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Enhanced Social Group Based Routing Using ORACO

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Abstract: DTN (Delay Tolerant Networks) are defined by the continuous endless connection due to node mobility, limited storage and constrained power resources. In order to overcome the above issue along with the frequent disconnections, DTN stores the data packets for long time and transmits the data packets to their neighbor node. This paper deals with the two main objectives which are maximizing the delivery ratio and reducing the storage and energy consumption. This paper proposes the scheme ESGBR [Enhanced social group behavior based routing] with a Meta heuristic metho with ORACO[optimal routing based on ant colony optimization] protocol.

Index Terms: Delay Tolerant Networks, DTN Protocol, Optimal Routing.

1. INTRODUCTION

DTN represents a unique wireless network architecture enabling mobile nodes to have communications with each node in environment where there is no continual route between end nodes. DTN are alternative structures to traditional networks facilitating connectivity of system and network regions with sporadic or unstable communication links. In networks with such circumstance mobile relay node are used to carry and forwarding message and make communication possible among other nodes. Depending on DTN type communication opportunities could be either scheduled over time or completely random. In ESGBR the Meta heuristic model for optimal routing considers Meta information of the global observer using ORACO protocol, which selectively spreads the data copy to the selected nodes in the network.. The routing ORACO can yield a higher delivery ratio and lower delay and also have a lower data forwarding cost, which means of the number of relays used in the data forwarding.

2. RELATED WORK

The related works depends on different routing protocols used in delay tolerant networks.

Routing protocols are classified according to the amount and type of information used to take the routing decision [2].

Blind routing protocols aim at fast spreading of packets in the network. They do not collect information about other nodes because they do not use a node selection criterion. They vary according to their spreading mechanism and amount. [3][4][5]

Guided routing protocols aim at efficiently selecting the relay nodes to enhance the delivery probability in case of limited storage and energy resources [6][8][9]. To select relay nodes, they have to collect information about other nodes in the network. Guided Protocols vary in the type and amount of information gathered. Guided routing protocols collect information about other nodes in the network to guide packets to their destinations. Guided routing protocols outperform blind protocols in the delivery ratio, but increase the average packet delay. [10][11] [12]

Epidemic Routing [3] was historically the first DTN routing protocol. In Epidemic Routing, nodes transfer copies of all the packets they have to all the other nodes they become in contact (limited by the contact duration). Packets are dropped when they expire or a destination delivery acknowledgment is received. Because of the limited storage space and contact durations, the protocol performance drops significantly with the high-traffic rates. To overcome this problem, other routing protocols limit the flooding of packets to a certain number of copies or hops.

Spray-and-Wait (SnW) [4] protocol proposed a simple scheme that manages to overcome the shortcomings of epidemic routing and other flooding-based schemes, and avoids the performance problem inherent in utility-based schemes. Spray-and-Wait (SnW) [4] protocol limits the number of copies by associating with each copy the number of extra copies to spread. When no more spreading is allowed the carrying node keeps the packet until it either meets the destination or the packet is dropped due to buffer overflow or lifetime

expiry. In this work they investigated the problem of efficient routing in intermittently connected mobile networks and SnW leaves some work for future work which intends to look in detail into schemes that spray a number of copies quickly and then use utility based or other efficient single-copy schemes to route each copy independently.

A binary version of SnW permits each node to use half the number of transfers allowed for the packet and the other half is left for the receiving node.

These protocols assign weights to nodes using information collected from the network. This information could be topological [8][9][11][12] environmental and energy aware [13], or content based [14]. The collected information can be used to detect social relations among the network nodes as in [8], [9], [10], [16], and [17]. One of the earliest papers, and well known protocols, that predict contacts among DTN nodes is the PROPHET protocol [8]. PROPHET estimates a node metric by tracing the number of meetings between nodes. When two nodes meet, they increase their link weight toward each other and toward the nodes met by the other node. Similar to PROPHET, MAXPROP [9] strengthens the link between two nodes using the number of meetings.

The contribution in MAXPROP can be observed in its buffer management technique that encourages forwarding packets with lower number of hops over those traveled far in the network without reaching their destinations.

The paper [15] presented a heuristic routing protocol that utilizes the social relations between nodes to reduce redundant copying of packets. The results of [15] show that the proposed protocol significantly reduces number of transmissions leading to a considerable saving in energy consumption, while keeping same or higher delivery ratio. The study also shows that increasing the delivery ratio causes an increase in the average packet delay which is acceptable in delay tolerant networks.

3. EXISTING OF SGBR IN DTN

The existing SGBR[Social Groups Based Routing] use different protocol design which has the following properties:

Each packet generated is assigned to a unique ID where each node have a degree of connectivity to every other node strengthened by their frequent meeting. The degree of connectivity two nodes can decided to forwarded their packets except those that are destined to other node should be deliver the other node. It starts to transmit data package exchange the ID. Packets that are designed to the other node are put on the head of the transmitted queue other packet are not stored in buffer based on their traversed hop count, so that packets with the minimum hop count will be transpired.

