Chapter 2

Mobility Challenges and Management in the Future Wireless Heterogeneous Networks

Jianfeng Guan
Beijing University of Posts and Telecommunications, China

Changqiao Xu
Beijing University of Posts and Telecommunications, China

Hongke Zhang
Beijing University of Posts and Telecommunications, China & Beijing Jiaotong University, China

Huachun Zhou
Beijing Jiaotong University, China

ABSTRACT

With the development of the various network technologies, the mobility management as a growing concern issue has been one of the most expected features in the future wireless heterogeneous networks environments. Both academia and the industry look forward to the deployment of mobility support, but none of the proposed solutions have been adopted in the large scale due to the various impediments. This chapter investigates the mobility challenges and management in the wireless heterogeneous environment, gives a brief description of the current mobility management solutions, and provides a comparison of the different solutions including their advantages and disadvantages.

The organization of this chapter is as follows: It begins by analyzing the mobility challenges under the multi-accessing wireless heterogeneous environments. Next the chapter gives a brief introduction of the mobility management. Afterwards it introduces the state-of-art of the mobility management solutions and describes the respective approaches and compares their advantages and disadvantages. The last section concludes this chapter.

DOI: 10.4018/978-1-4666-0017-1.ch002
INTRODUCTION

Mobility management as an important issue in current and future wireless heterogeneous environments has been got growing concern and many mobility management schemes have been proposed in the past few years (Zhu, 2010). The mobility can be classified into terminal mobility, session mobility, personal mobility and service mobility based on the different mobile entities (Strang, 2005). Terminal mobility happens when a terminal changes its attachment to the network, which may cause the change of the IP configuration. Here the terminal can be a traditional cellular device or a portable device such as notebook. Personal mobility means that a user can be globally reachable by unique personal identifier and originate or receive a service by accessing to any authorized terminals. While the session mobility is similar to the personal mobility which uses the different devices with diverse characteristics while maintaining state or transferring the session from one host to another. As for the service mobility, it enables a user to obtain subscribed and personalized services consistently even if connected to a foreign network service provider anytime and anywhere.

In this chapter we mainly concern on the terminal mobility which allows a device to move between subnets while being reachable to other host to maintain the ongoing communication. The objective of this chapter is to investigate the mobility management challenges and the relevant solutions under future wireless heterogeneous environments, and to analyze their development trends and future directions.

BACKGROUND

Mobility management born with the development of the wireless mobile communication systems, and migrates into the Internet due to the big success deployment of the IP-based services. The emerging the mobility management is due to the drawback of the traditional networks which are designed for the static hosts connected through wired networks that cannot support the mobile hosts. The mobility management solutions are generally classified into the link layer mobility support, network layer mobility support, transport layer mobility support and the application layer mobility support. IEEE 802 workgroup mainly focuses on the link layer mobility support and has published several standard specifications in the past few years include the 802.11f (Kerry, 2003), 802.11r (Kerry, 2008), 802.16e (Marks, 2006), 802.20 (Klerer, 2009) and 802.21 (Gupta, 2009). As for the network mobility support, Ioannidis et al. proposed the Columbia protocol (Ioannidis, 1991) to provide mobility on a campus, which uses the Mobile Support Station (MSS) as the default access router for all mobile nodes in that cell. The Mobile Node (MN) uses an IP address derived from a special IP prefix as its identifier. Each MSS keeps a tracking list of MNs that are currently in its cell. MSS detects the attachment and detachment events to notify the related MSS to update the records. At the same time, Teraoka et al. (1991) proposed the Virtual Internet Protocol (VIP) solution, which modify the IP header to carry the virtual IP address as the identifier and a regular IP address as the locator. After that, Bhagwat and Perkins (1993) proposed Loose Source Routing (LSR) protocol which introduces a designated router for each MN to assign an IP address as the identifier, and introduces the Mobile Access Station (MAS) entity in each network to perform the location management. Afterwards, Bhagwat et al. (1996) surveyed the mobility support solutions and compared several selected candidate proposals. Based on the proposed solutions, IETF published the Mobile IPv4 (MIPv4) specification (Perkins, 1996). After that, IETF successively standardized the MIPv4 (Perkins, 2002), Mobile IPv6 (MIPv6) (Johnson, 2004), Proxy Mobile IPv6 (PMIPv6) (Gundavelli, 2008), Dual-Stack Mobile IPv4 (DSMIPv4) (Tsirtsis,
Related Content

Link Failure Avoidance Mechanism (LFAM) and Route Availability Check Mechanism (RACM): For Secure and Efficient AODV Routing Protocol
[www.igi-global.com/article/link-failure-avoidance-mechanism-lfam-and-route-availability-check-mechanism-racm/209431?camid=4v1a](www.igi-global.com/article/link-failure-avoidance-mechanism-lfam-and-route-availability-check-mechanism-racm/209431?camid=4v1a)

Security and Mobility Aspects of Femtocell Networks
[www.igi-global.com/chapter/security-mobility-aspects-femtocell-networks/61954?camid=4v1a](www.igi-global.com/chapter/security-mobility-aspects-femtocell-networks/61954?camid=4v1a)

Detection of PUE Attack in CRN with Reduced Error in Location Estimation Using Novel Bat Algorithm

IP Paging for Mobile Hosts in Distributed and Fixed Hierarchical Mobile IP
[www.igi-global.com/article/paging-mobile-hosts-distributed-fixed/55883?camid=4v1a](www.igi-global.com/article/paging-mobile-hosts-distributed-fixed/55883?camid=4v1a)