UEB 400 DXP

Receiver, recorder and analyzer for DAB signals according to ETSI EN 300 401

Key features:

- Recording of DAB data streams recovered from an RF signal
- Structural analysis of DAB(+)/DMB multiplexes
- Bit error analysis with PRBS sequences
- Measuring of temporal variation of a received signal

Fields of application:

- Capturing of data streams for replay and off-line analysis
- DAB analyzer for developers, broadcasters and network operators
- Test of receivers and transmitters
- Validation of SFN synchronism
- Coverage measuring

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Software & Data Communication - The world of bit streams is our business!

VAD

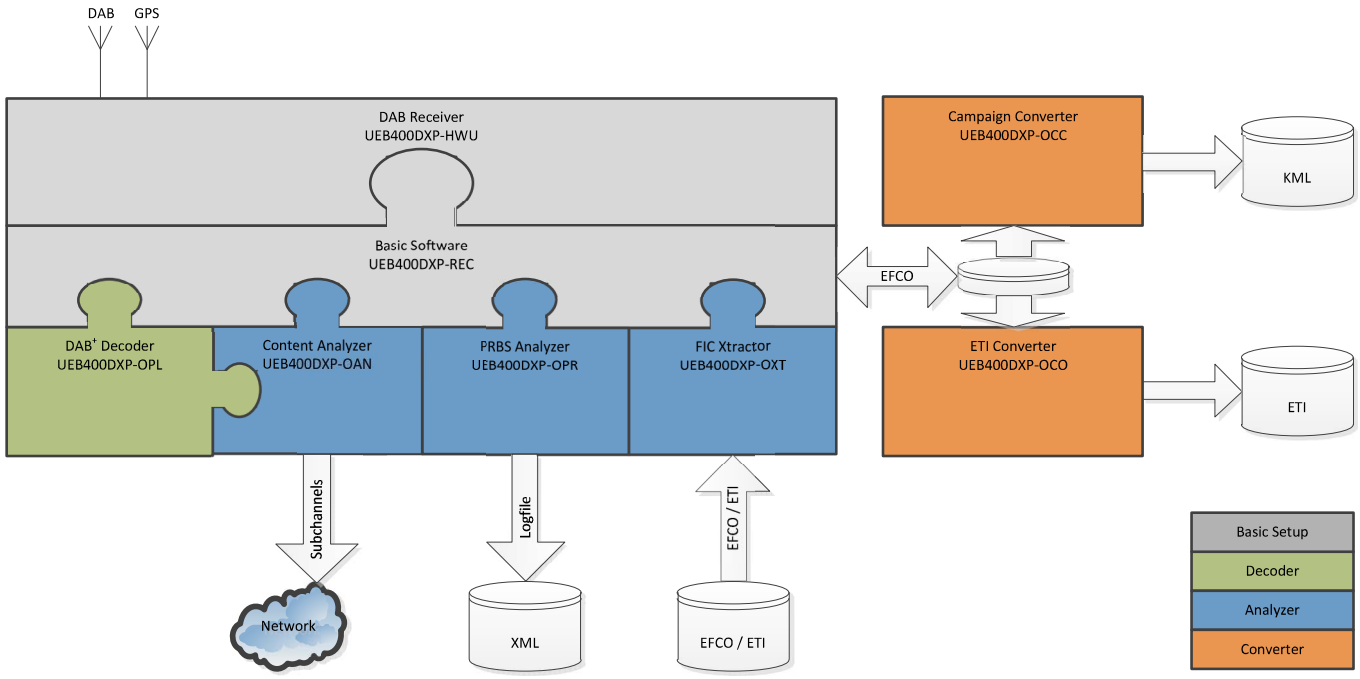
Description

The UEB 400 DXP allows the user to receive DAB signals according to ETSI EN 300 401 and to perform a detailed analysis of the data streams contained therein. A comprehensive collection of tools gives a clear view on the structure of the data streams and supports the user in tracking error sources in the transmission chain.

