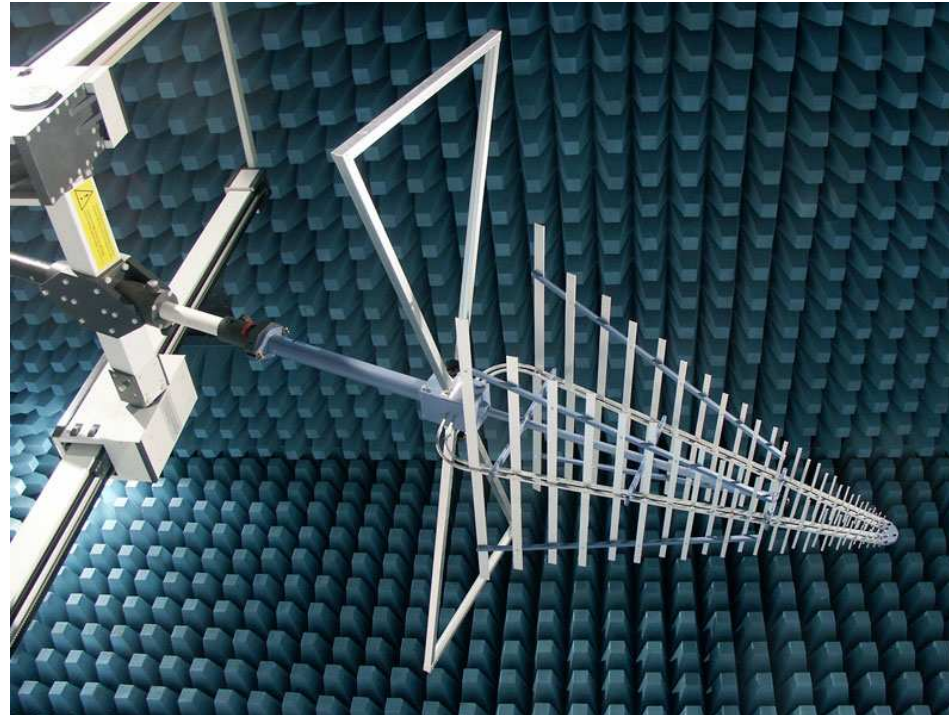


RF & MICROWAVE RESEARCH FACILITIES

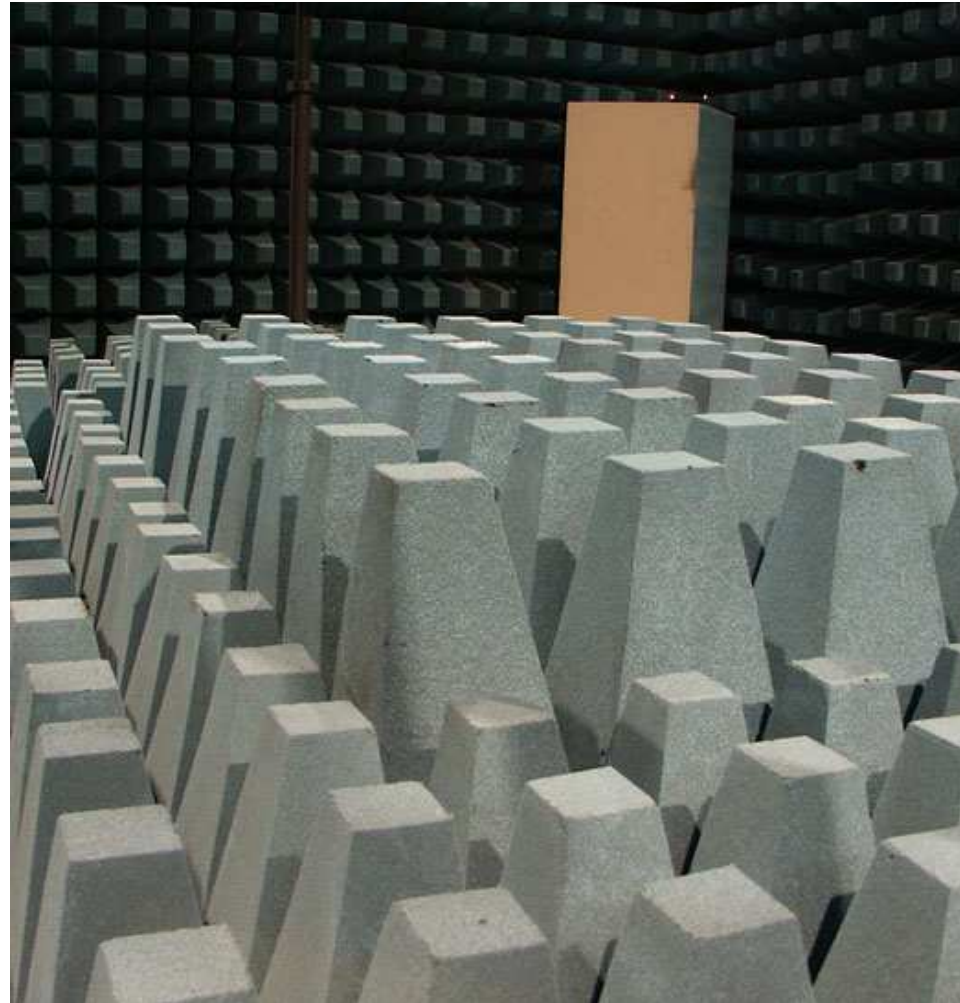


**DEPARTMENT OF ELECTRICAL &
INFORMATION ENGINEERING**

UNIVERSITY OF OULU

Optoelectronics and Measurement Techniques Laboratory

Anechoic Chamber



Anechoic Chamber

- Frequency Range 30 MHz...20 GHz
- Size of Chamber 11x6,5x5,5 Meters (LxWxH)
- 5 Meter Measurement Track
- Turntable
 - Loading up to 1000 kg
 - 5° Measurement Resolution in Azimuth Plane
- Antenna Mast
 - Height 4,0 m
 - Antenna Weight up to 15 kg
 - Vertical / Horizontal Polarizations

EMC Measurements



EMC Measurements

- EMC Measurements 30 MHz...20 GHz
 - Power Amplifier up to 50 W at 1...1000 MHzFrequency Range
- EMC32, Rohde&Schwarz System Software
 - Emission Measurements (EMI)
 - Electromagnetic Susceptibility Measurements (EMS)

Telecommunication Laboratory

Satimo StarLab – Multiprobe System



Measurement System for Handset Antennas

Satimo StarLab

- Measurement Bandwidth 0,8...6 GHz
- 3D Radiation Pattern Measurement Time ~2 min
- Size of Antenna between 10...40 cm
- Antenna Weight up to 10 kg
- Option to Measure with Phantom Head
- Reference Dipole Kit (900, 1800, 1900, 2050 & 2450 MHz)

