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Protected Way of Routing by Using On Demand MDR Algorithm in WSN

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Abstract - To handle routing challenge, I propose a peer-to-peer (P2P)-based on demand Market-guided Distributed routing mechanism (ODMDR). The advantage of ODMDR is to organize highly efficient data routing. ODMDR protocols were designed to overcome the wasted effort in maintaining unused routes. Routing information is acquired only when there is demand. The required routes are calculated on demand. This overcome disadvantages of idle routes at each node, the latency for communicating data packets will considerably increase. Finally, ODMDR routing technique provide efficient and reliable routing for high throughput. Simulation results show that ODMDR provides hybrid routing schemes in achieving high throughput.

Keywords- MANET, Base Stations (BSes), ODMDR, peer-to-peer (P2P).

I. INTRODUCTION

Hybrid wireless network that combines a mobile ad-hoc network and an infrastructure network, efficient and reliable data routing is important for high throughput. Existing routing schemes that simply combine ad-hoc and infrastructure routings inherit the drawbacks of ad-hoc routing including congestion and high overhead for route discovery and maintenance. Although current reputation systems help increase routing reliability, they rely on local information exchanges between nodes to evaluate node reputations, so they are not sufficiently effective and efficient. A challenge here is if we can coordinately develop an efficient routing algorithm and effective cooperation incentives for reliable routing. To handle this challenge, this paper presents a peer-to- peer (P2P)-based Market- guided On Demand Distributed Routing mechanism (ODMDR). ODMDR takes advantage of widespread base stations to coordinately realize highly efficient data routing, and effective reputation management and trading market management for reliable data routing. The packets from a source node are distributive transmitted to base stations directly or indirectly, and then they are transmitted to the destination. The base stations form a P2P structure for reputation collection and querying to avoid local information exchanges, and for managing the service transactions between nodes in the trading market. By leveraging the single-relay transmission feature, base stations can monitor the actual transmitted packets of relay nodes to more accurately and efficiently evaluate their reputations and execute trading market management, as well as detect falsely reported reputation information. I further propose market-based policies to strengthen cooperation incentives. Simulation results show that ODMDR outperforms the traditional hybrid routing schemes and reputation systems in achieving high throughput. pecifically, ODMDR consists of a locality-aware P2P-based infrastructure (LP2P), a distributed routing algorithm (DRA), an efficient and accurate reputation management system (EARM), and a trading market model (TMM).

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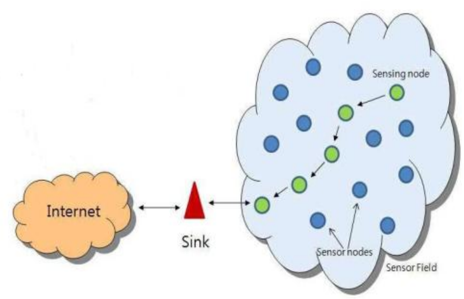

Fig. 1.1 shows a high-level architecture of ODMDR.

LP2P supports the efficient operations of EARM, TMM and DRA. To avoid selfish nodes, a routing algorithm can choose high-reputed nodes as relay nodes by using reputation systems. In most current reputation systems, each node locally evaluates other nodes' reputation values based on reputation information exchanged between neighbors. This frequent information exchange generates high overhead and reputation evaluation based on local partial information (i.e., partial forwarding activities of a node) may result in an insufficiently accurate reputation value. Calculating a node's reputation based on all reputation information on this node (i.e., all forwarding activities of this node) can more accurately reflect the node's cooperative behavior. Furthermore, the reputation systems cannot avoid falsely reported reputation information and cannot effectively provide incentives for cooperation. To increase the throughput of hybrid networks through highly efficient and reliable routing, a challenge here is if it can take advantage of the widespread BSes to coordinately develop an efficient routing algorithm and effective cooperation incentives for reliable routing; the routing algorithm facilitates the implementation of the cooperation incentives to

