

Entwicklung und Einsatz eines Softwareradios zur Suche von RF Störquellen

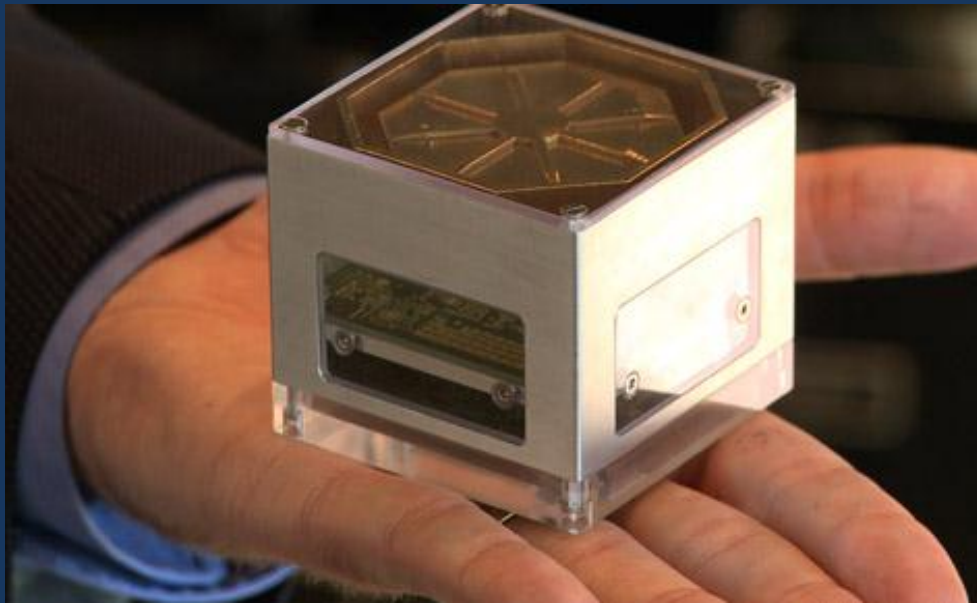


Vortrag bei USKA Sektion Bern HB9
Mittwoch 27. Juni 2012

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lightRadio from Alcatel-Lucent supports 2G, 3G and LTE, and can be tuned from 400MHz to 4GHz. It's connected via a fiber optic broadband link and allows everything to be crunched in an HP-powered cloud system of network controllers and gateways.

Source : www.mobile-research.ethz.ch/var/pres_joerg_straube.pdf

Jörg Straube (Alcatel-Lucent): lightRadio



RF Projects CH



RF Projects USA



RF Source Searcher



Applications



SDR Class



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RF Source Searcher



Applications

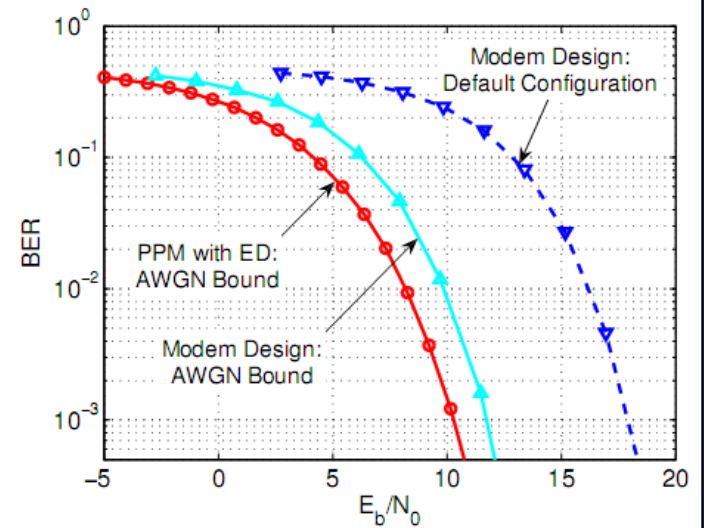
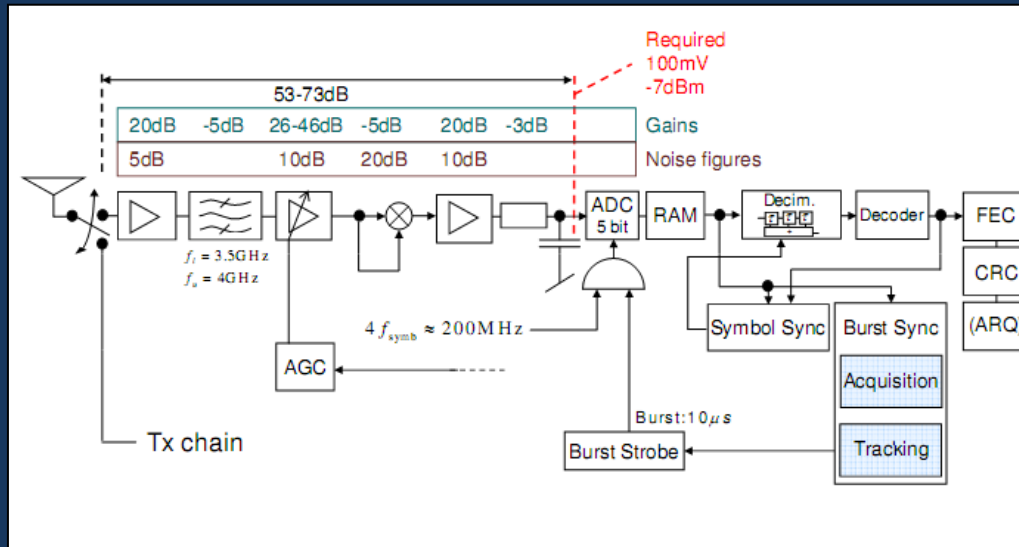
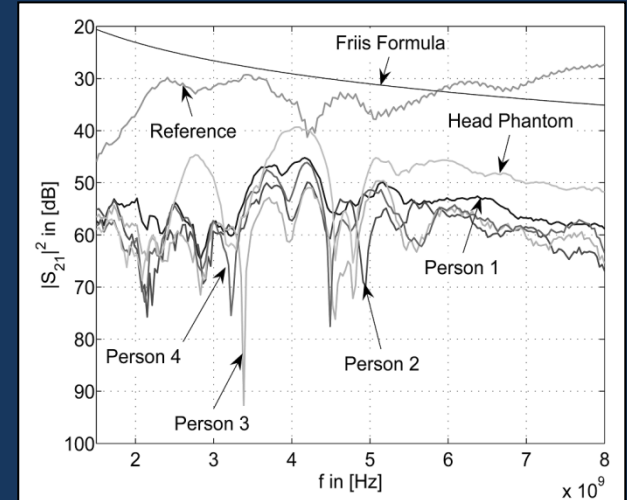
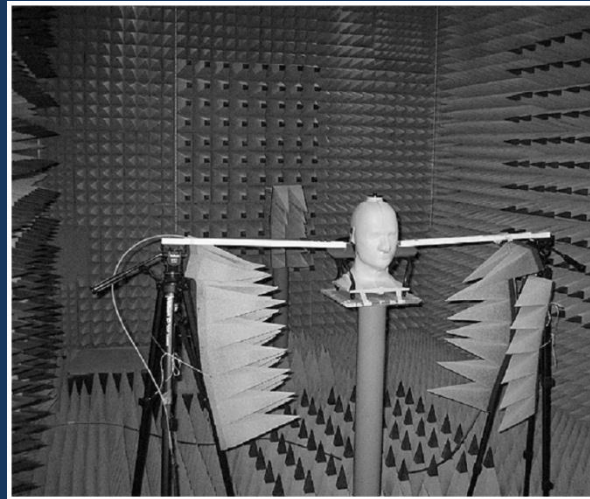
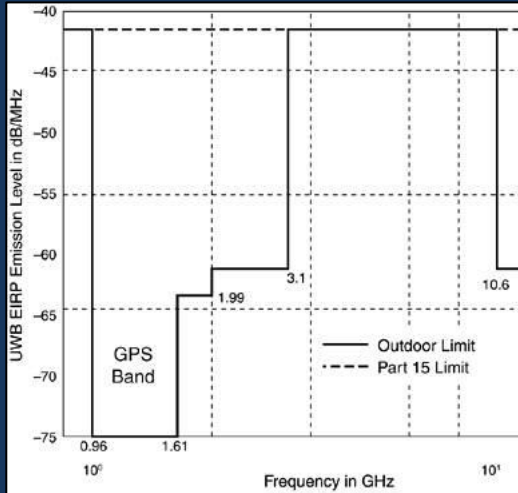


