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Novel Approach for Routing in Vanet by Network Connectivity with Meta Heuristic

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Abstract— . ***A popular example of opportunistic routing is the "delay tolerant" forwarding to vanet network when a direct path to destination does not exist. The evaluation of this work is twofold. We implemented two prototypes on off -the-shelf hardware to show the technical feasibility of our opportunistic network concepts. Also, the prototypes were used to carry out a number of runtime measurements. Then, we developed a novel two-step simulation method for opportunistic data dissemination. The simulation combines real world user traces with artificial user mobility models, in order to model user movements more realistically. We investigate our opportunistic data dissemination process under various settings, including different communication ranges and user behavior pattern in this use Conventional routing in this case would just "drop" the packet. With opportunistic routing, a node acts upon the available information, in this thesis optimize the routing by centrality information then refine by ant colony met heuristics. In this method validate our approach on different parameter like overhead, throughput.***

Keywords— ant colony, met heuristics, Vehicular Ad-hoc network (VANET), QOS.

I. INTRODUCTION

Wireless network is the network which transmitted the packets with the existence of wireless links. A device can forward messages to another device via the air, wireless medium and accommodate that the target of the sender is within the communication range in a wireless network. It permits hosts to move without the restriction of wired network. People can arrange a wireless network easily also quickly. End users can roam everywhere although remaining connects to the network. It plays a valuable role in both military as well as civilian systems. Primary claiming in wireless connections are data rate enhancements, cost, user security, low power networking, Quality of Service and minimizing size. The applications of the wireless network are handheld personal computer connectivity, notebook computer connectivity, vehicle and ship networks, and rapidly deployed emergency net-works. Hosts as well as routers in a wireless network can roam around. Hence, the network topology can be dynamic as well as unpredictable.

The infrastructure operating mode is networks in which all Station must be associated with an access point to access the network and they started communicate with each other through the Access Point. It can be fixing up with a set topology by a situated point, term as a base station either an access point. An infrastructure is an one with prepared, everlasting network medium establishment. The recent is linked to the backbone network, by a wired link. The base station either access point, is a analytical component for communication. Each wireless hosts within the communication broadcasting can connect to the base station and to communicate with the backbone network. Cellular networks and WLANs operate as the static infrastructure networks.

Vehicular Ad-hoc network (VANET) is based on the principles of the mobile ad-hoc networks. It's a spontaneous process that exchange data from one node to another node. VANET provided two types of communication. First, communication between vehicles to vehicles (V2V). Second, communication between vehicle and infrastructure (V2I) that is between the road side units (RSU). It is

used in safety and non-safety application. There are two types of unit that is assembled with each node in VANET that is i) On Board Unit, ii) Application Unit.

VANET is a subset of MANET having different characteristics like node mobility, self-organizing, frequently-data exchange. VANET also known as Intelligent Transportation System. ITS improve the road safety, comport and efficiency. V2V is used automobile technology which is design to talk automobile with each other. The communication between vehicles through Wi-Fi networks or Bluetooth. Public key infrastructure is the current security system that is used in V2V communication. V2V communication is suited for short range communications. V2V communication is fast and reliable provide more safety. V2V does not need any road side units. One problem occurs in V2V is vehicle shadowing that means smaller vehicle shadowed by larger vehicle preventing it to communicate with the road side units. In V2I communication vehicle communicate with road side equipment that provide information such as safety warnings or traffic information. Main goal of vehicular communication is avoid collision and provide safety. V2I provide a larger range networks. Roadside infrastructure involves additional installation cost. V2I used pre-existing network infrastructure such as wireless access point.

1.1 Advantages & disadvantages of VANET are: 1. Public Safety 2. Traffic Management 3. Traffic Coordination along with Assistance 4. Traveller Instruction Support 5. Amenity 6. Air pollution radiation measurement as well as reduction. Besides it has various disadvantages: 1. flooding in route discovery initial phase 2. Wasted band width 3. Delay 4. Increasing network congestion 5. External source for destination location 6. Bad performances for long distance between source and destination.

