A u f g a b e der Abschlussarbeit im
Auslandsorientierten Studiengang
Informations- und Kommunikationstechnik

für: Herrn Khalid Almallak

gestellt von: Herrn Prof. Dr.-Ing. K. Solbach, Fakultät 5 - Hochfrequenztechnik

Thema: Characterisation of the Frequency Dependence of MIMO Indoor Channels

Aufgabenstellung:

Spatial diversity in RF communications may be exploited by using MIMO (Multiple-Input-Multiple-Output) systems constisting of several antennas on both the transmit and receive site. The corresponding matrix transfer function and thus the corresponding MIMO channel capacity will in general depend on frequency. The focus of this work is to investigate this frequency dependency and its possible impact on communication systems based on ultra-wideband transmissions.

First a literature survey regarding the subject shall be performed. In the second step, measurements shall be performed to obtain time-invariant wideband indoor MIMO transfer functions for a small set of indoor propagation scenarios. These measurements shall be based on an existing and available measurement set-up for single-input multiple-output measurements using a network analyser and an automatic positioning rail. An appropriate measurement procedure shall be devised to accommodate the MIMO measurements. The frequency range shall be app. 2 GHz to 6 GHz, and the number of antenna positions app. 4-8 on one side and a few hundred (automatically sampled) on the other side.

The measurement results shall be evaluated to determine the transfer matrix, its spectral properties (e.g. based on singular value decomposition) and the corresponding MIMO channel capacity for sub-bands within the measurement band as function of various parameters. Parameters include the centre frequency and width of the sub-bands and the subset of transmit and receive antenna positions used. The main focus shall be put on the centre frequency and bandwidth dependency. The observed dependencies shall be discussed.

All necessary computations shall b performed using Matlab.

At the end of the workings a presentation of the results will be obligatory in the department.

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Zweitgutachter der Abschlussarbeit: Herr Dr.-Ing. P. Waldow

Aufgabensteller / Betreuer

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E R K L Ä R U N G

Hiermit erkläre ich, dass ich die Arbeit bis auf die offizielle Betreuung durch den Aufgabensteller selbständig und ohne fremde Hilfe verfaßt habe.

Die verwendeten Quellen sowie verwendete Hilfsmittel sind vollständig angegeben. Wörtlich übernommene Textteile und übernommene Bilder und Zeichnungen sind in jedem Einzelfall kenntlich gemacht.

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