

# **"Mobile Phone Base Stations and Health"**

## **Results of a Measurement Programme Concerning Mobile Phone Base Station Emissions in North Rhine-Westphalia**

Dr. Chr. Bornkessel, IMST GmbH, Kamp-Lintfort (Germany)

Dr. Elke Stöcker-Meier, MUNLV NRW, Düsseldorf (Germany)



**Title:** Investigation of RF Exposure Due to Mobile Phone Base Stations (Measurement programme is part of it)

**Client:** Ministry of Environment and Nature Conservation, Agriculture and Consumer Protection, North Rhine-Westphalia, Germany

**Period:** November 2001 – June 2002

**Aims:**

- Risk communication, open dialog with the public
- Information about actual exposure situation
- Assistance for environment offices in their dialog with network operators



## Contents of the study

- Theoretical and practical investigation of *base station exposure* (actual exposure in the vicinity, not for compliance purposes)
- Measurements of *overall RF exposure* at fixed points
- Guidelines for correct measurements
- Influence of exposure limit variation on overall RF exposure

## Differentiation from other studies

- Exposure was investigated *systematically*
- Measurement places mostly *inside* buildings
- *Categorisation* of base stations was discussed

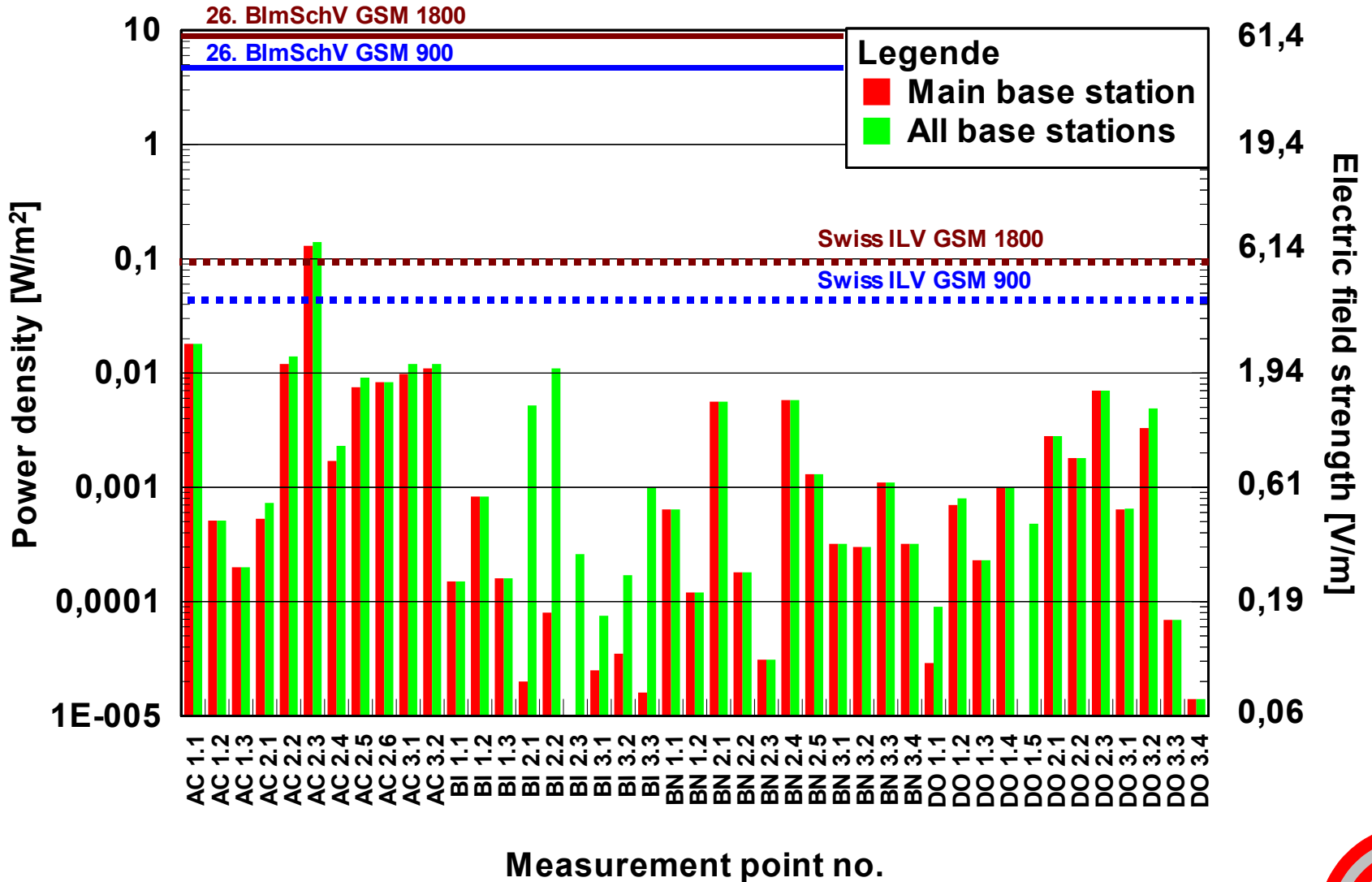




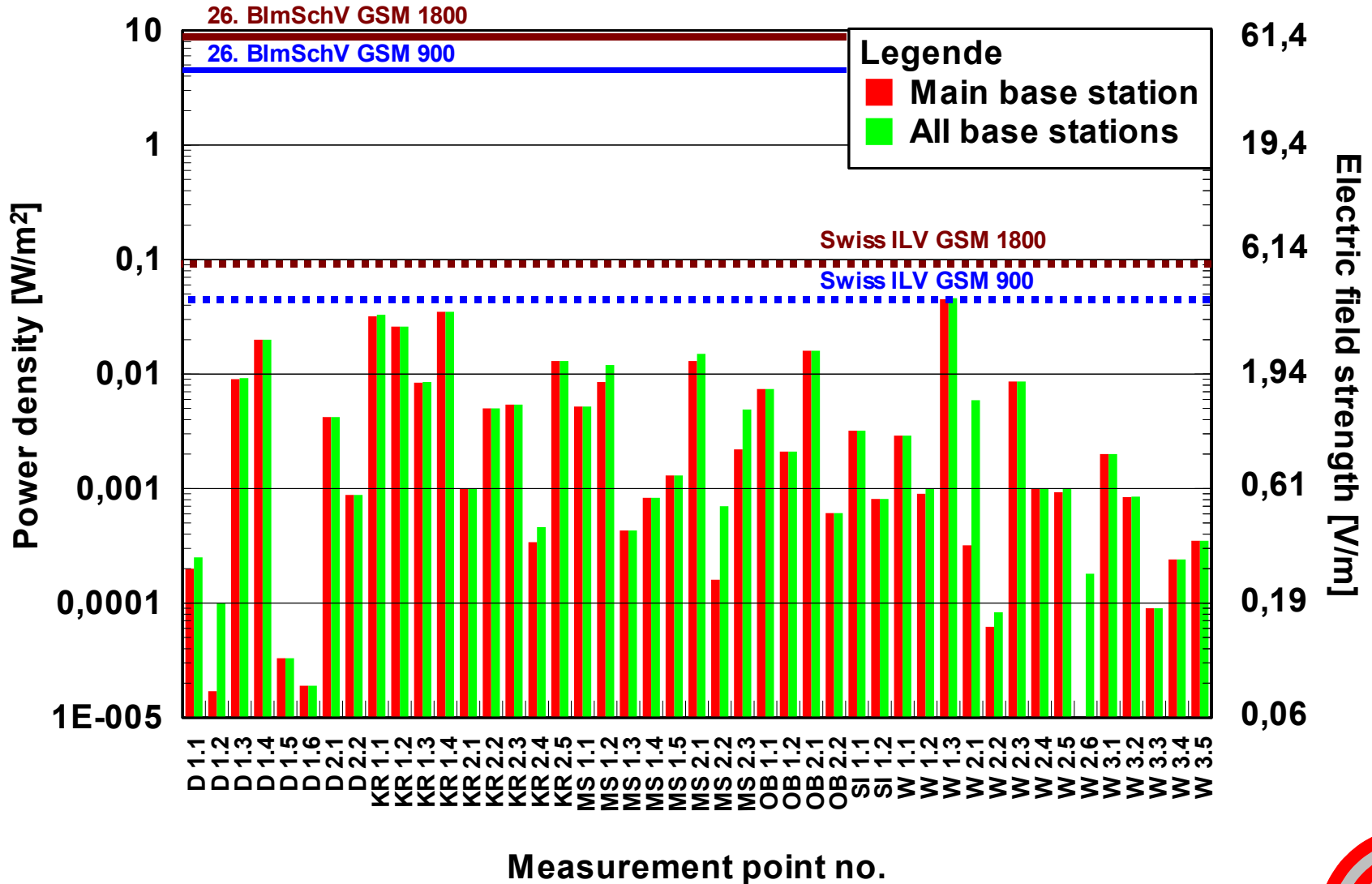
- Frequency selective measurement with spectrum analyser and antenna
- Maximum finding procedure in indoor sites: "sweeping method"
- Extrapolation on maximal operational state of the base station (worst case)
- Frequency hopping was taken into account
- Measurement uncertainty not added to measurement results



