BEST: International Journal of Management, Information Technology and Engineering (BEST: IJMITE)
ISSN 2348-0513
Vol. 2, Issue 7, Jul 2014, 59-64
© BEST Journals

COMPARISON OF PROTOCOLS IN MANETS

RENU DAHIYA & RAKHI KHEDIKAR

Department of Electronics & Communication Engineering, Dronacharya College of Engineering, Haryana, India

ABSTRACT

A Mobile Ad-Hoc Network [MANET] is a self-configuring infrastructure-less network of mobile devices connected by wireless. Each device/node in a MANET is free to move independently in any direction, and will therefore change its links to other devices frequently. Because of that there is no long term guaranteed path from any one node to other node. Each must forward traffic unrelated to its own use, and therefore be a router. The primary challenge in building a MANET is equipping each device to continuously maintain the information required to properly route traffic. In recent years several routing protocols have been proposed for MANET like DSDV, AODV, DSR, etc. In this paper, overview, characteristics, functionality, advantages and disadvantages of some of these protocols have been described so as to make their comparative analysis in order to improve their performance. MANET have very enterprising use in emergency scenarios like military operations and disaster-relief operation where there is need of communication network immediately following some major event, or like conference and seminar at new place where there is no earlier network infrastructure exist and need alternative solution.

KEYWORDS: MANET, DSDV, AODV, QoS

INTRODUCTION

A wireless network is any type of computer network that uses wireless data connections for connecting network nodes. Now, there exist network protocols that are developed just for the purpose of wireless networks. There are two types of mobile wireless network mainly exists:

- **Network with Existing Infrastructure:** These are networks with fixed and wired gateways and the bridges for these networks are known as base stations. Here, a mobile unit connects to the nearest base station that is within its communication radius for communication. When the mobile travels out of range of one base station and enters into the range of another, a handoff occurs, and the mobile can continue communication seamlessly throughout the network. Typical application of this type of network includes wireless local area networks.
- **Infrastructure-Less Mobile Network:** Also known as ad-hoc network. These networks have no fixed routers means all nodes are capable of movement and can be connected dynamically in an arbitrary manner. The nodes of these networks function as routers which discover and maintain routes to other nodes in the network. Typical application of ad-hoc networks may include once emergency search-and-rescue operations [1].

ROUTING PROTOCOLS FOR MANETS

An ad-hoc routing protocol is a convention or standard that controls how nodes come to agree which way to route packets between computing devices/nodes in a MANET. In ad-hoc networks, the nodes do not have a prior knowledge of topology of network around them, they need to discover it.

A new node announces its presence and listens to broadcast announcements from its neighbors. In this way, a node learns about new near nodes and ways to reach them. It then announces that it can also reach those nodes. As time increases, each node knows about all other nodes and one or more ways how to reach them.

Generally, existing routing protocols in MANETs can be classified under two categories, figure 1 [5].

- Proactive or table-driven.
- Reactive or demand-driven.

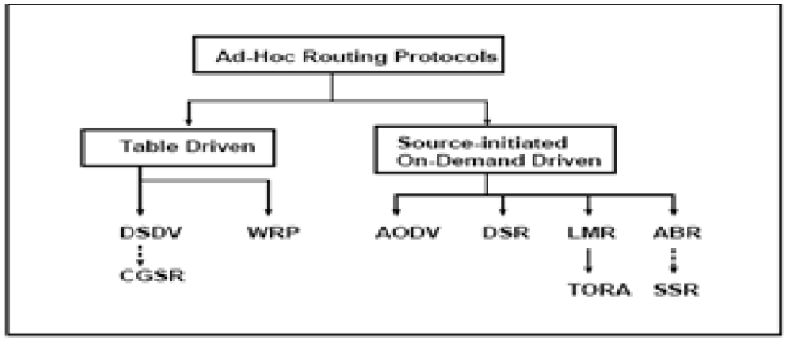


Figure 1: Categorization of Ad-Hoc Routing Protocols

Table-Driven Routing Protocols

Table-driven routing protocols attempt to maintain consistent up-to-date routing information from each node to every other node in the network. Here, table-driven DSDV routing protocol is described only.

