DVB-S2 Demodulator Core DVBS2-D

Technical Overview

The Zaltys DVB-S2 Demodulator (DVBS2-D) IP core is a variant of the Zaltys HDRM-D2 demodulator core which implements a DVB-S2 compliant demodulator. The core accepts I & Q complex baseband samples from an external RF front-end through dual-ADCs. The demodulator output is a sequence of symbols, nominally positioned at the specified constellation points, intended to drive an external LDPC / BCH soft-decision FEC decoder to recover the MPEG transport stream data.
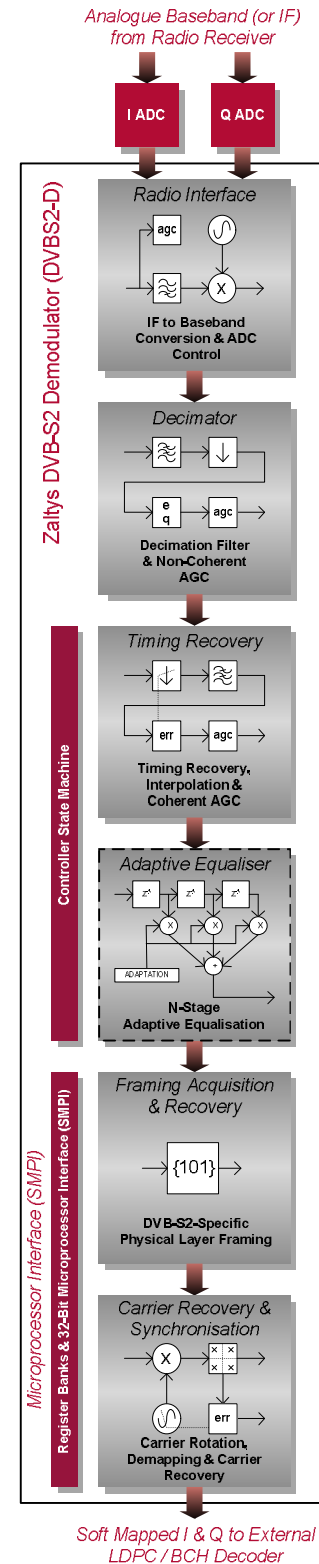
In order to deliver excellent performance, the design utilizes multiple gain control stages within the data path to maximize dynamic range. Up to four sets of matched root-raised cosine filter coefficients can be incorporated into a given implementation, allowing four excess bandwidth values for the input signal to be selected in software. All aspects of the timing and carrier recovery are fully programmable, including loop filter coefficients and lock detector thresholds. In addition, monitoring registers provide a high degree of software visibility for parameters such as frequency offsets, lock levels and SNR estimation.

The demodulator datapath consists of six distinct sections. These correspond to the Radio Interface, Decimator, Timing Recovery, Adaptive Equaliser, Framing Acquisition, and Carrier Recovery functions. The overall operation of the system is automatically managed by an integrated Finite State Machine controller. Communications with the core is handled by a 32-bit Simple Microprocessor Interface (SMPI).

Features

"
" Excellent performance
" Supports QPSK, 8PSK, 16APSK & 32APSK modulations
" Supports VCM operation
" Normal and short frame sizes
" 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 code rates
" Simple microprocessor interface (SMPI)
" Data capture and monitoring facilities throughout data path
" Fully synchronous design with single clock

Analogue Baseband (or IF) from Radio Receiver

I ADC   Q ADC

Zaltys DVB-S2 Demodulator (DVBS2-D)

Radio Interface
agc
IF to Baseband Conversion & ADC Control

Decimator
e q   agc
Decimation Filter & Non-Coherent AGC

Timing Recovery
err   agc
Timing Recovery, Interpolation & Coherent AGC

Adaptive Equaliser
ADAPTATION
N-Stage Adaptive Equalisation

Framing Acquisition & Recovery
{101}
DVB-S2-Specific Physical Layer Framing

Carrier Recovery & Synchronisation
err
Carrier Rotation, Demapping & Carrier Recovery

Controller State Machine

Microprocessor Interface (SMPI)
Register Banks & 32-Bit Microprocessor Interface (SMPI)

Soft Mapped I & Q to External LDPC / BCH Decoder

DVB-S2 Demodulator Core

Applications

″ Satellite Communications

″ Microwave Line-of-Sight

″ Broadcast Networks

Licensing

There are three licensing models for this IP core (both royalty-free and royalty-based):

″ Single-Project Netlist (project-based, FPGA-specific)

″ Multi-Project Netlist (site-based, FPGA-specific)

″ Multi-Project VHDL (site-based, source-code)

Additional Products

Zaltys Related Cores

The Zaltys DVB-S2 modulator (DVBS2-M) is an efficient, high-performance, DVB-S2 modulator and is the natural partner for the Zaltys DVB-S2 demodulator core.

Zaltys MPE adapters enable Ethernet and other data services to be connected to our range of modulators and demodulators to provide high data rate communication links. The Zaltys MPE Encapsulator core (MPE-E) encapsulates high rate Ethernet and arbitrary data streams in a transport stream so they can be input to a modulator (such as the Zaltys DVBS2-M) for transmission. At the receiver, a demodulator (such as the Zaltys DVBS2-D) recovers the transport stream and the Zaltys MPE Decapsulator core (MPE-D) recreates the original Ethernet and other data streams.

Silicon Infusion also supplies many other communications-related cores to help complete your design, including our High Data Rate modulator and demodulator cores (HDRM range), DVB-S and DVB-S2 solutions and Intelsat related framing and FEC solutions. Please contact us with your enquiry.

Zaltys Evaluation Boards

Evaluation boards are available for Zaltys products including the DVBS2-D core. They connect to a PC via a USB or serial port, allowing easy communication with the ZEDwire Communicator software.

Zaltys GUI Software (ZEDwire Communicator)

ZEDwire Communicator is a software GUI which runs under Microsoft Windows®. It interacts with the Zaltys evaluation boards, enabling rapid testing and evaluation of Zaltys cores.

About Silicon Infusion and Zaltys

Silicon Infusion has been established for over ten years, and has a successful history of providing unique and innovative technical solutions to the wireless telecommunications industry. Our global client list includes organisations from many diverse market sectors - from Broadcast and Telecoms equipment manufacturers to Military solutions providers.
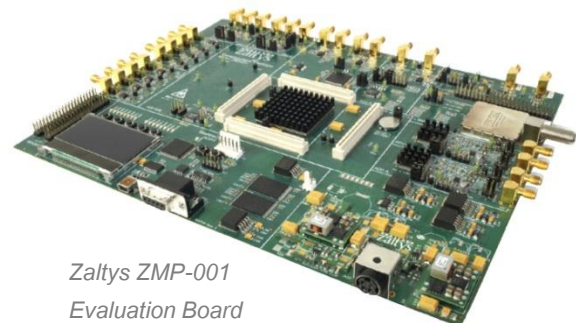
The Zaltys range of products are used for efficient high-speed transmission of voice, video and data. Zaltys modem cores are currently being used in many third-party products, carrying many thousands of user connections on a daily basis.

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Zaltys ZMP-001
Evaluation Board