R-SOR: Ranked Social-based Routing Protocol in Opportunistic Mobile Social Networks

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Abstract-Exploiting social information to improve routing performance is an increasing trend in Opportunistic Mobile Social Networks (OMSNs). Selecting the next message's relay node based on the user's social behavior is a critical factor in attaining a high delivery rate. So, to ascertain the most efficient selection of the next relay, the correlation between daily social activities and the social characteristics in the user profiles can be exploited. In this paper, we consider the impact of the social characteristics on mobile user activities during certain periods of the day and then rank these characteristics based on their relative importance in order to be included in the routing protocol. These processes consolidate the proposed Ranked Social-based Routing (R-SOR) protocol to provide an effective way for data dissemination in OMSN. We use the real data set INFOCOM06 to evaluate the proposed protocol. The experimental results show that the proposed protocol has higher routing efficiency than flooding-based protocols such as Epsoc and Epidemic, prediction-based protocols such as PRoPHET, and social-based protocols such as MSM and Bubble Rap.

Keywords-opportunistic networks; mobile social networks; data dissemination; social-based routing

I. INTRODUCTION

Nowadays, smart mobile devices are present in all areas of human activity. They transform the ways of sharing data into a new paradigm of Mobile Social Networks (MSNs) [1-4]. MSNs combine the social features of users carrying mobile devices in the strategy for data delivery. In an Opportunistic Mobile Social Network (OMSN), the mobile nodes communicate opportunistically and data forwarding occurs when they encounter each other. In other words, routes from the sender to the destination of a message are created dynamically, and any possible node can opportunistically be used for the next hop. For these reasons, data routing in such networks is a crucial challenge.

The Store-Carry-Forward (SCF) method was developed as a data forwarding mechanism in opportunistic networks. With the SCF mechanism, each node stores data packets in the buffer. When the node encounters another node, it forwards the duplicated data packets. As a result, network resources such as bandwidth and node packet buffers are consumed in large amounts. For this reason, selecting the appropriate relay is a major challenge and key issue in OMSNs. In [5], the performance of different routing protocols in opportunistic networks is analyzed. For instance, epidemic routing protocols [6, 7] use a flooding-based principle for spreading copies of messages to newly discovered contacts. Prediction-based routing protocols, such as PRoPHET [8, 9], use contact history between users to estimate nodes' delivery probability which characterizes the probability of successfully delivering a message to the destination from a local node. Social-based routing is an emerging research trend where researchers look for ways to use social information of individuals to assist routing as it has been found that people follow almost stable patterns in their social behavior [10].

Routing in mobile networks is a challenging issue [11], networks such as the Vehicular Ad-hoc Network (VANET) and

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