1.2 Applications of VANET

- Collision Avoidance: In this 60% accidents can be avoided if before collision drivers were provided a warning half a second [5]. Collision can be avoided if a driver gets a warning message on time.
- Cooperative Driving: If Drivers can get signals for traffic related warnings alike curve speed warning, Lane change warning etc. These signals can co-operate the driver for a steady and safe driving.
- Traffic optimization: In traffic optimization Traffic can optimized by the use of forwarding signals like jam, accidents etc. to the vehicles so that they can take up their periodic` path and can save time.
- Peer to peer application: Such applications are useful to provide services. Among the vehicles in the network like sharing music, movies etc.
- Internet Connectivity: All the time, People always want to connect with the Internet. Hence VANET accommodate the constant connectivity of the Internet to the users.
- Other services: VANET can be used in other user based application such as to locate the fuel station, payment service to collect the tall taxes, restaurant etc.

II. LITERATURE REVIEW

Abadlla et.al [1] presented the standardization work and researches related to vehicular networks and discuss the claiming facing future vehicular network. Vehicular Networks are gathering an area of consideration along with the vast different of services they may yield. Their functions range from safety as well as crash delay to Internet access also the multimedia. A field of work along with research over the globe as handled to decide the principle for vehicular communications.

Bai et. al[3] analysed that community network are design to find out the networks that may also useful for routing protocol as well as QOS strategy designing. Opportunistic network that consist of number of movable nodes, His topology switch beyond the period. Thus community declaration comes tougher than still nature. An overlying colony declaration is wider complicated difficulty. It analysed the period changing topology of opportunistic networks along with the overlying colony structure of individual. Community declaration algorithm utilized on social science, complicated networks and graph theory. The algorithm is deeply reliable and flexible for overlying community declaration in the opportunistic networks.

Bell et. al[4] used a meta-analytical approach for ant colony optimization (ACO) to build a set of vehicle routing problem. Changes are made to the ACO algorithm used to solve the travelling salesman issue to allow searching the different route of the VRP. Finding fluently vehicle route is a valuable logistics issue. Ant colony approach is used to find a good optimal path. Ant colony optimization use artificial ants to find the result to combinatorial optimization issue. ACO is situated on the performance of real ant and possess advance abilities such as memory of rapid action and knowledge about the distance to other locations.

Benamar et. al[5] presented a inclusive overview regarding routing protocols designed for routing into Vehicular Delay Tolerant Networks into vehicular surrounding. It core on a certain kind of VANET, where the vehicular traffic is scattered along with straight end-to-end paths among broadcast parties do not ever occur. Thus, transmission in the circumstances descent into the type of Vehicular Delay Tolerant Network. Being the restricted communication area of a Road Side Unit, remote vehicles, into VDTN, cannot link to the RSU straight also thus have to confide on intermediary vehicles to broadcast the packets. While the message broadcast process, finished end-to-end paths cannot occur into vastly subdivided VANETs. Hence, the intermediary vehicles necessary buffer as well as delivered messages opportunistically. The key goal of routing protocols in DTN is to increase the possibility of delivery to the target while decreasing thus end-to-end delay.

Chim et. al[7] proposed a navigation strategy as advance the online road information gathered by a vehicular ad-hoc network via instruct the drivers to appropriate location in a real-time as well as distributed manner. The recommended strategy has the merit of utilizing real-time road conditions to figure out a suitable route also at the similar time, the information origin can be accurately validate. To secure the confidentiality of the drivers, the query as well as the driver who matter the query get approved to be unlinkable to some party along with the trusted command. In addition to validation as well as privacy-preserving, our strategy achieves every another necessary security requirements.

Daraghmi et. al[8] presented the discontinuous connectivity, unexpected changes into network topology also below reception scale are the better necessary properties as analyse vehicular ad --hoc networks of another category from ad-hoc networks. To maximize reliability as well as time criticality metrics into data transmission protocols for VANET, novel suggestion get required. Process a tutorial on mechanism at the network layer, sustain in current literature, for low as well as high scale routing protocols, also broadcasting, data propagation, as well as warning delivery.

III. Proposed Work

Step 1: In first step use a one simulator to deploy a VANET network. The ONE is a simulation environment that is adequate of

- Generating node movement utilizing various movement models.
- Routing messages among nodes with different DTN routing algorithms and sender along with receiver types
- Visualizing both flexibility and message transient in real time in its graphical user interface.

ONE can import flexibility data from real-world traces or other flexibility generators. It can also outcome a variance of reports from node movement to message transient along with general statistics.

