Topics in Coding, Cryptography and Information Security

Editors:

Mohammad Umar Siddiqi
Sigit Puspito Wigati Jarot
Othman Omran Khalifa

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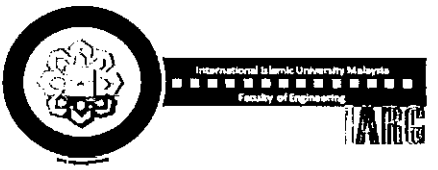

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Chapter 7

Convolutional Coded OFDM in Broadband Mobile Communication[1]

Sigit P.W. Jarot

7.1. Introduction

OFDM is one of the promising systems to support the generation broadband mobile communication system, due to its capability to mitigate inter-symbol interference in high bit rate transmission over mobile radio channel. OFDM based systems have been used in many applications of wired and wireless communication systems. OFDM is also the modulation scheme that has been official selected for the several new standards in broadband wireless such as LTE, 802.11 and WiMax.

Error correcting coding across OFDM subcarriers, in conjunction with frequency interleaving, is one of powerful methods in improving the performance of OFDM systems, by taking advantage of frequency diversity. The importance of channel coding and interleaving in an OFDM system is very well known, and there have been several studies for various applications, such as, DAB [3], [4], wireless ATM [5], satellite communication [6], wireless home link [7], and so forth. These varieties of study show that the coding strategy and its aspects very much depend on the applications and the channel environments of the system. Since convolutional coding is one of the error correction coding that is most widely used in OFDM systems so far, it is important to clarify the performance of the convolutional coding and the frequency diversity effect, in a broadband mobile radio channel. In this chapter, we present evaluations of the performance of convolutional coded OFDM system. Coding rate, delay interval, Doppler frequency, interleaving span and number of sub-carriers are used for evaluation parameters.

This chapter presents the performance evaluation of convolutional coding focusing on the frequency interleaving effects in OFDM over 80 MHz broadband mobile radio channel, for various coding rate, delay interval, Doppler frequency, and number of subcarriers. Computer simulation demonstrates that frequency interleaving span has to be changed when the path interval changes, in order to keep the system performance. This chapter is organized as follows. Section 7.2 gives explanation on system model, including the frequency interleaving method, and the channel model assumed for performance evaluation. Section 7.3 presents the

[1] Portions of the material have appeared previously in [1], [2] and [10].