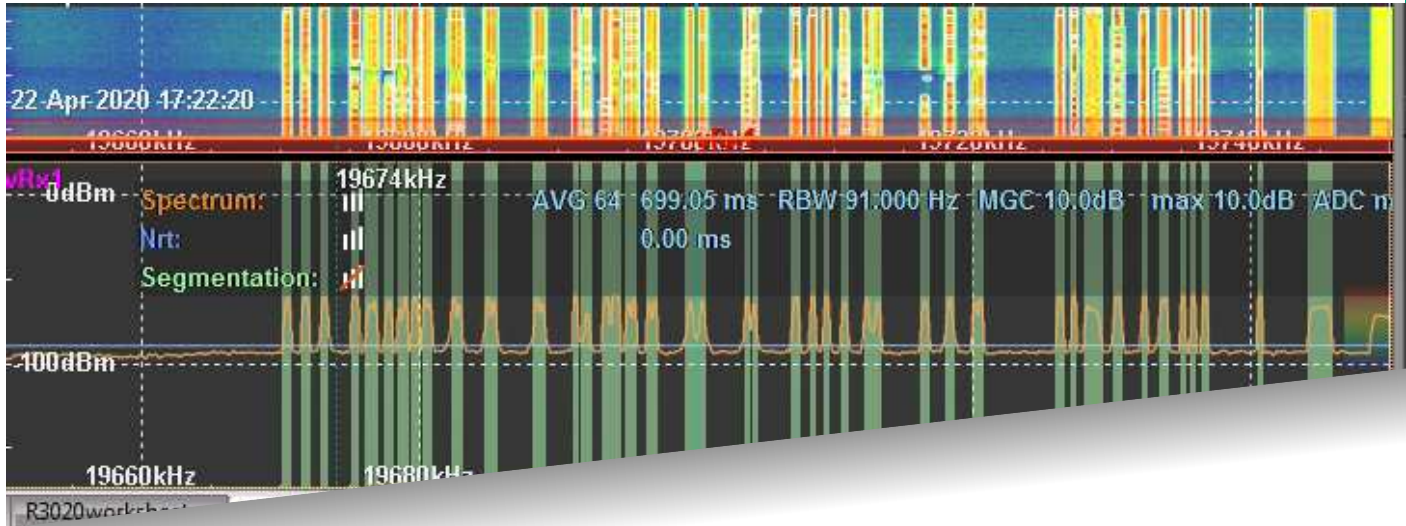


IZT RF Surveillance System



- Versatile radio monitoring solution
- Automated HF/VHF/UHF surveillance
- Supports all IZT receivers
- Continuous buffering and recording
- Signal acquisition and classification
- Content production
- Post-processing

KEY FEATURES

- Seamless online and offline processing
- Create databases and signal libraries
- Extension with IZT direction finder components
- Multiple parallel IZT receivers
- Monitor multiple signals of interest simultaneously
- Versatile visualization of spectrum
- Powerful signal acquisition
- Hopper declaration
- Demodulate analog and digital signals

Seamless Online and Offline Processing

If supported by the receiver, the first processing stage is a large buffer combined with automatic frequency selective recording (AFSR). An automatic database clean-up optimizes the required storage space.

Versatile Visualization of Spectrum

The spectrum can be visualized in the IZT Signal Suite GUI in versatile way:

- Spectrum
- (Long-term) Spectrogram
- Persistence display
- Multiple windows can be arranged by the user
- Zoom and scroll function
- Browsing through past data while recording
- Configurable PSD parameters