Antenna Measurements

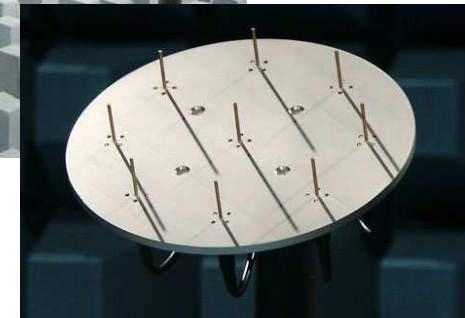
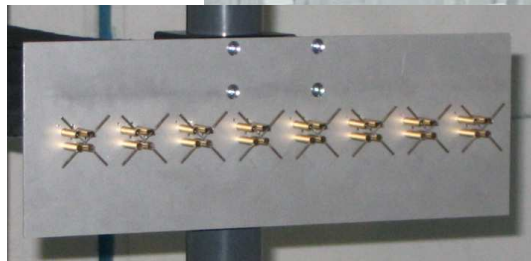
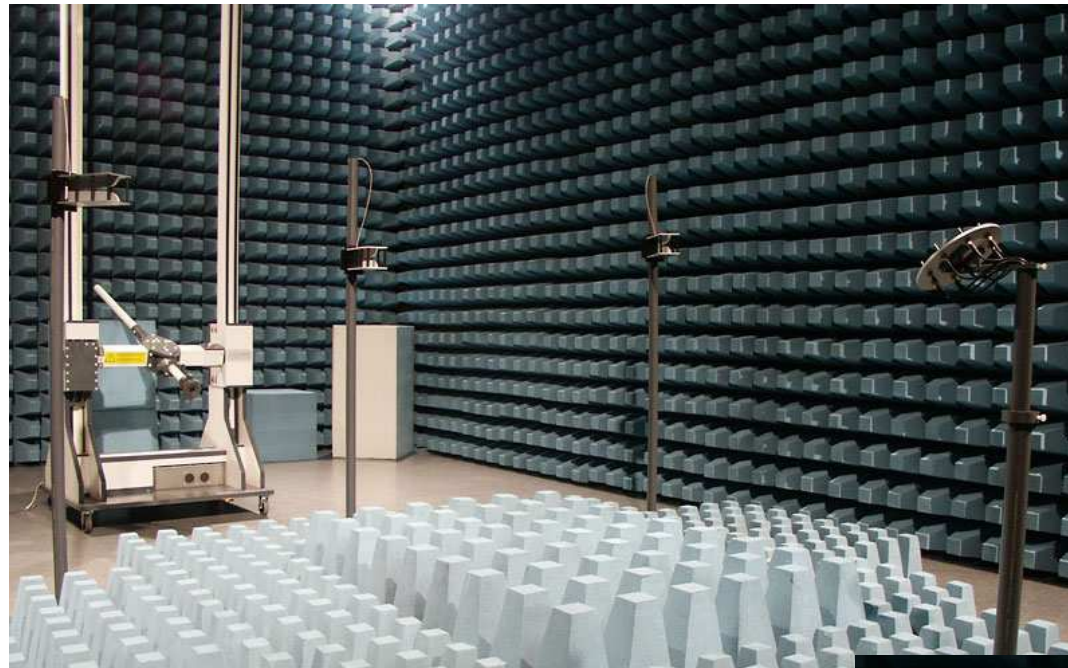


Antenna Measurements

- 3D Radiation Pattern Measurements
- Frequency Range 30 MHz...26,5 GHz
- Sunol Sciencies ELAZ75 Antenna Positioner
 - Antenna weight up to 34 kg
 - 0,5° Measurement Resolution in Azimuth and Elevation Plane



