

Research Article

EpSoc: Social-Based Epidemic-Based Routing Protocol in Opportunistic Mobile Social Network

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In opportunistic networks, the nature of intermittent and disruptive connections degrades the efficiency of routing. Epidemic routing protocol is used as a benchmark for most of routing protocols in opportunistic mobile social networks (OMSNs) due to its high message delivery and latency. However, Epidemic incurs high cost in terms of overhead and hop count. In this paper, we propose a hybrid routing protocol called EpSoc which utilizes the Epidemic routing forwarding strategy and exploits an important social feature, that is, degree centrality. Two techniques are used in EpSoc. Messages' TTL is adjusted based on the degree centrality of nodes, and the message blocking mechanism is used to control replication. Simulation results show that EpSoc increases the delivery ratio and decreases the overhead ratio, the average latency, and the hop counts as compared to Epidemic and Bubble Rap.

1. Introduction

Opportunistic mobile social network (OMSN) [1–4] is a promising networking model for data dissemination. In the OMSN, mobile nodes grab the opportunity of encountering the peer (they are in the communication range of each other) to forward the data. The OMSN incurs intermittent and disruptive connectivity due to node mobility. To tackle with this complex environment, the store-carry-forward scheme is applied in the OMSN. If no connection is available at a particular time, a mobile node stores data in its buffer and carries them until it encounters other mobile nodes to forward the data [5–8]. Various approaches have been proposed to address the information delivery problem in the OMSN such as in [9–12]. The main concerns of OMSN routing approaches are yielding high delivery ratio, low delay, and low overhead or cost on networks and nodes.

Flooding is one of the dominant schemes to disseminate data in the OMSN [13]. Each message will be flooded to every node in the network. Multiple copies of each message are generated and spread in the network. Epidemic [9] routing protocol is the flooding-based routing protocol. When two

nodes encounter, they exchange all of their messages. This results in messages spread over the whole network by pairwise contacts between two nodes. If no buffer constraints are applied, Epidemic represents the upper bound in message delivery and latency. Epidemic routing is used as a benchmark and a reference for the most of other routing protocols in the opportunistic network. The main drawback of the Epidemic scheme is its high overhead. Many schemes are proposed to decrease the overhead in Epidemic-based approaches by limiting the number of message replicas [14–16]. An effective scheme to control replication spread is the vaccine [17]. It applies the antipacket mechanism to control replica distribution in Epidemic-based routing. In [18], a new scheme is proposed to control the replication of epidemically distributed information. Based on the vaccine scheme, signal distribution is early controlled by the fully immunized vaccine. In addition, a partially immunized vaccine is initiated when there is a local-forwarding opportunity to vaccine more packets.

In the OMSN, mobile devices are portable by humans so that social features of people can be exploited for networking purposes [19–21]. Social-based protocols utilize social properties of mobile users such as similarity, centrality, and