UNIVERSITI TEKNOLOGI MARA

PERFORMANCE MEASUREMENT OF LTE ALONG LIGHT RAPID TRANSIT (LRT) RAILWAY TRACK OF KELANA JAYA LINE

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ABSTRACT

Abstract— This thesis presents the results of LTE signal measurements of commercial mobile devices on board of a train with the velocity of 80 to 100 km/h along the railway track. This study aimed to measure the quality of cellular LTE coverage from Kelana Jaya LRT station to Gombak LRT station considering the fact that there have been growing demands for better service quality from the subscribers.

The measurement was performed by conducting a drive test at the frequency range of 1800 MHz in a commercial network where the results were obtained using the G-Net Track. The measurement results exhibited that the quality of the LTE coverage had not yet reached the standard specified by the Third Generation Partnership Project (3GPP) group in terms of Reference Signal Received Power (RSRP), Signal Interference Noise Ratio (SINR), and data rate. From the measurement results presented in this study, the operators in Malaysia can acquire the benefits for future LTE deployments along the railway track.

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CHAPTER ONE

INTRODUCTION

1.1 RESEARCH BACKGROUND

There are several categories of communication technology in the railway system. One of the technologies is known as GSM-Railways (GSM-R). GSM-R is one of the most vital communication networks for railways due to its rising recognition across Europe and other places around the world, which replaced the legacy national railway communication technologies [1]. Nonetheless, GSM-Railway (GSM-R) is an outdated mobile technology with some drawbacks in terms of competence and capacity. These drawbacks have become a major problem for railways, as GSM-R is unable to support advanced data services and limit the number of running trains in certain areas. Consequently, GSM has slowly been abandoned by telecommunication operators.

In Malaysia, the needs for adopting GSM-R by railways have become unsound. Therefore, alternative technologies such as LTE should be considered to better suit the present and future demands of communications technology for railways. The technological reason to use LTE is related to the enhanced performance and capacity of new broadband communication system for both passengers and railway operation [2]. One of the purposes to use LTE is the allocation of the new spectrum. The worldwide depiction for LTE spectrum is very fragmented and complex yet generally, there are two spectrum ranges that are provided in Malaysia. A smaller area, which is at about 1800 MHz in the digital dividend, is good for medium capacity requirements over a wide region. On the other hand, a larger area at about 2600 MHz may offer more bandwidth yet it has limited coverage. Communication technology in railways is a very dire environment for communications because of factors such as fast changes in the channel due to long distances, high speeds, interferences with other systems, obstructions, high-rise tower, dead zones and bandwidth capacity.