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MDR Based Cooperative Strategy Adaptation in Wireless Communication

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Abstract: **Cooperation among nodes is the fundamental requirement for the Opportunistic Mobile Networks (OMNs).Here using the store-carry-and-forward mechanism, messages are processing the communication. Each and every node in the network has a mobility and range of region in which each node communicate with other node or its neighbour node. For avoiding the confusion and complexity in topological interface, provide a parent node capacity to each node in the network based on user requirement. Cooperation strategy is based on Message Delivery Ratio (MDR). The system mainly use three cooperation adaptation criteria, which are cooperator, exploiters, isolators are based on Distributed Information Based Cooperation Ushering Scheme (DISCUSS). The nodes which preserve the exchange information with one another during contacts about the message created and delivered in the network. Based on this information nodes are evaluate their own performance and evaluate with network performance and adapt most successful forwarding strategy. The evaluation is based on message delivery ratio. If the nodes are not in contact, receive the appropriate information from global knowledge and proceed the communication and enhance the reliability and lossless communication**

Keywords: **Cooperation, Message Delivery Ratio, Opportunistic Mobile Network, Strategy Adaptation.**

I. INTRODUCTION

Opportunistic Mobile Networks (OMNs) are a category of delay-tolerant-networks (DTNs). Delay Tolerant Networking (DTN) is a communication networking pattern that provides a communication environments where there may be no end-to-end paths, or continuous path, communication opportunities change and their interval can be very lengthy and not even identified beforehand. Routing messages in this type of environments can be reasonably different compared to traditional networks. This has form a requirement to find new routing protocols that receive efficiently into explain the distinct nature of these networks. Different approaches can be tested and evaluated by simulation, but the simulation results are really helpful only if they are a result of somewhat credible simulation scenarios.

OMNs are routing their path opportunistically from source to destination using store-carry and forward mechanism. The mobility among nodes in the network which create new opportunity to communicate with one another. Here the path exists between source and destination pairs might not be connected at the same time. Each node which are typically computed the routes based on the local information of the node. When Source node and destination node are in contact, it delivers the message to destination node otherwise the message is forwarded to the intermediate node. The intermediate node which store and carry the message until one of them meets the destination node and forward to it or they can find other nodes. The MDR based cooperation adaptation in wireless networking is considerably depends on cooperation of the intermediate nodes.

The present routing protocol which provide a hypothesis that nodes are fully cooperative. The every node in the network has their own goals, so we not considered a fully cooperation. Since typically it is unmanaged. Some nodes which shown a selfish behavior. Some nodes may take help from others for forwarding their message but may not always assist in forward others message. It will affect the overall network performance. For the upgrading of cooperation and network performance giving a punishment and reward.

II. EXISTING SYSTEM

OMN is generally reliant upon cooperation by intermediate nodes. Existing system which uses different cooperation enforcing schema

A. Credit based schemes:

In credit based schema vitual currency or pricing acts as the credit. Different types of credit based schema used in existing systems.

1. pair-wise Tit-for –Tat(TFT)

It is based on two constraints, i.e., generosity and contrition for maximizing cooperation among nodes.

2. SMART(secure multilayer credit based incentive scheme)

Increasing the cooperation among nodes by preventing the malicious users from cheating credit.

3. Provide incentives to the selfish nodes for forwarding others node's message.

4. Pi protocol

Selfish nodes for forwarding others node's message. Pi attaches incentives to the message and send. It need a trusted authority, for storing credit and reputation of each nodes. So iTrust, which detect the misbehaving nodes.

B. Reputation based schemes:

Here reputation of the nodes is calculated by their neighbours based on the message forwarding actions. It Need a offline system manager. when each node register to join the network .Reputation value is assigned to the forwarding node.

Nodes are not accepted when their corresponding reputation are less than a given threshold. Some reputation based schemes are,

1. Pri schema

In this pri schema , the offline security manager (OSM) which in charge of key distribution.

2. Based on probability distribution of packet delivery delay and communication cost.

3. Based on a message scheduling framework, which improves message delivery ratio

III. SYSTEM MODEL

In opportunistic mobile network the main problem is unreliable communication and loss communication. To enhance the reliable communication will ensure the cooperation among the nodes. For enhance the cooperation of each node to analyze the strategy of each node and increase the message delivery ratio. Proposed system, promote cooperation based on DISCUSS and its variant on DISCUSS with global knowledge. In DISCUSS scheme, The nodes reliably exchange information with their neighbour nodes. In DISCUSS with global knowledge, The nodes can obtain message delivery information from a central knowledge. Each node follows any one of these message strategy.