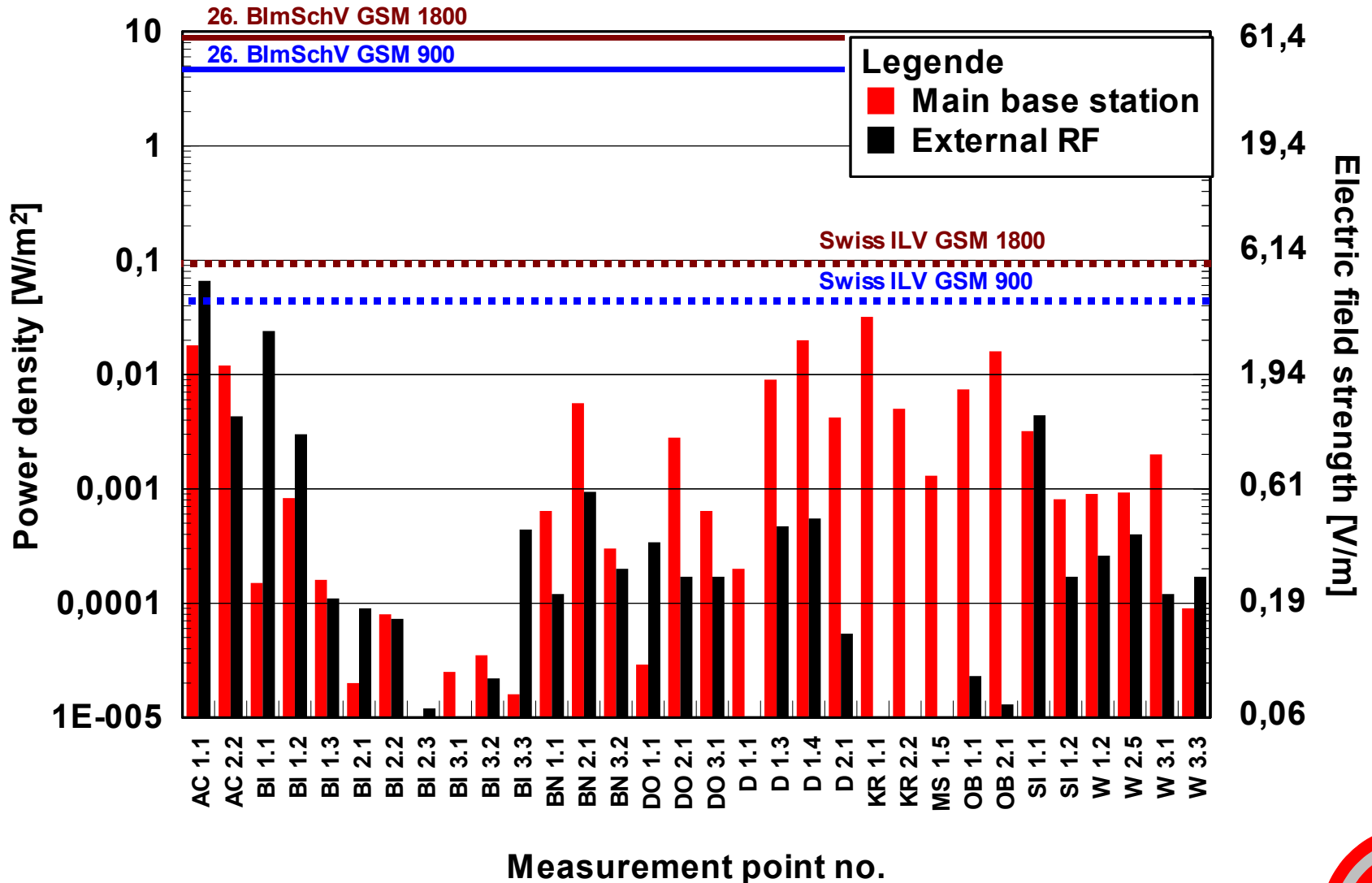
# Measurement Results (1)