SDR Class



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UltraWideBand Communication (Prof. Wittneben ETHZ)



DECT/GSM/Sat Telephones (ASCOM Solothurn)



Wireless Body LAN (PHONAK Murten)





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RF Source Searcher



Applications

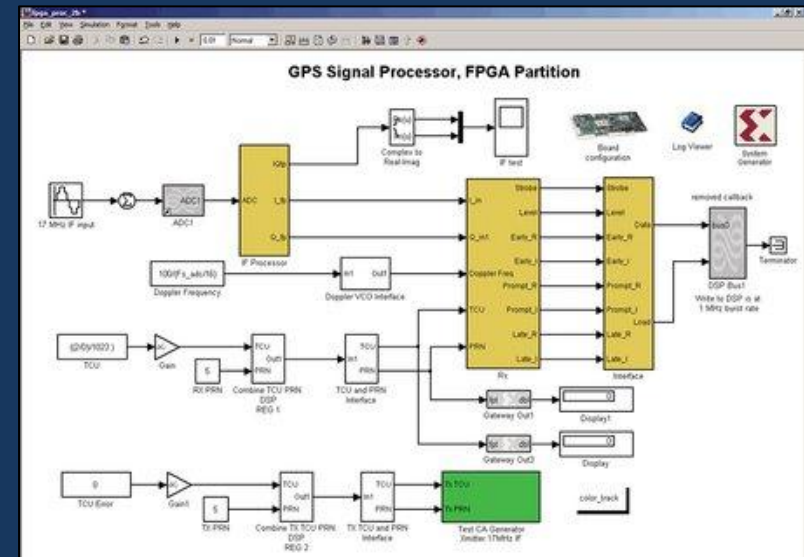
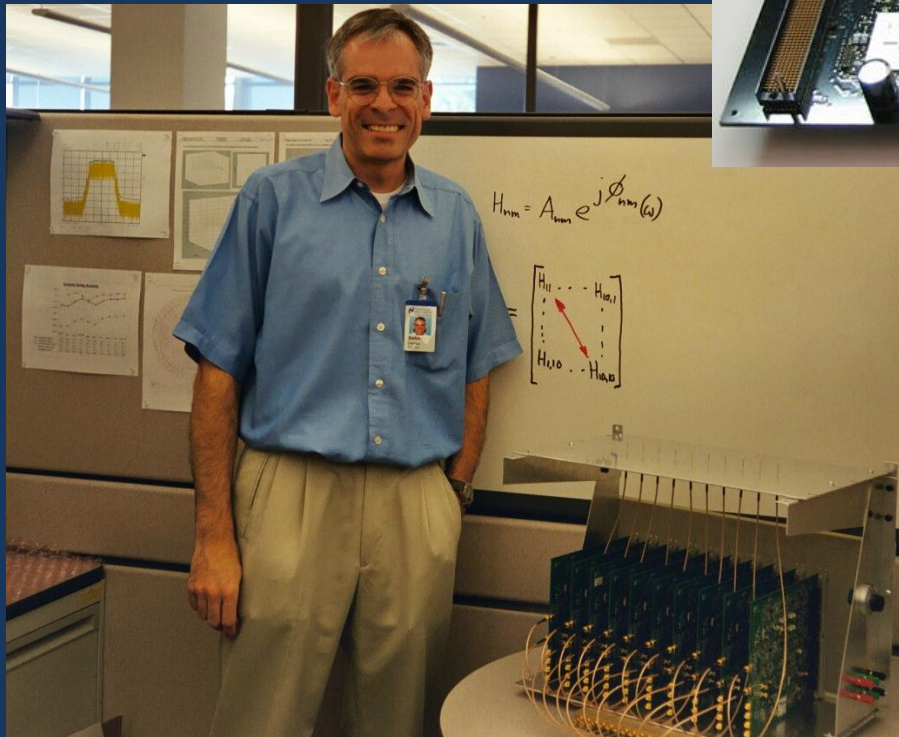
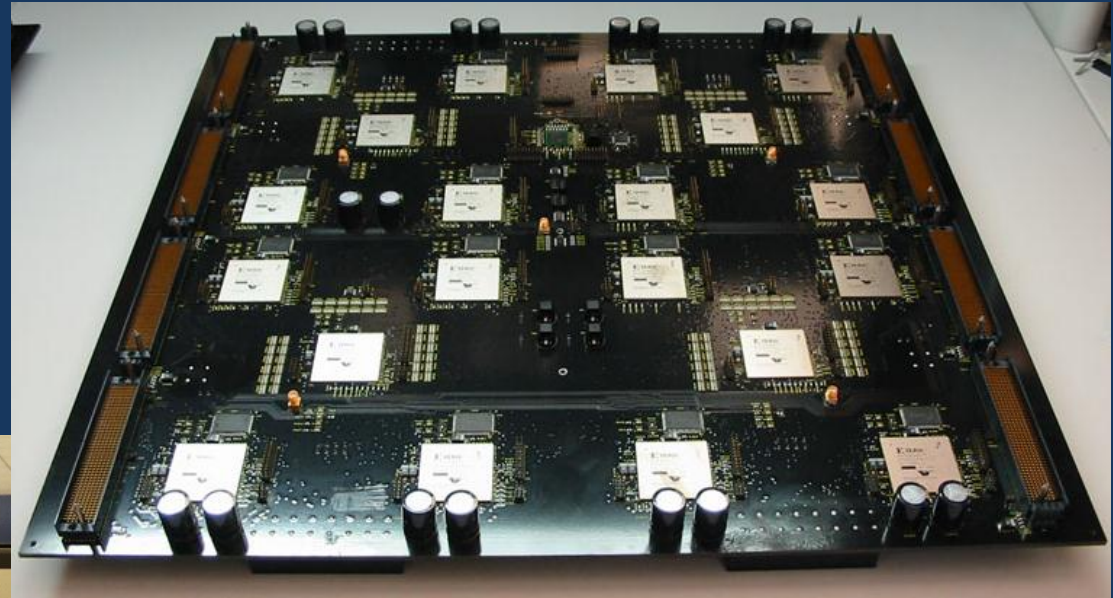
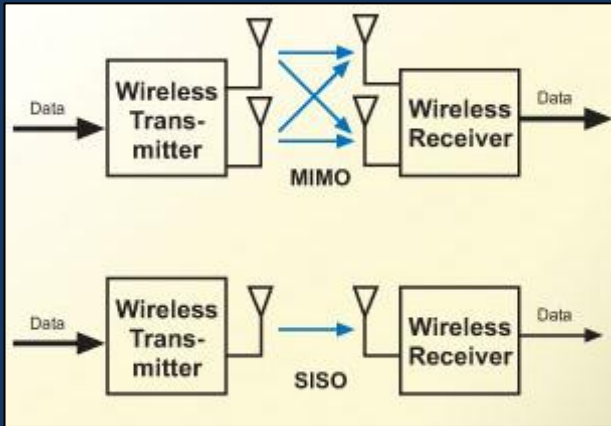


