Real-time UWB MIMO channel sounder

Workshop on
Short Range Ultra-Wideband Systems
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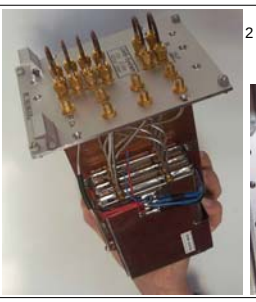
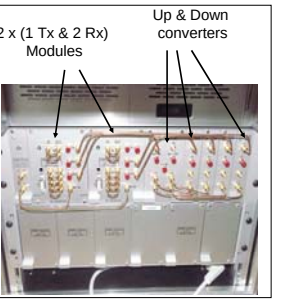
Highlights

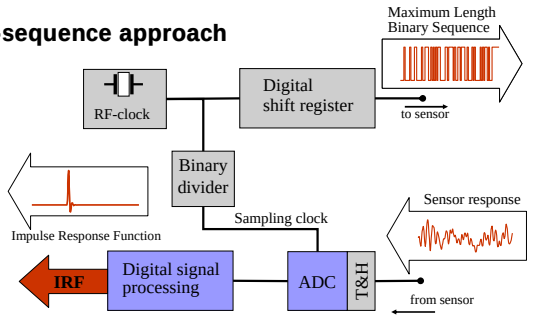
- Bandwidth up to 7 GHz for extremely high range resolution
- Several frequency bands available
- Multiple transmit and receive channels for directional resolution
- Measurement rates up to several thousands IR/s
- Modular construction for evaluation of sensor networks
- Software solutions for data visualization and post-processing

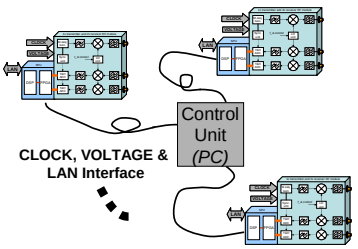




Architecture & System design

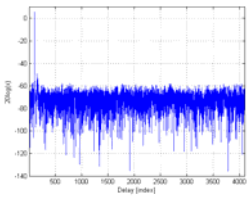
M-sequence approach



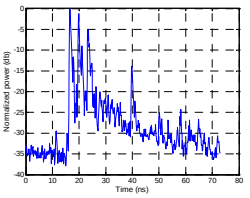


Modular concept in 19" rack

- Robust construction
- Suitable for the field measurements
- Easy transportation
- Easy system upgrades and extensions



Baseband impulse response (back to back connection)



60GHz +/-3.5GHz impulse response

Sounder parameters

Bandwidth: DC – 3.5 GHz 3.5 – 10.5 GHz 60GHz +/-3.5GHz

In/Out: 4 Rx – operating parallel 2 Tx – operating sequentially

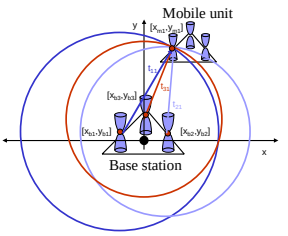
IR length: 585ns - ambiguity range = 175.5m **AGC:** 0-40dB

Meas. rate: continuous mode: 13 IR/s high speed mode: 3330 IR/s

Dynamic range: about 50dB **Max. output power:** 25dBm

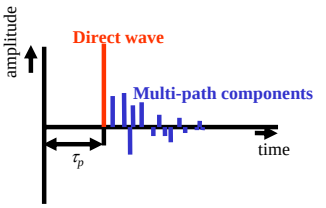
Application areas

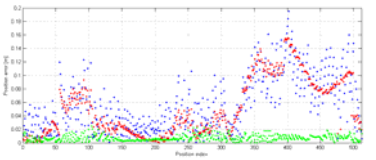
Evaluation of localisation systems and sensor networks



Localization - basic principle

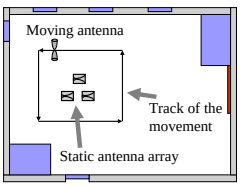
Channel modelling





Measurement results – positioning error

Imaging of the propagation environment



Measurement scenario

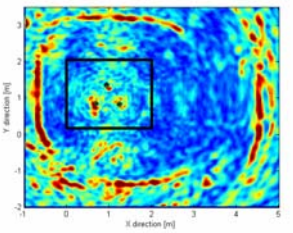
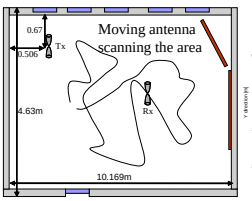


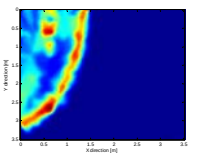
Image of the lab

Investigation of the wave propagation under realistic conditions

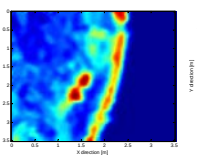


Measurement scenario

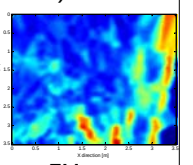
Measurement example (DC-3.5GHz)



EM-waves after 7.1ns

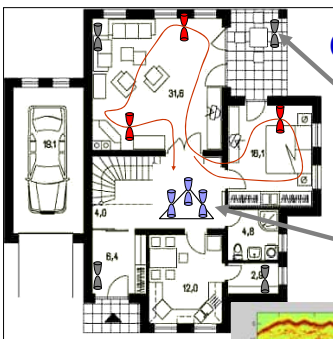


EM-waves after 13.6ns



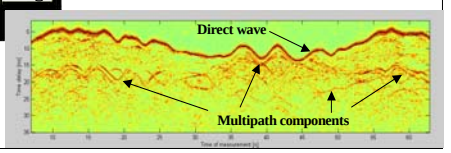
EM-waves after 20ns

Channel sounding



Antenna elements in an infrastructure

Antenna arrays with co-located antenna elements



Measured channel impulse responses

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