EXPERIMENTAL EVALUATION OF LSPR ROUTING PROTOCOL

BY:

Outline

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Introduction - Overview of MANETs
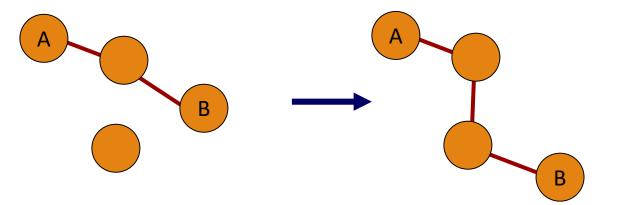
➢ MANET = Mobile Ad Hoc Network

➢ Mobile hosts with limited wireless communication ability

➢ No fixed Infrastructure (routers, switches, Access points)

➢ Multi-hop communication

➢ Each node = host + router

➢ Dynamic topology

Introduction - Routing Protocols

➤ "Routing is the process of establishing a path from one host (source) to the other host (destination) in a network."

➤ Routing in MANETs is a challenging task because of the dynamic topology.

➤ A **routing protocol** specifies how different hosts communicate with each other as well as the paths along which those hosts deliver data through a network

Introduction - Types of Routing protocols

❑ Topology Based Routing protocols

❑ Position Based routing protocols.

Introduction - Topology Based Routing Protocols

❑Uses information about available links (Topology) to

construct a path.

❑2 Types:
- ➢ Proactive Protocols (eg: DSDV)
  - ▪ Maintain routes to each and every host at all times.
  - ▪ Uses periodic updates.
- ➢ Reactive Protocols (eg: AODV, DSR)
  - ▪ Constructs route when needed.
  - ▪ Uses spontaneous flooding.

Introduction - Position Based Routing Protocols

❑ Each node determines its position using GPS or some other localization technique.

❑ Each node periodically updates its position to the Location Registrar (a designated node).

❑ Sender node obtains the current position of the destination from the Location Registrar.

❑ Data forwarding is done via nodes that are geographically located in the direction of the

destination node.

Literature Review (Topology Based Routing Protocols)

Protocols	Advantages	Disadvantages
Destination Sequence Distance Vector (DSDV) ■ Routing Protocols in Mobile Ad-hoc Networks[] Krishna Gorantala (2006)	■ Path Selection: DSDV maintains only the best path instead of maintaining multiple paths to every destination. With this, the amount of space in routing table is reduced.	■ It is difficult to maintain the routing table's advertisement for larger network.
Ad-hoc On-demand Distance Vector (AODV) ■ Demand-driven Routing Protocol for MANET[] ■ AODV is a packet routing protocol designed for use in mobile ad hoc networks (MANET) Clausen, Ed (2003)	■ Source, destination and next hop are addressed using IP addressing ■ Each node maintains a routing table that contains information about reaching destination nodes ■ AODV is loop free, self-starting, and scale the large number of nodes.	■ High Network routing load when any link breakage occurs. ■ AODV takes long time to build the routing table.
Location Aided Routing (LAR) ■ Performance Analysis of FSR, LAR and ZRP Routing Protocols in MANET. [] Sumaiya Thaseen (2012)	■ LAR outperforms other protocols in general for all the scenarios due to reduced routing overhead.	■ Throughput of LAR is higher at start but it falls as the node density increases.

Literature Review (Position Based Routing Protocols)

Protocols	Advantages	Disadvantages
<u>Location Server Assisted Routing Protocol (LSAR)</u> ▪ Hybrid: Position-based cum Topology-based reactive protocol Aijaz Ali Chhachhar, MS Thesis, (Dec 2015) ▪ Protocol is a reactive protocol which utilizes Geographical data to locate the briefest way between the nodes.	▪ Rather than direct flooding, this convention send information bundles through connections subsequently having the highlight of topology based convention. ▪ LSAR convention is reactive in nature that is root gesture will make the course just when required.	▪ It sends Root Announcement message to all nodes irregularly and all nodes upgrade their directions once they get the message. This all progresses are overhauled at root node and it takes much time.

Research Gap

❑ Topology-Based routing protocols cannot discriminate between two alternatives :

  ❑ A node that is about to go beyond range, leaving a broken link.

  ❑ A node that is closer and carries a lesser risk of broken link.

❑ Location based routing protocols are greedy in nature and often stuck into local maxima.

