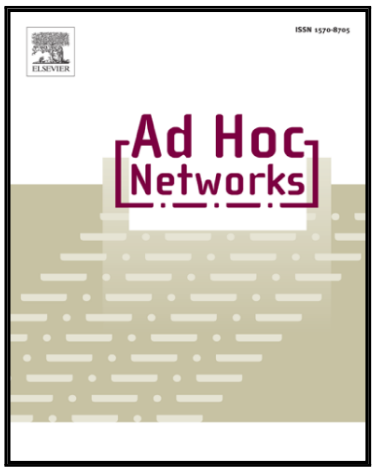

ICN-based cache-aware routing scheme in MSN

Junling Shi, Xingwei Wang, Min Huang

PII: S1570-8705(18)30103-3
DOI: 10.1016/j.adhoc.2018.04.004
Reference: ADHOC 1659

To appear in: *Ad Hoc Networks*

Received date: 26 April 2017
Revised date: 5 March 2018
Accepted date: 5 April 2018

Please cite this article as: Junling Shi, Xingwei Wang, Min Huang, ICN-based cache-aware routing scheme in MSN, *Ad Hoc Networks* (2018), doi: 10.1016/j.adhoc.2018.04.004

ICN-based cache-aware routing scheme in MSN

Junling Shi[a], Xingwei Wang[b,*], Min Huang[c,*]

[a]College of Computer Science and Engineering, Northeastern University, Shenyang, Liaoning 110169, China

[b]College of Software, Northeastern University, Shenyang, Liaoning 110169, China

[c]College of Information Science and Engineering, Northeastern University, Shenyang, Liaoning 110819, China

Abstract

With the growing requirements of digital media by Mobile Social Network (MSN) users, an effective routing scheme plays an important role to transmit the interest requests and the requested contents of users. Due to the native support of Information-Centric Networking (ICN) for mobility, we propose a cache-aware routing scheme in MSN based on ICN paradigm. In the proposed scheme, Interest Routing scheme (IR) is devised based on the social regularity with respect to the proposed interest metrics among nodes, which are obtained by exploiting the content names. To transfer data packets back to the interest requesters, Data Routing scheme (DR) is devised based on the proposed closeness metrics among nodes. An In-network Caching scheme (IC) is devised based on the proposed friendship metrics among nodes to respond to the forthcoming requests, and it can get the shorter response latency than the traditional MSN routing schemes. Simulation results show that the proposed scheme has higher message delivery ratio and lower network overhead than other existing ones.

Keywords: mobile social network, information-centric networking, routing, cache-aware, social regularity

1. Introduction

At present, people widely use mobile devices to generate and consume digital media contents, producing large volumes of traffic. By 2020, the numbers of mobile users and videos are expected to reach 70% of the global population and account for 75% of the global mobile data traffic respectively [1]. With the increasing video appetites of mobile users, Mobile Social Network (MSN) is considered as a promising technology to improve the content provision of digital media [2]. MSN is a mobile communication system which involves the social relationships among users. In particular, the mobile users in such network can access, share, and distribute data (e.g. video) in a mobile environment by exploiting their social relationships [3, 4].

As we know, MSN nodes (e.g., mobile devices held by mobile users) are mobile and their movements are uncontrollable. Such movements cause the frequent change of the network topology and lead to the difficulty to maintain an end-to-end path, which results in the unpredictable data dissemination path [5]. Furthermore, an MSN routing scheme forwards a packet from its source to its destination via intermediate nodes in a distributed environment [6]. Although the requested content may be carried by an intermediate node, the current source-to-destination routing proposals [7, 8] do not consider to cache the content. In other words, the traditional MSN node has no content caching ability, thus leading low routing efficiency. Moreover, according to the previous research [6], the social relationships among MSN users can help improve routing efficiency greatly. However, exploiting the correspondingly diversiform social regularities of users to understand their behavior patterns and enhance their data sharing is still a big challenge [6].

As a new networking paradigm, Information-Centric Networking (ICN) shifts the current host-centric communication mode towards a content-centric one [9]. It makes an explicit separation between "what" (user or content) and "where" (location) [10]. In this way, the network is no longer necessary to interpret the changed location of the content provider for a user. Instead, the user can utilize the consistent name of the requested content to find it. Furthermore, such human-friendly content name reflects the interest preference of the user. When the naming policy used in ICN is integrated into MSN, the implied interest information can be exploited by analyzing the requested content name. As a result, the difficulty of exploiting social regularity in MSN can be solved. In addition, an ICN node has the multiple content copies due to its capacity of in-network caching, and they can respond to the current and forthcoming interest (content) requests [11]. To improve the interest response efficiency in MSN, in-network caching should be considered by effectively caching the content that is carried by the receiving packet, rather than only caching the packet.

Similar to ICN, there are two kinds of packets in this paper, i.e., interest packet and data packet. An interest packet is used to find the content provider for the interest requester, and a data packet is used to return the content from the content provider to the requester. When routing interest packet, to exploit the interest preference of a user, we collect his historical interest

*Corresponding author. Tel.: +86 18512451179
E-mail address: wangxw@mail.neu.edu.cn (Xingwei Wang).