The packet is not designed to the other node are transferred only degree connectivity where two nodes do not to the same group, each packet has a limited number of copies to be spread using the binary SNW. After the packet is transferred it may be dropped from the sender of it the degree connectivity is grated than the dropping. The receiving node from being in the same group. The buffer of the receiving node is full, packet with the largest hop count is dropped to create a space for the forwarded packet to be stored.

4. PROBLEM DEFINITION:

Several research techniques and protocols failed to perform the following metrics together in DTN.

- Storage management
- Reliability
- Energy and resources
- And security

Those metrics are considered as main drawback of the system. The major challenges in DTN Routing protocols are described in this chapter. All routing protocols developed for DTN should be adapted to many challenging environment by sending multiple copies of data packets to increase the possibilities that one of the copy reaches the destination at a transaction. Here the protocols should maintain the nodes to store them until they meet other nodes or meet their destinations. The main challenge in DTN is maximizing packet delivery ratio and minimizing the delivery cost. Maximizing delivery ratio requires increasing the number of packet copies spread throughout the network to increase the probability of reaching the destination, while minimizing delivery cost, in terms of network overhead, requires decreasing the number of copies.

Another challenge is the compromising nature regarding the amount of information collected to guide the packets to their destinations. Collecting information from the network helps in selecting the relaying nodes to the destination, but requires time to collect the information that increases the packet

delays. On the other hand, collecting little or no information leads to spreading the packet copies blindly, and decreases the probability of reaching the destination unless a large number of copies were spread.

Best Results While Using OARCO WITH ESGBR IN DTN:

Using the method the packets will transmit continuously in the path, which is already visited by the sender node. The packets will not transmit in the path which is visited one time. This method may create an infinitive loop, to avoid this situation after a certain interval of time if an ant (packet)has not reached the destination, the packet is marked as unsuccessful and its journey is forcefully stopped. In this method after the completion of the journey of the successful packets the paths of the packets are checked and made free of any of the loops that may have formed during the course of its journey, and then the score deposit of the nodes of the loop free paths are updated.

Select the start node and the destination node (target node). Each node on encounter will exchange summary vectors of the messages they have. Comparing the two vectors, each node will determine the messages it does not have and send a request for those messages to the other node. Perform identifying the contact details such as contact duration and age for grouping. Perform for sorting the packets based on the score. This step may include the updating process which is named as ACO with tabu search for fast search of nodes. This simple communication protocol needs to be modified to accommodate the immunity message exchange.

The delay measure will be as in fig.1 as the result of testing a number of nodes where the delay is lesser than the existing method SGBR.

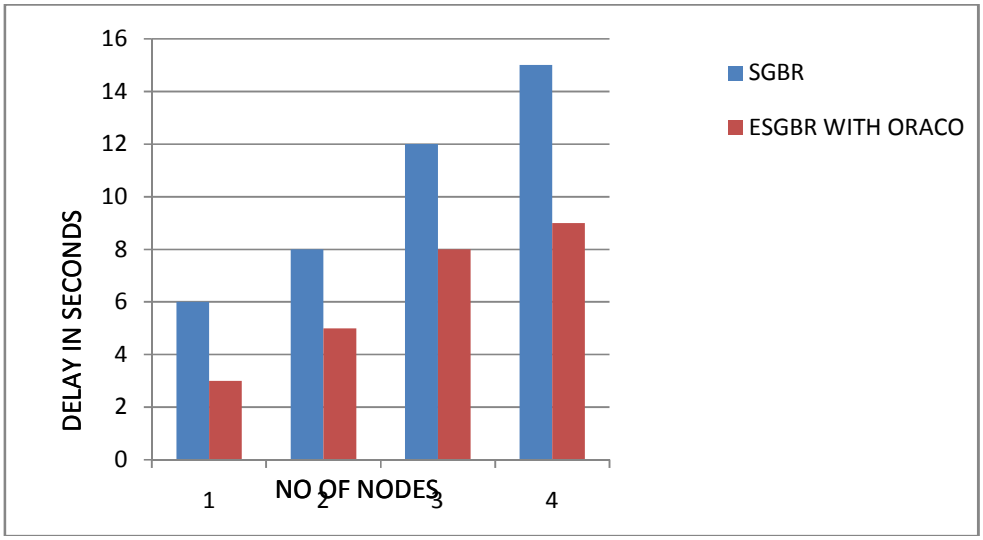

Fig.1 Delay Comparison

5. CONCLUSION

In this paper the methods ESGBR and OARCO has been used with DTN to reduce energy resources and increase security. The contribution in MAXPROP can manage buffers and encourage forwarding packets with lower number of hops.Here a number of nodes has been tested and the result for delay is shown in seconds which is lesser than the existing, and efficiency in percentage which is more than the existing method.

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