❑ Limitations of Previous Location based Routing protocols:

  ❑ Significant amount of communication required to setup a route

  ❑ Location registrar becomes the bottle neck.

  ❑ Hard to detect and fix broken links.

Objectives

❑ To Design the Location server based proactive routing protocol (LSPR) that will :

 ▪ Overcome the shortcomings of existing routing protocols.

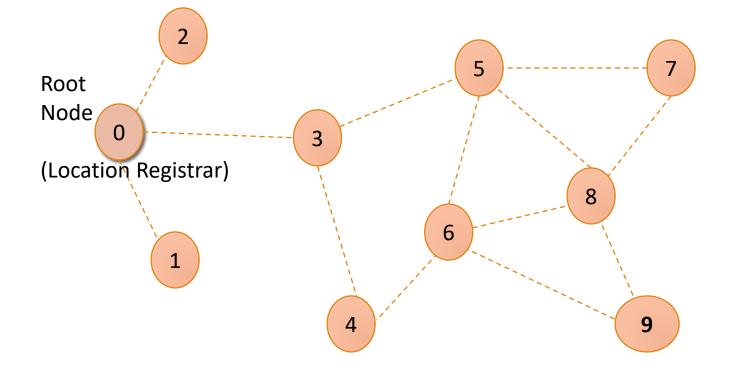 ▪ Utilize Location as well as topology information.

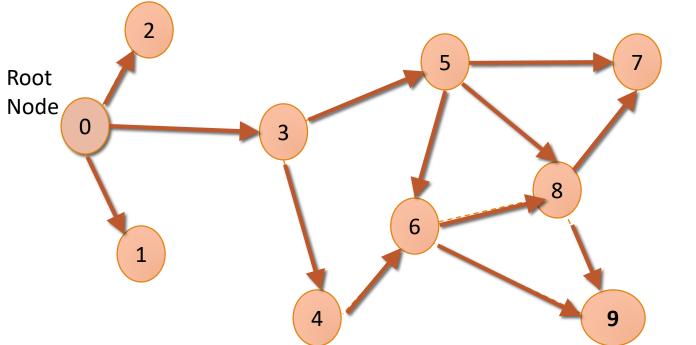❑ To implement the protocol in NS2 simulator for study.

Scope
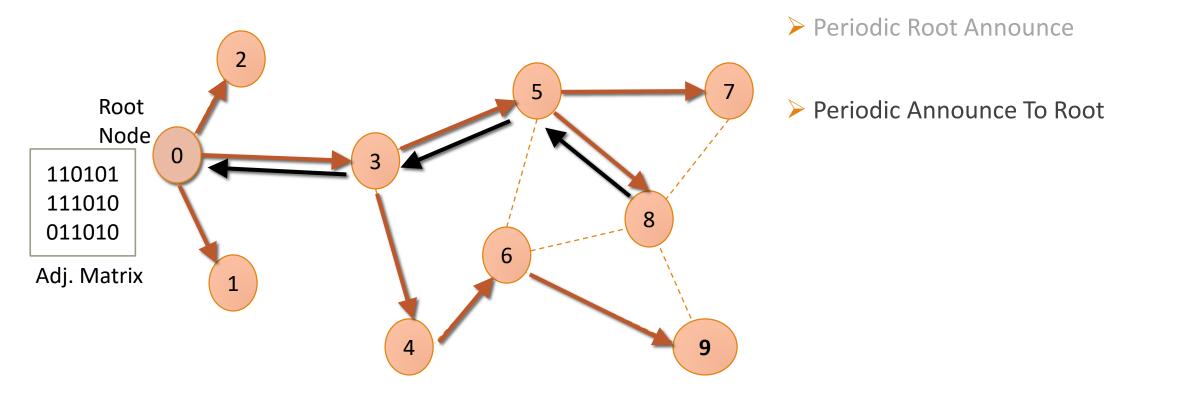
The scope of this research is limited to the following:
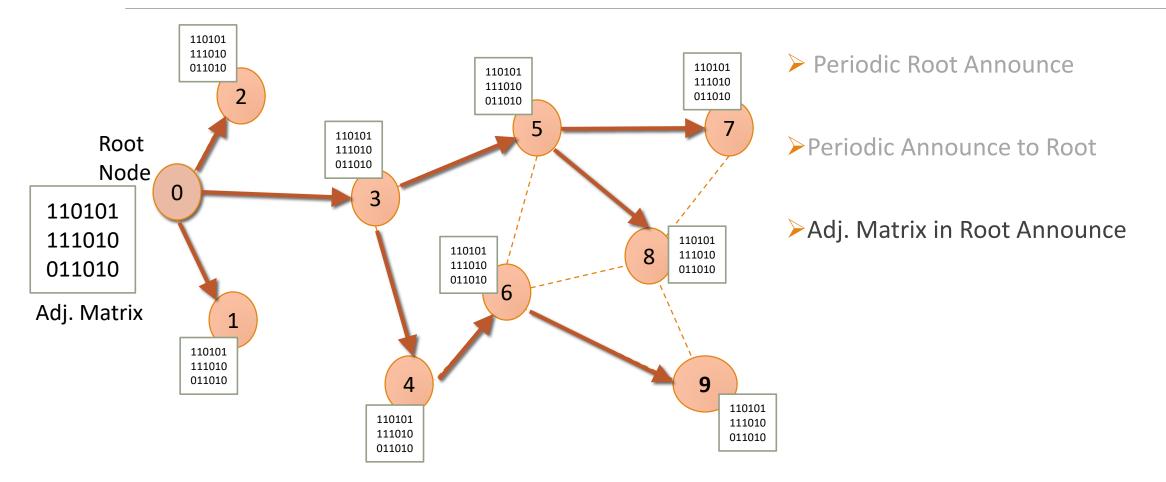
- Implementation of LSPR in NS2 simulator.