SDR Class

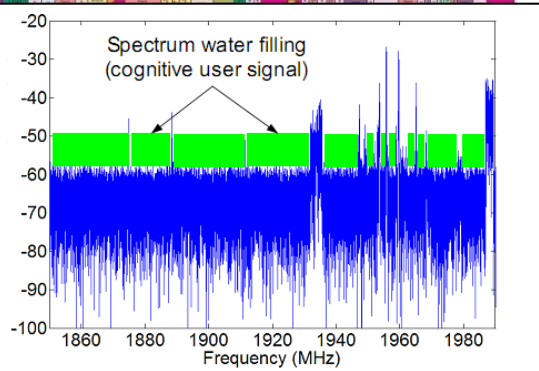
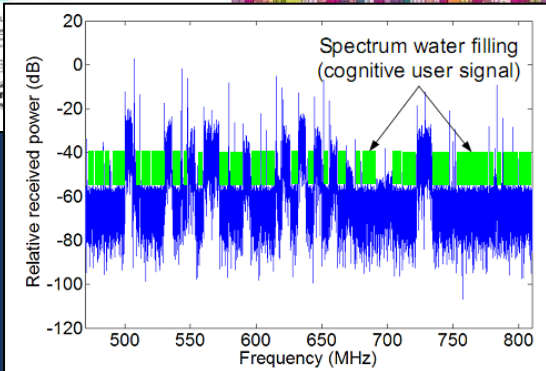
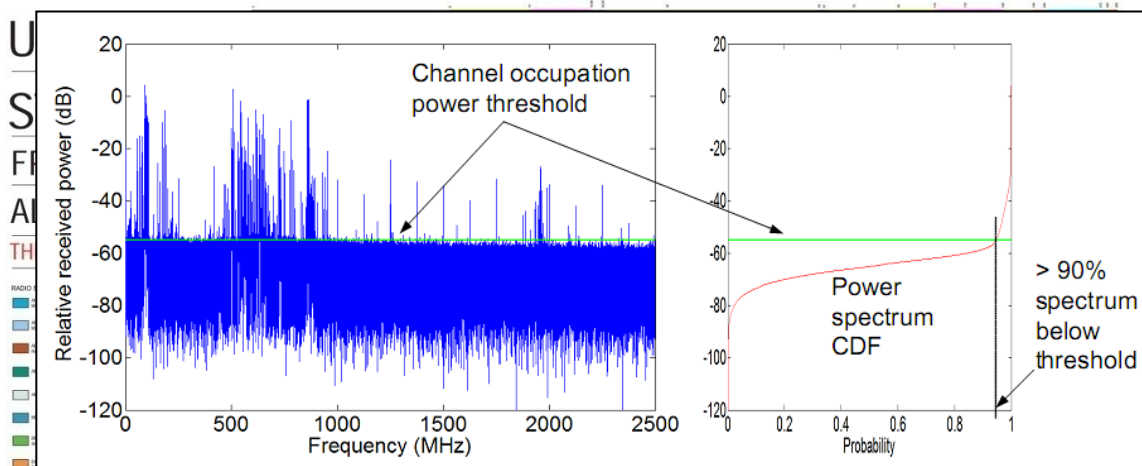


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MIMO Systems (National Semiconductor, CA USA)



Cognitive Radio (Adaptrum, CA USA)



Federal Communications Commission

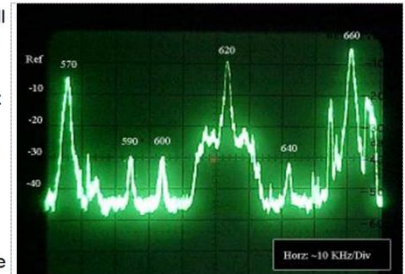
Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of)
Unlicensed Operation in the TV Broadcast Bands) ET Docket No.
Additional Spectrum for Unlicensed Devices) ET Docket No.
Below 900 MHz and in the 3 GHz Band)

