

A Study On The Performance Of Various Routing Protocols In MANET

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Abstract : *Mobile Ad-Hoc Networks (MANETS) Consists Of A Collection Of Mobile Nodes Without Having A Central Coordination. In MANET, Node Mobility And Dynamic Topology Play A Very Important Role Within The Performance. MANET Gives A Resolution For Network Connection At Anywhere And At Any Time. The Major Features Are Square Measure, Fast Set Up, Self Organization And Self Maintenance. Routing May Be A Major Challenge In MANET Due To It's Dynamic Topology And High Quality. There's No Mounted Infrastructure, Which Ends Up Additionally And Exclusion Of Any Range Of Nodes From The Network For Comparatively Little Networks Routing Protocols Could Be Decent. However, In Larger Networks Either Hierarchical Or Geographic Routing Protocols Are Needed. In This Survey Paper Routing Protocols AODV (Ad- Hoc On-Demand Distance Vector), OLSR (Optimized Link State Routing Protocol) And DSR (Dynamic Supply Routing Protocol) On With Several Alternative Algorithms Square Measure Delineate Shortly.*

KEY WORDS- MANET,QOS, Reliability, AODV, Routing.

1. INTRODUCTION

There Are Many Types Of Computer Networks, They Can Be Distinguished Supported Several Parameters And One Such Parameter Is The Approach During Which The Nodes In Network Communicate With One Another. Two Major Varieties Of Networks Exist And That They Are Wired Networks And Wireless Networks.

Wireless Networks Are An Emerging New Technology That May Permit Users To Access Data And Services Electronically, In Spite Of Their Geographic Position. Wireless Networks May Be Classified In 2 Types: - Infrastructure Network And Infrastructure-Less (Ad Hoc) Networks. Infrastructure Network Consists Of A Network With Fixed And Wired Gateways. A Mobile Host Communicates With A Bridge Within The Network (Called Base Station) Inside Its Communication Radius. The Mobile Unit Will Move Geographically Whereas It's Human Activity. Once If It Goes Out Of One Base Station, It Would Connect With New Base Station And Starts Human Activity Through It. This Is Often Referred To As Football Play. During This Approach The Bottom Stations Are Fixed

The Manets Are Wireless Networks Functioning On A Very Stable Basis Even With Changes Of Network Topology Both In Time And Space. Such Networks Do Not Require Any Infrastructure Or Centralized Administration. Nodes In The MANET Not Only Function As

Hosts , But Also As Routers. Each Node That Is Supposed To Become A Part Of The Network Must Be Within Range Of Other Nodes Currently Connected In The Network. For Example (See Fig. 1), If The Node A Is Within Range Of The Node B Which Is Already A Part Of The MANET (Represented By The B, C, D, E Nodes) And They Are Able To Communicate With Each Other, The Node A Becomes A Part Of The Network. In Case, That The Node E Lies Out Of Range Of The Node A And They Need To Exchange Data, Then The Transfer Will Be Carried Out Through The B, C And D Nodes.

Figure 1. MANET NETWORK SCENERIO

I. BACK GROUND AND RELATED WORKS

Routing Protocols For Manets Can Be Broadly Classified Into Three Main Categories[1,2,3]:-

1. Proactive Routing Protocols: Every Node In The Network Has One Or More Routes To Any Possible Destination In Its Routing Table At Any Given Time.
2. Reactive Routing Protocols: Every Node In The Network Obtains A Route To A Destination On A Demand Fashion. Reactive Protocols Do Not Maintain Up-To-Date Routes To Any Destination In The Network And Do Not Generally Exchange Any Periodic Control Messages.
3. Hybrid Routing Protocols: Every Node Acts Reactively In The Region Close To Its Proximity And Proactively Outside The Region, Or Zoneseveral Routes.

1) Proactive Routing Protocols

Proactive Routing Means That The Routing Information, Like Next Forwarding Hop Is Maintained In The Background Irrespective Of Communication Requests. The Advantage Of Proactive Routing Protocol Is That There Is No Route Discovery Since The Destination Route Stored In The Background, But The Disadvantage Of This Protocol Is That It Provides Low Latency For Real Time Application. A Table Is Constructed And Maintained Within A Node. So That, Each Entry In The Table Indicates The Next Hop Node Towards A Certain Destination. It Also Leads To The Maintenance Of Unused Data Paths, Which Causes The Reduction In The Available Bandwidth. The Various Types Of Proactive Routing Protocols Are: LSR And FSR.