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overcome aforementioned drawbacks. To handle this challenge, we propose a peer-to-peer (P2P)-based Market-guided Distributed Routing mechanism (ODMDR). ODMDR takes advantage of widely-scattered BSes to facilitate highly efficient single relay distributed data routing, in which the segments of a message are transmitted directly or indirectly to BSes in a distributed manner through multiple relay nodes. The remainder of this architecture is organized as follows. Section 2 details the protocols components. Section 3 briefly discusses our strategies to handle route that exploit the vulnerabilities of ODMDR to gain unfair benefits.

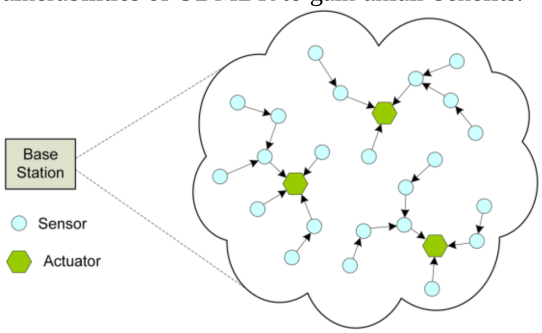

Fig 1.2 ODMDR in Hybrid wireless network

On Demand Dynamic source routing protocol (ODMDR): is an on-demand protocol designed to restrict the bandwidth consumed by control packets in ad hoc wireless networks by eliminating the periodic table-update messages required in the table-driven approach. The basic approach of this during the route construction phase is to establish a route by flooding Route Request packets in the network. The destination node, on receiving a Route Request packet, responds by sending a Route Reply packet back to the source, which carries the route traversed by the Route Request packet received. Each Route Request carries a sequence number generated by the source node and the path it has traversed.. Thus, all nodes except the destination forward a Route Request packet during the route construction phase. A destination node, after receiving the first Route Request packet, replies to the source node through the reverse path the Route Request packet had traversed. Nodes can also learn about the neighboring routes traversed by data packets if operated in the promiscuous mode (the mode of operation in which a node can receive the packets that are neither broadcast nor addressed to itself). This route cache is also used during the route construction phase.

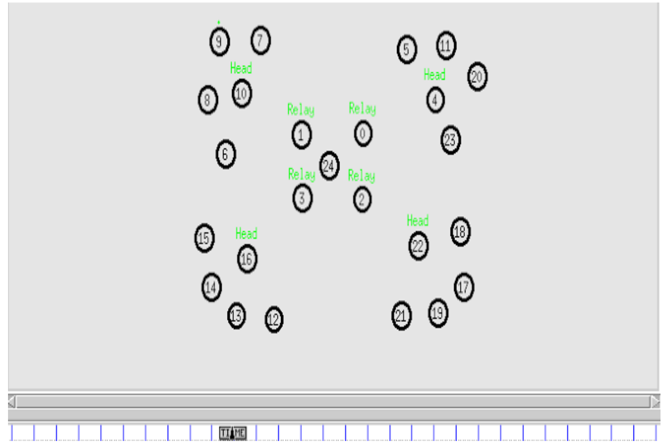

Fig 1.3 Actual Node Deployment

DISADVANTAGES

1. Packet Loss
2. Consumes More Energy
3. Efficiency of Routing will be less.

2. PROPOSED METHOD

1.The source node sends these segments to different capable neighbors selected in a distributed manner. Source node first broadcasts a request with the segment length. Its neighbors with sufficient capacity for the forwarding reply to the cause node. The source node relies on EARM and TMM for reliable and cooperative relay node selections then sends the segment to the selected relay selection.
2. The relay nodes carry the segments and send the segments to BSes when they enter their coverage areas.
3. BSes then forward the segments to the BS where the destination resides. To locate the destination BS, DTR takes advantage of LP2P for destination tracking.
4. The BS where the destination resides forwards the segments of a message to the destination node, and the destination reassembles the message.

