

MSV: Signal Processing Methods

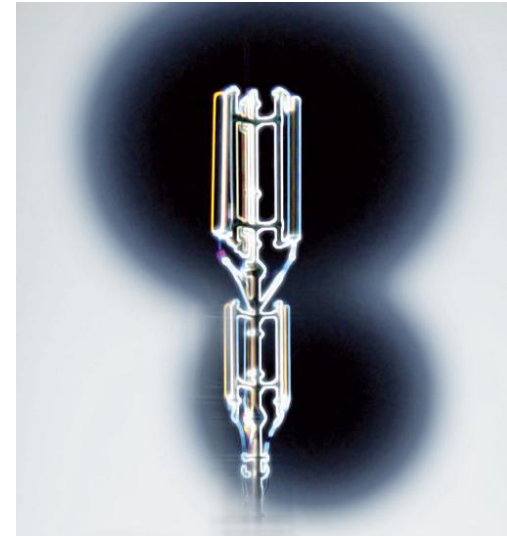
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Main Topics:

- Signal and Communication Theory
- Wireless Communication Systems (5G and beyond)
- Multiantenna Systems, MIMO Systems
- Parameter Estimation, System Identification
- Direction Finding, Localization, MIMO Radar
- Optimal Power Flow in Transmission Grids
- Automotive Safety and Autonomous Driving

Methodologies:

- Array Processing
- Convex Optimization
- Machine Learning
- Numerical Mathematics / Compressive Sensing
- Statistical Signal Processing



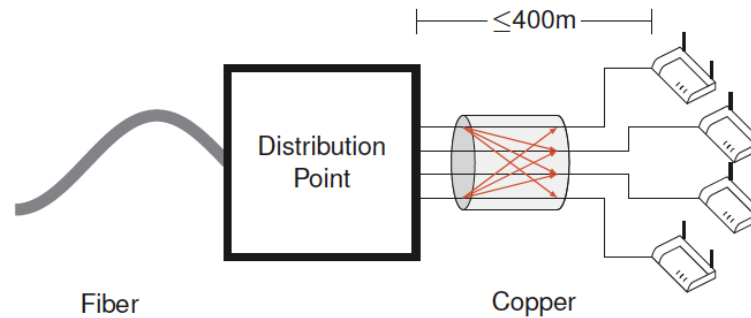
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Poster Presentation: just two of many topics

Precoding for Enhanced User Experience in G.fast DSL (wireline)

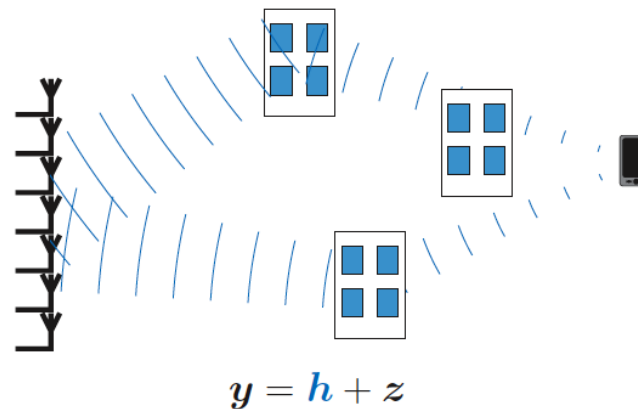
(part of an ongoing industry collaboration)



Frequencies up to 212 MHz \Rightarrow Interference increases significantly

CSI Acquisition based on Machine Learning – Leveraging Massiveness in 5G Systems (wireless)

(part of an ongoing DFG research project)



The structure of the channel could be exploited to reduce the noise in the observation y .

Further ongoing/recent research topics

Wireless-/line Communications:

- Channel Estimation and Transceiver Design in MIMO / Massive MIMO
- Pre-Coding, Pre-Distortion, Pre-Equalization Techniques and Receiver Design
- Hybrid Precoding for mmWave Communication Systems
- Interference Management and Coordination for Cooperative Communications
- Resource Allocation in Heterogeneous Cellular Networks
- Network Coding and Relaying for Multicast Networks
- Physical Modeling of Antennas and Communication Systems

Signal and Communication Theory / Parameter Estimation:

- Model-Aware Compressive Sensing for Radio Applications
- High Resolution Direction Finding, Localization, MIMO Radar
- Estimation of Covariance Information in Very Large Sensor/Antenna Systems
- Reduced-Entropy Signals in Interference Limited Communication Systems

Automotive Applications:

- Analysis and Robust Design of Sensors and Functionalities for Safety Applications
- Verification and Quality Criteria for Machine Learning in Autonomous Driving

Power Networks:

- New Development Strategy for the (German) Power Network by a Hybrid Transmission Architecture
- Fault-Tolerant Operation of Hybrid Transmission Grids