

# An optimized travelling time estimation mechanism for minimizing handover failures and unnecessary handovers from cellular networks to WLANs

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## Abstract

**Purpose** – The paper aims to propose an optimized handover necessity estimation scheme for a mobile terminal (MT) traversing from a third-generation (3G) cellular network into the wireless local area network (WLAN) cell for reducing the number of handover failures and unnecessary handovers.

**Design/methodology/approach** – The proposed optimized handover necessity estimation scheme comprises of two algorithms – a “travelling time prediction” reliant on consecutive received signal strength (RSS) measurements and MT’s velocity, and a “time threshold estimation” depending on the handover latency, WLAN’s cell radius, tolerable handover failure probability and the tolerable unnecessary handover probability.

**Findings** – Our performance analysis reveals that the suggested mechanism effectively minimizes the number of handover failures and unnecessary handovers by 60 per cent as compared to the already proposed schemes in the literature.

**Originality/value** – The convergence of Internet and wireless mobile communication accompanied by a massive increase in the number of cellular subscribers has led mobility management to emerge as a significant and challenging domain for wireless mobile communication over the Internet. Mobility management enables serving networks to locate roaming terminals for the call delivery (location management) and ensures a seamless connection as MT enters into the new service area (handover management). In this manuscript, an optimized handover necessity estimation scheme has been envisaged for reducing the probability of handover failures and unnecessary handovers from 3G cellular networks to WLANs to provide optimal network utilization along with an enhanced user satisfaction. Performance analysis reveals that the suggested scheme yields enhanced results as compared to the schemes already proposed in the literature.

**Keywords** Quality of service, Handover failure probability, Received signal strength, Vertical handover decisions

**Paper type** Research paper

## 1. Introduction

Over the recent past, wireless communication market has witnessed a considerable amount of intensification, both in aspects of mobile technology and subscribers, which has led network operators and vendors to apprehend the importance of efficacious networks along with an equally intelligent design processes (Hasswa *et al.*, 2007; Misra, 2013; Yan *et al.*, 2010). Wireless communication has today become ubiquitous; it has