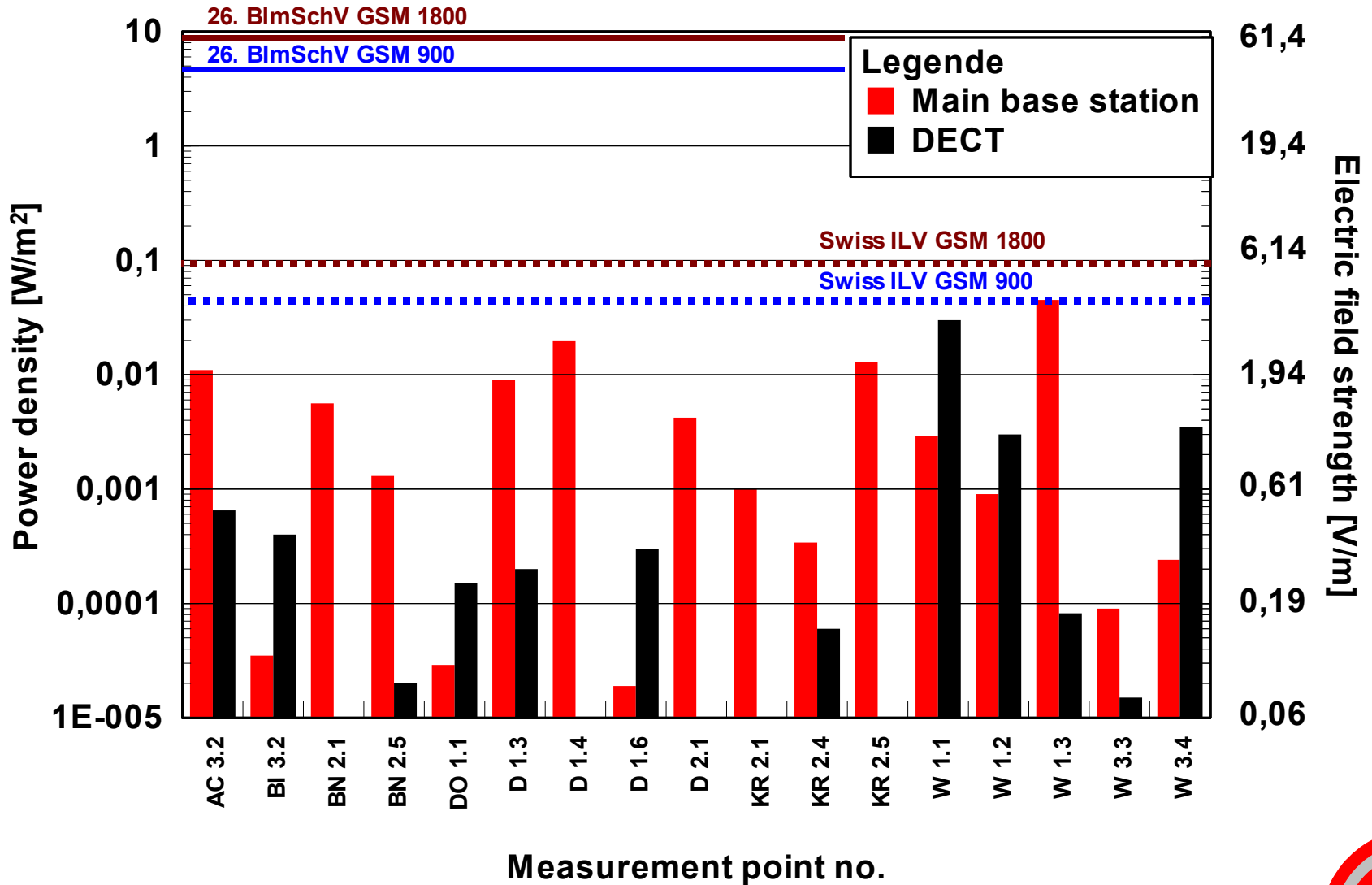
# Measurement Results (2)



