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Smart Milk Delivery

Nallakaruppan M K[1]
School of Information Technology and Engg,
VITUniversity, Vellore-632014
Tamil Nadu, India.

Chandrasegar.T[2]
School of Information Technology and Engg,
VITUniversity, Vellore-632014
Tamil Nadu, India.

Rajesh.E[3]
C.K.College of Engg and Technology,
Anna University Cuddalore-607003
Tamil Nadu, India.

Abstract: Milk delivery system is facing major challenges in the areas of storage and delivery of milk. The milk is a substance that gets dehydrated with increasing temperature and the presence of lactic acid which generates chemical imbalance to the milk as time increases. This urges the need for a system which provides the automatic routing and detection of the nearest storage point. The previous work [1] proposed root discovery with LTL (Linear Temporal Logic) logic for model checking. The proposed work not only detects the shortest path but also identifies the nearest storage location.

Keywords: WSN, RWP, AODV, DSV, RREQ, RREP.

I.Introduction

Routing Techniques

Routing is a technique of selecting the shortest path in a network among the network traffics. Routing technique is used in various networks. Such as telephone networks are used to perform circuit switching, transportation networks and electronic data networks (internet) are using the packet switching technology. In packet switching technology, routing sends packet forwarding the logical addressed packets from the source to destination through the intermediate nodes. The intermediate nodes are network hardware devices such as routers, gateways, firewalls or switches and bridges. The routing forwards the packets on the basis of routing table. The routing table maintains the records of various destination routes. The routers have a memory of the constructed routing table.

Dijkstra's Algorithm

It is used to find the minimum length path from one node to any other node. In this algorithm a weighted graph is used and the algorithm finds the shortest path in the graph from any two given nodes. It has the advantage of finding the shortest path to all permanently labeled nodes. For each step a new diagram is not necessary. But the disadvantage of this algorithm is blindly searches all nodes to find the shortest path which is time consuming and wastes a lot of resources which is a major drawback. Negative edges are not allowed in dijiktra's algorithm.

Prim's algorithm

This algorithm uses a minimum spanning tree. Initially any one node is taken to be the first node from its minimum spanning tree T. Take the arcs currently in T connected by the nodes outside of T. Add the minimum weight arc to T. Repeat this until all nodes are in T. The advantage of prim's to be simple but the disadvantage of prim's is that if the number of nodes in the graph is more than the time taken to find the smallest weight arc is more which makes it slow.

Kruskal's algorithm

In this algorithm the node with least weight from the graph is chosen and to this node the next minimum weight node is added such that it does not form a cycle. These steps are repeated until n-1 nodes are added to the graph. It has the advantage to find the minimum weight is simple. But it is difficult to decide whether the added node forms a cycle if the graph has large number of nodes therefore making it slow.

II.Existing System

The existing system is constructed with automated routing with route discovery using shortest path identification with the help of model checking algorithm which is generated on the basis of LTL (Linear Temporal Logic). This logic determines whether the model constructed has the ability to correctly guide the routes for identifying the nearest delivery locations through the shortest path of service [1]. The proposed system not only deals with routing but also deals with nearest storage location.

III.Proposed System

Random Waypoint model

Random Waypoint model is the model used for mobility of the users and detects how their velocity, distance and acceleration change over the time. Hence it is the most suited for detecting the object under movement and it is the model which is used in our work .This model detects the vehicle under movement and makes the vehicle to communicate with the transceiver and in turn the transceiver processes the route request and detects the nearest storage location. Random way point model is not only used for detecting mobile nodes but also used for evaluating the performance of the Mobile Adhoc Network routing protocol as a benchmarking model.

Ad-hoc on demand Distance Vector (AODV) Routing protocol

In this protocol there is no difference between routers and end nodes, As no setup is required as There is a common application where mobile hosts communicate only with subset within range at given time with any other node. In these paper we discuss about the Mobile Ad-hoc routing protocol (MANET) which is , Ad-hoc on demand distance vector routing protocol which is a hop-by-hop routing protocol. It's an on demand protocol. The existing system for milk delivery was built with shortest path dijkstra's or prim's algorithm with model checking done by Linear Temporal Logic (LTL) [1]. But with the added advantage of routing on demand ad-hoc based AODV seems to be the most prepared protocol as route discovering is done only it is needed. Route discovery is undertaken whenever a node needs a "next hop" to forward a packet to a destination and route maintenance is used when link breaks, rendering next hop unusable. Compare to all previously used protocols this routing protocol is easy and very efficient under the random waypoint model.

There are two operations with AODV protocol, one is Route Discovery and other one is route request. **Route request**

It is done when source broadcasts route request (RREQ) message for specified destination. The Intermediate node is a node which forwards (broadcasts) message toward destination and creates next-hop entry for reverse path to source, to use when sending reply.

Route Reply

In this, destination unicasts route reply (RREP) message to source and RREP contains, sequence number, hop-count field (initialized to 0). Route Reply will be sent to the "reverse" path hops created by intermediate nodes which forward RREQ. As RREP is received and forwards along with the reverse path and increments hop-count field in RREP and forwards it . It selects the source with lowest hop count.