Furthermore data streams recovered from the DAB Signal can be captured in EFCO[1] files and converted to ETI data streams.

Such test patterns can be employed for the verification of DAB receivers and the final inspection of transmitters.

The modular software design facilitates the configuration of custom-made solutions. The data analysis as well as the conversion and modification of test patterns can be done either on site or later by processing EFCO data captured previously. An overview of the receiver's components and their interactions is given in the following block diagram.



UEB400DXP software options

The setup of the receiver, the adjustment of its reception frequency and the control of capturing and replaying EFCO data files is carried out utilizing a convenient graphical user interface (GUI). This GUI can be installed on a PC or laptop, which also stores the recovered data streams in EFCO files. Connecting the UEB 400 DXP to a PC requires a USB interface.

The GUI provides basic functionality for signal analysis and enables one to investigate the bit error rate (BER) of the FIC and MSC. Furthermore it provides a clearly structured presentation of the ensemble configuration and decodes DAB audio data (MUSICAM).

Further investigation of EFCO data can be carried out by applying an optional decoder, which can process data streams provided by the UEB 400 DXP as well as previously recorded data streams.

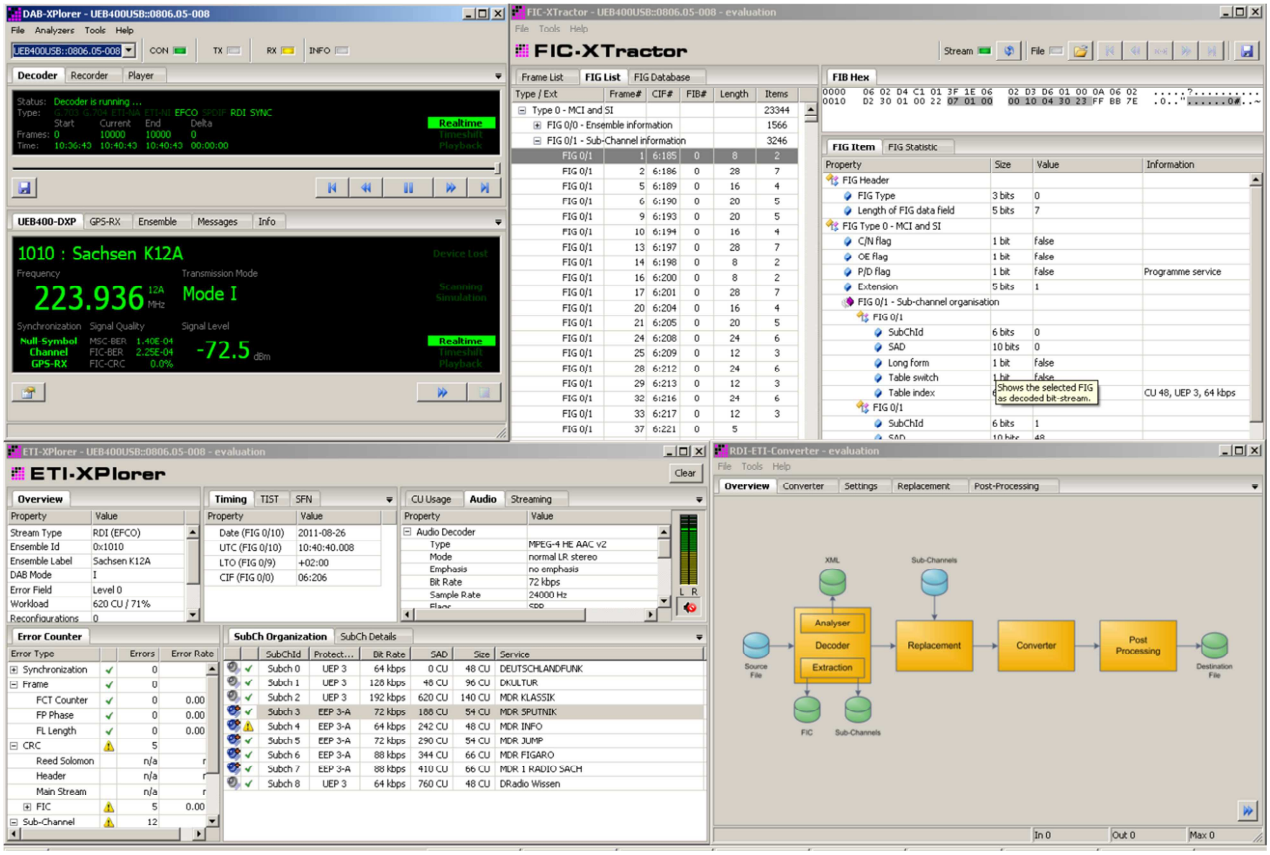
The EFCO decoder allows structural analysis of the FIC and MSC, evaluation of messages regarding the receiver state and the streaming of subchannels via UDP.