# Comparison With External RF

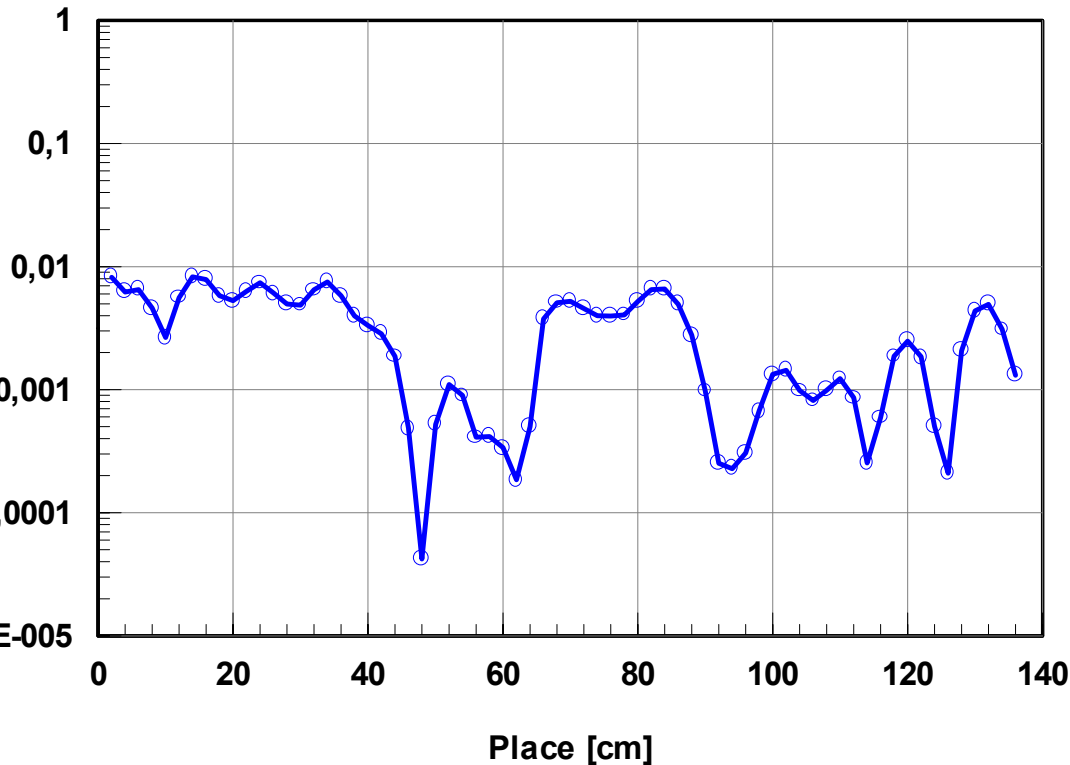


# Comparison With DECT





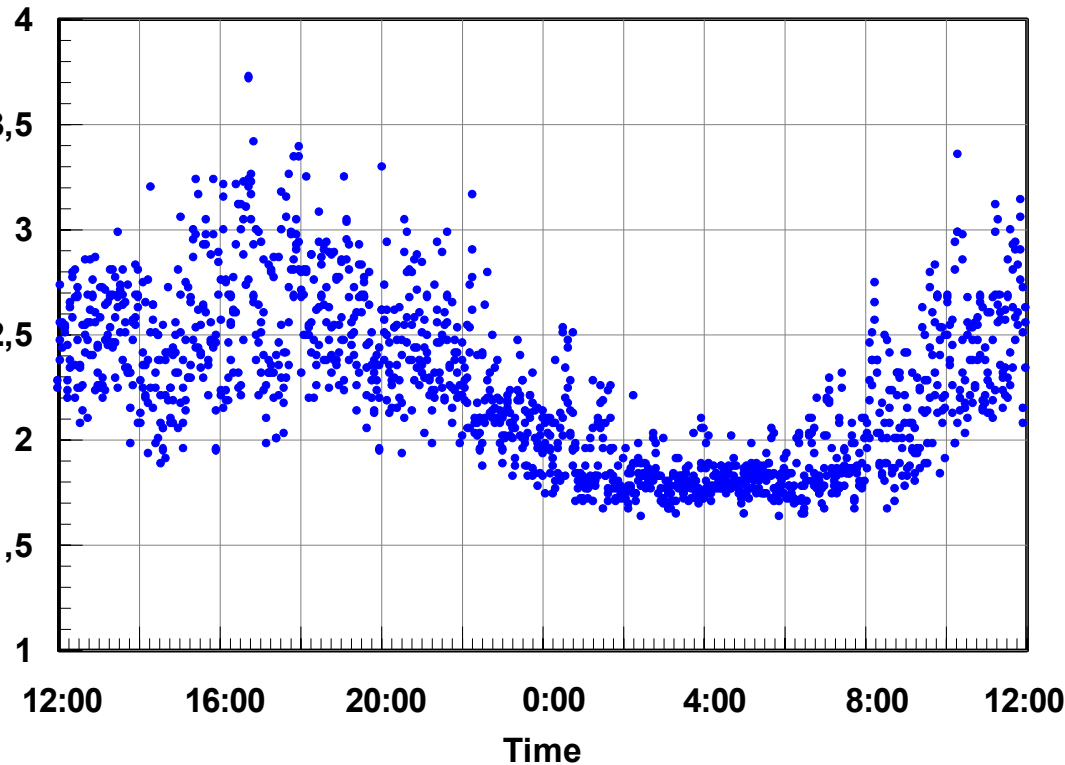
# Local Variation Indoor



- Measurement under lab conditions: Scanner
- Frequency: 1.9 GHz
- Transmit antenna in upper level
- Receive antenna (omni directional) in basement
- strong local variations (> factor 100 concerning power density)
- Maximum finding procedure!!



# 24 Hour Measurement



- Measurement with broadband field probe
- 1 value each minute
- Strong dependence from time of day
- At night: Small variation and low exposure
