

Title	Chained Turbo Equalization for OFDM System without Guard Interval
Author(s)	Irawan, Ade; Anwar, Khoirul; Matsumoto, Tad
Citation	電子情報通信学会大会講演論文集, 2011: 281-281
Issue Date	2011-02-28
Type	Conference Paper
Text version	publisher
URL	<a href="http://hdl.handle.net/10119/9839">http://hdl.handle.net/10119/9839</a>
Rights	Copyright (C) 2011 The Institute of Electronics, Information and Communication Engineers (IEICE). Ade Irawan, Khoirul Anwar, and Tad Matsumoto, 電子情報通信学会大会講演論文集, 2011, 281-281.
Description	IEICE General Conference 2011

# Chained Turbo Equalization for OFDM System without Guard Interval

Ade Irawan\*, Khoiril Anwar\* and Tad Matsumoto\*<sup>‡</sup>

\*Information Theory and Signal Processing Lab., School of Information Science, Japan Advanced Institute of Science and Technology (JAIST)

<sup>‡</sup>Center for Wireless Communications, University of Oulu, Finland

## 1 Introduction

This paper proposes Orthogonal Frequency Division Multiplexing (OFDM) system without guard interval using Chained Turbo Equalization (CHATUE) with a doped accumulator to improve the bit-error-rate (BER) performance. OFDM systems commonly use cyclic prefix as GI to mitigate inter-symbol interference (ISI) due to the multipath fading channel. However, the use of GI causes loss in spectral efficiency. The CHATUE algorithm in [1] allows us to completely remove the GI where the exchange of log-likelihood ratio (LLR) between the neighboring OFDM symbols is used to eliminate the ISI components. The convergence property of the proposed technique is analyzed using the Extrinsic information transfer (EXIT) chart.

## 2 Simulation

Fig. 1 shows the considered system model. The system parameters are summarized in Table 1. We assess performances of OFDM with GI and without GI. To make a fair comparison, a puncturing is used by OFDM transmitter to keep the same symbol duration of OFDM with GI and without GI.

Table 1 Simulation Conditions

Parameter	Specification
Modulation	BPSK
Sub-carriers (FFT points)	512, no training sub-carriers
GI length	64, 128
Encoder	CC with GP = [5,7] R = 1/2, 2/3, 4/7
Interleavers	Random
Channel	64 paths, Jakes Model
Equalizer	FD/SC-MMSE
Iterations	10
Decoder	log-MAP BCJR

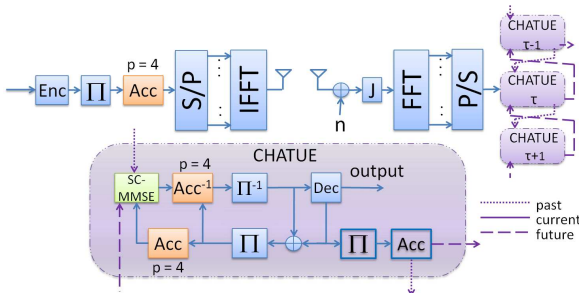


Fig. 1 System Model

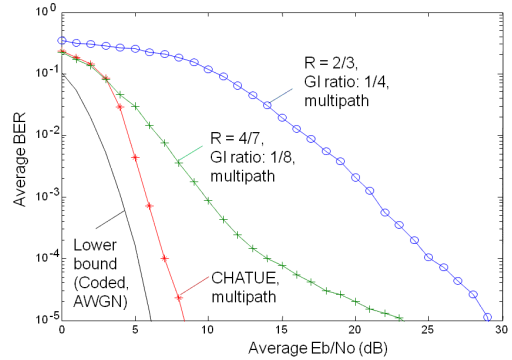


Fig. 2 OFDM BER Performance

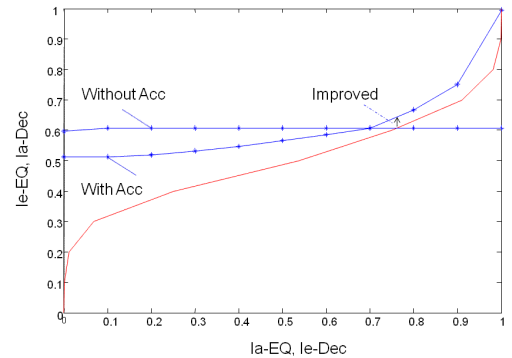


Fig. 3 EXIT of CHATUE when Eb/No = 4 dB

## 3 Result

Fig. 2 shows that with the same spectral efficiency, OFDM system without GI can improve the BER performance by about 14dB for R=4/7 and 20dB for R=2/3 with BER 10<sup>-5</sup>. Doped accumulator is used to achieve the (1,1) mutual information point and to obtain a matching between equalizer and decoder as shown in Fig. 3.

## 4 Conclusion

The CHATUE algorithm makes the OFDM transmission is possible with significant performance improvements. The improvement is obtained by replacing the GI part with parity bits information that strength the error protection capability of the system.

## Reference

[1] K. Anwar, H. Zou and T. Matsumoto, *Chained Turbo Equalization for Block Transmission Without Guard Interval*, in *VTC-spring 2010*, May 2010