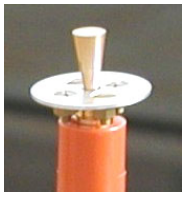
SIMO Measurements in a Micro Cell Including Polarization

Measurement Setup:

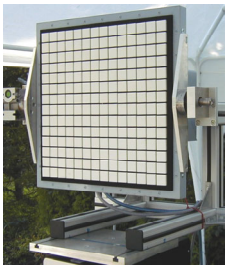
- Propagation situation: line-of-sight and non-line-of-sight, Tx antenna moved at slow driving speed, Rx antenna fixed
- Place: Autobahn A71 exit Ilmenau
- Carrier frequency: 5.2 GHz, bandwidth: 120 MHz, maximum excess delay 3.2 µs, transmitter power: 33 dBm



Transmit antenna:

omnidirectional single element with vertical polarization mounted on the roof of a car

height above ground: ca. 2 m



Receive antenna:

8x8 elements uniform rectangular patch array (URA), vertical polarization, mounted at a bridge, about 25° tilted downwards

element separation: 0.4943 λ
height above ground: ca. 7 m

References:

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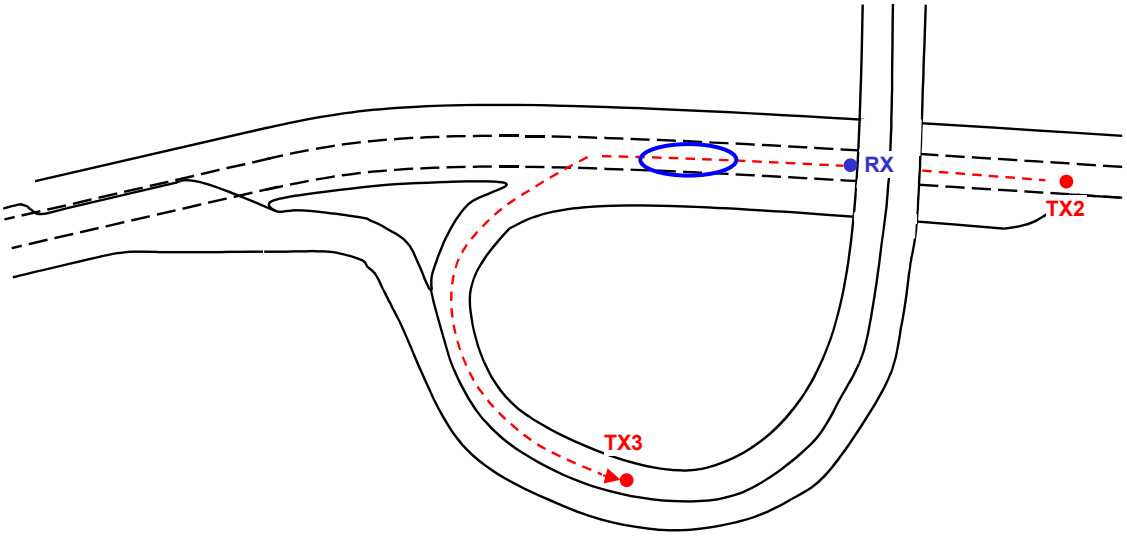
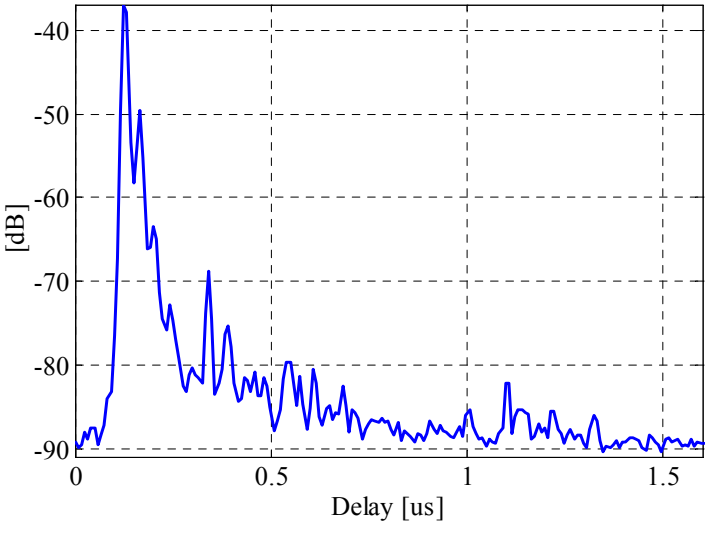
Photograph and sketch of the measurement environment:

The receive array looks towards the Tx track leading from TX2 to TX3.

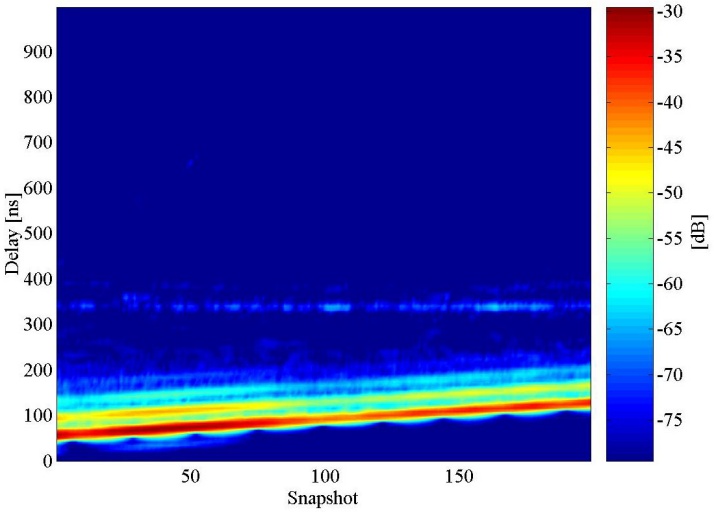
The sample data cover a section of about 10 seconds or 21 meters while the Tx had LOS (encircled in blue) and is relatively close to the Rx. This results in a significant change in elevation of the multipath components. The snapshot spacing is about 1.8 λ.