- At day: High variation (Power control!)

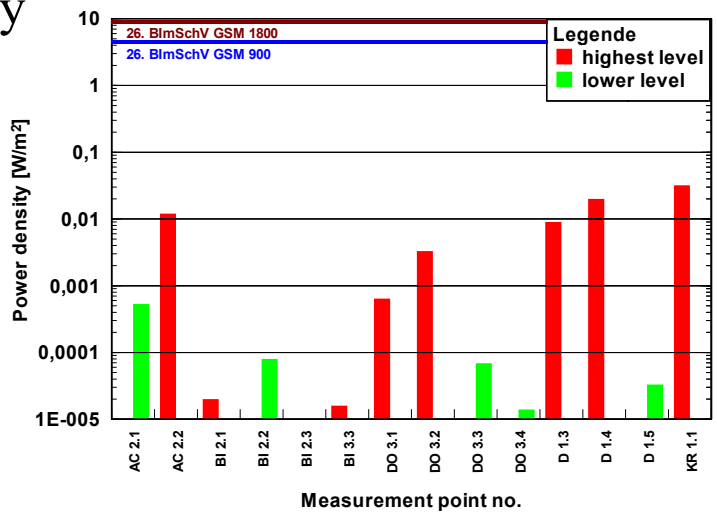


- **Goal** (relevant for local environment authorities):  
Estimation of expected exposure (new base stations)
- **Problem:** Large variety of base station types
- **Task:** Finding of a suitable categorisation
- **Idea:** Morphographical parameter as main class  
Example: Base station on high inner city building
  - often several channels and several operators
  - often antennas with large downtilt
  - buildings of same height often far awayOrientation to main lobe as sub class,  
Distance and sight condition as free parameter