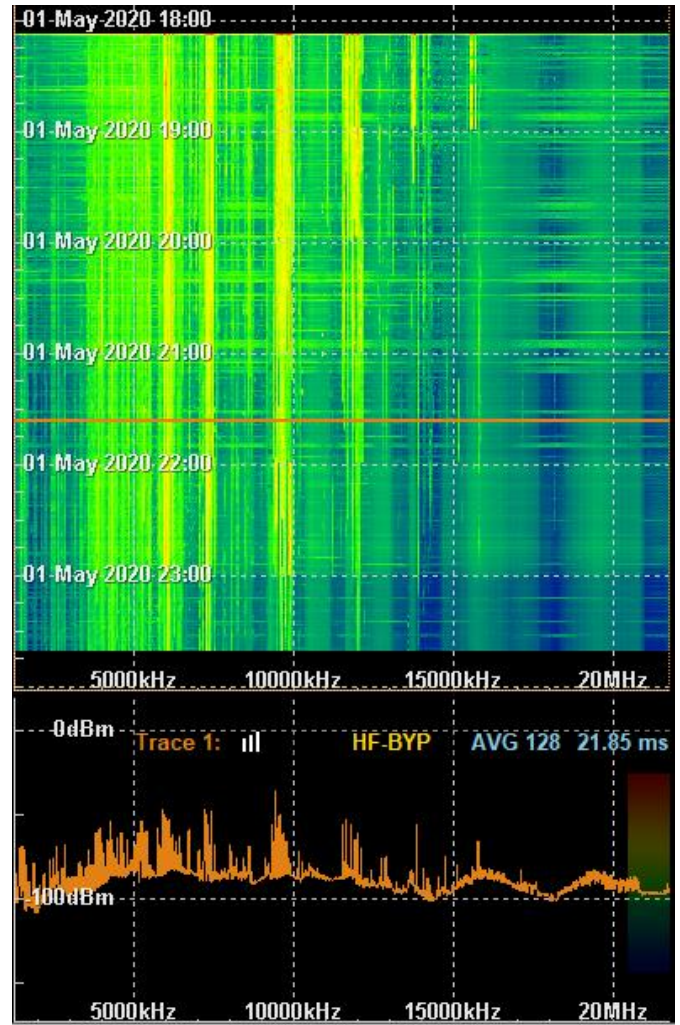


FIGURE 1: LONG-TERM RECORDING WITH SPECTROGRAM AND SPECTRUM VIEW

Powerful Signal Acquisition

For the identification of signals a noise-riding threshold (NRT) makes the system robust to colored and quickly changing noise, which is especially important in the HF domain.

Extension with a Direction Finder

The surveillance system can be extended with a direction finder component to locate the transmitter position and/or to separate co-channel signals.

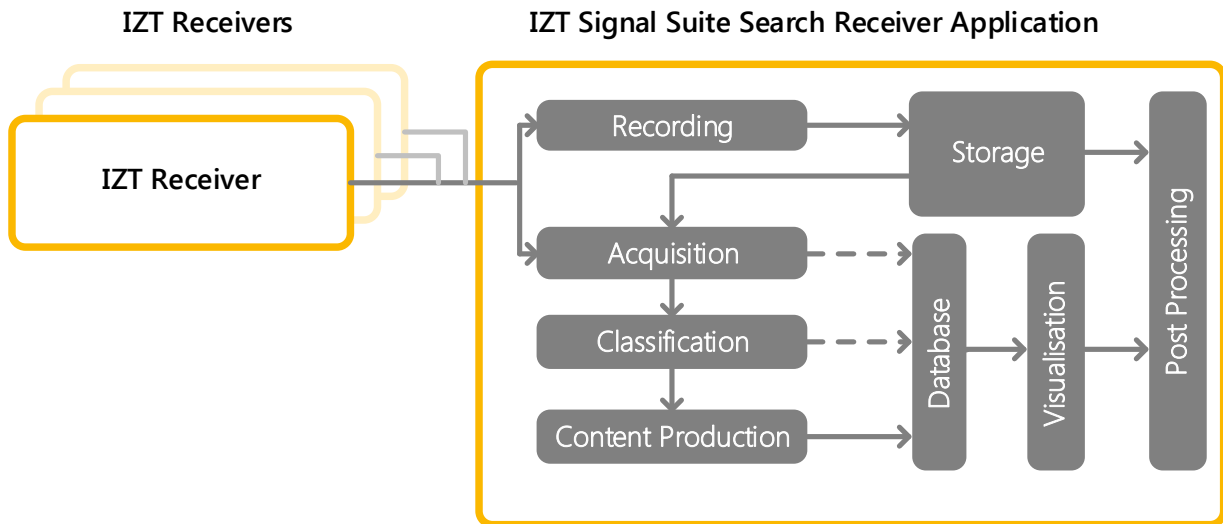


FIGURE 2: SYSTEM COMPONENTS

OVERVIEW

The IZT RF Surveillance System is a powerful, modern system for massive parallel intercept, recording, acquisition, classification and content production of signals in the radio spectrum. It is suitable for terrestrial and satellite signals and supports different decoder packages.

The system is scalable in terms of instantaneous bandwidth and number of simultaneous decoding and analysis channels. Large buffers allow for long-term storage and seamless online and offline processing for optimum utilization of the available decoder resources.

The IZT RF Surveillance System can be enhanced with a direction finder component for locating emissions and separation of co-channel signals.

SYSTEM DESCRIPTION

The system components are shown in Figure 2.

IZT Receivers

IZT offers a broad range of high-quality receivers suitable for HF, VHF, UHF or satellite monitoring up to 120 MHz real-time bandwidth. The HF band can be covered full-simultaneously with very high linearity.