ADVANTAGES

1. No Packet Loss
2. Less Energy
3. High Security
4. Efficient Routing

The proposed routing :
Protocol ODMDR consists of greedy mode and void processing mode. In ODMDR, greedy algorithm is adopted to select relay node in greedy mode. If greedy mode fails when a routing void is encountered, void processing mode is activated. Void processing mode is composed of three phases, according to processing in the order, respectively void detecting, virtual coordinate mapping and void region dividing. After the implement of void processing mode, the virtual coordinates of edge nodes are established. Then greedy mode is reactivated, these edge nodes that have the virtual coordinates can be selected as the relay node by greedy algorithm. In the following section, three main phases

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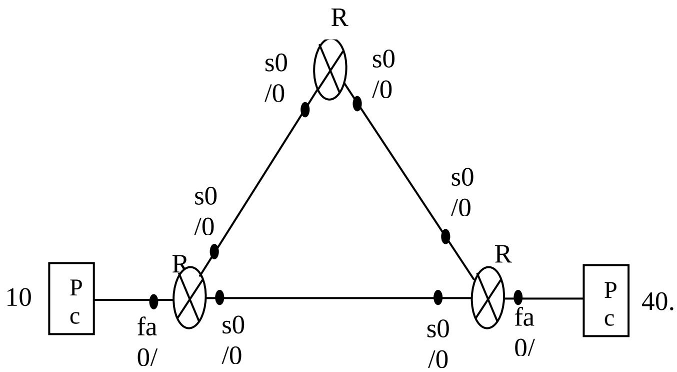
in void processing mode and the main steps of entire process in ODMDR are depicted Network Simulator (NS2) is a discrete event driven simulator developed at UC Berkeley.

3. DISTANCE VECTOR ROUTING ALGORITHMS



Router Table

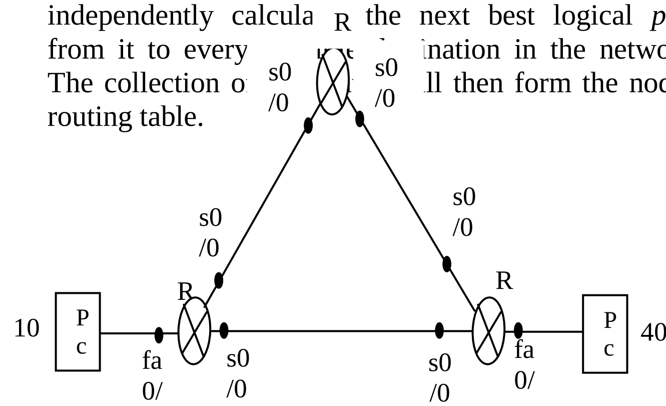
Route 0		**Route 2**		**Route 3**	
Interface	**Ip add**	**Interface**	**Ip add**	**Interface**	**Ip add**
fa0	**10.0.0.2**	**s0**	**20.0.0.2**	**fa0**	**40.0.0.1**
s0	**20.0.0.1**	**s1**	**30.0.0.1**	**s0**	**30.0.0.2**
s1	**50.0.0.2**			**s1**	**50.0.0.1**
Pc0	**10.0.0.1**			**Pc1**	**40.0.0.2**

under dynamic routing algorithm. This algorithm operates by having each route maintains a table giving the least known distance to reach destination and include line in used to get these. These are updated by changing information with neighbour. This is called “Bell mann ford algorithm” and “fod fick” algorithm.

A distance-vector routing protocol is one of the two major classes of routing protocols, the other major class being the link-state protocol. A distance-vector routing protocol requires that a router informs its neighbors of topology changes periodically. Compared to link-state protocols, which require a router to inform all the nodes in a network of topology changes, distance-vector routing protocols have less computational complexity and message overhead.