Route Maintenance

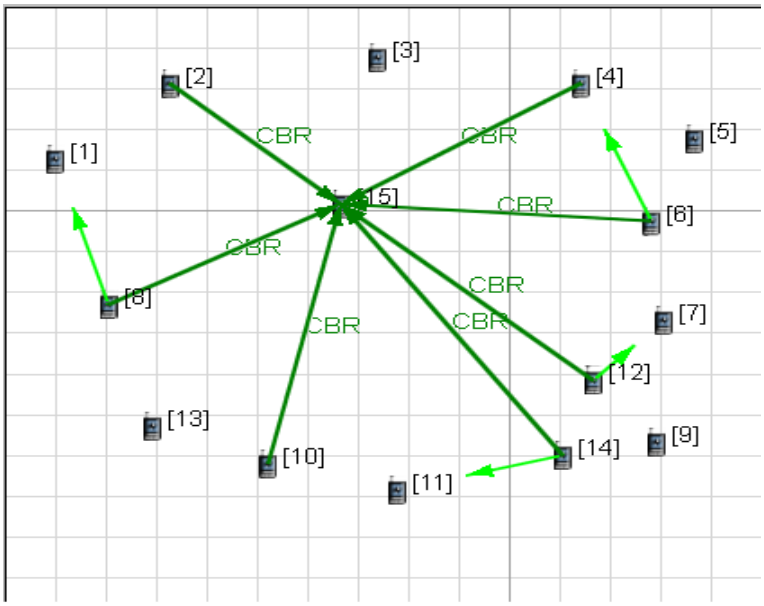
This is done when link breakage occurs and detected by link-layer acknowledgement (ACK), "passive ACK", and AODV "hello" messages. It performs local repair by sending RREQ to destination from intermediate node Route-error (RERR) messages are generated and pre-cursors that recently sent packets which was forwarded over broken link.

IV.Algorithm

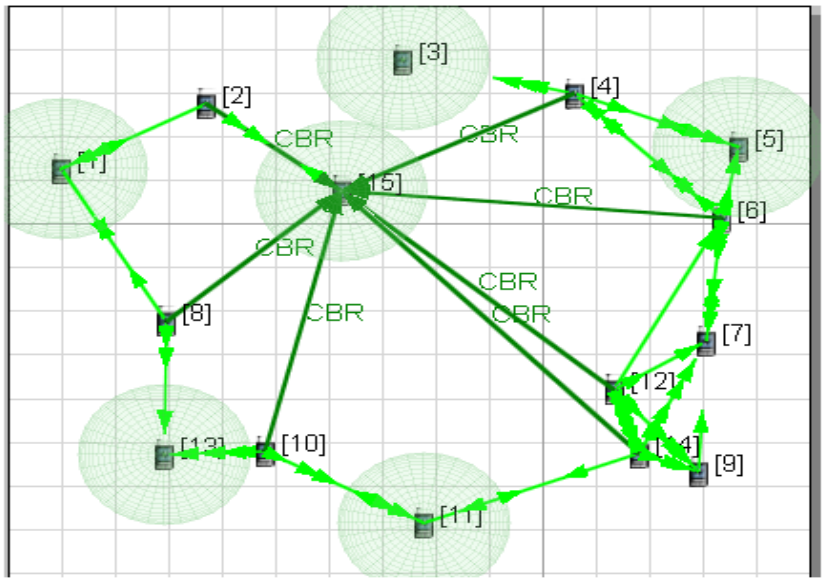
Step 1: Route Discovery is initiated for 'n' routes
Step 2: 'n' routes contain 'm' number of Transceivers for carrying out the route request
Step3: Route request is initiated by vehicle 'x' on transceiver 'm'
Step 4: Route request is forwarded to the centralized router 'i'
Step 5: Nearest storage location 'j' is detected by the transceiver 'm' and reported to the vehicle 'x'
Step 6: Milk is delivered to the location 'j'.

V.Implementation

Simulation Time	300 seconds
Routing Protocol	AODV
Internet protocol	IPV4
Mobility Model	Random waypoint
Node Interaction	CBR
Start Time	1second
End	15 seconds
Total Number Of Nodes	15



(a) Detection of nearest mobile nodes for delivering the milk



(b) Interaction with nearest neighbourhood node detection in Random way point model

VI.Advantages And Improvements

We make use of random waypoint mobility model which identifies the sensor node in vehicular nodes under transportation and this model is prove to be more suitable for automated delivery system rather than other delivery system. In random waypoint mobility model the nodes reconfigure themselves based on the routing request of the traveling node which allows the vehicle to be sensed during the entire span of travel. Route data is updated on a central remote server as the vehicle is diverted towards the shortest routes. The proposed system we use route discovery and nearest storage location discovery using AODV protocol.

VII.Conclusion

Compared to all generic routing methods AODV has the advantages for Milk Delivery System. As the vehicles that carry the milk are available at ad-hoc locations and discovering them, maintaining the traffic data and automatic forwarding of vehicles can only be possible with AODV. This is what is implemented in the paper.

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