Step 2: In second step to find a shortest path by using Dijkstra algorithm is used. It is graph based searching algorithm that solves the individual source shortest path difficulty. This principle is also worn in routing. Dijkstra algorithm is used for finding the shortest path with minimum cost. It is a principle for discovery the shortest path among nodes in a graph. Dijkstra principle does not need a min-priority queue and run with it time O ($|V|^2$).

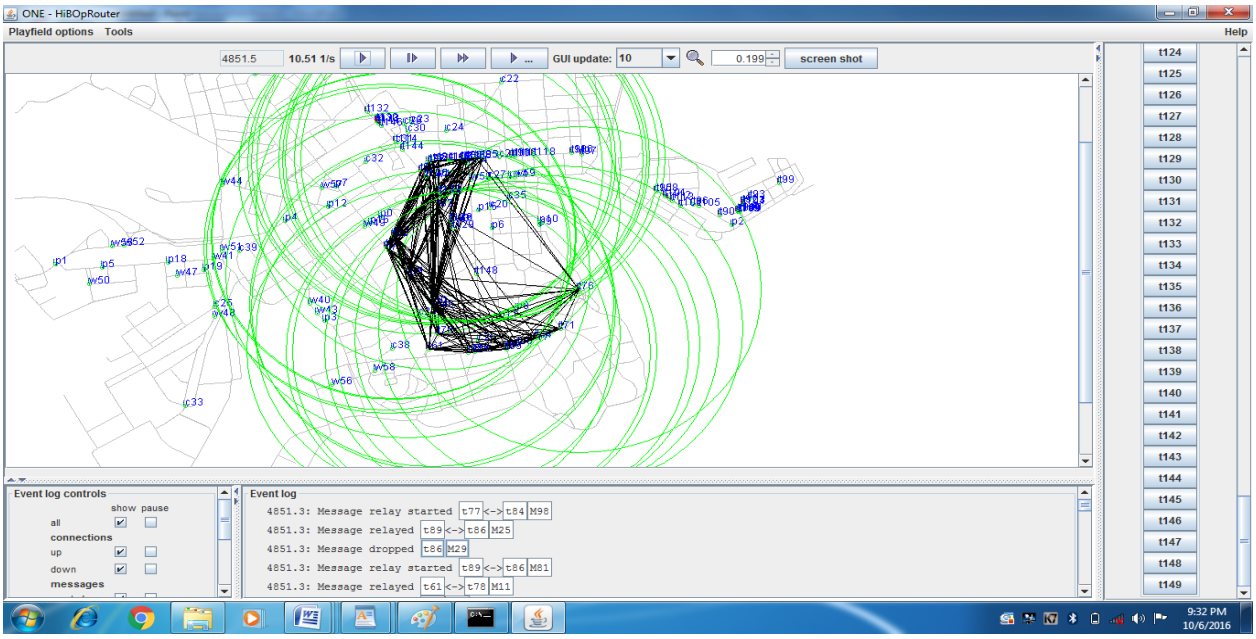
Algorithm: Let the node on that starting known as primary node.
1. Assign whole node a tentative distance value: specified it zero for primary node and set infinity (∞) to whole another nodes.
2. Set primary node as a contemporary node. Mark whole another nodes as an unfrequented nodes termed the unfrequented set.
3. For the contemporary node, consider complete the of its unfrequented neighbor nodes also compute their distance. Evaluate all sudden values and assign smaller one.
4. When all the neighbor node are visited of contemporary node then mark contemporary node as accessed node and wipe out from the unfrequented set. Accessed nodes never visit another time.
5. If target node is remarkable visited then end the principle. The algorithm is completed.
6. Otherwise, chosen the unfrequented node that is remarkable with least tentative distance, fix it as the new contemporary node and push aback into step 3.

Step 3: Between's centrality: - Between's centrality is used to gather the social information of the node. It shows how much packet delivers from source to destination. Between's centrality also shows how much packets drop in a network.

Step 4: Decision of routing is done by ACO algorithm.