1. *Cooperate:* - Forward their own message and other's message

2. *Exploit:* - Forward their own message and drop other's message

3. *Isolate:*-Only receive the message which they are destination. They don't take help from other and don't do

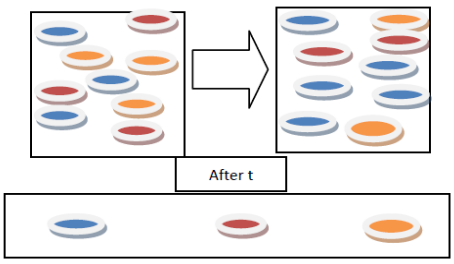

Fig 1- Strategy adaptation of nodes after a t time

IV. PROPOSED SYSTEM

1. *Architecture:*

The system architecture consist of three phases, they are node generation, cluster formation, packet forwarding.

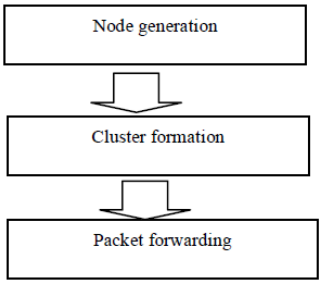

Fig 2- Proposed system architecture

a. *Node generation:*

Node generation is the initial phase in which the network of nodes are formed. In this phase , should specify the node id, node type, node position, number of nodes, node link etc. based on that elements source and destination nodes also specifies and processing node integration and results are forward to the input of cluster formation phase.

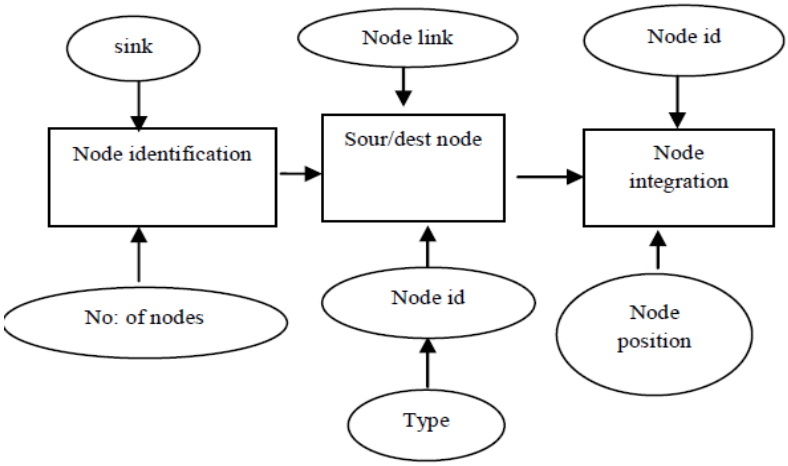

Fig 3- Node generation

b. *Cluster formation:*

Cluster formation is the second phase in which form the different clusters based on number of nodes and calculate energy level and cluster head. The energy level calculations are based on the battery level of nodes and finally construct the route table. That result of route table which promote to next phase

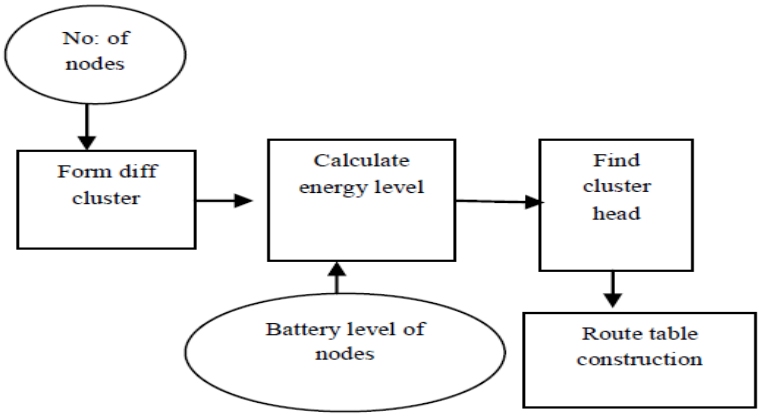

Fig 4- Cluster formation

c. Packet forwarding:

Packet forwarding is the final phase , find out the available cluster head and proceeding the routing . on the basic of performing the routing, data are collected and transferred to base station and update the route table.