Selected data view:

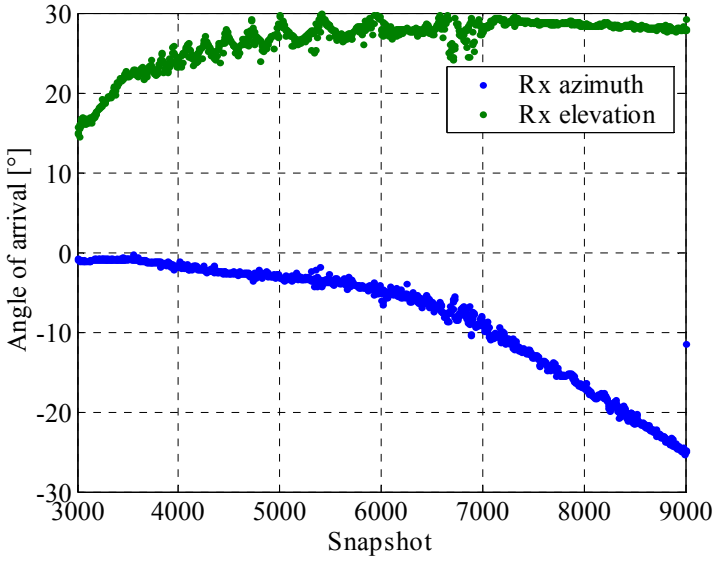


Delay spectrum: single snapshot averaged over all Rx antenna channels.



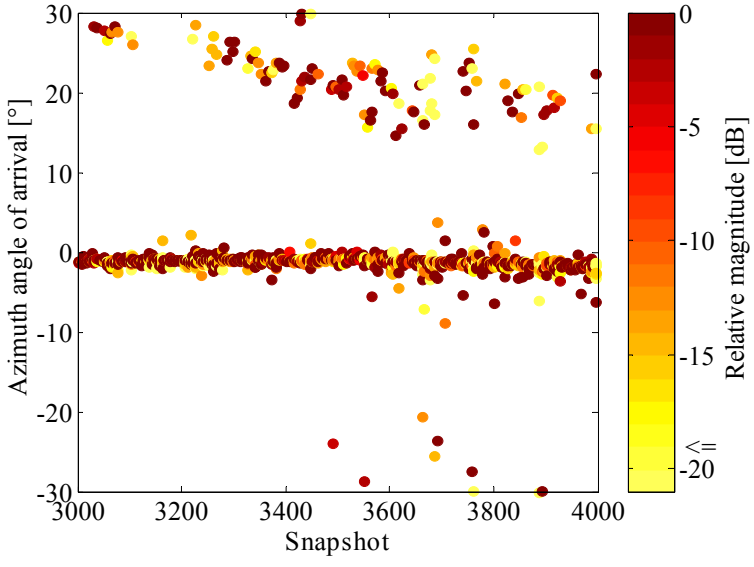
Time-variant delay spectrum for the sample data section, averaged over all 64 Rx antenna channels.

Advanced parameter estimation results:



Joint 3dimensional superresolution parameter estimation by Unitary ESPRIT.

Azimuth and Elevation of arrival of the strongest multipath component for a larger section of the measurement track.

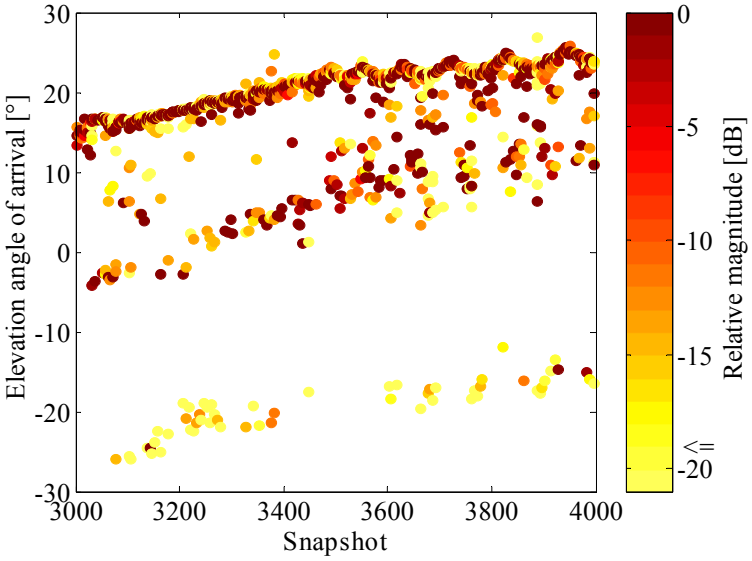


The sample data cover only the snapshots 3000 to 4000. Each estimated multipath component is represented by a dot in the dimensions

Azimuth angle of arrival

and

Elevation angle of arrival



Measurement file remarks:

- Array calibration including coupling compensation for the URA
- No phase alignment to compensate the temporal offset between capturing the individual antenna channels (cf. time diagram)
- Filename: http://www.channelsounder.de/downloads/urasimo1.zip
- Ordering of the Rx elements: column major order