4. LINK STATE ROUTING:

The basic concept of link-state routing is that every node constructs a *map* of the connectivity to the network, in the form of a graph, showing which nodes are connected to which other nodes. Each node then independently calcula the next best logical *path* from it to every ination in the network. The collection o ll then form the node's routing table.



Router Table :

Route 0		**Route 2**		**Route 3**	
Interface	**Ip add**	**Interface**	**Ip add**	**Interface**	**Ip add**
fa0	**10.0.0.2**	**s0**	**20.0.0.2**	**fa0**	**40.0.0.1**
s0	**20.0.0.1**	**s1**	**30.0.0.1**	**s0**	**30.0.0.2**
s1	**50.0.0.2**			**s1**	**50.0.0.1**
Pc0	**10.0.0.1**			**Pc1**	**40.0.0.2**

5. Implementation procedures

The implementation phase is less creative than system design. A system project may be dropped at any time prior to implementation, although it becomes more difficult when it goes to the design phase.

The final report to the implementation phase includes procedural flowcharts, record layouts, report layouts, and a workable plan for implementing the candidate system design into an operational one. Conversion is one aspect of implementation.

Several procedures of documents are unique to the conversion phase. It include the following,

- The conversion portion of the implementation plan is finalized and approved.
- Files are converted to proper format.

- Parallel processing between the existing and the new system are logged on a special form.

- Assuming no problems, parallel processing is discontinued. Implementation results are documented for reference.
- Conversion is completed. Plans for the post-implementation review are prepared. Following the review, the new system is officially operational.

Implementation Steps

Step I: Neighbor Discovery

In this step, all nodes in the network learn their tier numbers, their neighbor IDs, and their neighbors' remaining energy levels. Initially, the sink broadcasts a message with Tier Number field equal to 0. The nodes receiving this packet set their tier number value to 1. Then, these nodes broadcast a packet including the fields with the Tier Number field set to 1. Nodes receiving packets with Tier Number 1, set their tier numbers to 2. This way, the sink has Tier Number equal to 0, the one-hop neighbors of the sink have Tier Number equal to 1, and so on. To generalize, nodes receiving a broadcast packet with value Tier Number set their tier number value to Tier Number + 1 and after waiting for a certain time enough to receive the broadcast messages from all its neighbors from lower tier numbers, they broadcast their own message containing. When nodes receive broadcast messages from nodes with equal or higher tiers, they do not modify their tier number value but store the information about their neighbors (Node ID, Residual Energy and Tier Number).

Step II : Scheduling Tier 1 Nodes

After each node discovers its local neighborhood, UDASSA continues with the next step in which the sink decides which nodes from tier 1 will be operating by solving an integer linear program called ILPSink. Greatly enhances performance as compared to a random or other nonfeedback based method when there is no location information. Also, the sink not only chooses a balanced structure but also chooses the active nodes from tier 1 which have the largest remaining energy. Since this procedure is applied at each round, the algorithm provides balanced energy consumption for tier 1 nodes. Recall that the sink was assumed to have abundant energy resources and high computational capabilities. Thus, using the sink in such a process is reasonable.

Step III: Scheduling Intermediate Nodes

In the third step of the algorithm, nodes from tier 1 which were decided to be active in the previous step choose which nodes will be active from the next tier, i.e., tier 2, depending on the residual energy levels of these nodes. Every node in tier 1 broadcasts the node ID of its neighbor with the highest remaining energy.

