FORWARD LINK POWER CONTROL FOR HIGH ALTITUDE PLATFORM STATION W-CDMA SYSTEM

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A project report submitted in partial fulfilment of the requirements for the award of the degree of Master of Engineering (Electrical- Electronics & Telecommunications)

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NOVEMBER 2008
This work is dedicated to my beloved parents, for all the sacrifices they have made to ensure that I obtain the best education possible. Their unconditional love and words of encouragement has really been a tonic to me. Looking back to the dark days and tough times I have been through, my parents has always given me the strength to persevere. Then I dedicated to my brother and sisters. May Allah be with them every step of the way, and richly bless them in everything they do.
ACKNOWLEDGEMENTS

First and foremost, I would like to give thanks to the Almighty Allah for He made my dream comes true by giving me strength and good health to complete this study. Without Him, all my efforts would have been fruitless but because He is the only one who knows our fate, He made it possible for me to pursue my studies at UTM.

Special thanks go to my supervisor Dr. Jafri Bin Din, for allowing me to carry out this study under his supervision, and for his constructive criticism and support, which has enabled me to complete this study on time. During the past one year of my research under his supervision, I have known Dr. Jafri Bin Din as a sympathetic and principle-centered person. He thought me how to be a challenger, how to set my benchmark ever higher and how to look for solutions to problems rather than focus on the problems. I learned to believe in myself, my work and my future. Thank you Dr. Jafri Bin Din, for your love, emotional and intellectual support as well as your never-ending faith in me.

Last but not least, I am forever indebted to all my family members for their constant support throughout the entire duration of this project. Their words of encouragement never failed to keep me going even through the hardest of times and it is here that I express my sincerest gratitude to them.
ABSTRACT

In parallel with terrestrial and satellite wireless networks, a new alternative based on platforms located in the stratosphere has recently introduced, known as High Altitude Platforms (HAPS). HAPS are either airships or aircraft positioned between 17 and 22.5 km above the earth surface. It has capability to deliver a wide spectrum of applications to both mobile and fixed users over a broad coverage area. Wideband code division multiple access (WCDMA) has emerged as the mainstream air interface solution for 3G networks. Also the ITU has specifically authorized the use of some IMT-2000 (3G) frequency bands from HAPS. This project addresses only forward link power control for high altitude platform station for a WCDMA under the assumption of power control imperfections. Power control improves the uplink and the downlink performance both by equalizing the powers of all users in a cell and by compensating for the channel fading. However in real systems power control imperfections degrade the system capacity. In this project, the performance of two distance based forward link power control schemes (nth-power-of distance and optimum power control schemes) are evaluated for high altitude platform station (HAPS) W-CDMA systems. For a HAPs system with 19 beams, the total capacity of the system would be in the order of 1206 voice users or 144 data users. The coverage of the platform with 19 beams each with a radius of 1.2 km can by approximated by a circle with a radius of 6 km. It has been shown that HAPS UMTS gives capacity and resource management improvements.
ABSTRAK

Seiringan dengan ragkaian terestrial dan satelit, satu alternatif rangkaian berdasarkan aplikasi platform terapung di lapisan stratosfera telah diperkenalkan. Ia dikenali sebagai High Altitude Platforms (HAPS). Teknologi HAPS menggunakan kapal terbang atau stesen udara yang diletakkan pada posisi 17km dan 22.5km daripada permukaan bumi. Teknologi ini berkemampuan untuk menghantar maklumat dalam julat spektrum frekuensi yang luas untuk aplikasi perhubungan pengguna-pengguna mobil atau tetap. Posisi HAPS di udara membolehkan kawasan yang agak luas mendapat liputan darinya. Wideband code division multiple access (WCDMA) telah muncul sebagai kod penggunaan yang utama untuk solusi jaringan 3G yang menggunakan perantara udara. ITU telah mengkhususkan penggunaan beberapa julat frekuensi IMT-2000 (3G) untuk pengunaan teknologi HAPS. Projek ini mengkaji penalaan jaringan kuasa arah-hadapan untuk HAPS, menggunakan WCDMA dengan anggapan penalaan kuasa adalah tidak sempurna. Perbaikan penalaan kuasa dilakukan dengan menyamakan penggunaan kuasa oleh setiap pengguna dalam satu sel dan melalui pengimbangan saluran frekuensi yang menurun. Namun, dalam kondisi sebenar, kondisi penalan kuasa tidak sempurna merendahkan kapasiti sistem secara keseluruhan. Di dalam projek ini, prestasi dua skim penalaan jaringan kuasa arah-hadapan (skim kawalan kuasa-n dengan jarak dan kuasa optimum) dilaksanakan ke atas sistem HAPS-WCDMA. Untuk sistem HAPS yang menggunakan 19 pancaran, kapasiti total sistem berkenaan adalah 1206 suara pengguna atau 144 data pengguna. Kawasan yang mendapat liputan stesen HAPS yang mempunyai 19 pancaran dengan jejerian setiap pancaran 1.2km boleh dianngarkan dengan yang lingkaran yang berjejari 6km. Telah dibuktikan bahawa HAPS UMTS meningkatkan kapasiti dan prestasi pengurusan sumber.