2) Reactive/Ad Hoc Based Routing

Reactive Routing Opens The Route Only When It Is Necessary For A Node To Communicate With Each Other. It Maintains Only The Routes That Are Currently In Usage. As A Result It Reduces The Burden In The Network. Reactive Routing Consists Of Route Discovery Phase In Which The Query Packets Are Flooded Into The Network For The Path Search And This Phase Completes When Route Is Found. The Various Types Of Reactive Routing Protocols Are AODV, PGB, DSR And TORA.

B. Position Based Routing Protocols: Position Based Routing Consists Of Class Of Routing Algorithm. They Share The Property Of Using Geographic Positioning Information In Order To Select The Next Forwarding Hops. The Packet Is Send Without Any Map Knowledge To The One Hop Neighbor Which Is Closer To Destination. Position Based Routing Is Beneficial Since No Global Route From Source Node To Destination Node Need To Be Created And Maintained. Position Based Routing Is Broadly Divided In Two Types: Position Based Greedy Protocols, And Delay Tolerant Protocols.

C. Cluster Based Routing

Cluster Based Routing Is Preferred In Clusters. A Group Of Nodes Identifies Themselves To Be A Part Of Cluster And A Node Is Designated As Cluster Head, It Will Broadcast The Packet To Cluster. Good Scalability Can Be Provided For Large Networks But Network Delays And Overhead Are Incurred When Forming Clusters In Highly Mobile VANET. In Cluster Based Routing Virtual Network Infrastructure Must Be Created Through The Clustering Of Nodes In Order To Provide Scalability. The Various Clusters Based Routing Protocols Are COIN And LORA_CBF. The Requirements Of QOS Will Vary From One Application To Another Application [4,5,6]

II. REACTIVE ROUTING PROTOCOL

In AODV [7] (Perkins, 1999) Routing, Upon Receipt Of A Broadcast Query (RREQ), Nodes Record The Address Of The Node Sending The Query In Their Routing Table. This Procedure Of Recording Its Previous Hop Is Called Backward Learning. Upon Arriving At The Destination, A Reply Packet (RREP) Is Then Sent Through The Complete Path Obtained From Backward Learning To The Source. The AODV Algorithm Enables Dynamic, Self-Starting, Multihop Routing Between Participating Mobile Nodes Wishing To Establish And Maintain An Ad Hoc Network. AODV Allows Mobile Nodes To Obtain Routes Quickly For 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 Loop-Free, And By Avoiding The Bellman-Ford "Counting To Infinity" Problem Offers Quick Convergence When The Adhoc Network Topology Changes (Typically, When A Node Moves In The Network). When Links Break, AODV Causes The Affected Set Of Nodes To Be Notified So That They Are Able To Invalidate The Routes Using The Lost Link. Route Requests (Rreqs), Route Replies (Rreps) And Route Errors (Rerrs) Are Message Types Defined By AODV [7].

The Dynamic Source Routing Protocol (DSR) [8] Is (Perkins, 2007), An On Demand Routing Protocol. DSR Is A Simple And Efficient Routing Protocol Designed Specifically For Use In Multi-Hop Wireless Ad Hoc Networks Of Mobile Nodes. Using DSR, The Network Is Completely Self-Organizing And Self-Configuring, Requiring No Existing Network Infrastructure Or Administration. The DSR Protocol Is Composed Of Two Main Mechanisms That Work Together To Allow The Discovery And Maintenance Of Source Routes In The Ad Hoc Network: Route Discovery Is The Mechanism By Which A Node S Wishing To Send A Packet To A Destination Node D Obtains A Source Route To D. Route Discovery Is Used Only When S Attempts To Send A Packet To D And Does Not Already Know A Route To D.

Route Maintenance Is The Mechanism By Which Node S Is Able To Detect, While Using A Source Route To D, If The Network Topology Has Changed Such That It Can No Longer Use Its Route To D Because A Link Along The Route No Longer Works. When Route Maintenance Indicates A Source Route Is Broken, S Can Attempt To Use Any Other Route It Happens To Know To D, Or It Can Invoke Route Discovery Again To Find A New Route For Subsequent Packets To D. Route Maintenance For This Route Is Used Only When S Is Actually Sending Packets To D. In DSR Route Discovery And Route Maintenance Each Operates Entirely "On Demand".

