Adaptive Equalizer Decoder
Application Note

Adaptive equalizer in Wavecom W-CODE

In modern digital communication systems data is transmitted at high speed through some band-limited channels (e.g., dial-up telephone network, high-frequency (HF) wireless radio channel etc.). Transmission over such channels is distorted by bandwidth restrictions (e.g., 3 kHz for most telephone line), multipath dispersion, and in HF radio channel Doppler fading may cause a problem as well. All these problems result in intersymbol interference (ISI) in digital communication, which causes high data error rate.

For this reason an equalizer is generally required in the demodulation to compensate such interference before the data can be further processed. Because the channel or the distortion may change with time (time-variant), such equalizer must be adaptive. There are many kinds of equalizers: optimum equalizer estimates the maximal likelihood data sequence according to the channel knowledge. Such equalizer has usually very high computational complexity and is impractical or infeasible for time-variant channel.

Many kinds of low complexity equalizer are proposed. They include linear equalizer, which operates with different criteria e.g. peak distorti-

on, minimum mean square error (MMSE), etc. Decision feedback equalizer (DFE) is a very popular nonlinear equalization scheme. In most case it is a combination of a linear equalizer and a nonlinear decision part, both parts can be implemented with different algorithms. Most recently, iterative equalizers (Turbo equalizers) are researched where channel estimation and channel decoding are considered as well.

All these techniques may be combined to reach a lower data error rate at low computational complexity. This is a very old but still very active research area.

There are several kinds of adaptive equalizers in Wavecom decoders: decision feedback equalizer based on Kalman algorithm, equalization based on estimated channel matrix and Turbo equalizer.

These equalizers are used in most MIL and STANAG modes, because most of them employ a bandwidth effecient single carrier 8-PSK modulation scheme for high speed data transmission (up to ca. 10k bps).

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Since more than thirty years Wavecom Elektronik AG has developed, manufactured and distributed high quality devices and software for the decoding and retrieval of information from wireless data communication in all frequency bands. The nature of the data communication may be arbitrary, but commonly contains text, images and voice. The company is internationally established within this industry and maintains a longstanding, world-wide network of distributors and business partners.

Product Information

Products	http://www.wavecom.ch/product-summary.php
Datasheets	http://www.wavecom.ch/brochures.php
Specifications	http://www.wavecom.ch/product-specifications.php
Documentation	http://www.wavecom.ch/manuals.php
Online help	http://www.wavecom.ch/content/ext/DecoderOnlineHelp/default.htm
Software warranty	One year free releases and bug fixes, update by DVD
Hardware warranty	Two years hardware warranty
Prices	http://www.wavecom.ch/contact-us.php

System Requirements

	Minimum	Recommended
CPU	Core i5 or Core i7 2.8 GHz	Core i7-6700 3.4 GHz
Memory	4 - 8 GB RAM	16 - 32 GB RAM
OS	Windows 7	Windows 10 32-bit or 64-bit

Distributors and Regional Contacts

You will find a list of distributors and regional contacts at http://www.wavecom.ch/distributors.php

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