The GUI of the UEB 400 DXP and the EFCO decoder can be upgraded with supplementary components for processing DAB+ and T-DMB data streams.

In addition, convenient tools are available for signal investigations utilizing PRBS sequences and structural analysis of the FIC. Conversion of the recorded data into ETI files and their further processing is done by applying a separate converter.

Using the measured data of the integrated GPS receiver it is possible to calculate the time jitter of a DAB signal and geo referenced illustration of quality parameters. Based on the jitter calculation of the DAB signal the synchronism of a single frequency network (SFN) can be validated.

[1]EFCO - enhanced full capacity output - internal data format, which contains the FIC and MSC data of all subchannels. Besides this, extra information concerning bit errors recognized by the viterbi decoder and the state of the receiver is included.



UEB400DXP software package

Connectors and controls

The following drawing depicts the close-packed front panel of the UEB 400 DXP, which carries all major connectors and operational controls of the device.

An SMA connector (1) serves as RF input for signals in L-band as well as for signals in VHF-band III. It can be biased for the supply of active antennas with a regulated DC voltage of 8.5 V on customer's demand. To its right the RF input (2) of the GPS receiver is located. A two-coloured LED (3) close-by indicates proper GPS reception.

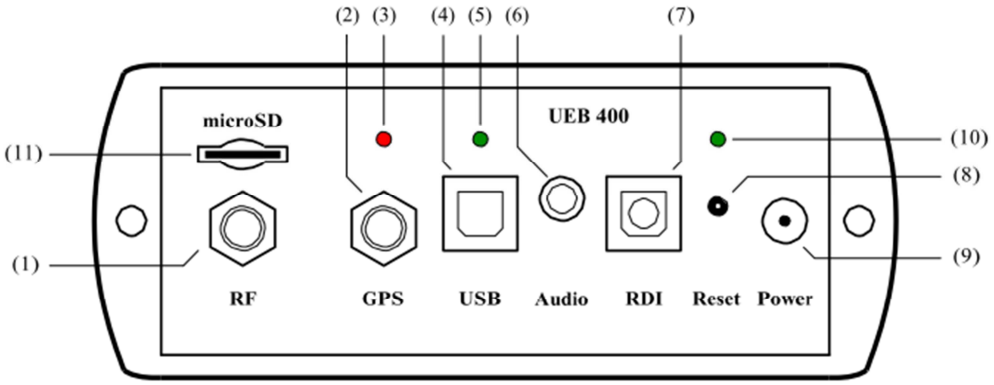
The setup of the receiver, the exchange of status information and the transmission of the recovered data stream are done by means of a USB interface (4) using a B-type USB connector. The state of this interface is also signalized by an LED (5).

A USB cable for connecting to the host-PC is shipped with the UEB 400 DXP.

In addition, the front panel houses an analog stereo audio jack to feed active speakers (6) and the optical interface connector (7) of the UEB 400 DXP. The latter can be used either for the output of the recovered data stream according to the RDI standard or as a digital audio output (S/PDIF). The desired function is determined by a jumper inside the UEB 400 DXP; the manufacturer's default is the usage for RDI output.

