APPLYING SMART ANTENNA ON SOFT HANDOVER BY SIMULATION USING OPNET

This thesis is presented in partial fulfillment for the award of the

Bachelor of Electrical Engineering (Honours)

UNIVERSITI TEKNOLOGI MARA

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ACKNOWLEDGEMENT

In the name of Allah S.W.T, The Most Beneficent, The Most Merciful. It is with deepest sense of gratitude of the Almighty Allah who gives me the strength and ability to complete this project.

I would like to thank Prof. Madya Norhayati Ahmad for his supervision, knowledge, support and persistent encouragement during my final project at University Technology of MARA.

My studies would not have been complete without the help and the friendship of others, which gave me so much help and support. They will always have a place in my fond memories.

I would also like to extend my thanks to the numerous members of support staff who have made the technical and financial part of my work possible. Finally, with my love and gratitude, I want to dedicate this thesis to my family who has supported me.

ABSTRACT

Mobile networks allow users to access services while on the move so giving end users "freedom" in terms of mobility. However, this freedom does bring uncertainties to mobile systems. The mobility of the end users causes dynamic variations both in the link quality and the interference level, sometimes requiring that a particular user change its serving base station. This process is known as handover (HO). Compared with the conventional hard handover employed in the Global System of Mobile (GSM) networks, the soft handover used in IS-95 and being proposed for third-generation (3G) has better performance on both link and system level. In this project, the performances of soft handover are studied by applying smart antenna in OPNET Soft Handover model. Then, the simulation results are compared with soft handover that uses omni-directional antenna in terms of their performance in soft handover network.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Handover in Wideband Code Division Multiple Access (WCDMA) can be classified into three: hard handover, soft handover and softer handover. In these systems the hard handover approach would cause excessive interference into the neighbouring cells. The base station, to which the user equipment (UE) is currently connected to, would have to increase its output power a lot to keep the signal quality at a reasonable level, before the call is handed over to the destination base station. The same goes for every handover and consequently the capacity in the system would be substantially reduced. To avoid this, using hard handover, you would need to switch to the new cell as soon as the signal quality is higher than in current cell. This is not, however, feasible in practice. One problem is the rapid variations in the signal quality, due to fast fading, which would cause ping-pong effects, where a UE switches between two cells a number of times before one cell is finally chosen.

Instead, WCDMA systems use something called soft handover, which means the UE is connected to more than one (RBS), at the same time. With this approach a new RBS will be added to the set of RBSs the UE currently is connected to (active set), when the signal strength exceeds a certain threshold. The threshold is the signal quality from the currently best RBS when the handover is made, and the additional interference will be lower than if using hard handover. All the RBSs in the active set can receive the signal from the UE, and the UE can coherently combine the signals form the different RBSs.