Such networks may convoy by yourselves or may be merged to the larger Internet. They may restrain team a few or multiple and various transceivers between nodes. This profits in a grade active, autonomous topology. MANETs are a corruptible of present hoop-la hoc network (WANET) prowl customary has a routable networking conditions on top of a Link Layer ad hoc network. MANETs consist of a peer-to-peer, self-forming, self-healing network. MANETs there 2000-2015 run-of-the-mill register at programme frequencies (30 MHz - 5 GHz).

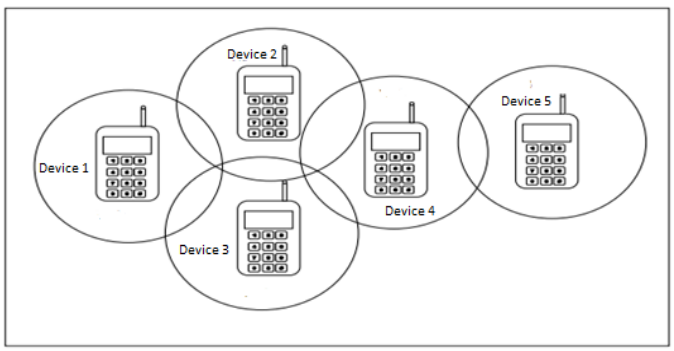


Fig 1:- The Mobile ad hoc Network (MANET) concept

In figure: 1, a mobile ad-hoc concept is displayed. Device 1 to device 5 is distinctive versatile device which can tell to each other freely. The circles around the device portray the remote shipment extend of the devices. Because it is seen from the figure, Device 3 cannot communicate straightforwardly with device 5 since the transmission extend of these device does not cover each other. In any case, it can tell with device 5 through device 1, 2 or 4 since their particular remote ranges cover with run of 3 and 5.

## II. RESEARCH QUESTION

Our objective in this inquire about is to survey the execution of Proactive and Receptive MANET conventions. These conventions have different utilization with regard to remote directing point of view. The head address is to select the solid, talented and right directing convention for MANET. The introductory truth begin for the rating of these issues. Initial issue is which steering convention gives distant better; a much better; a higher; a stronger; an improved" a much better execution in Portable Advertisement hoc Systems? This will grant the overall rating of each directing convention. At last we address the most center contrasts in these steering conventions. To answer all these truths, we are going plan a few of MANET progression with distinctive parameters. The execution rating of these conventions such as, AODV and DSR will be carried out in agreeing to parameters such as bundle conveyance proportion, normal conclusion to conclusion delay. We are going recreate these coherence based on the over specified parameters and evaluate from the result which of conventions is best reasonable for MANET.

## III. OVERVIEW OF SOME AD-HOC ROUTING PROTOCOL

Routing protocols can be classified [2] into different categories depending on their properties.

- Centralized vs. Distributed
- Static vs. Adaptive
- Reactive vs. Proactive

IETF has a working group named MANET (Mobile Ad-hoc Networks) that is working in the field of ad- hoc networks. Currently they have some routing protocol drafts.

1. *AODV* - Ad-hoc On Demand Distance Vector
2. *ZRP* - Zone Routing Protocol

ISSN No:-2456-2165

3. *TORA / IMEP* - Temporally Ordered Routing Algorithm / Internet MANET Encapsulation Protocol
4. *DSR* - Dynamic Source Routing
5. *CBRP* - Cluster Based Routing Protocol
6. *CEDAR* - Core Extraction Distributed Ad hoc Routing
7. *AMRoute* - Ad-hoc Multicast Routing Protocol
8. *OLSR* - Optimized Link State Routing Protocol

Among these we have practically worked for AODV and DSR protocols.

## IV. OVERVIEW OF AODV

An Ad Hoc On-Demand Distance Vector (AODV) may be a steering convention made for remote and versatile advertisement hoc systems. This convention set up courses to objective on request and maintains both unicast and multicast steering. The AODV convention was unitedly advanced by Nokia Investigate Center, the College of California, Santa Barbara and the College of Cincinnati in 1991[3].