The front panel is completed by a buried reset button (8) and the connector for the power supply (9). A green LED (10) indicates the presence of the supply voltage.

The UEB 400 DXP is fitted with a microSD card slot (11), which is located well accessible next to the RF input connector.



UEB400DXP front panel

Power supply

The power supply of the UEB 400 DXP requires a DC voltage in the range of 4.5 V to 14.5 V, which can be supplied through the provided wall power supply or any other (unregulated) DC source. The UEB 400 DXP has an integrated reverse polarity protection.

Product characteristics

Technical data

RF characteristics

Input Impedance	50 Ω/ VSWR < 2,0	
Input level range[1]	−95 dBm ...	−20 dBm
Input frequency range	174 MHz ...	240 MHz
	1452 MHz ...	1492 MHz
Tuning step size		16 kHz
Adjacent channel selectivity[1]		> 40 dB
Overall selectivity[1]		> 40 dB

Supplied data

RDI-Interface FIC/MSC data of all subchannels; additional information regarding bit errors; RSSI

USB-Interface[2] FIC/MSC data of all subchannels; additional information regarding bit errors; state of synchronism; ensemble structure including detailed information on sub-channels, services, components and labels; BER of FIC/MSC; RSSI; NMEA data of the GPS receiver; etc.

EFCO-Analysis verification of check sums (reed-solomon, FIB-CRC, CRC of scale factors, ISO-CRC); checking of frame counter and frame length as well as timestamps; detection of reconfigurations; display of the structure of all subchannels including their main parameters; play back of any DAB audio channel (MUSICAM, optionally DAB+)

FIC-Analysis statistical information concerning the contained FIGs; display of time and date; structural analysis of the included subchannels, services and components and their dependencies

PRBS-Analysis suitable for the final inspection of transmitters in accordance with ETSI EN 302 077 and receiver tests according to EN 50248; BER measurements within the MSC

FIC-XTractor structural analysis of (captured) FIC data streams on FIB and bit level

GPS-Campaign-Converter geo referenced RSSI, BER of FIC/MSC, audio error rates as Google Earth™ KML files

Interfaces

Setup & data	USB 2.0 High Speed
RDI/SPDIF[3]	TOSLINK
Miscellaneous	Analogue-Audio (Stereo)

Power supply

Supply voltage	4.5 ... 14.5 VDC
Power consumption	< 2 W

General data

Dimension (W/L/H)	108 x 200 x 42 mm³
Mass	650 g
Operating temperature range	0°C to +40°C

Ordering information

Hardware Options:

UEB400DXP-HWU Receiver for DAB+ /T-DMB with USB interface and integrated GPS receiver; USB cable; wall power supply; antenna for VHF-band III and L-band; active GPS antenna;

DABXP-CM CM-Stick USB-Licence-Key

Software Options:

UEB400DXP-REC DAB(+)/DMB Basic-Software

UEB400DXP-OAN EFCO decoder; analysis of FIC and MSC; logging of messages; streaming of subchannels via UDP or pipes

UEB400DXP-OCC GPS-Campaign-Converter

UEB400DXP-OCO RDI-ETI Converter

UEB400DXP-OPL DAB(+)-Decoder

UEB400DXP-OPR PRBS-Analyzer

UEB400DXP-OXT FIC-XTractor

Dongle Options:

UEB400DXP-OCC-D GPS-Campaign-Converter

UEB400DXP-OCO-D RDI-ETI Converter

UEB400DXP-OXT-D FIC-XTractor

[1] for BER < $1*10^{-4}$ according to EN 50248: "Characteristics of DAB receivers"
[2] The communication is compatible with the protocol of the DAB 752 by Philips and based on the exchange of commands, notifications and periodicals.
[3] The desired function is determined by an internal jumper; manufacturer's default is RDI.

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