Microsoft tags value of theoretical white space devices at \$100 billion

[Microsoft: Whites Spaces Worth \\$100 Billion](#) [Broadband Reports]

While the technology is still awaiting certification from the FCC, Microsoft has commissioned a study that indicates that white space technology could be worth \$100 billion over the next 15 years. That's a big number for a technology that has yet to demonstrate that it can work in



unlicensed spectrum between licensed spectrum used for television broadcasts. White space advocates have proposed to allow so-called





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RF Source Searcher



Applications

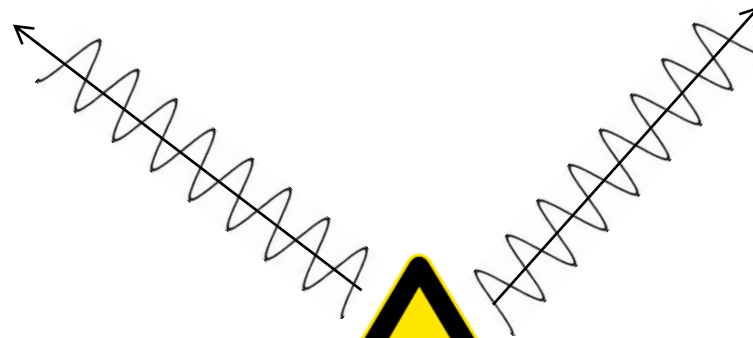


SDR Class



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UMTS RF Interferer



Unwanted RF Source

Damaged
Cordless
Phones

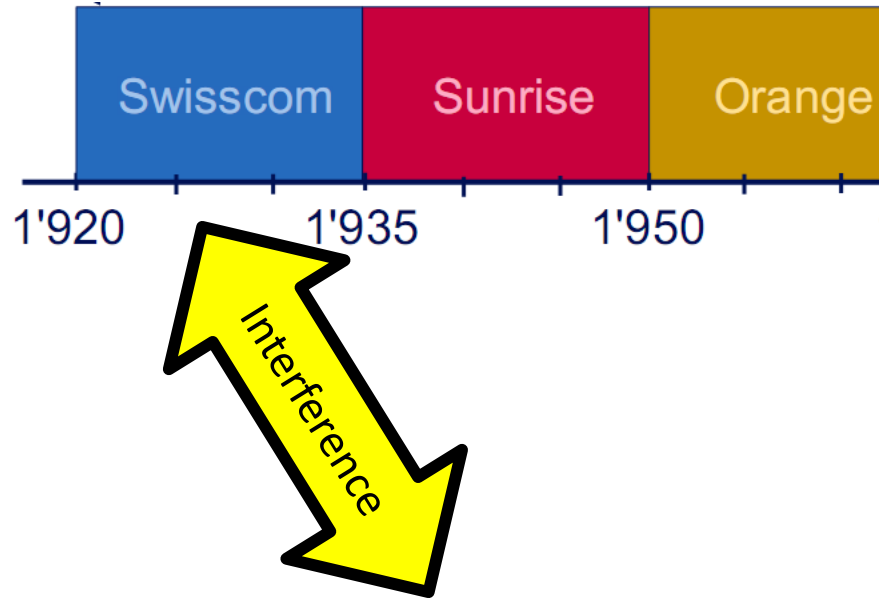
Foreign
Cordless
Phones

Intentional
Jammers

De-Tuned
Repeater

Passive
Intermodulation

UMTS Uplink Interferer : USA DECT



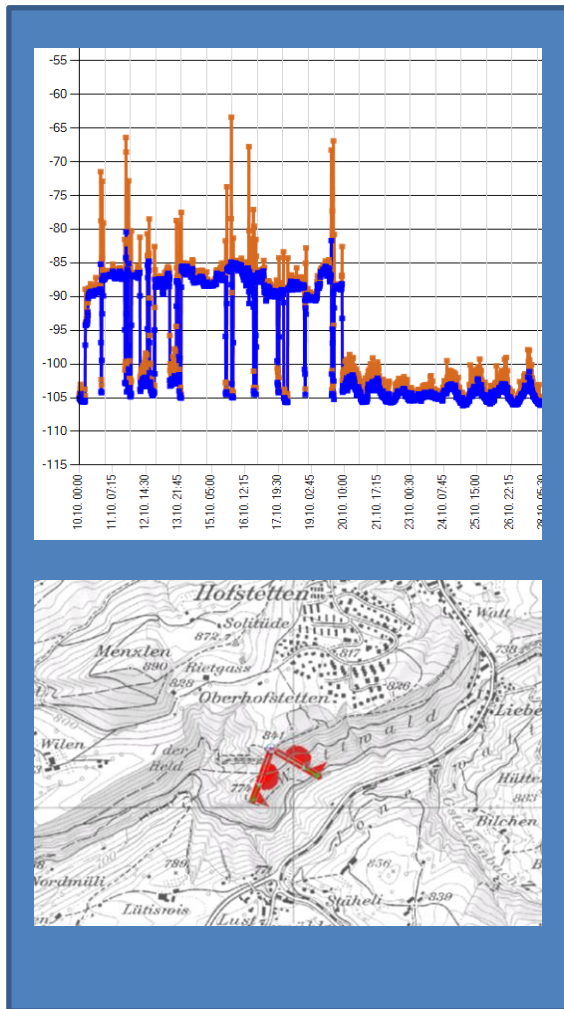
<i>Technical Specifications</i>	
RF frequency band	1921.536 MHz — 1928.448 MHz
Channels	5
Operating temperature	5°C to 45°C
Telephone base voltage (AV voltage, 60Hz)	96 — 130 Vms
Telephone base voltage (Adapter output)	6V AC, 300mA