Recording to Storage

The whole received signal band or user-configurable subbands of it are recorded to a storage system. In addition the signals for classification and content production are also stored.

Technology	99% BW	Power level	C/N	C/N0	Modulation	Center (fine)	Symbol rate	Roll-off	Info bit rate	Channel code	Inner cod
	220.681 kHz	-75.96 dBm	33.44 dB	85.09 dBHz	QPSK	1234.000 MHz	146.283 kBd	0.35	292.567 kbit/s		
	157.543 kHz	-75.90 dBm	33.67 dB	85.15 dBHz	QPSK	1235.000 MHz	137.775 kBd	0.35	275.550 kbit/s		
Intelsat	216.707 kHz	-75.86 dBm	34.11 dB	85.19 dBHz	8PSK	1236.000 MHz	128.001 kBd	0.35	256.002 kbit/s	TCM	0.67
Intelsat	235.314 kHz	-75.85 dBm	33.76 dB	85.21 dBHz	8PSK	1237.000 MHz	139.462 kBd	0.35	278.925 kbit/s	TCM	0.67
Intelsat	192.208 kHz	-75.84 dBm	34.64 dB	85.21 dBHz	8PSK	1238.000 MHz	113.774 kBd	0.30	255.992 kbit/s	TPC	0.75
	115.561 kHz	-75.85 dBm	35.25 dB	85.20 dBHz	8PSK	1239.000 MHz	97.522 kBd	0.35	292.566 kbit/s		

FIGURE 3: CLASSIFICATION RESULTS (IZT MODREC)

Signal Acquisition

In the signal acquisition step, the signals are detected and analyzed in frequency domain. For each detected signal the following parameters are determined: coarse center frequency, 3dB/10dB/90%/99% bandwidths, power level and C/N ratio.

Classification

In this step, the modulation scheme and/or transmission standards are classified and modulation parameters such as symbol rate, roll-off factor and carrier frequency are determined. It can be performed with IZT ModRec or 3rd party software.

Content Production

After determination of the transmission standard the signals are demodulated and decoded in the content production step. It can be performed with 3rd party software.

Database and Visualization

All results of the signal acquisition, classification and content production steps are stored into a database. The decoupled visualization of the database entry can be performed by an IZT or 3rd party result viewer.

Post-Processing

The stored recordings can be post-processed by an IZT software such as IZT Signal Suite or IZT Signal Explorer or by 3rd party products.

Modem	Center	Text	Start	Duration	Stop
ARQ-E Cyc4 85...	n/a	II0%58.40%58.4_3_4#-/+PU ENG...	04/22/20 17:22:...	173.4s	04/22/20 17:24:...
ARQ-E3 48Bd 4...	19.678805 MHz	/_	04/22/20 17:22:...	163.6s	04/22/20 17:24:...
ARQ-E3 48Bd 4...	19.678805 MHz	ZZZUUZZZZZUUZZZZZUUZZZ...	04/22/20 17:22:...	9.8s	04/22/20 17:22:...
PACTOR I/II/III	19.675372 MHz		04/22/20 17:22:...	9.8s	04/22/20 17:22:...
Tetra	391.462376 MHz	22.04.2020 17:22:31.915 Country C...	04/22/20 17:22:...	52.7s	04/22/20 17:23:...
Tetra	392.187733 MHz	22.04.2020 17:22:31.476 Country C...	04/22/20 17:22:...	146.7s	04/22/20 17:24:...
Tetra	391.112548 MHz	22.04.2020 17:22:30.895 Country C...	04/22/20 17:22:...	5.7s	04/22/20 17:22:...
Tetra	392.388183 MHz	22.04.2020 17:22:30.838 Country C...	04/22/20 17:22:...	28.7s	04/22/20 17:22:...
Tetra	390.413085 MHz	22.04.2020 17:22:30.895 Country C...	04/22/20 17:22:...	28.7s	04/22/20 17:22:...
Tetra	394.287423 MHz		04/22/20 17:22:...	6.7s	04/22/20 17:22:...
Tetra	394.437575 MHz	22.04.2020 17:22:30.824 Country C...	04/22/20 17:22:...	85.4s	04/22/20 17:23:...