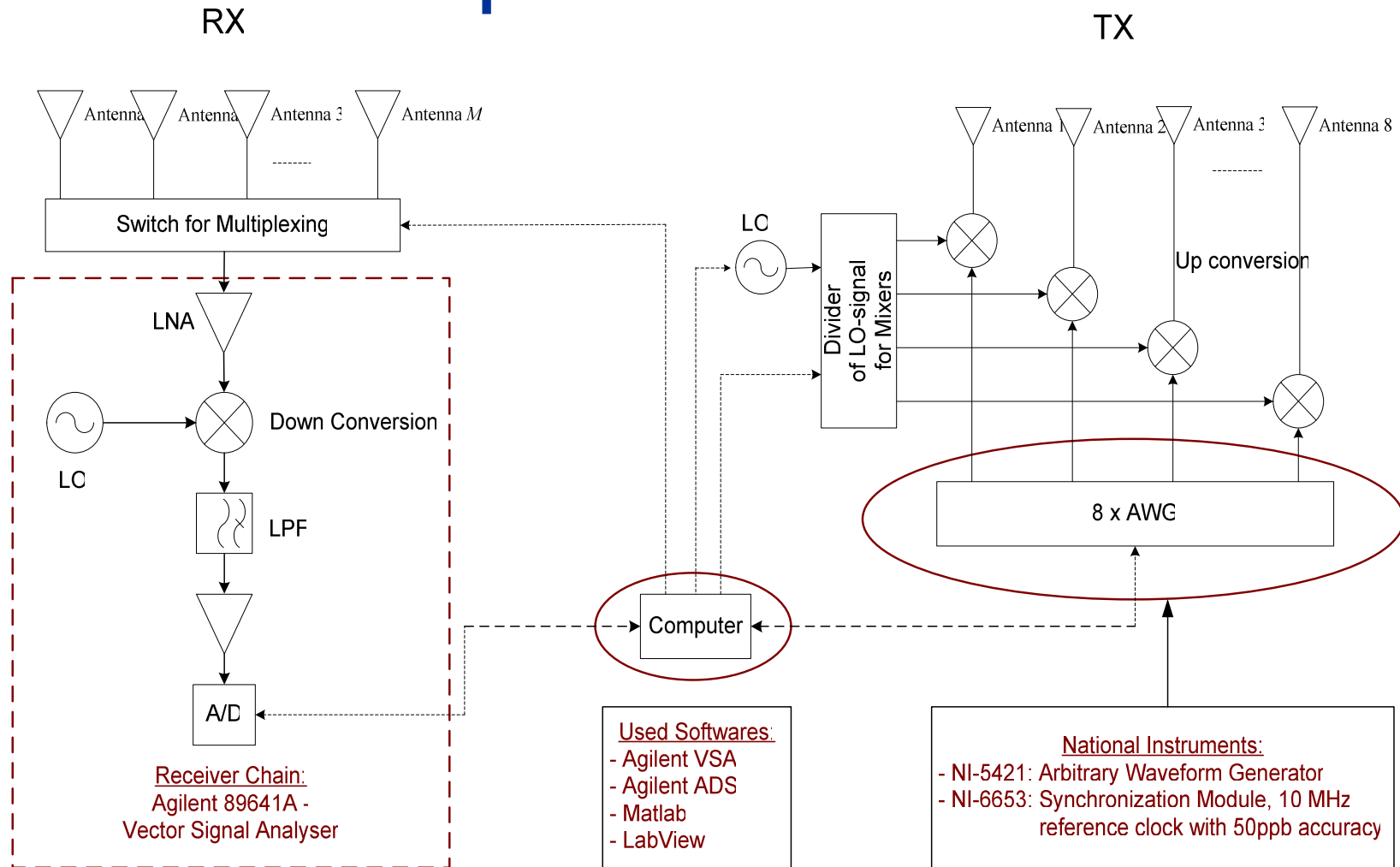
Measurement System for Adaptive Antennas



Measurement System for Adaptive Antennas

- 8 Transmitting Antennas => Multipath Propagation in Laboratory Conditions
- 8 NI-5421 AGW's with NI-6653 Synchronization Module as Transmitter
- Agilent 89641A VSA used as Receiver
 - Frequency Range 1...6 GHz
 - Bandwidth 36 MHz
- Option to Measure 2...12 Element Arrays at 0,5° Resolution Accuracy

Measurement System for Adaptive Antennas



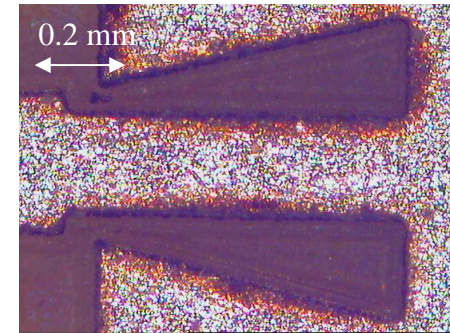
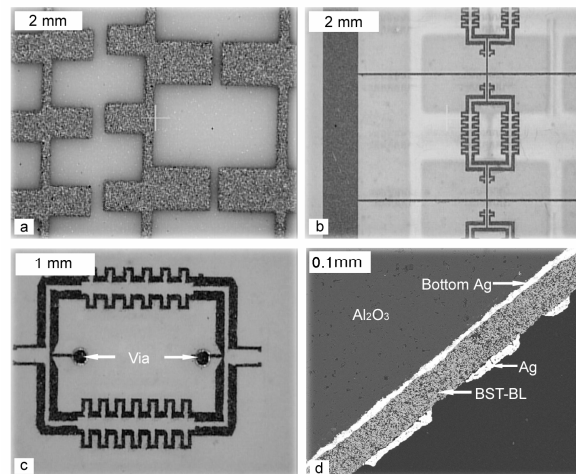
Block Diagram of the System