IV. Result and Analysis

Simulation at 150 nodes



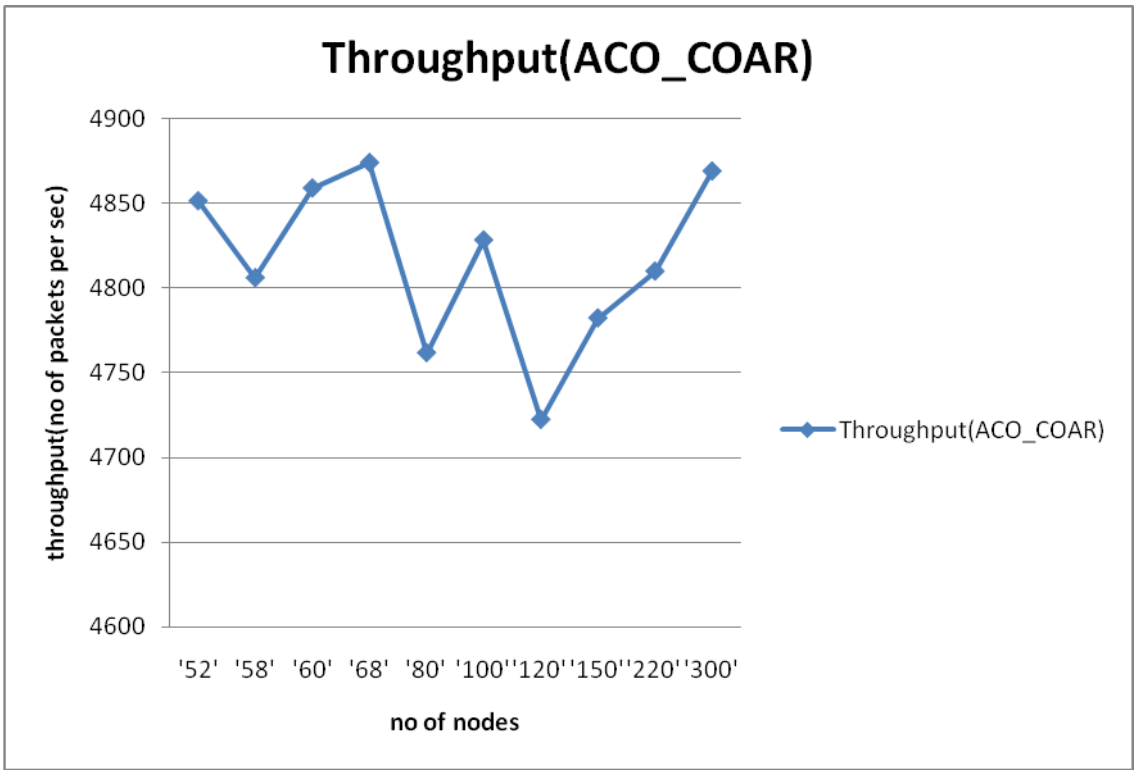


Figure 4.1: throughput vs number of nodes (ACO)

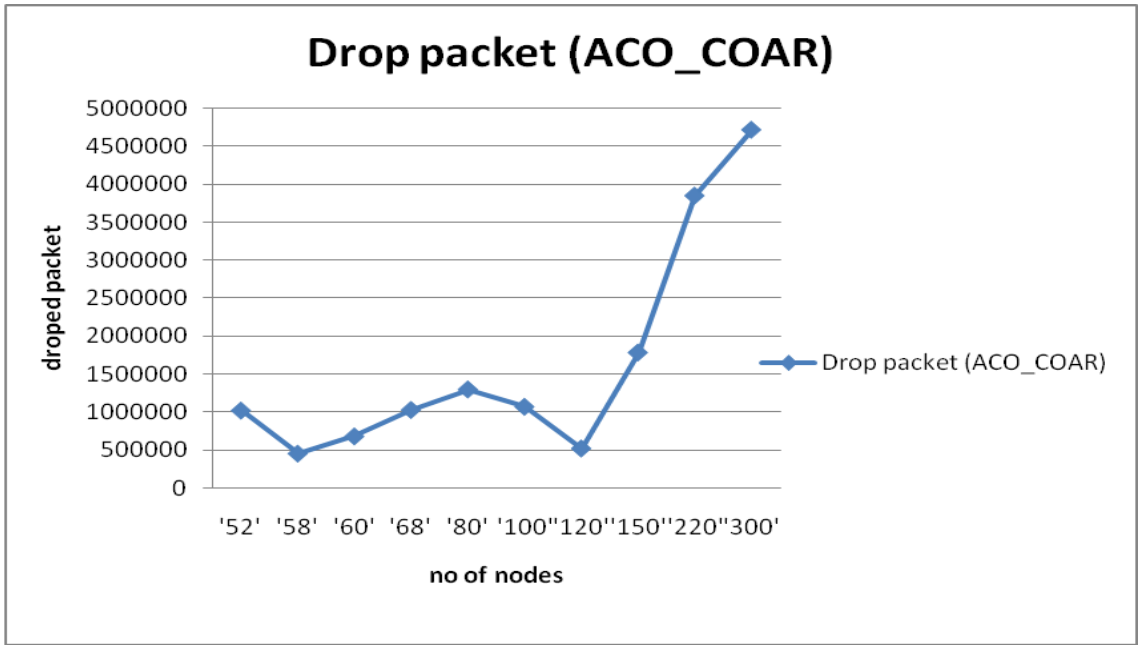


Figure 4.2: drop packet vs number nodes (ACO)