In small scale networks, only the node with the greatest remaining energy is selected whereas in larger networks, the first two or more nodes with the highest energies are selected to be active (recall that the energy information of the neighbor nodes was retrieved in the first step of the algorithm). This number is represented by the parameter Number of Selected Descendants (NSD) in the algorithm. Nodes from higher tier numbers than 1 can also schedule nodes from their subsequent tiers to sleep or not to sleep. A parameter named Adaptive Scheduling Depth (ASD) is used to determine how further this process will continue. The nodes with tier number less than or equal to ASD schedule their neighbors from the next tier depending on the energies of these neighbors. In some network configurations, employing this structure only in the first tier gives good results whereas in some network configurations, employing this structure up to the last tier gives better results. Nodes with tier number up to ASD transmit a packet to their subsequent tier with the structure. Nodes in tier number ASD + 1, which are the last nodes which this scheduling mechanism goes up to, broadcast a packet if they will be active to the next tier since these nodes will not determine their subsequent tier's sleep schedule. This packet only contains the node ID of the node transmitting it. The nodes with tier number ASD + 2 will understand that the node with that node ID will not sleep from this broadcast message. The nodes which decide to sleep do not transmit such a packet.

Schedules nodes with high residual energies must to be active at each round. In this way the energy consumption among nodes is balanced. For example, assume that are at the beginning of the network operation. The energies of the active nodes will become lower than the energies of their neighbors which are scheduled to sleep. Thus, in the next round, one of the neighbors which were sleeping in the previous round will be selected to be active since its energy will be higher. Thus, the active role will be rotated among the nodes and the energies of the nodes will be consumed in a balanced manner.

Step IV: Scheduling Far Away Nodes

In the last step of scheduling, nodes with tier numbers greater than or equal to ASD + 2 randomly decide whether to sleep or not to sleep. They generate a random number uniformly distributed in the interval [0; 1] and then compare this number with ps. If the number is less than ps, they sleep, otherwise, they decide to operate. After making a decision, the non-sleeping nodes broadcast a packet containing their node IDs. Nodes from higher tier numbers use this information in the network layer to route packets to non-sleeping nodes.

Step V: Transmitting and Forwarding Data

After each node decides its activity state, it forwards its data and its neighbors' data according to a simple routing procedure which will be explained next. Nodes forward their data to their neighbors from the previous tier which has the highest remaining energy. In addition to the other steps in which nodes with higher remaining energies are scheduled to be active, this step ensures that nodes with the maximum energies have higher loads. So, apply a two-fold energy balancing scheme; both in scheduling and in routing.

Step VI. Maintenance

The objectives of this maintenance work are to make sure that the system gets into work all time without any bug. Provision must be for environmental changes which may affect the computer or software system. This is called the maintenance of the system. Nowadays there is the rapid change in the software world.

Due to this rapid change, the system should be capable of adapting these changes. In our project the process can be added without affecting other parts of the system. Maintenance plays a vital role. The system is liable to accept any modification after its implementation. This system has been designed to favor all new changes. Doing this will not affect the system's performance or its accuracy.

6.Conclusion

In order to gain some insight into the problem, a theoretical analysis on the number of nodes that should be deployed for various coverage levels without considering connectivity is presented. Furthermore, the minimum number of sensors that should be deployed in order to satisfy a given partial coverage target with a certain probability while maintaining connectivity is computed and an UDG formulation is presented for finding the minimum number of sensors that should be activated within the set of deployed sensors. The main objective of ODMDR is to find the minimum set of nodes which can satisfy the desired coverage without using any location information and only using local information. The Geographical Perimeter Stateless Routing (GPSR) with Unit Disk graph as the connectivity model which enables the nodes to randomly choose the neighboring node to transmit messages when the network is under high mobility, along with the mobility model and an objective of reducing the power consumption by the entire network. The simulation result shows that the performance has increased while using the above protocol and the mobility model, the network can achieve better performance even when the network is under high frequency mobility.