Microelectronics and Material Physics Laboratories

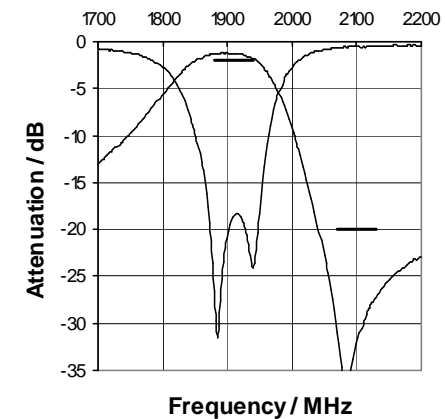
Fabrication

- Materials research and development with dielectrics, ferroelectrics, piezoelectrics, composites etc.
- Fabrication and prototyping with LTCC, laminates, laser-aided micromachining
- Nanotechnology

Electrically tunable multilayer devices (26 GHz)



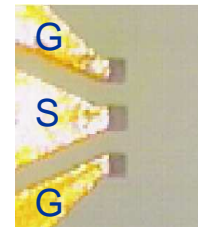
Laser micromachined antenna



LTCC filter

Probe Measurements

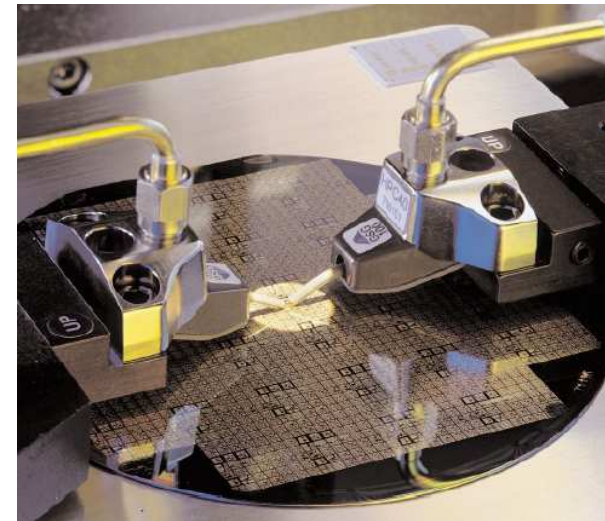
- Up to 50 GHz
- Ground-Signal-Ground (GSG) or GS/SG configuration
- Probe pitches available from 50 μm to 1250 μm
- 50 GHz max. probe pitch 250 μm



Probe tip



Probe



Microwave wafer probing

Other Measurements

- Impedance analyser up to 3 GHz
- Electrical field assisted tunability measurements (max. 200 V)
- LCR for low frequencies
- Several characterization methods for evaluation of components (ND and D) like acoustic, x-ray and electron microscopy

Softwares Used in Research

- Telecommunication System Simulators
 - CoCentric System Studio (CSS)
 - Optimized Network Engineering Tool (OPNET)
- Circuit Simulators
 - APLAC
 - Agilent Advanced Design System (ADS)
- Signal Analyzing Software
 - Agilent Vector Signal Analyser (VSA)

- Electromagnetic Simulators
 - Ansoft High Frequency Simulators
 - HFSS – Based on Finite Element Method (FEM)
 - Designer – RF & Microwave Design, RFIC Verification
 - CST – Based on Finite Difference Time Domain (FDTD)
 - SuperNEC - Based on Method of Moments (MoM)
- Other Software
 - LabView
 - Matlab / Simulink

Contact Information

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