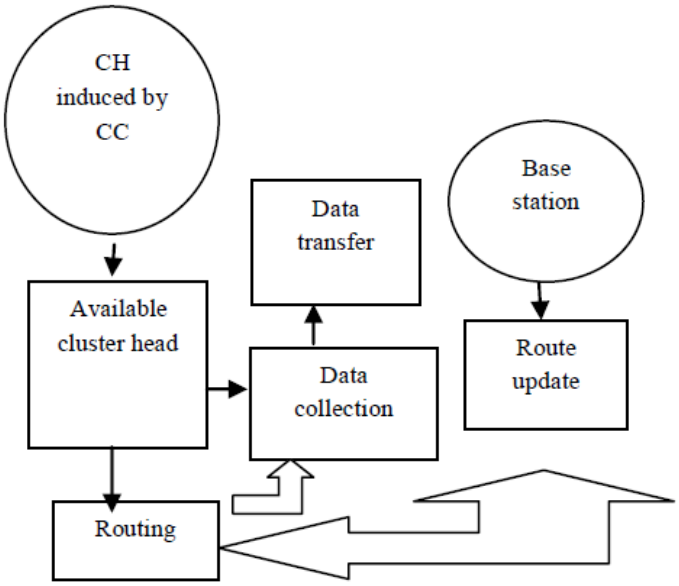

Fig 5- Packet forwarding

2. Proposed System Design:

The designing of the proposed system comprised of four modules. They are topology creation, message transfer, opportunistic mobile network, distributed information.

Topology Creation:

It has not a specific topology, because each t time the topology will be changed due to the movement of the nodes. Sensor nodes form a DAG and extract a routing tree from DAG. The proposed Tree on DAG is a semi structured approach that uses Dynamic Forwarding on an implicitly constructed structure composed of multiple shortest path trees to support network scalability. When a node wants to send out a packet, it attaches a sequence number with it, encrypts the packets and then forward packet to parent on the routing tree. The routing tree is reshaped every round. As a certain number of rounds have passed, the sink will have collected information about node behaviours in different routing topologies. The purpose of system initialization is to set up the DAG and the routing tree to facilitate packet forwarding from every sensor node to the sink. Each sensor node u is preloaded the following information:

Np: The maximum number of parent nodes that each node records during the DAG establishment procedure.

Ns: The maximum packet sequence number. For each sensor node, its first packet has sequence number 1, the Ns^{th} packet is numbered Ns and so on and so forth.

Message Transfer:

When an innocent intermediate node receives a packet, it attaches a random variable to mark the forwarding path of the packet, and then forwards the packet to its parent. A misbehaving intermediate node may drop a packet it receives the intermediate node may either drop or modify the packets before sending to sink. On receiving a packet, the sink node decrypts it, and thus finds out the original sender and the packet sequence number. The sink node tracks the sequence numbers of received packets for every node, and for every certain time interval, which we call a round. it calculates the packet-dropping ratio for every node. Based on the dropping ratio and the knowledge of the topology, the sink node identifies packet droppers.

Opportunistic mobile network:

Represent an OMN as (N; M; S), where N denotes the set of nodes in the network. M denotes the set of messages generated by the nodes. S denotes the set of strategies selected by any node in forwarding the messages (Cooperate;

Exploit; Isolate). Each node may act as a source, a destination or an intermediate relay node**.** We consider three group of nodes cooperators, exploiters, and isolators based on these strategies. The following section elaborates the behavior of the individual nodes.

a. Cooperators:

These nodes with the strategy "cooperate" not only forward their own messages, but help the other nodes as well in doing so. In other words, the cooperators act as relays by receiving, storing and forwarding the messages generated by the other nodes.

b. Exploiters:

On the other hand, the exploiters forward their messages to the other nodes (cooperators) for delivery. They receive other node's messages, but instead of storing them, they silently drop those messages. The exploiters take help from others for forwarding their own messages as free riders, without helping them.

c. Isolators:

The isolators only receive the message for which they are the destinations. They do not take help from the other nodes for forwarding their messages, neither do so for others. The isolators directly deliver their messages, when they meet with the corresponding destination node.

