

# Improved Energy Efficiency in Multipath AODV and Performance Evaluation of Energy Efficient Routing Protocols in MANET

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**Abstract**— Mobile ad hoc network is a wireless network which is organized by itself autonomously without fixed infrastructure.[2] Mobile nodes are highly dynamic mobility. This requires more energy consumption due to mobility of nodes. This causes high rate of breakage of link and causes packet loss. To overcome this, many routing protocols has been proposed. This paper will discuss about energy utilization aspect of MANET routing protocols. Over view of Dynamic source routing (DSR) and Ad hoc on demand distance vector (AODV) routing protocols. The routing protocols are divided based on number of routs discovered as single path and multipath protocols. [1]

**Keywords**— MANET, routing protocols, DSR, AODV, energy optimization.

## INTRODUCTION

MANET can be developed by connecting different nodes without fixed infrastructure. Since they contain mobile nodes which move freely from one place to another and changes topology of the network rapidly and unpredictably over time. This results in network activities such as finding network topology and message deliveries executed by mobile nodes which saves energy and extends the life time of network. Quality of topology is determined on the basis of connectivity, efficiency of energy, mobility robustness and throughput. All nodes in the network which are connected to each other must act as routers to deliver the packets accurately. Routers are connected through the links. The route quality is depended on change in link quality varying link route will not produce good results. Therefore many routing protocols have been proposed and presented to Internet Engineering Task Force (IETF). In transmitting data node can consume energy and also in receiving data and managing the congestion and in overhearing. This is due to shared medium. The routing protocols must be required to transfer the message or packets from source node to destination node appropriately. Each mobile node in the mobile ad-hoc network must be able to forward the data to another mobile node. [2]

## BACKGROUND

V.Kanakaris , D.Nazi And D.Anzzi Access Ad Hoc Network Protocols Based On The Various Network Mobility Factor. The Evaluation Of Aodv,Dsdv,Dsr And Tora Was Carried Out

Using Network Simulator-2 And Tora Performance Was Poor Hence It Is Credited To Its Operation. Therefore Carried Out Enquiry Of Tora Execution In Ns2.[5]

## ROUTING PROTOCOLS

The Routing Protocols Can Be Divided Based On Number Of Routs Discovered As Single Path And Multipath. Single Path Protocol Will Select The Best Route After Learning The Routs To Reach Destination From Source. These Protocols Are Able To Reach The Destination.[4] Single Route Is Simple For Packet Forwarding, But It Has Many Disadvantages . It Is Very Difficult To Respond Toa Large Burst In Traffic. If The Path Fails New Route Must Be Discovered Which Results In Packet Loss.

Multi Path Protocols Are More Reliable As They Study And Discover Many Routes From Source To Reach The Destination. They Better For Balancing The Load. They Improve Efficiency Of Communication & Promotes Quality Of Service By Utilizing Different Routes. They Reduce Control Overhead, Data Transmission Rate Us Enhanced, Increased Network Bandwidth & Energy Is Saved.[6]

## OVERVIEW OF ROUTING PROTOCOLS

Routing Protocols Are Required For Establishing Path Between Source Node To Destination Node. Optimum Path Should Be Selected Between Two Communicating Nodes. It Is Also Responsible For Maintaining Path Between Two Communicating Nodes. The Optimality May Depend On The Distance Between Two Nodes Or The Number Of Hops. Optimality In Terms Of Distance States That The Shortest Path To The Destination From Source Node. Optimality In Terms Of Number Of Hops States That The Hops Are In Minimum Number. Many Routes Are There To Reach The Destination Mode But Optimal Path Should Be Chosen Many Routing Protocols Were Developed The Classification Of Routing Protocols In Mobile Ad-Hoc Network[4]

- a. Proactive Routing Protocol
- b. Reactive Routing Protocol
- c. Hybrid Routing Protocol

Proactive Routing Protocol: It Is Also Known As Table-Driven Protocol They Are Related To Progress Internet Routing Protocols For Example

1. Rip (Routing Information Protocol)
2. Dv (Distance Vector)
3. Ospf (Open Shortest Path First)
4. Link – State Routing

In This Routing Protocol Each Node Maintain Its Own Routing Table Which Stores All Routing Information Of The Network. The Information In The Routing Table Is Up – To Date. The Proactive Protocols In The Network Are Appropriate For Less Number Of Modes, Because They Need To Upgrade The Routing Table Information Forevery Node In The Whole Network. Advantage Of Proactive Protocol Is Whenever They Needed The Routes Are Available At That Movement. Disadvantages Are Control Over Head Can Be Significant In Networks Where There Is Rapid Moving Nodes And Additional Control Traffic. There Are Several Routing Protocols

- A. Wrp (Wireless Routing Protocol)
  - B. Dsdv (Destination, Sequenced Distance – Vector)
- C. Gsr (Global State Routing)
- D. C G S R (Cluster Head Gateway Switch Routing)
- E. Fsr (Fisheye State Routing)
- F. Hsr (Hierarchical State Routing)
- G. Zhls (Zone Based Hierarchical Link State)
- H. Star (Source Tree Adoptive Routing)[4]

Reactive Routing Protocol (On Demand Routing Algorithm)

In This Routs Are Discovered Whenever They Want To Communicate With Each Other From Source Node To Destination Node. It Does Not Maintain Route Between Each & Every Node In The Network. It Checks The Route Table To Find A Valid Route, If It Does Not Find It Performs A Route Discovery Algorithm. It Becomes On – Demand. The Advantage Is It Has Less Routing Overhead As Compared To Other Protocols. Disadvantage Is , When The Route Is Discovered There Is Finite Latency. Whereas In Proactive Routing Protocol , The Routes Are Available Whenever They Are Needed. Some Of The Protocols Are Dsr (Dynamic Source Routing), Aodv (On Demand Distance Vector Routing), Tora (Temporary Ordered Routing Protocol).