1	Platform	Windows Vista Ultimate
2	NS Version	Ns –Allinone-2.29

3	Simulation Time	300 S
4	Topology	Size 4000 M X 7000 M
5	Routing Protocols	AODV, DSR, OLSR And DSDV
6	Traffic Type	TCP
7	Data Type	CBR
8	Data Packet Size	512 Bytes

The Optimized Link State Routing Protocol (OLSR) [9] Is Developed For Mobile Ad Hoc Networks. It Operates As A Table Driven, Proactive Protocol, I.E. Exchanges Topology Information With Other Nodes Of The Network Regularly. Each Node Selects A Set Of Its Neighbor Nodes As "Multipoint Relays" (MPR). In OLSR, Only Nodes, Selected As Such Mprs Are Responsible For Forwarding Control Traffic, Intended For Diffusion Into The Entire Network. Mprs Provide An Efficient Mechanism For Flooding Control Traffic By Reducing The Number Of Transmissions Required. Nodes, Selected As Mprs, Also Have A Special Responsibility When Declaring Link State Information In The Network. Indeed, The Only Requirement For OLSR To Provide Shortest Path Routes To All Destinations Is That MPR Nodes Declare Link-State Information For Their MPR Selectors. Additional Available Link-State Information May Be Utilized, E.G., For Redundancy. Nodes Which Have Been Selected As Multipoint Relays By Some Neighbor Node(S) Announce This Information Periodically In Their Control Messages. Thereby A Node Announces To The Network, That It Has Reach Ability To The Nodes Which Have Selected It As An MPR. In Route Calculation, The Mprs Are Used To Form The Route From A Given Node To Any Destination In The Network. Furthermore, The Protocol Uses The Mprs To Facilitate Efficient Flooding Of Control Messages In The Network.

Destination-Sequenced Distance-Vector Routing (DSDV) DSDV [10] Is A Table-Driven Routing Scheme For Ad Hoc Mobile Networks Based On The Bellman-Ford Algorithm. It Was Developed By C. Perkins And P. Bhagwat In 1994. It Eliminates Route Looping, Increases Convergence Speed, And Reduces Control Message Overhead. In DSDV, Each Node Maintains A Next-Hop Table, Which It Exchanges With Its Neighbors. There Are Two Types Of Next-Hop Table Exchanges: Periodic Full-Table Broadcast And Event-Driven Incremental Updating. The Relative Frequency Of The Full-Table Broadcast And The Incremental Updating Is Determined By The Node Mobility. In Each Data Packet Sent During A Next-Hop Table Broadcast Or Incremental Updating, The Source Node Appends A Sequence Number. This Sequence Number Is Propagated By All Nodes Receiving The Corresponding Distance-Vector Updates, And Is Stored In The Next-Hop Table Entry Of These Nodes. A Node, After Receiving A New Next-Hop Table From Its Neighbor, Updates Its Route To A Destination Only If The New Sequence Number Is Larger Than The Recorded One, Or If The New Sequence Number Is The Same As The Recorded One, But The New Route Is Shorter. In Order To Further Reduce The Control Message Overhead, A Settling Time Is Estimated For Each Route. A Node Updates To Its Neighbors With A New Route Only If The Settling Time Of The Route Has Expired And The Route Remains Optimal.

The Performance Evolution Of Routing Protocols By Uma Nagaraj And Et Al., Found That The Results As Shown In The Figure 2 With The Simulation Details In Table 1.

TABLE 1: SIMULATION SETUP

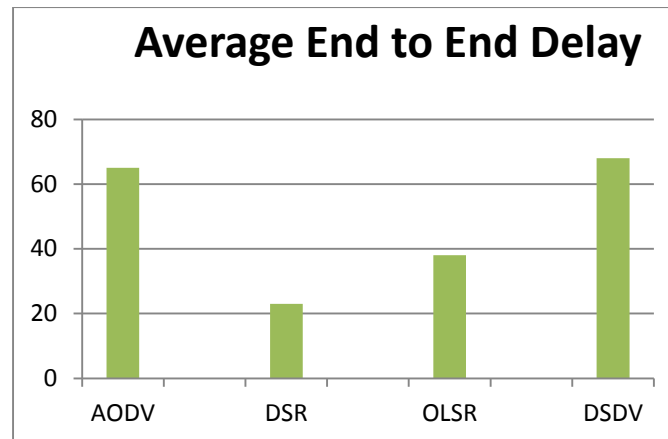


Figure 2. Average End to End Delay

2. CONCLUSION

In This Paper The Analysis Of Ad Hoc Routing Protocol Is Done In Realistic Scenario Of MANET. After Doing The Simulation Based Analysis Of AODV, DSR, OLSR And DSDV In Realistic Scenario Of MANET, We Can See That The Performance Of AODV In Terms Of PDR Is Very Good Approximate 98% And DSDV Is Approximate 97%. OLSR Has Average Performance As The PDR. The Average End To End Delay Of AODV Is Very High. The DSR Performs Well In Both Of The Scenario In Terms Of Avg. End To End Delay.

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