FIGURE 4: CONTENT PRODUCTION RESULTS

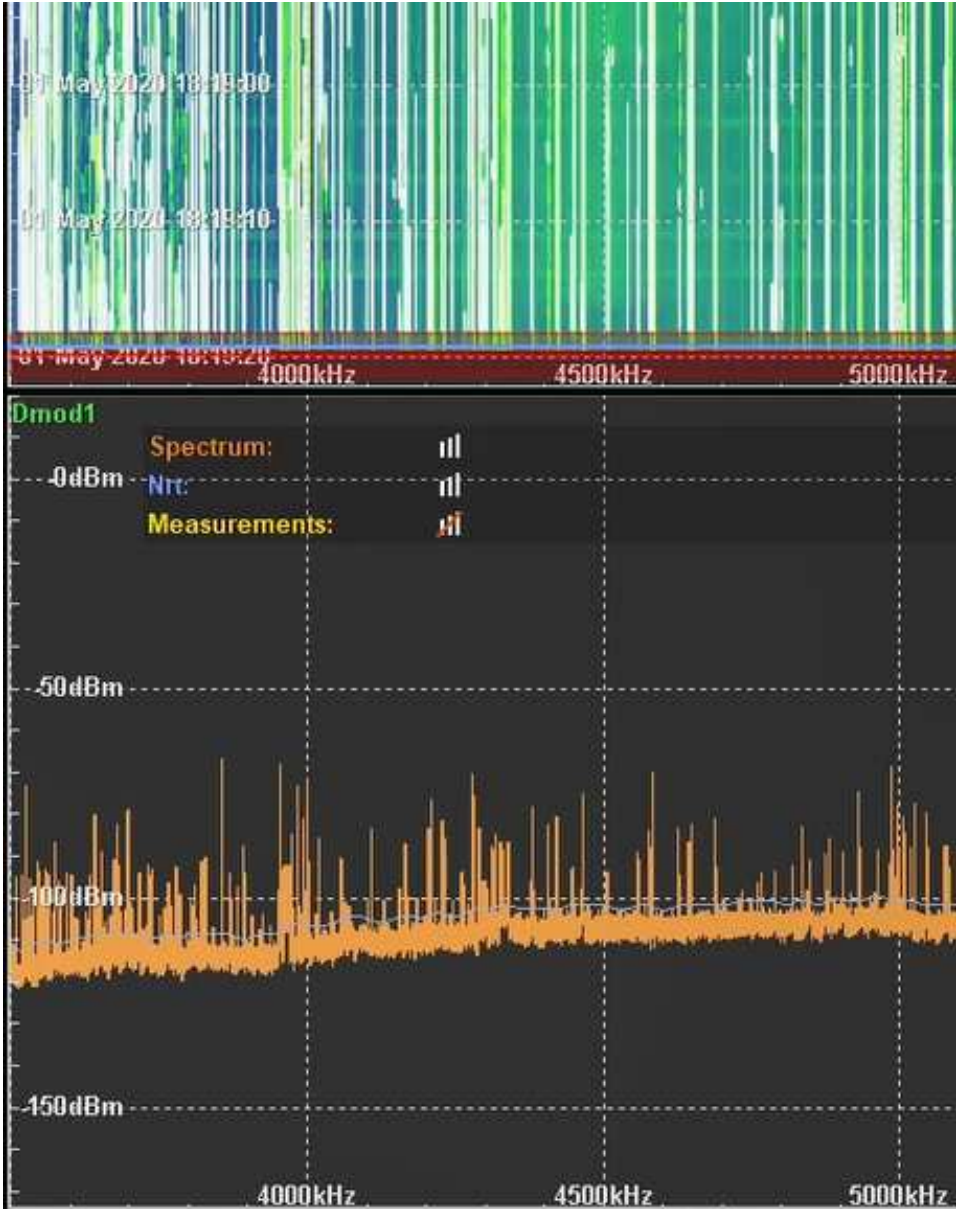


FIGURE 5: EMISSIONS ARE ACQUIRED AND VISUALIZED AS WHITE BOXES IN SPECTROGRAM VIEW

About IZT The Innovationszentrum fuer Telekommunikationstechnik GmbH IZT specializes in the most advanced digital signal processing and field programmable gate array (FPGA) designs in combination with high frequency and microwave technology.

The product portfolio includes equipment for signal generation, receivers for signal monitoring and recording, transmitters for digital broadcast, digital radio systems, and channel simulators. IZT offers powerful platforms and customized solutions for high signal bandwidth and real-time signal processing applications. The product and project business is managed from the principal office located in Erlangen/Germany. IZT distributes its products worldwide together with its international strategic partners. The IZT quality management system is ISO 9001:2015 certified.

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INNOVATIONSZENTRUM FÜR TELEKOMMUNIKATIONSTECHNIK GMBH IZT AM WEICHELGARTEN 5 · 91058 ERLANGEN, GERMANY
GENERAL MANAGER: RAINER PERTHOLD · TEL: +49 (0)9131 9162-0 · FAX: -190 · SALES@IZT-LABS.DE · WWW.IZT-LABS.DE