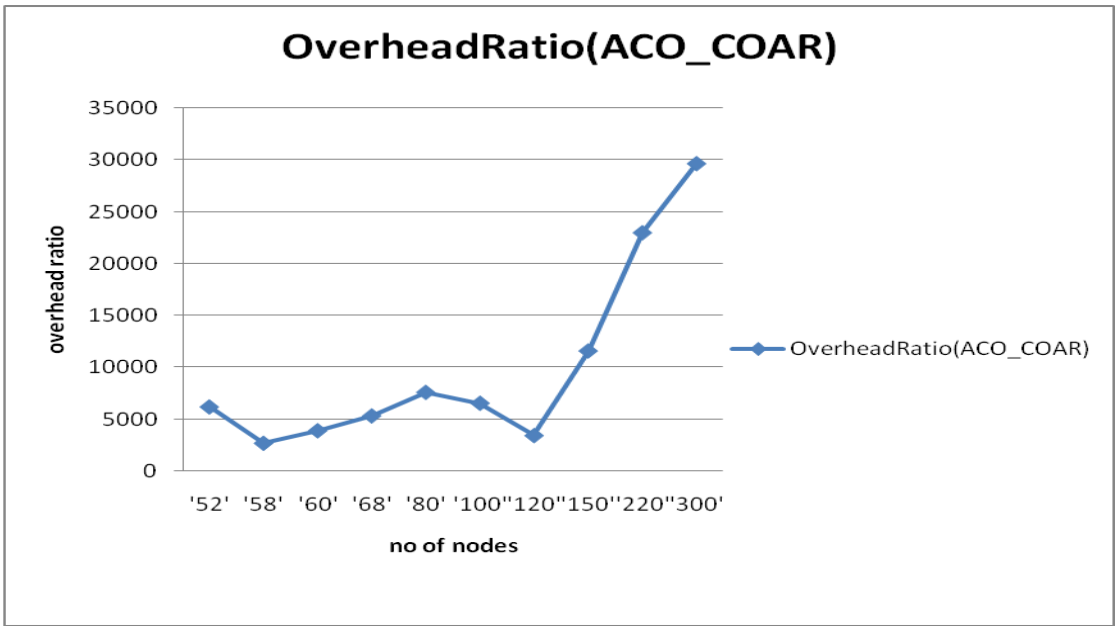


Figure4.3: overhead ratio vs number of nodes (ACO)

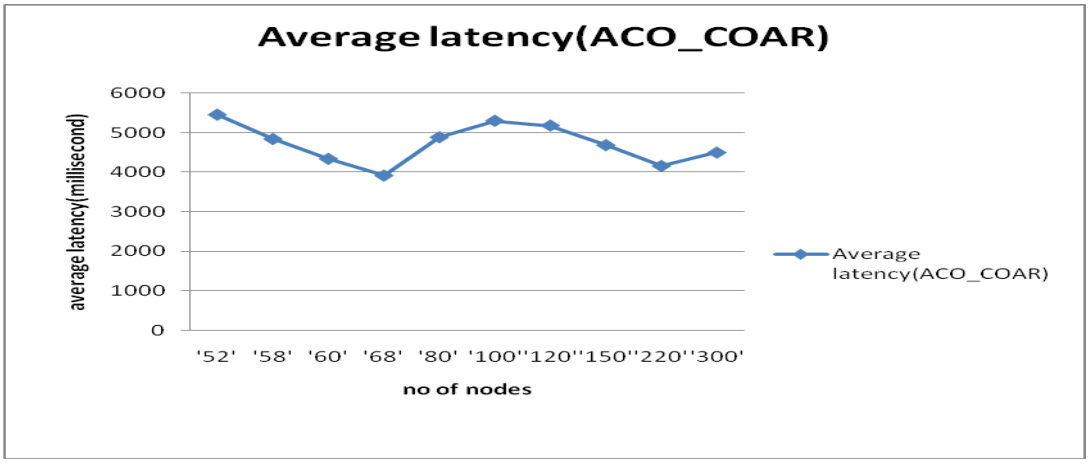


Figure 4.4: average latency vs number of nodes (ACO)

