Code Location based forwarding technique in Opportunistic Network

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***Abstract*—In opportunistic network, the nodes have no knowledge regarding network topology. Hence, forwarding from the source node to the target destination node is a challenging issue. A connection between two nodes is unstable in opportunistic network, but the store-carry-forward scheme and node's mobility enable nodes to dissemination information between them. Flooding forward technique delivers message to every encounter node in transmission range. It incurs network congestion and consumes amount of network resources. This paper presents the location code-based data dissemination forward technique which utilizes the similarity between neighbor node's location code and the destination node's location code. The match degree approach is used to identify the relay node for a better way to disseminate data in opportunistic network. The experimental results show that code location approach delivers messages to the target destination with less overheads, and better performance as compared to flooding approach.**

Keywords-Opportunistic Network; Data Dissemination; For-warding technique; Location code.

I. INTRODUCTION

In recent years, mobile device (node) has the capability to generate, store, forward and receive messages. A node acts as three roles such as host, router and gateway in a network. Thereupon, some new networks are emerging, such as Mobile Ad-hoc NETwork (MANET), Mobile Peer to Peer network (MP2P), Disruption Tolerant Network (DTN) and Opportunistic NETwork (OpNET)[1][2][3]. In this paper, we focus on data dissemination in OpNET. In OpNET, node does not know any topology information about the network and a connection between nodes is intermittent. Hence, forwarding message from the source node to the target destination node is a challenging issue in OpNET. The store-carry-forward scheme [4] enables the communication in opportunistic network. If a connection is unavailable at present, the source node carries message till a new connec-tion established. Therefore, the store-carry-forward scheme supports message dissemination while the connectivity is intermittent.

Researchers proposed different solutions for data dissem-ination techniques in OpNET. For instances, the simplest forward technique is direct delivery [5], the source node only forwards message to the destination node. Since the source node and the destination node may not at the same network at the same time, the source node does not forward the message until it meets the destination node. Direct delivery technique suffers from success rate and delivery delay, but it obtains the optimal overheads (network re-source consumption) results. Epidemic forward technique [6], an emblematic flooding-based forward technique, the source node forwards message replica to every encounter node in communication range. It consumes lots of network resources and leads to network congestion. However, the Epidemic gets the optimal delivery delay results but suffers from overhead results. In this paper, we propose Location Code based Data Dissemination (LCDD) to improve the data dissemination performance which exploits the similarity between the neighbor node's location code and the target destination node's location code.

The rest of this paper organized as follows. A survey of related work is presented in Section II. Section III introduces the propose location code based data dissemination forward technique. The evaluation of the performance of the propose LCDD forward technique by simulation is discussed in Section IV. Section V proposes a conclusion of the paper.

II. RELATED WORKS

A. Forwarding techniques in OpNET

Forwarding is a single action from the source node, the source node is responsible to forward a message without concerns whether the node receives the message or not. The node has no knowledge about network topology. Numbers of forward techniques are proposed for data dissemination in OpNET. For instances, Spray and Wait (SnW) [7] is a flooding-control protocol. In spray phase, the source node generates a fixed number of message and delivers the duplicates in binary tree with exponential growth till the source node only keeps one message and the fixed numbers of message duplicates control the flooding. In wait phase, a time-to-live (TTL) to be used to measure a message's life in a node, the source node forwards a message to the destination node before the TTL expiration. If the source node does not meet the destination node in the TTL, then the source node discards the message. The SnW improves the Epidemic forward technique.

Context-Aware Routing (CAR) protocol [8] captures the node's attributions from the node's entire context. The CAR utilizes the Kalman filter prediction technique and utility theory to calculate a prediction future value of node, the source node selects a relay node based on the predic-tion future value. The prediction future value calculation takes amount of time, therefore CAR suffers from bad delivery delay results. History-Based routing protocol in Opportunistic network (HiBOp) [9] exploits node's personal information (such as user's name, the residence address, workplace and hobbies, etc.) and node's social relationships (family, classmates, colleagues, etc.) to calculate a node's dissemination probability. The source node selects a relay node based on the dissemination probability. The nodes have to store