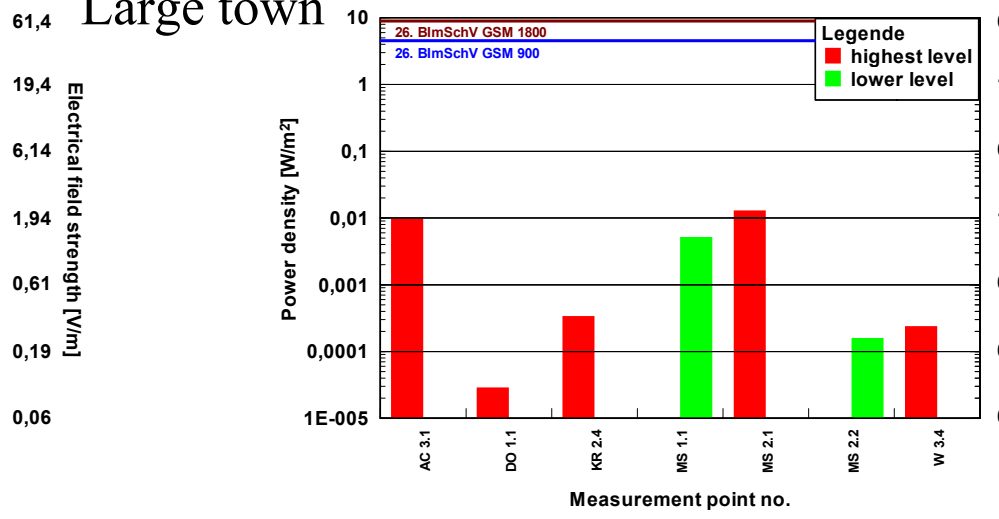


# Cat Results: Below Base Station

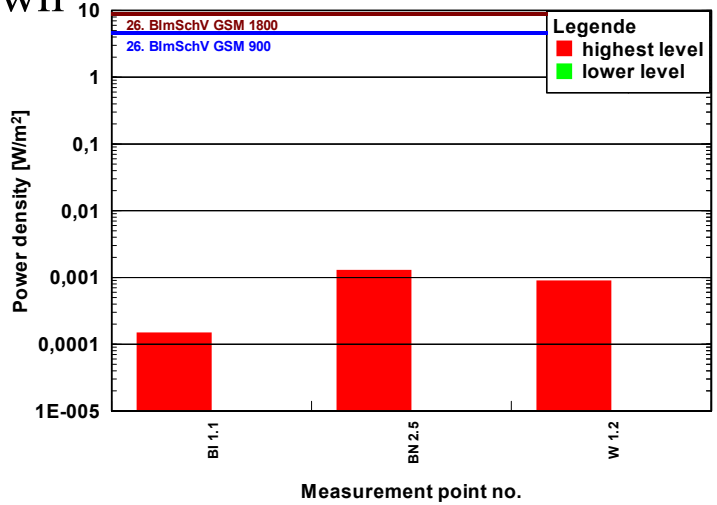
city



Large town



all town



- Variation of more than 3 orders of magnitudes despite of comparable measurement points
- Umbrella effect???



# For Interested Readers ...

Further results of  
Categorisation,  
Minimisation strategies,  
Description of the measurement guidelines, and  
Influences of exposure limit variation  
can be found at

[www.munlv.nrw.de/sites/arbeitsbereiche/immissionen/mobil.htm](http://www.munlv.nrw.de/sites/arbeitsbereiche/immissionen/mobil.htm)

Sorry, it's in German language!)



- Systematic measurement campaign: 87 measurement points around 24 base stations in 10 cities
- All measured exposures well below ICNIRP limits
- Swiss ILT exceeded only at one place, but nearly reached some times
- Other external RF exposure or DECT may be in the same order as mobile phone exposure
- Categorisation not successful
- Exposure directly below antenna not always very low; umbrella model questionable
- More results on Internet

