Chapter 1
An Efficient Policy for Vertical-Handover-Based Multi-Attribute Utility Theory in Heterogeneous Wireless Networks

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ABSTRACT

The rapid evolution of wireless networks over the last decade has allowed users to reach any access network at anytime and anywhere. The main challenge in this heterogeneous network is to determine the best access network for the end user in terms of quality of service (QoS) when the vertical handover process is needed. In this chapter, the authors propose an efficient policy for vertical handover based on multi-attribute utility theory. This theory combines two approaches the utility function and multiple attributes decision making (MADM). Firstly, they apply the utility function to build the utility values which are inputted to the attributes matrix decision of MADM. Then they use the NMMD algorithm which is MADM technique to rank the interfaces according utility values. The simulation results demonstrate that the proposed policy can achieve a significant improvement concerning three parameters: the reversal phenomenon, the ping-pong effect, and the number of handoff failures.

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INTRODUCTION

The future of mobile wireless communications represents a heterogeneous environment which integrates variety of network generation like third generation (3G), fourth generation (4G) and fifth generation (5G). The 3G mobile system is designed to support multimedia services and video teleconferencing with data rate of 2 Mbps to 11 Mbps. The 3G can be divided into two groups. The first group represents cellular networks designed by the International Telecommunication Unit's (UIT). The universal mobile telecommunication system (UMTS) is one of the most popular 3G network. The standardization of UMTS network (Javier, & Mamadou, 2001) is carried out by Third Generation Partnership Project (3GPP). In addition the UMTS network can provide wireless data with data rate of 2Mbps.

The second group of 3G systems consists of wireless access networks specified by IEEE 802.11 committee (IEEE 802.11. 2007). These networks include WiFi (IEEE 802.11 a) and its extended systems such as IEEE 802.11b, IEEE 802.11n, etc. For example, the IEEE 802.11 a technology can ensure data rate of 11 Mbps. Furthermore, the 4G technology is on all IP system characterized with high data rate and high coverage area. The 4G system can integrate cellular networks such as Long Term Evolution (LTE) and wireless networks such as Interoperability for Microwave Access (WIMAX). The LTE network (Barth, U. 2006) is specified by 3GPP in December 2008, this standard allows supporting a variety of services such as interactive and streaming. The WiMax network (IEEE 802.16) is specified by the IEEE 802.16 committee (IEEE 802.16. 2004). This technology have been deployed in order to provide high data and to support multimedia applications.

In this heterogeneous environment, the deployment of 3G technology and 4G technology became a reality for different telecommunications companies since last decade. Actually both 3G and 4G have been increasing demand of utilization in spite of their limitations in term of coverage, bandwidth and mobility. In this context, in order to enhance the quality of service (QoS), to ensure high mobility and to increase the bandwidth, the companies of telecommunications are currently driving the development of the fifth generation network (5G). With the emergence of this new technology, the industry and the enterprises have the opportunity to shift their behavior from the traditional models business management to the modern ways of operation and management. This transition referred to a new paradigm namely digital transformation.

Indeed, based on broadband capability and the high mobility of the 5G technology, the digital transformation paradigm allows for customers and different industries the ability to share information and resources anytime and anywhere, the ability to collaborate more between different actors of each industry, the possibility to accelerate business activities and to overturn traditional business models.

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www.irma-international.org/chapter/online-engagement-and-impact/115070