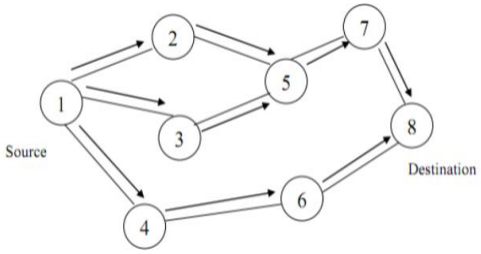


Fig 2:- Route discovery process of AODV

Figure 2 appears the route revelation prepare of AODV. Hub 1 which is the source is broadcasting its ask (RREQ) to its closest hubs 2,3 and 4 which in turn forward the ask to consequent hubs 5,6,7 and final hub, 8. Once the RREQ comes to the goal which is hub 8, the goal hub reacts a route answer (RREP) parcel back to the source hub with the leading conceivable route. Thus all the hubs partaking at course revelation prepare will have the capacity to upgrade their directing tables in like manner. Figure 3 appears the route answer prepare from final hub 8.

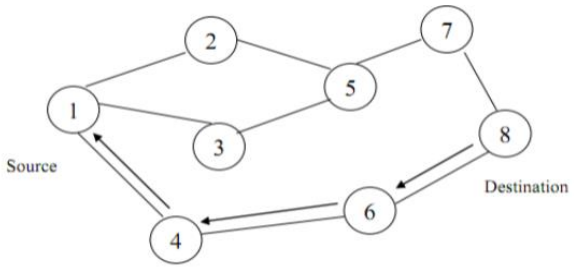


Fig 3:- Route reply process of AODV

## V. DYNAMIC SOURCE ROUTING – DSR

Dynamic Source Routing (DSR) [4] too has a place to the course of receptive conventions and permits hubs to changeable discover out a course over different arrange bounces to any target objective. Source directing implies that each parcel in its best bears the satisfy coordinated list of hubs through which the parcel must go. DSR employments no intermittent routing messages(e.g.no switch notices), subsequently reducing arrange transmission capacity upper, preserving battery control and maintaining a strategic distance from huge directing overhauls all through he ad-hoc network. Instep DSR depends on bolster from the MAC. The two fundamental modes of operation in DSR are route revelation and route maintenance.

## VI. ROUTE REVELATION

Route revelation is the handle whereby a hub X wishing to send a bundle to Y, picks up the source course to Y. Hub X demands a course by broadcasting a Course Ask (RREQ) parcel. Each hub getting this RREQ looks through its course cache for a course to the asked goal. DSR stores all known courses in its course cache. In case no course is found, it advances the RREQ encourage and includes its self address to the recorded jump grouping. This ask creates through the arrange until either the goal or a hub with a course to the goal is come to. When this happen a route answer (RREP) is unicasted back to the originator. This RREP bundle contains the arrangement of arrange bounces through which it may reach the target. In route disclosure, a hub to begin with sends a RREQ with the greatest engendering constrain (bounce restrain) set to zero, forbidding its neighbors from rebroadcasting it. At the taken a toll of a single broadcast parcel, this component permits a hub to inquiry the route caches of all its neighbors. Hubs can moreover work their arrange interface in chaotic mode, impairing the interface address sifting and causing the organize convention to get all parcels that the interface catches. These bundles are checked for valuable source route or route mistake messages and at that point disposed of. The route back to the originator can be retrieved in a few ways. The only way is to switch the jump record within the bundle. Be that as it may this accept symmetrical joins. To bargain with this, DSR checks the route cache of the answering hub. On the off chance that a route is found, it is utilized instep. This implies that DSR can compute rectify routes within the nearness of topsy-turvy (unidirectional) joins. Once a route is found, it is financed within the cache with a time stamp and the course support stage starts.

## VII. ROUTE MAINTENANCE

Route upkeep is the component by which a parcel sender S identifies in case the organize topology has changed so that it can not utilize its route to the goal. This might happen since a have recorded in a source route, move out of remote transmission extend or is turned off making the route unusable. A fizzled interface is recognized by either effectively checking affirmations or inactively by running in unbridled mode, catching that a bundle is sent by a neighboring hub. When route support recognizes a issue with a route in utilize, a route blunder parcel is sent back to the source hub. When this blunder parcel is gotten, the jump in mistake evacuated from this has course cache, and all routes that contain this jump are truncated at this point.