Interference Hunting Procedure

1 : Remote Alert

2 : Search

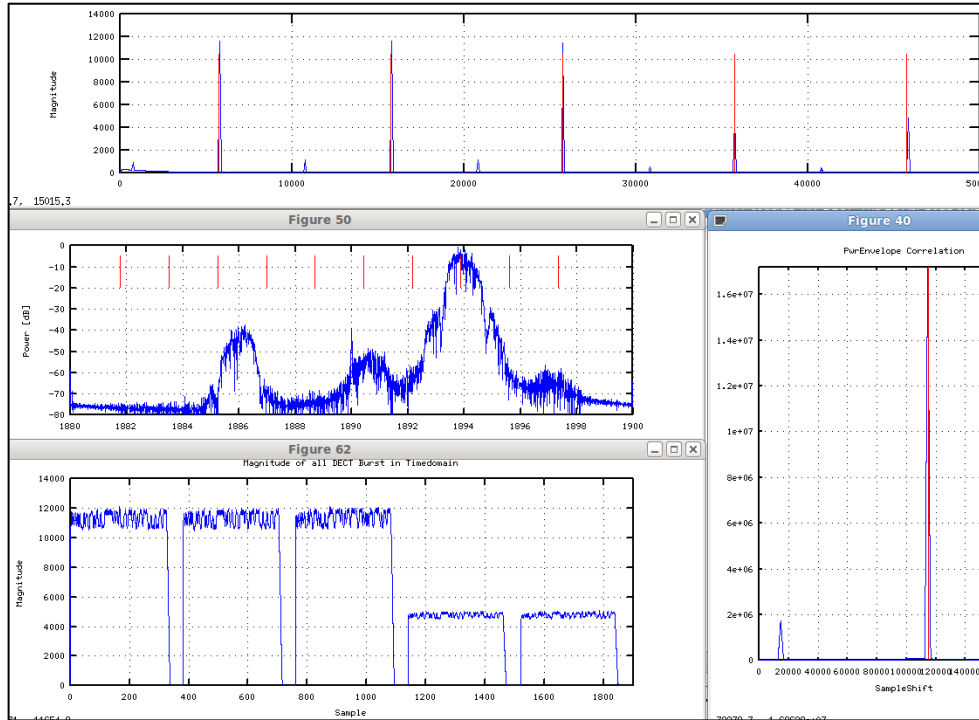
Step 3 : Disable



Timeconsuming
Few Resources

Idea : Use the power of Math to detect DECT

DECT Phy Properties



Difficult to detect

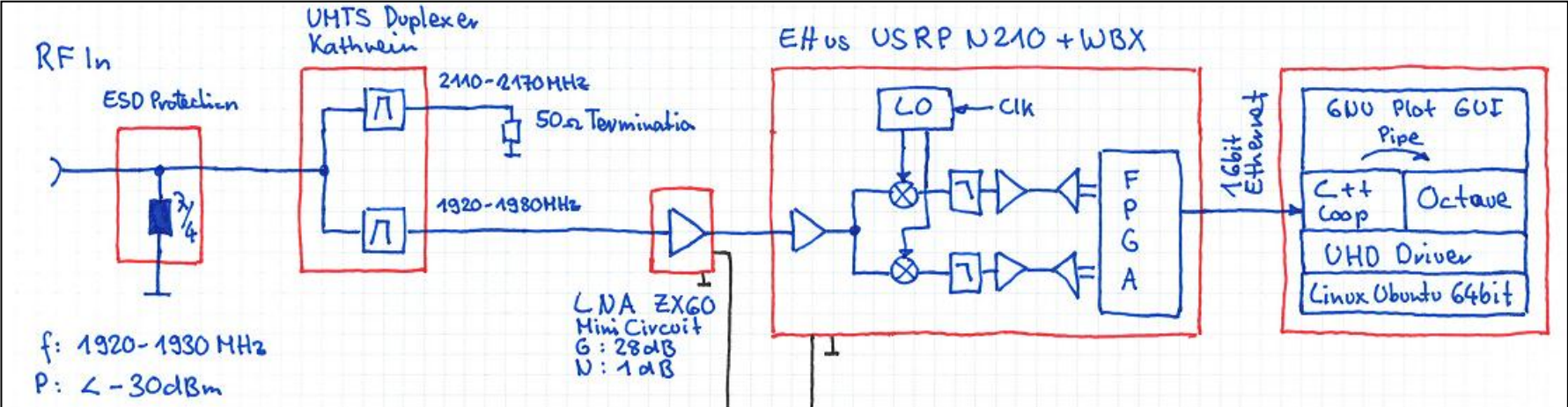
NEW APPROACH



Software
Defined
Radio

- Very low Duty Cycle ($< 1\%$)
- Wide Spectrum (Frequency Hopping)
- Level jumps (TX Polarisation Diversity)

DECT Searcher Prototype : Realisation



DECT Searcher Prototype : Features

- very high weak signal detection probability
- transmitter identification due to demodulation capabilities (Radio Fixed Part Identity, Equipment Manufacturer Code)