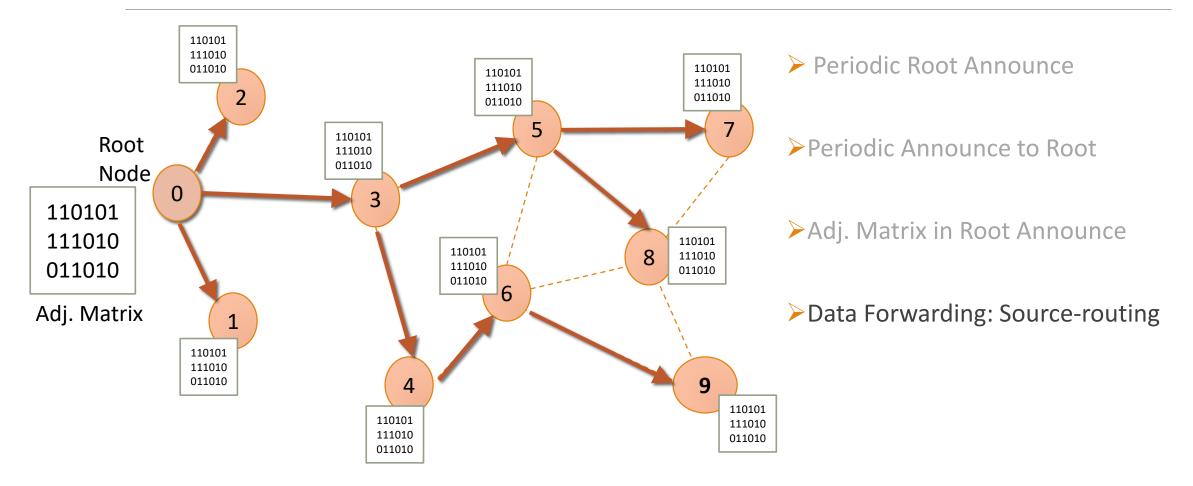- Performance comparison of LSPR with AODV, DSDV, LAR and LSAR protocol.

LSPR: The Proposed Protocol

LSPR: The Proposed Protocol

➢ Periodic Root Announce

LSPR: The Proposed Protocol

Periodic Root Announce

Periodic Announce To Root

Root Node

110101
111010
011010

Adj. Matrix

LSPR: The Proposed Protocol

LSPR: The Proposed Protocol

➢ Periodic Root Announce

➢ Periodic Announce to Root

➢ Adj. Matrix in Root Announce

➢ Data Forwarding: Source-routing

Research Methodology

➢Details of the new LSPR protocol described.