#### HYBRID ROUTING PROTOCOL

It Is A Mixture Of Both Proactive, Reactive Feature Of A Routing Protocol Nowadays More Hybrid Routing Protocols Are Used.[3] It Is Useful In The Control Traffic Overhead Reduction From Proactive Protocol & To Reduce The Route Discovery Delays In Reactive Protocols. They Use Routing

Table Information. It Requires Less Memory & Processing Power. Example: Z R P (Zone Routing Protocol).

#### OVERVIEW OF PROTOCOL

*Dsr(Dynamic Source Routing):*

Dsr Is An Efficient Routing Protocol. It Is Proposed To Be Used In Multi-Hop Mobile Ad Hoc Networks Specially. It Has Two Phases First One Is Routing Discovery And Second One Is Route Maintenance. It Is Designed To Limit Bandwidth Consumed In Ad-Hoc Network. It Is An On Demand Protocol.[1] Dsr Discover Routs Using Source Routing Algorithm. Each Node Forwards Its Source Route Information To The Next Hop Based On Its Routing Information. Dsr Need Not Inform Its Presence To Its Neighbours By Periodic “Hello” Packet Transmission. The Source Routing Is Loop Free Routing. It Does Not Require To Know The Routing Information Which Is Up-To-Date. The Source Node Sends “Rreq” Packets To All The Neighboring Nodes Till It Has Reached Its Destination Or Other Node Is Found With The Fresh Route To The Destination. Destination Node Sends The “Rrep” Reply Packet When The Packet Reaches The Destination Node , On The Reverse Path Back To Sender .The Reply Packet Contains The Destination Route. The Destination Node Selects The Optimal Route Received First And Stores Other Routes For Further Use. On The Other Hand “Rerr” Packet Is Sent ,When Ever The Link Breaks . It Propagates To The Original Source. Which Progresses The New Route Discovery Processes.[2]

#### *I. Aodv(Ad Hoc On Demand Distance Vector)*

Aodv Is Reactive Routing Protocol .It Will Discoverand Maintain New Routes When They Need To Communicate With Each Other Until Then It Will Not Discover The Routes. Aodv Finds Routes In Reactive Approach And Identify Most Recent Path By Proactive Approach .It Finds Routes Similar To Dsr By Using Route Discovery Approach.[1] To Compute Fresh Route It Uses Destination Sequence Numbers .During Route Discovery Procedure The Source Node Sends The “Rreq” Packets .It Contains Sid(Source Identifier),Did (Destination Identifier) , Sseq (Source Sequence Number), Dseq (Destination Sequence Number), Bid (Broadcast Identifier) And Ttl Fields .If The “Rreq” Packet Is Received By The Next Node Or Prepares “Rreq” Packets That Is Route Reply Packet , If It Has A Valid Route To Its Destination . The Validity Of The Intermediate Node Route Is Checked By Comparing The Sequence Number Of Destination Node In ”Rreq” With The Intermediate Node Sequence Number . It Will Store The Previous Node Information Whenever “Rrep” Packet Is Received By The Node .Therefore Each Node In The Network Will Maintain Only The Information Of The Next Hop.[2]

#### ENERGY OPTIMIZATION IN AODV AND DSR

An Energy Efficient Routing Protocol Will Decrease The Consumption Of Power In The Nodes By The Consumption Of Least Amount Of Energy In Routing Data. It Is Storing Information Using Caching Technique, To Propose Energy

Efficient Routing Protocol .In Terms Of Saving The Energy It Has Good Performance Compare To Dsr Protocol .They Have Shown Better Results In Evolution Of Performance By Simulation .It Has Decreased Routing And Information Storage By Proposing Loop-Free Energy Conservation .This Scheme Successfully Proved That They Have Decreased More Than 20% Of Total Consumption Of Energy .They Have Been Presented New Routing Protocol Emrp. It Will Increase The Networks Lifetime.[4]

#### CONCLUSION

In This Paper ,Routing Protocols Are Divided Based On Number Of Routes Discovered As Single Path And Multipath . Multipath Is More Reliable Than The Single Path.The Performance Evolution Of Aodv Protocol And Dsr Protocols Are Compared In Terms Of Consumption Of Energy, Network Traffic, Throughput And End To End Delay. In Dsr Routing Protocol Throughput, Consumption Of Energy Is Less And Network Overhead Is High. In Case Of Aodv Routing Protocol Network Overhead Gives Good Performance Than Dsr.

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