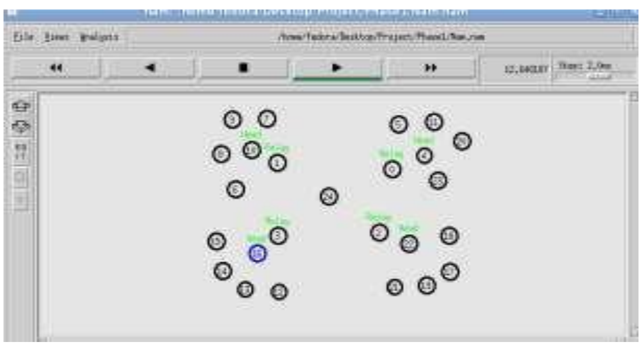


Fig 4.1 shows node dispatch

7.Future Work

Future work involves several refinements and extensions of the above work, as well as validation of the analytical results by more comprehensive simulations where the simplifying assumptions employed in the analysis are relaxed and more realistic channel models are considered. In particular, issues which should be considered are the development of a semi- Markov model for UDASSA, the consideration of various other metrics, the coupling of the energy-latency analysis with the multihop scenario, and the effect of different traffic models, e.g., when packets are generated in bursts or by nodes which are in the same geographical area.

Environmental Setup

Network simulator 2 is used to simulate ODMDR. NS2 provides lot of features that can be modified and extended.
Network simulator (NS) is a preferable for networking research. NS2 provides substantial support for simulation of routing and multicast protocols over hybrid networks. The simulator is a result of an ongoing effort of research and developed. Even though there is a considerable confidence in NS, it is not a polished product yet and bugs are being discovered and corrected

PC	**PC**
Default: **Tracing route to 40.0.0.2 over a maximum of 30 hops:** **1 31 ms 31 ms 31 ms 10.0.0.2** **2 62 ms 62 ms 62 ms 50.0.0.1** **3 66 ms 78 ms 94 ms 40.0.0.2** **Trace complete.**	**Default:** **Tracing route to 10.0.0.1 over a maximum of 30 hops:** **1 31 ms 32 ms 16 ms 40.0.0.1** **2 63 ms 47 ms 63 ms 50.0.0.2** **3 79 ms 93 ms 93 ms 10.0.0.1** **Trace complete.**
When path2 cost changed to 200: **Tracing route to 40.0.0.2 over a maximum of 30 hops:** **1 47 ms 31 ms 31 ms 10.0.0.2** **2 62 ms 62 ms 62 ms 20.0.0.2** **3 94 ms 93 ms 93 ms 30.0.0.2** **4 125 ms 125 ms 125 ms 40.0.0.2** **Trace complete.**	**When path2 cost changed to 200:** **Tracing route to 10.0.0.1 over a maximum of 30 hops:** **1 17 ms 31 ms 31 ms 40.0.0.1** **2 63 ms 63 ms 63 ms 30.0.0.1** **3 66 ms 94 ms 78 ms 20.0.0.1** **4 125 ms 112 ms 125 ms 10.0.0.1** **Trace complete.**

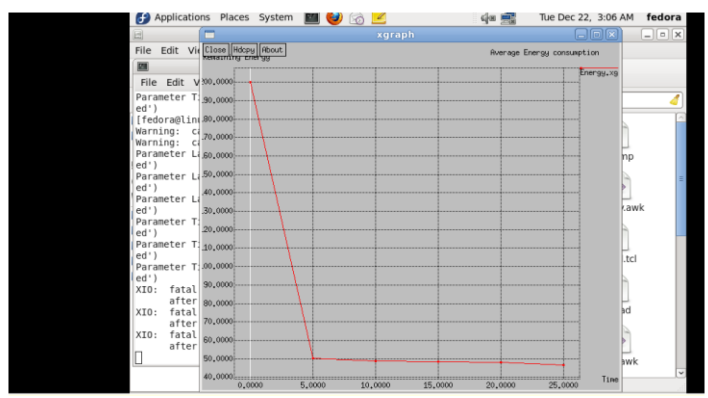


Fig4.2Throughput of ODMDR

fig 4.2 shows that the overhead rate of Hybrid is much higher than that of ODMDR. In addition, the overhead rate of ODMDR remains nearly the same whereas that of Hybrid increases sharply as the number of source nodes grows.

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