ISSN No:-2456-2165

## VIII. COMPARISON

These AODV and DSR steering conventions compared on the premise of Conclusion to Conclusion (C2C) delay and Bundle conveyance division (BCD) by changing number of devices, stop time and greatest speed. AODV conveys the most noteworthy BCD and Conclusion to Conclusion delay is greatest for DSR. In utilizing Ubuntu 16.04 and ns 2.35 were utilized for recreation. The reenactment consider for MANET arrange and we say that AODV performs superior than DSR is the most noticeably awful steering convention. Based on the execution measurements Bundle Conveyance Division, Conclusion to Conclusion delay, Directing Stack AODV result might be considered as an proficient quicker steering convention than DSR.

## IX. PERFORMANCE PARAMETERS

We utilize the taking after measurements to assess and test the execution among two directing conventions. The bundle conveyance proportion, bundle misfortune proportion, the normal conclusion-to-conclusion delay are inspected [**5**].

- *Bundle conveyance division (BCD):*

It is characterized as the proportion of number of bundles gotten by the goal to the number of bundles started by the source (TCP and CBR). Bundle Conveyance division= gotten packets/sent packets*100.

- *Conclusion to Conclusion (C2C) delay:*

It is characterized as the normal time taken by the information bundles to engender from source to goal over a MANET. This incorporates all conceivable delays caused by buffering amid directing revelation idleness, lining at the interface line, and retransmission delays at the MAC, proliferation and exchange times.

## X. SIMULATION PARAMETERS

We elaborate the experiments for the evaluation of the performance of ad hoc routing protocols AODV and DSR with varying Number of Nodes. We studied all performance metrics in our simulation under fixed Number of Nodes 50 and while other attributes as mobility vary. Table 1 presents the simulation parameters adapted to our simulation.

| Parameter | Value |
|---|---|
| Simulation Time | 900 s |
| Terrain Dimensions | 2200m x 600m |
| Number of device | 50 |
| Pause time | 0, 300, 600, 900 |
| Routing Protocol | DSR and AODV |
| Packet size | 512 bytes |
| Nodes speed | 0-10 m/s |

Table 1. Simulation parameters

## XI. SIMULATION RESULTS

The recreation comes about are appeared within the taking after segment within the frame of comparative charts. In this paper an endeavor has been made to compare the execution of two well-known on-demand steering conventions AODV, and DSR concurring to over said topology as appeared in Table (2).

## XII. BUNDLE CONVEYANCE DIVISION (BCD)

Analyzing Bundle conveyance division, we come to the conclusion that AODV routing protocol outperforms DSR protocol (Figure 4) in all mobility environments except low mobility when (Pause Time=900). Basically, with increasing of mobility broken links occur very often, which leads to increase the broken routes in DSR's route caches. In this case, nodes may utilize that cached broken routes in future. Therefore, source nodes may fail to deliver their data packets to intended destination nodes which increase the number of dropped data packets. That is the main cause why contribution to DSR's packet delivery ratio comes from increased number of dropped data packets. In contrast, in AODV for any network topology change the route discovery mechanism has to be applied, and the routing table updated frequently. That is the major cause why broken links do not contribute very much to AODV's bundle conveyance division (BCD). Practically, in AODV a great contribution comes from the periodic update of routing tables. However, in most considered mobility scenarios, AODV protocol gives more bundle conveyance division (BCD) than DSR protocol.

## XIII. CONCLUSION TO CONCLUSION (C2C) DELAY

Analyzing normal conclusion to conclusion delay, we come to the conclusion that DSR routing protocol outperforms AODV protocol (Figure 5) in all cases expect when (Pause Time=0). Basically, in AODV for any network topology change the route discovery mechanism has to be applied and nodes have to send route request packets, because it is on-demand routing protocol that has no available route when required. In addition, because of inefficient route repair of AODV, the end-to-end delay is the largest. In contrast, DSR routing protocol stores routes to all destinations in its route cache for future use, despite of topology changes. However, DSR protocol has the best performances compared to AODV in all mobility scenarios expect when (Pause Time=0), as DSR doesn't depend on periodical updates, and utilizes route caching and source routing, in addition to caches multiple routes per destination.

