

UNIVERSITI TEKNOLOGI MARA

PERFORMANCE ANALYSIS OF CAPACITY IMPROVEMENT
USING ADDITIONAL FREQUENCY SPECTRUM IN
UNIVERSAL MOBILE TELECOMMUNICATIONS
SYSTEM (UMTS) NETWORK

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ABSTRACT

Nowadays, the common method of upgrading network capacity is by upgrading the carrier by using 2100 MHz and 900 MHz spectrum. However, with increasing demand from the users, most of the macro cells are in maximum configurations and could not be upgraded further. The capacity needs are being check on a daily basis to ensure that every particular macro cells have enough capacity to cater for the data traffics. Countless research has been done on techniques to increase capacity on UMTS network. However, none of the research proposed to expand the capacity using additional frequency spectrum. This is due to allocation of spectrum already given to the mobile providers and it is costly to obtain additional frequency spectrum. Nevertheless, mobile providers can share the frequency spectrum among them. This study proposes on enhancing UMTS capacity by using additional frequency spectrum. By referring to carrier upgrade policy and triggering, two trial sites are chosen based on their high failure rate, high HS users as well as good traffic distribution. Designing process is done based on the analysis and the carrier architecture has been deployed into live network. The implementation of the additional carrier show positive improvement as the failure rate decreased to zero and the coverage of the sites becomes wider which allows it to capture additional traffic from the users.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

The fast growing communication technology has witnessed huge data traffic development along the communication generation. Mobile data services are penetrating mobile markets rapidly [1]. It means, with rising of traffic demand will lead to increasing of spectrum demand in the future. By contemplating into Second Generation (2G) data traffic usage, Third Generation (3G) comes with advance features to accommodate the data traffic needs. 3G is also known as Universal Mobile Telecommunications System(UMTS). The overall architecture of UMTS network can be translated as Figure 1.1:

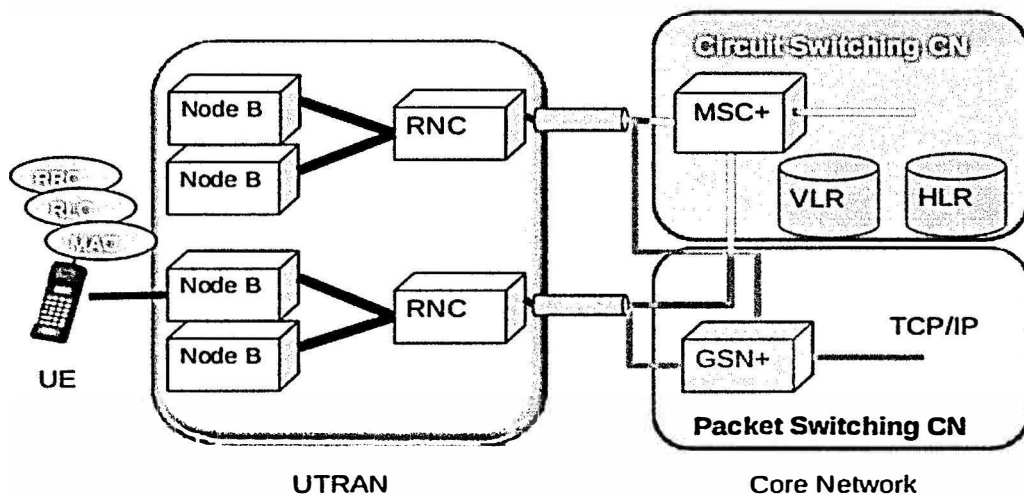


Figure 1.1: UMTS network architecture

Each of the macro cells with 2G capability were upgraded with 3G capability in order to synchronize with the enormous data traffic usage. Since the mobile industry rely heavily on data services, it is critical for the mobile operators to maintain