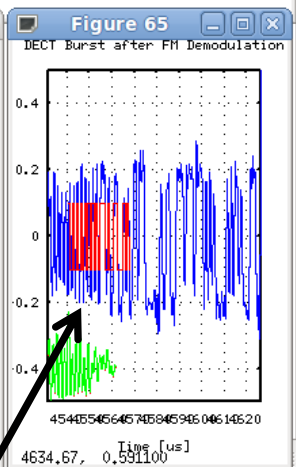
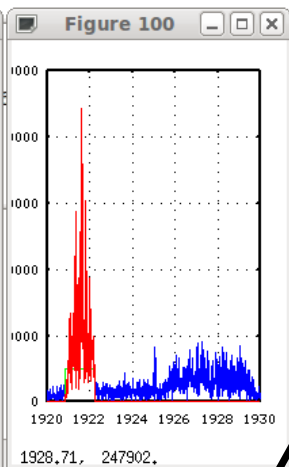
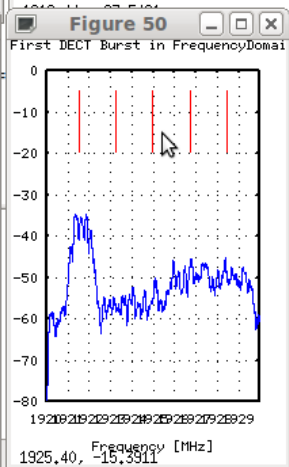
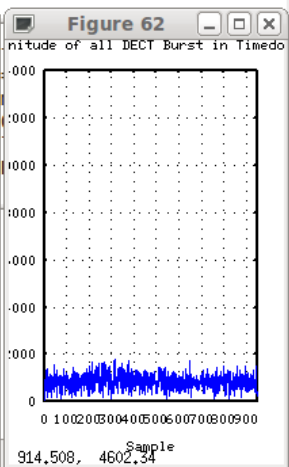
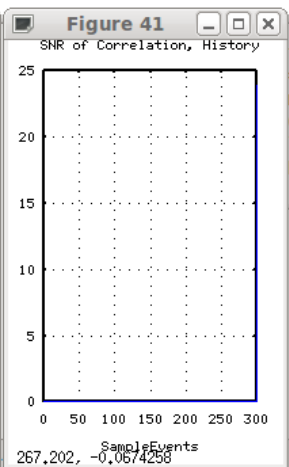
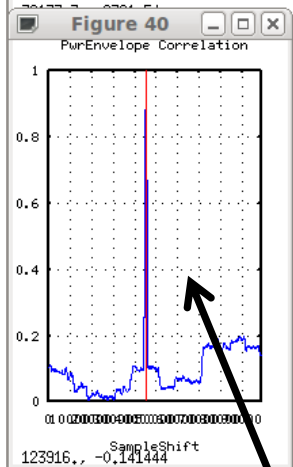
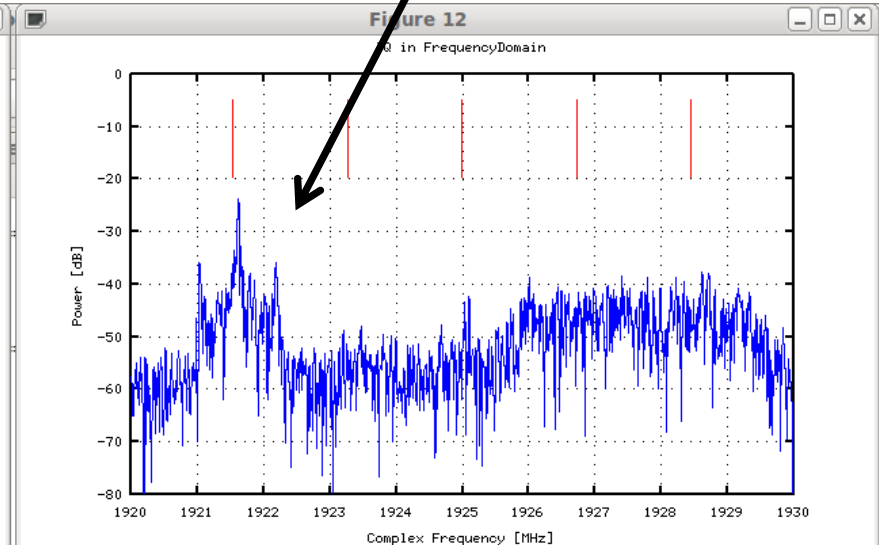
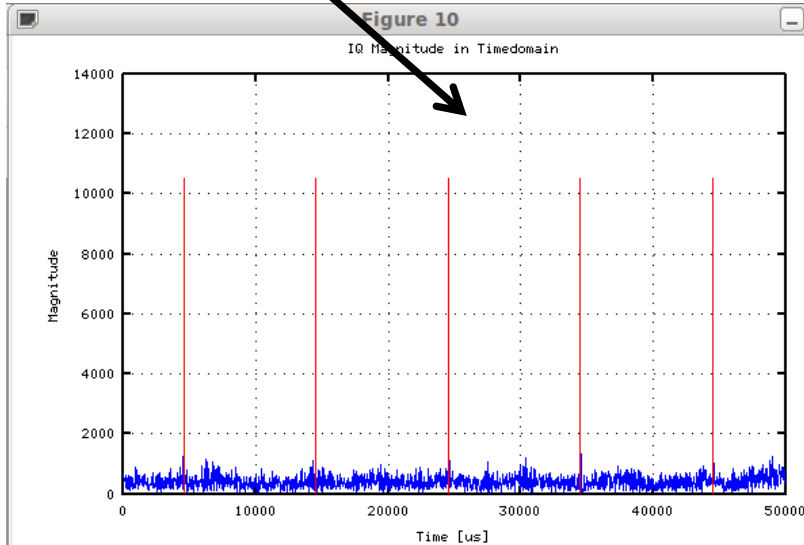
BASEL Search NOVARTIS BELE2								
13:44:54	20-Dec-2011	Afield	H:0x6E	T:0x018A04F3B8	C:0xA8ED	CRC:1	TXf:1921.5MHz	CorrSNR:29dB
13:44:56	20-Dec-2011	Afield	H:0x6E	T:0x018A04F3B8	C:0xA8ED	CRC:1	TXf:1921.5MHz	CorrSNR:25dB
13:44:58	20-Dec-2011	Afield	H:0x6E	T:0x018A04F3B8	C:0xA8ED	CRC:1	TXf:1921.5MHz	CorrSNR:20dB
13:45:00	20-Dec-2011	Afield	H:0x6E	T:0x018A04F3B8	C:0xA8ED	CRC:1	TXf:1921.5MHz	CorrSNR:33dB
13:45:02	20-Dec-2011	Afield	H:0x8E	T:0x6F0F284F42	C:0xA503	CRC:1	TXf:1921.5MHz	CorrSNR:32dB
13:45:04	20-Dec-2011	Afield	H:0x6E	T:0x018A04F3B8	C:0xA8ED	CRC:1	TXf:1921.5MHz	CorrSNR:35dB
13:45:06	20-Dec-2011	Afield	H:0x6E	T:0x018A04F3B8	C:0xA8ED	CRC:1	TXf:1921.5MHz	CorrSNR:33dB
13:45:08	20-Dec-2011	Afield	H:0x6E	T:0x018A04F3B8	C:0xA8ED	CRC:1	TXf:1921.5MHz	CorrSNR:33dB
13:45:10	20-Dec-2011	Afield	H:0x6E	T:0x018A04F3B8	C:0xA8ED	CRC:1	TXf:1921.5MHz	CorrSNR:20dB
13:45:12	20-Dec-2011	Afield	H:0x6E	T:0x018A04F3B8	C:0xA8ED	CRC:1	TXf:1921.5MHz	CorrSNR:26dB
13:45:14	20-Dec-2011	Afield	H:0xEE	T:0x04F3B818AA	C:0x1064	CRC:1	TXf:1921.5MHz	CorrSNR:25dB
13:45:17	20-Dec-2011	Afield	H:0x6E	T:0x018A04F3B8	C:0xA8ED	CRC:1	TXf:1921.5MHz	CorrSNR:29dB

- can be upgraded to other known RF sources (Wireless Microphones, Jammers, Wireless Cameras, ...)
- used remote controlled