Distributed information:

When a node dynamically switches its forwarding strategy, if required, to the most successful strategy in the concerned SD-OMN. Strategy defined OMN is a combination of N, M, S. N is denoted the set of nodes, M is denoted set ofmessages, S is denoted set of strategy selected(C, E, I).i.e.,Nc+Ne+Ni=|N|. The Node share their relevant information. They are

- Received message ID
- Message sender node ID
- Own delivery probability

It comprises of two phases that are repeated in every generation interval (t).

(1) Acquiring information on the performance of the SD-OMN.

(2) Strategy adaptation

The first phase requires information on

(a) The messages created (CM) by the nodes

(b) The delivered messages (DM)

(c) The delivery probabilities (DP) of the nodes.

In this module Categorization and Ranking will be performed based on the node behavior. If there is any modification or drop of packets in node it assumes negative value for modifier or dropper. The categorization of nodes can be taken in any one of the following cases.

- Packet droppers for sure.
- Suspicious packet droppers.
- No packet droppers for sure

3. Procedure:

The DISCUSS steps in the proposed system are as follows.

STEP 1: Start

STEP 2: Exchange information with nodes

STEP 3: Compute own delivery probability

STEP 4: Computed group wise weighted delivery probability(yc,ye,yi)

STEP 5: Compute P<max (yc,ye,yi), if it true then step 6 ELSE GO TO Step 8

STEP 6: Calculate G succ = arg max (yk), k∈yc,ye,yi

STEP 7: Set on strategy as G succ.

STEP 8: Stop

Design: *With the help of UML tools the design is supported. It represents how the proposed system working. The data flow diagram based on the steps in DISCUSS depicted below:*

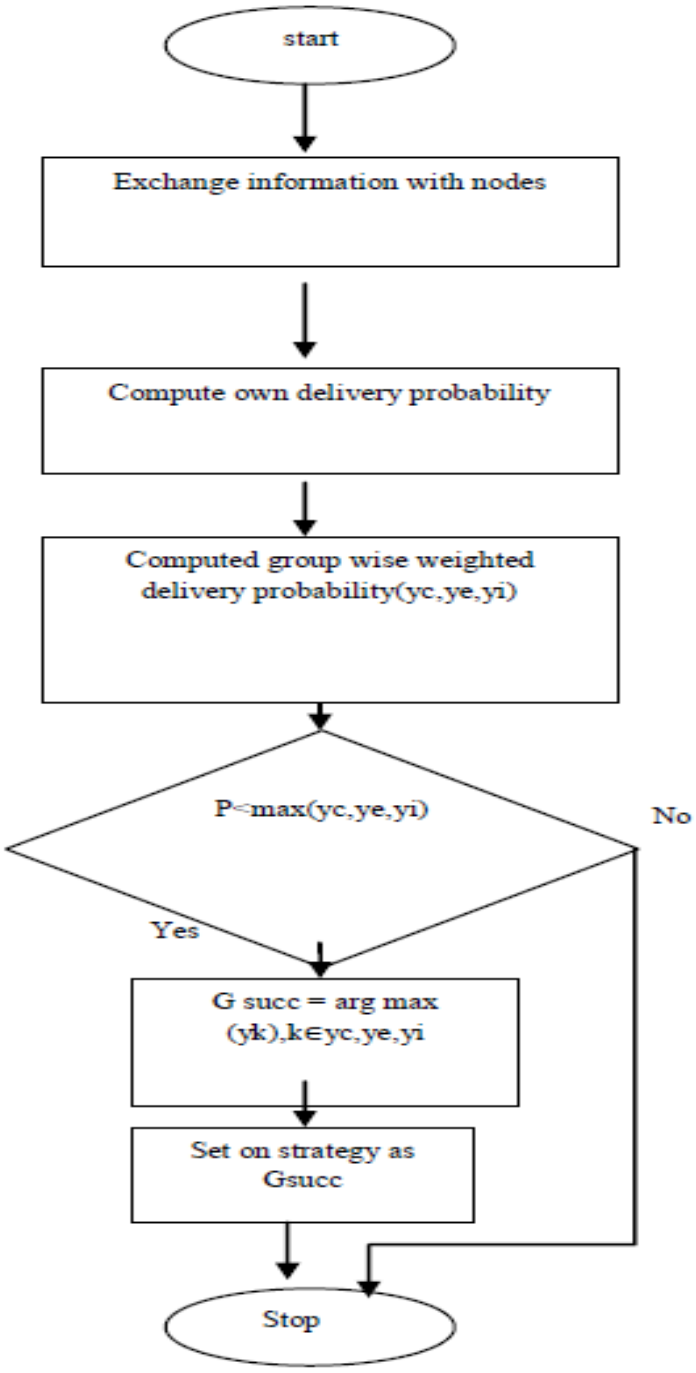

Fig 6: Flowchart depicting the steps in DISCUSS.