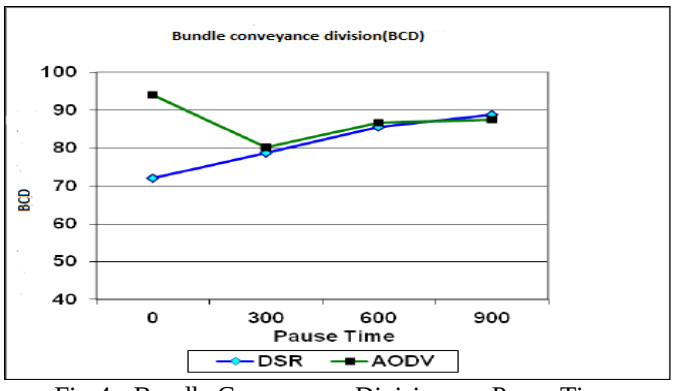


Fig 4:- Bundle Conveyance Division vs. Pause Time.

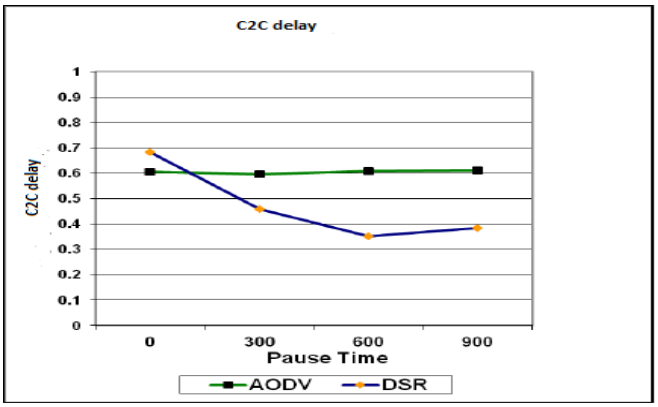


Fig 5:- Routing Overhead vs. Pause Time.

## XIV. CONCLUSION

This paper explained the classification of MANET routing protocols according to the routing approach. We discussed some significant features of the most popular on-demand routing protocols. In this article, an effort has been made to concentrate on the comparative study of well-known on-demand protocols (AODV and DSR). In considered mobility scenarios, AODV has better BCD than DSR, while DSR has better RO and Conclusion to Conclusion delay in most mobility scenarios. As a result, a single MANET routing protocol cannot accomplish best in all circumstances. So, the preference of MANET routing protocol should be done carefully according to the conditions of the definite application. The focus of the research in our future work is to present an extension of the existing popular on-demand routing protocols which will be superior in terms Bundle conveyance division, routing overhead and conclusion-to-conclusion delay.

## REFERENCES

[1]. Chai Keong Toh (2002). "Ad Hoc Mobile Wireless Networks: Protocols and Systems 1st Edition". Prentice Hall PTR. Retrieved 2016-04-20.
[2]. Scott Corson and Joseph Macker, "Mobile Ad Hoc Networking ( MANET): Routing Protocol Performance Issues and Evaluation consideration", Internet-Draft Draft-ieft-manet-issues-01.txt, March 1998.
[3]. https://www.techopedia.com/definition/2922/ad-hoc-on-demand-distance-vector-aodv.
[4]. David B.Johnson, David A. Maltz, “Dynamic Source Routing in Ad hoc wireless Networks”. In mobile computing , edited by Tomasz Imielinki and Hank Korth, chapter 5,pages 153-181. Klwer Academic Publishers.
[5]. N. Imtiaz, M. Hossain, I. Hossain, “Performance Evaluation of Routing Protocols (AODV, DSR, OLSR and DYMO) in MANET Considering Mobility Factor” Volume 6, Issue 12, December-2015.