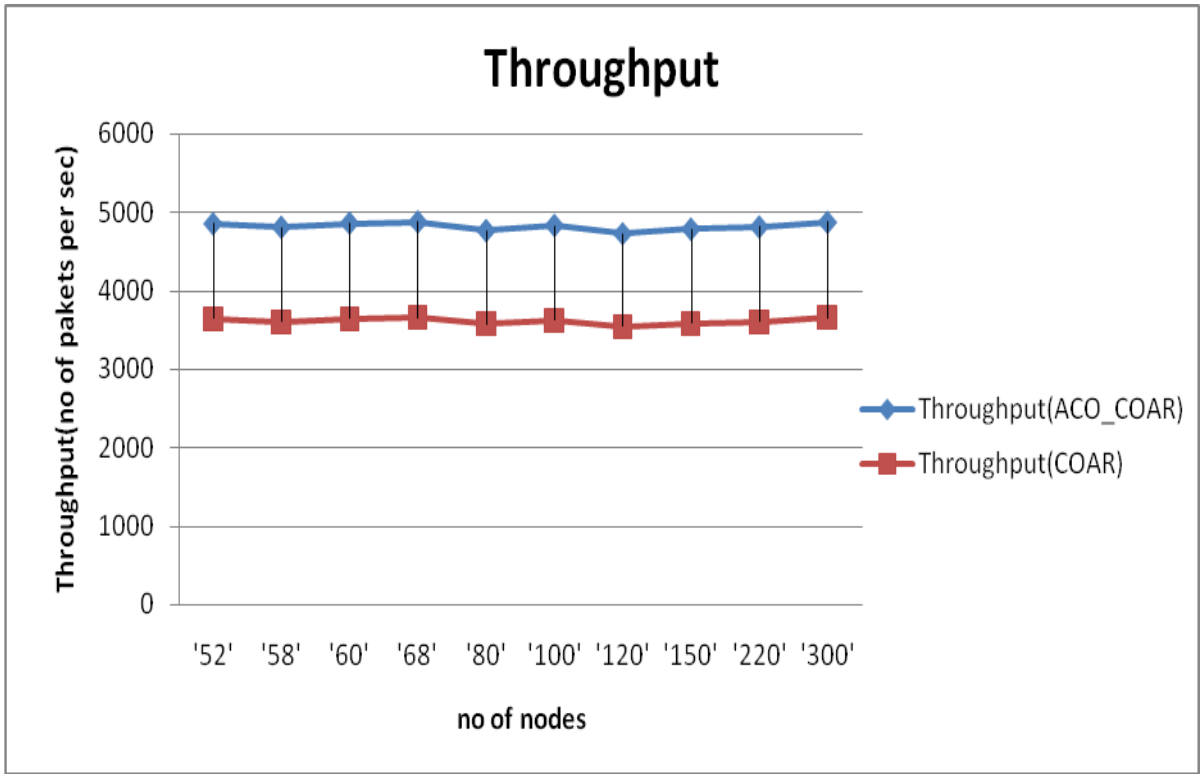


Figure 4.5: Throughput vs number of nodes (ACO and COAR)

III. CONCLUSIONS

In carrier-based routing, nodes of the infrastructure are mobile data collectors. They move around in the network area, following either pre-determined or arbitrary routes, and gather messages from the nodes they pass by. These special nodes are referred to as carriers, supports, forwarders, MULEs, or even ferries. They can be the only entities responsible for messages delivery, when only node-to-carrier communications are allowed, or they can simply help increasing connectivity in sparse networks and guaranteeing that also isolated nodes can be reached. In the latter case, delivery of messages is accomplished both by carriers and ordinary nodes, and both node-to-node and node-to-carrier communication types are allowed. An opportunistic routing strategy is a strategy where there is no predefined rule for choosing the next node to destination (as it is the case in conventional schemes such as OLSR, DSR or even Geo-Routing). Rather, an intermediate node en route act in an impromptu fashion and takes a decision that is based solely on current circumstances.

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