Destination-Sequenced Distance-Vector (DSDV) Routing Protocol

DSDV is a table-driven algorithm based on the classical Bellman-Ford routing mechanism. Improvements made to this algorithm include freedom from loops in routing tables.

Characteristics

Each mobile node maintains routing table with no. of hops to each destination recorded. Each entry is marked with sequence no. assigned by destination node. Routing table updates are periodically transmitted throughout the network so as to maintain table consistency. Route updates employ two types of packets: full dump-that carries available routing information and multiple network protocol data units (NPDUs), and smaller incremental packets-used to relay the changed information since last full dump. New route broadcasts contain destination address, no. of hops to reach destination, sequence no. of information received regarding destination as well as new sequence no. unique to broadcast. Route labeled with most recent sequence no. is always used. Mobiles also keep track of settling time of routes, by delaying broadcast of routing update by length of settling time, mobiles can reduce new traffic and optimize routes by eliminating broadcasts that would occur if better route was discovered in near future[2].

Advantages

- Sequence numbers enable mobile nodes to distinguish stale routes from new ones.
- No more formation of routing loops.

Source-Initiated on-Demand Routing Protocols

This type of routing creates routes only when desired by the source node. When a route to a destination is required, a route discovery process is initiated by it within the network and the process is completed once a route is found or all possible route permutations have been analyzed. Once a route has been established, a route maintenance procedure maintains this route until either the destination becomes inaccessible along every path from the source or until the route is no longer desired. Here, AODV is described only.

Ad Hoc on-Demand Distance Vector (AODV) Routing Protocol

AODV protocol is built on DSDV algorithm and hence, is an improvement on DSDV because it typically minimizes no. of required broadcasts by creating routes on demand instead of maintaining a complete list of routes as in DSDV algorithm.

Characteristics

When a source node desires to send message to some destination node and does not have a valid route to that destination, it initiates path discovery process to locate other node. It broadcasts route request (RREQ) packet to its neighbors, and so on, until either destination or an intermediate node with "fresh enough" route to destination is located. AODV routing protocol utilizes destination sequence numbers to ensure all routes are loop-free and contain most recent route information. Each node maintains its own sequence no. as well as broadcast ID. The broadcast ID is incremented for every RREQ the node initiates, and together with node's IP address, uniquely identifies an RREQ.

The source node also includes in the RREQ the most recent sequence no. it has for destination. Intermediate nodes can reply to RREQ only if they have route to destination whose corresponding destination sequence no. is greater than or equal to that contained in the RREQ. During forwarding RREQ, intermediate nodes record address of neighbor in their route tables from which first copy of broadcast packet is received, and a reverse path is established. If additional copies of same RREQ are later received, these packets are discarded. Once RREQ reaches destination/intermediate node with fresh enough route, by unicasting; route reply (RREP) packet is responded back to neighbor from which it first received RREQ. As RREP is routed back along reverse path, nodes set up forward route entries along this path indicating active forward route in their route tables which point to the node from which RREP came. Associated with each route entry is a route timer which cause deletion of entry if it is not used within specified lifetime. Because RREP is forwarded along path established by RREQ, AODV only supports use of symmetric links.

Route Maintenance Procedure: If a source node moves, it re-initiates route discovery protocol to find new route to destination & a link failure notification message (an RREP with infinite metric) to each of its active upstream neighbors is propagated to inform them of erasure of that part of route. These nodes in turn propagate link failure notification to their upstream neighbors, and so on until source node is reached. If a route is still desired, the source node may reinitiate route discovery for that destination [4].

Advantages

- AODV enables dynamic, self-starting, multi-hop on-demand routing for mobile wireless ad-hoc networks.
- AODV manages to avoid stale routing information by means of destination sequence numbers.
- AODV discovers paths without source routing and maintains table instead of route cache.

- It is loop-free using destination sequence numbers and mobile nodes to respond to link breakages and changes in network topology in a timely manner.