4. Proposed System's Strategy:

Proposed systems mainly based on DISCUSS and DISCUSS with global knowledge.

Discuss: In Discuss scheme the nodes are reliably exchange their information during the contact.

Discuss with global knowledge: For the sake of comprehensiveness, effectiveness and evaluating the success, we also think a version of DISCUSS, where the nodes have absolute information about the SD- OMN. In this case, imagine the occurrence of a central authority in the network, with which the nodes can communicate directly. Whenever a new message is produced (or delivered), the CA is up to date by the concerned node. Based on these information, the CA computes the DP of each node. At the end of each t, all the nodes get the DP information of all the nodes in the network from the CA. Based on this, the nodes adapt their strategies to the most successful one, if required.

Characteristics of Discuss:

Discuss which hold some constraints are given below:

1. The traffic generation rate is low, but messages are generated during the lifetime of the system measured

2. The traffic rate is high and messages are generated for a short period of time (possibly during the initial generation of the SD-OMN). In first case, exactly all of them can be delivered to the particular destination if most of the nodes are cooperators. In reality, depending on the contact patterns among the nodes, the same may be less than unity. In the second case, although more messages are created in the system, a reasonably longer lifetime allows the delivery of most of them. Again, when most of the nodes are cooperators. So needs a buffer capacity or lifetime of nodes.

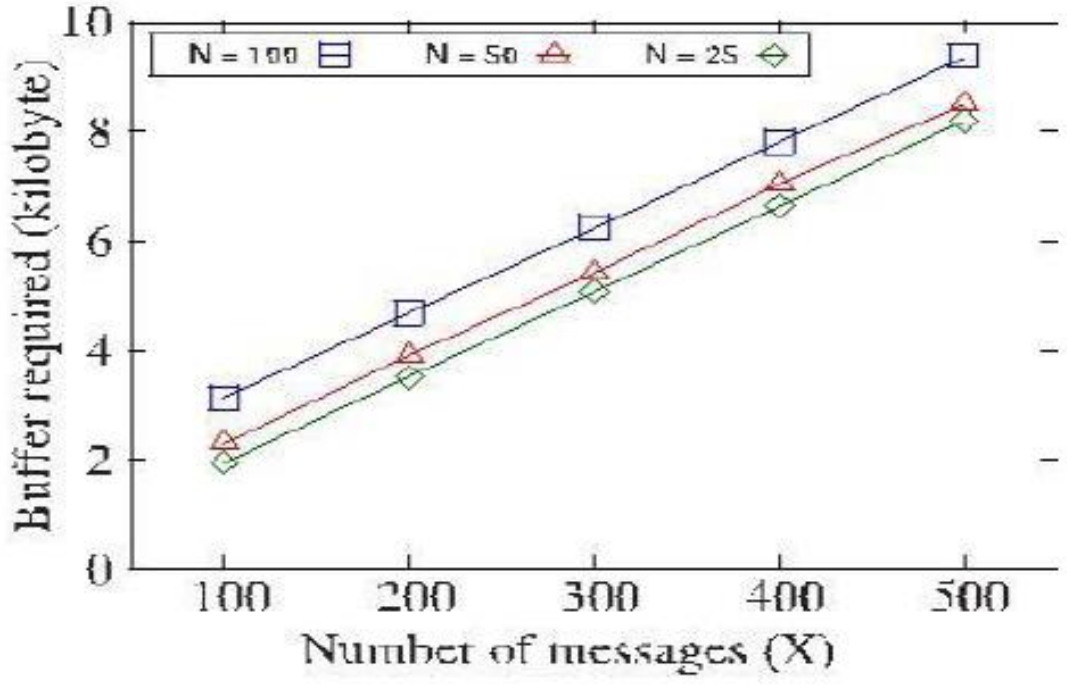

Fig 7: Storage overhead of DISCUSS as a function of the number of messages.

V. CONCLUSION

The mechanism DISCUSS, for converting the non cooperate nodes to cooperate. After a generation interval each node compare its performance with performance of other groups and adapt a most successful strategy. In DISCUSS , the strategy is based on message delivery ratio. It enhances the reliable communication and lossless communication. Improve the network performance.

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