UNIVERSITI TEKNOLOGI MARA

PERFORMANCE OF TYPE-I HYBRID ARQ USING REED SOLOMON CODE

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ABSTRACT

Reed Solomon code is one of the most effective error control scheme and it is a type of Forward Error Correction (FEC) code. This error control code is normally used in data transmission. Meanwhile, Automatic Repeat Request is another type of error control scheme that is widely used as error detection because of its simplicity. In recent years, there have been numerous researches on the third error control scheme known as Hybrid Automatic Repeat Request or in short Hybrid ARQ. The need to have a reliable transmission and to provide a throughput as high as possible has increased the system complexity and lead to the study of Hybrid ARQ.

It is believed that FEC and ARQ can overcome the drawbacks of FEC and ARQ schemes. To realize this, the model of Hybrid ARQ system is modelled. The Reed Solomon code and ARQ protocol are combined to form a hybrid ARQ. The system model of Type-I Hybrid ARQ scheme is developed and its performance is simulated using MATLAB$^{®}$. This thesis focuses on the performance study of Bit Error Rate (BER) and throughput.

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CHAPTER 1

INTRODUCTION

This chapter provides the background of the study and statement of problem. It also gives details of the significance of the study on error control system, the issues and problems that led to this research. The objectives of the study are discussed in this chapter as well.

1.1. Background of the study

The emergence of telecommunication technologies i.e.: UMTS (HSDPA and HSUPA), mobile WiMAX and 3GPP Long Term Evolution urges for high speed communication networks in packet data communication. A concern arises when there are high data transmissions in a communication system which contributes to higher transmission errors. In order to reduce the transmission errors caused by the channel noise and interferences such that data can be transmitted with a minimum error, a joint system for error detection and correction known as Hybrid Automatic Repeat Request (HARQ) has been developed.

Fundamentally, there are two categories of techniques for controlling transmission errors in data transmission systems; the Forward Error Control scheme or abbreviated as FEC scheme and an Automatic Repeat Request (ARQ) scheme [1]. The FEC protocols use coding schemes to correct errors in the receiver. Forward Error Correction (FEC) works