UNIVERSITI TEKNOLOGI MARA

SUB-CARRIER EFFICIENT RESOURCE ALLOCATION FOR MIMO-OFDMA BASED COGNITIVE RADIO

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ABSTRACT

Orthogonal Frequency Division Multiple Access (OFDMA) is the access techniques used in Cognitive Radio (CR). By assigning subset Resource Allocation (RA) of subcarrier to individual user, the multiple accesses are achieved in OFDMA whereby low data rate transmission from several users is allowed. The issues are inter-block interference (IBI) and inter-carrier interference (ICI) which will reduce the caparcity. Proposed Subcarrier allocation scheme will be introduced to reduce the interference and also to increase the capacity. Next, different type of diversity techniques will also be used for the subcarrier resource allocation to determine the best performance of OFDMA. The result from diversity research on this MIMO-OFDMA will most likely produce a better performance for the STF diversity technique. Besides, by increasing the number of subcarrier will also increase the transmission capacity over number of users.

CONTENTS

CHAPTER I

INTRODUCTION

1.0 Background

In the early 1980s, Digital Audio Broadcasting (DAB) and Digital Video Broadcasting (DVB) were very hot topics, and OFDM was the technology selected and developed for Digital Terrestrial Broadcasting in Europe [1]. By many, OFDM was actually perceived as the only technology that is able to cope with difficult multipath conditions and particularly for mobile reception.

Next in the year of 1990, the DVB project in Europe adopted OFDM for digital terrestrial TV broadcasting and single-carrier transmission for satellite and cable TV. After adoption of the transmission technique for these applications, the group started to work on the return channel. The return channel of cable network topics were concentrated on TDMA and its variants like DECT. Since the cable return channel is subject to narrowband interference, a basic OFDMA scheme which allocates one carrier to each user seemed to be an interesting choice [2].

An OFDMA with a single carrier per user requires a single-carrier transmitter and an OFDM receiver. Therefore, it avoids the PAPR problem of OFDM systems. The carriers subject to narrowband interference can be discarded. This makes OFDMA much more robust to narrowband interference than TDMA and CDMA. The proposal to the DVB project was not accepted at that time. But OFDMA was later included in the DVB-RC specifications [3].

Currently, Orthogonal Frequency Domain Multiplexing (OFDM) and Orthogonal Frequency Domain Multiple Access (OFDMA) are two promising technologies adopted in IEEE 802.16 standard to support broadband wireless access as well as multimedia quality-of-service (QoS). The OFDMA is a version of multi user OFDM digital modulation scheme. By assigning subset of subcarrier to individual user, the multiple accesses are achieved in OFDMA whereby low data rate transmission from several users is allowed [4].