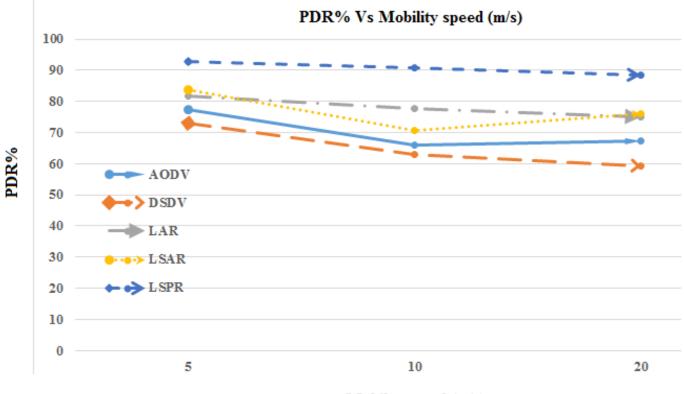➢Implementation of new protocol in ns-2 simulator for performance evaluation

➢Four Ad Hoc routing protocols AODV, DSDV, LAR and LSAR are compared with LSPR protocol.
   ➢Random Mobility Scenarios are Generated.
   ➢3 Mobility speeds: 5 m/s , 10 m/s , and 20 m/s.

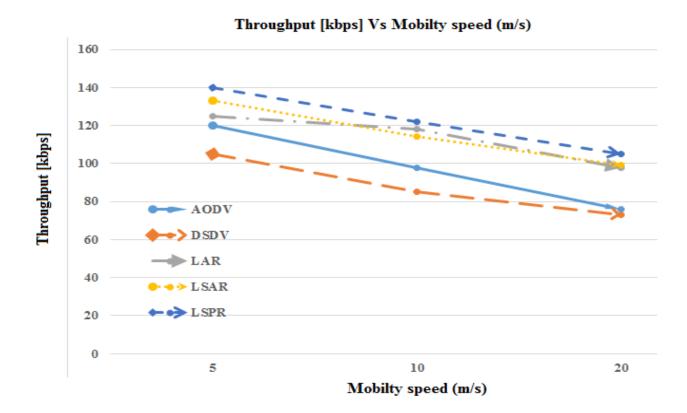➢Three Quality of Service Parameters are used as performance metrics:
   ◦ Packet Delivery Ratio (PDR).
   ◦ Average Throughput.
   ◦ Normalized routing load (NRL).

Results – Packet Delivery Ratio
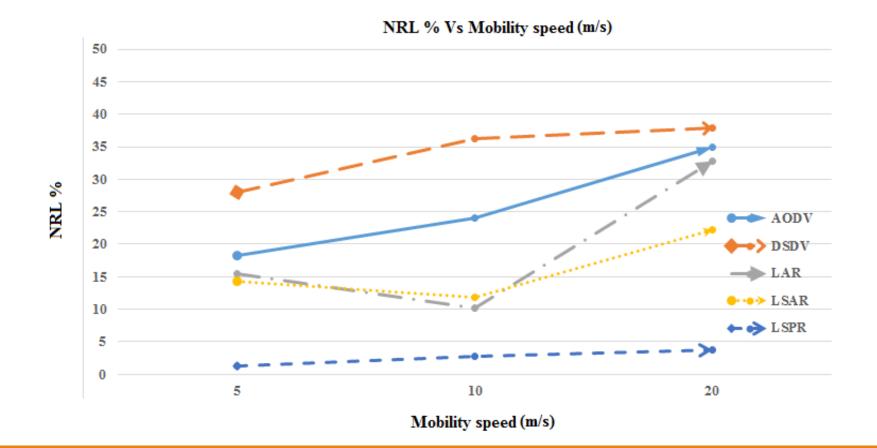
Results – Throughput

Throughput [kbps] Vs Mobilty speed (m/s)

Results – NRL

NRL % Vs Mobility speed (m/s)

Conclusion

Location Server based Proactive Routing (LSPR) protocol provides a unique combination of both topology-based and position-based routing strategies. The LSPR forms paths of topology data separated the geographical location data of the nodes. It ignores all the weak connections by confirming that each pair of communicating nodes is at least two-thirds transmission-range apart. In this study, we have attempted to provide more support and evidence that our LSPR protocol is indeed a better choice for routing in MANETs. We hereby compared the performance of LSPR protocol with AODV, DSDV, LAR, and LSAR routing protocols under varying mobility. The mobility does not affect the performance of LSPR, LSPR performances best in all quality of service parameters. This is a helpful sign or we are able to address so LSPR beats AODV, DSDV LAR, and LSAR into nearly every aspect.

Thanks