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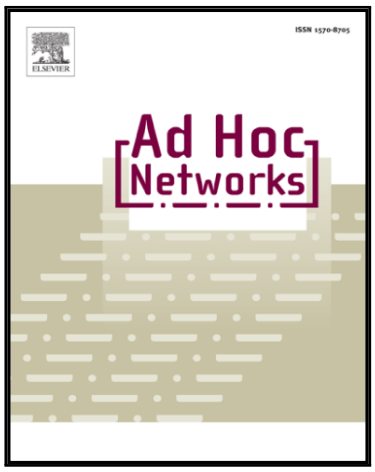

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ACCEPTED MANUSCRIPT

Information-centric mobile ad hoc networks and content routing: A survey

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Abstract

As the future Internet architecture, information centric networking(ICN) can also offer superior architectural support for mobile ad hoc networking. Therefore, information-centric mobile ad hoc networks(ICMANET), a new cross-cutting research area, is gradually forming. First of all, we introduce the current advances in ICN and analyze its development trends, and then interpret the formation of ICMANET and sketch an overview of it. Subsequently, we define a concept model for content routing and categorize the content routing into proactive, reactive and opportunistic, and then detail the representative schemes. Moreover, the existing issues are summarized. The goal of the work is to provide the references and guidelines for readers approaching study on the new area.

Keywords: content routing, mobile ad hoc networks, named data networking, information centric networking

1. Introduction

With booming web applications and ubiquitous wireless access technologies, as well as widespread smart mobile terminals, users can share the user-generated content and popular content with the others in various forms, such as social networks and peered networks, etc. Internet, thus, is evolving from a original communication system to a content distribution platform. However, TCP/IP protocol suite applied by the current Internet requires IP address to identify and locate a host, and then maintain the end-to-end connection to realize reliable data transmission. The host-centric networking(HCN), consequently, fails to match with content-centric applications.

In order to fundamentally address the mismatch, academia proposed various architectures for future Internet, such as the DONA[1], CCN/NDN[2], NetInf[3] and PURSUIT[4], etc., which are collectively referred to as ICN[5]. The philosophy is to transform Internet networking from the host-centric to the content-centric one through naming, routing, caching and securing content. As a matter of fact, ICN is not only suitable for the future Internet but also for the ad hoc networking.

In the ad hoc wireless environment, there are some physical features, such as signal interference, multipath fading, shadowing effect and so forth. Besides, the frequent movement of nodes will cause dynamic change of topology and intermittent connection between nodes. Due to these features, it is difficult to directly apply TCP/IP to ad hoc networking. As a clean-slate approach, however, CCN/NDN using receiver-driven model[6] can enable two communicating parties to interact asynchronously without establishing and maintaining an end-to-end connection, and meanwhile the location-independent naming can eliminate the requirements of reassigning the host identifier(such as IP address) to the moving nodes. In addition, with in-network caching, each node is able to exploit full potentials of the broadcast nature of wireless channel[7] to listen and subsequently cache content, which lowers redundant requests and decreasing content retrieval latency. More generally, all these merits are consistent with the requirements of ad hoc networking.

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