COMPARISONS BETWEEN PROACTIVE AND REACTIVE PROTOCOLS

- Routing information is available when needed in reactive routing whereas routing information is always available regardless of need in proactive routing.
- Flat routing philosophy is used by reactive protocols whereas proactive protocols use flat routing philosophy & few use hierarchical.
- Periodic route updates are not required by reactive protocols whereas periodic route updates are needed by proactive protocols.
- Inform other nodes to achieve consistent routing table but also use localized route discovery by reactive protocols whereas proactive protocols inform other nodes to achieve consistent routing table.
- Signaling traffic generated grows with increasing mobility of active routes in reactive routing whereas signaling traffic generated in proactive routing is greater than that of reactive routing.
- In reactive routing, few protocols support QoS (Quality of Service) metric, although most support shortest path whereas in proactive routing, mainly shortest path is supported as QoS metric.

Table 1: Comparison of DSDV & AODV Routing Protocols

DSDV	AODV
Also called proactive or table-driven routing protocol.	Also called reactive or demand-driven routing protocol.
Routes are readily available in the network.	Routes are needed to be discovered on demand.
More network communication overhead is required[7].	Less network communication overhead is required.
Consumes more network resources.	Consumes less network resources.
Provides single path to destination.	Supports symmetric links only.
Bandwidth-inefficient protocol.	Bandwidth-efficient protocol.
Response time is small.	Response time is large.

Hence, after comparing the two routing protocols: DSDV & AODV, it is seen that AODV has better features than DSDV & works well [3]

CONCLUSIONS

In this article, we have studied about MANETs and routing protocols that are implied for efficient route discovery in order to deliver information from source to a proper destination. The classification of several routing schemes proposed for mobile ad-hoc wireless networks has been studied briefly. Two main categories: proactive and reactive are described briefly and some of their protocols have been compared. Each protocol has its own certain advantages and disadvantages and is well-suited for certain situations. Mobile ad hoc wireless networks are rapidly growing and changing, such networks will see widespread use within the next few years.

REFERENCES

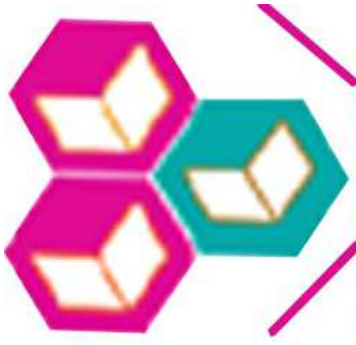
1. C. Sivaram & B.S. Manoj, *"Ad-hoc Wireless Networks: Architectures and Protocols"*, Pearson Education, 2004.
2. C.E. Perkins & P. Hhagwat, *"Highly Dynamic Destination Sequence Vector Routing(DSDV) for mobile computers"*, Computer Communication, 1994.

3. S. Corson & J. Macker, *"Mobile Ad hoc Networking (MANET): Routing Protocol Performance Issues & Evaluation Consideration"*, IETF WG Charter, http://www.ietf.org/html.charters/manet-charter.html, January 1994.
4. S. Das, C. Perkins & E. Royer, *"Ad hoc On Demand Distance Vector Routing (AODV)"*, IETF RFC 3561, July 2003.
5. Mehran Abolhasan, Eryk Dutkiewicz &Tadeusz Wysocki, *"A Review of Routing Protocols for Mobile Ad-hoc Networks"*, Elsevier 2003.
6. NS-2, The NS Manual (formally known as NS Documentation) available at http://www.isi.edu/nsnam/ns/doc.
7. C.Rama Krishna & Vasudha Arora, *"Performance Evaluation of Routing Protocols for MANETs under Different Traffic Conditions"*, Second International Conference on Computer Engineering & Technology [Volume 6], 2010.

AUTHOR'S DETAILS

Renu Dahiya received B.E. Electronics & Communication Engineering from Maharshi Dayanand University (MDU), Rohtak in September 2011. She is currently completing M.Tech in Electronics & Communication Engineering from MDU, Rohtak.

Prof. (Mrs.) Rakhi Khedikar received B.Tech & M.Tech Electronics & Communication Engineering with honors from Maharashtra & she is now teaching in Dronacharya College of Engineering, Gurgaon as an associate professor. She has authored a number of different journal & conference papers.


Best Journals
Knowledge to Wisdom
Submit your manucript at editor.bestjournals@gmail.com
Online Submission at http://www.bestjournals.in/submit_paper.php