DECT Searcher Prototype : Detection GUI

Timedomain

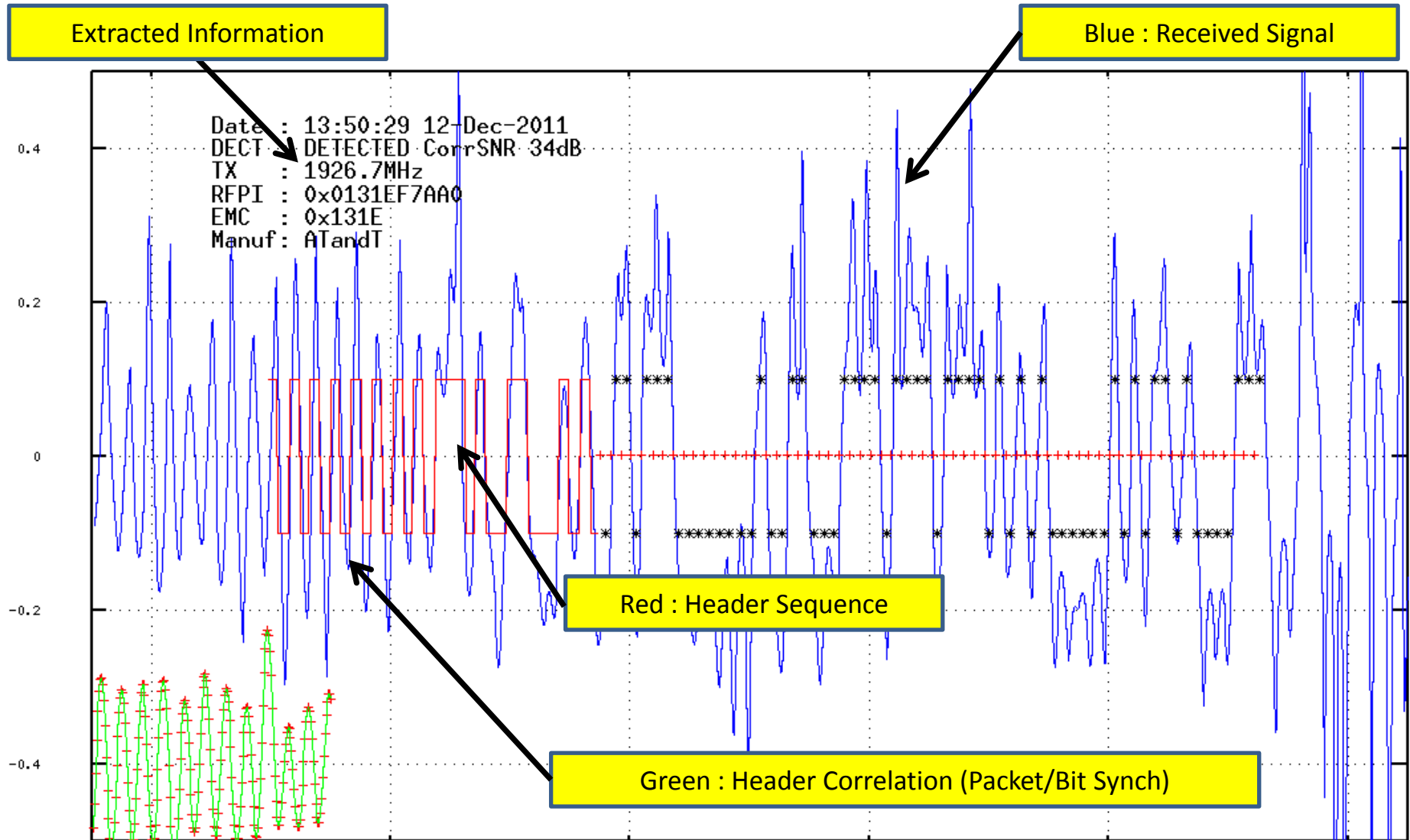
Frequencydomain



Correlation Peak

GFSK Demodulator

DECT Searcher Prototype : Demodulation GUI





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RF Source Searcher



Applications



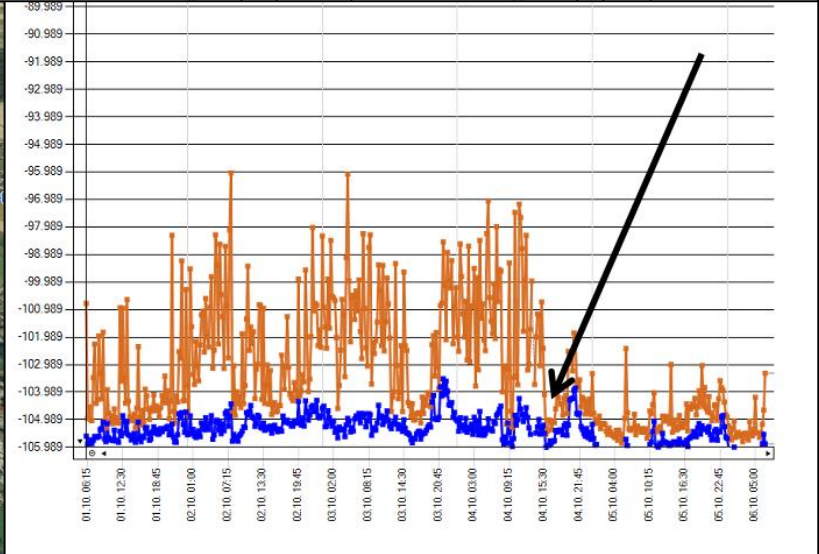
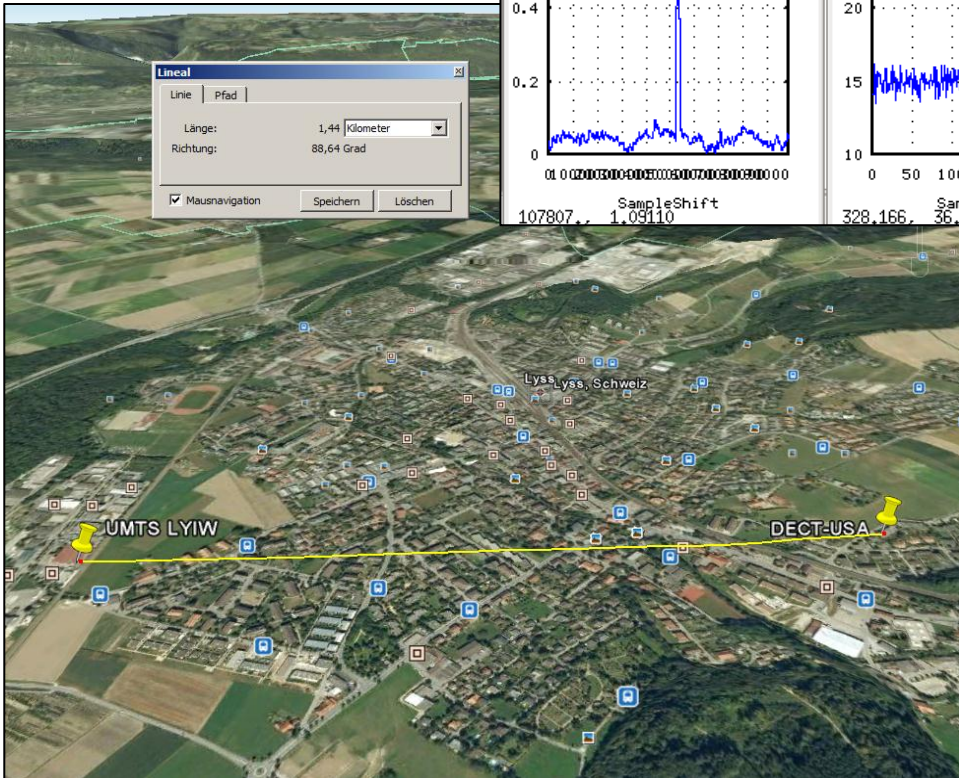
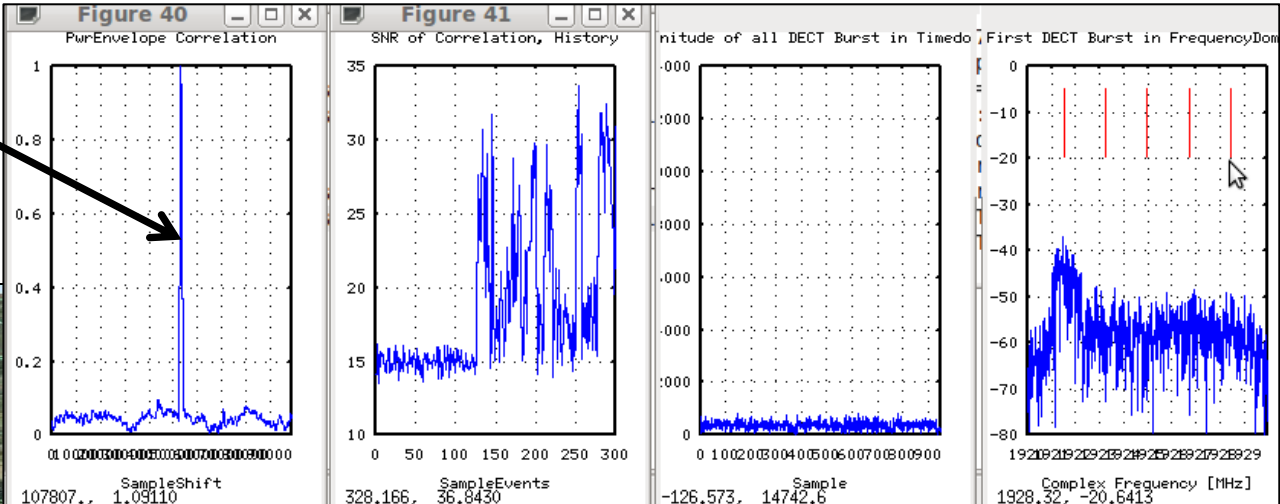
SDR Class



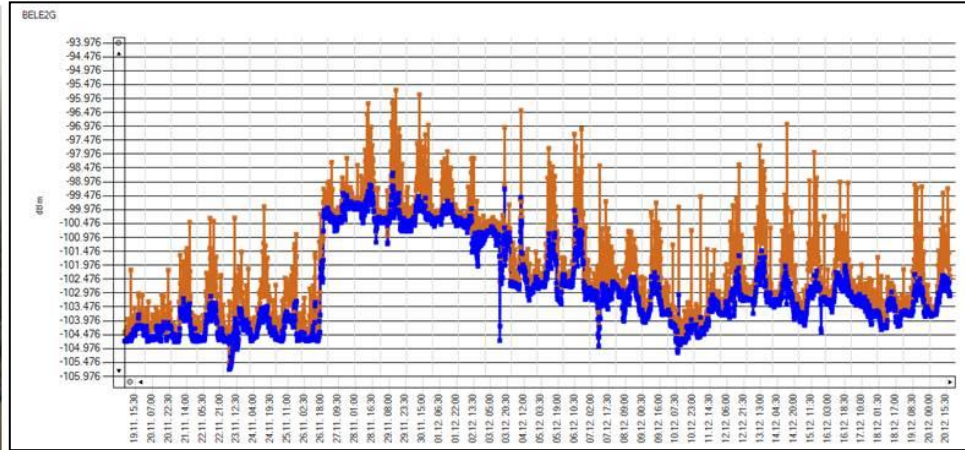
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Success in the Field : Case Lyss (LYIW)

Correlation Peak
=
USA-DECT



Success in the Field : Case Basel (BELE)





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RF Source Searcher



Applications



SDR Class



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KURS

Grundlagen und Anwendungen von Software Defined Radios (SDR)

Einführung sowie praktische Experimente mit einem SDR

Beschreibung

SDR Lösungen werden immer leistungsfähiger und zahlreicher in der Anwendung. Sei es in der Mobilkommunikation, Militär, Broadcast oder im Amateurfunk, mehr und mehr wird auf diese Technologie gesetzt. Seit die Rechenleistung von PCs das Realisieren von komplexen DSP Algorithmen erlaubt, sind eine Vielzahl technisch leistungsfähiger und kommerziell attraktiver Lösungen entstanden.

Kursinhalt und Dauer

Morgen (0900–1200)

- Einführung in SDR
- SDR Architekturen und ihre Tradeoffs
- Die Idee von Digital Signal Processing
- Der PC als Signal Processor
- Einsatzbeispiele von SDR in der Industrie

Nachmittag (1300–1600)

- Praktische Übungen an einem SDR





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RF Source Searcher



Applications



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Simple Az/EI Ham Radio Satellite Tracker

TheStefanCH



Subscribe

1 video



**Simple Az/EI
HAM Sat Tracker
Stefan HB9ZEM/KG4SDJ**

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0:02 / 4:04
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🕒
📺
📺
🔍

👍 Like
💬
Share
🚩

9,392

Uploaded by [TheStefanCH](#) on Jun 28, 2011

23 likes, 0 dislikes

In order to learn more about ham radio satellites, TCP/IP networking, stepper motor control, open-source Linux, and socket programming, I decided to build a simple prototype of a satellite Az/EI tracker.

Show more

Vielen Dank für Ihre
Aufmerksamkeit

Stefan
HB9ZEM/KG4SDI

