GEFÖRDERT VOM
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System-Level Simulations for IRS-Assisted Communication

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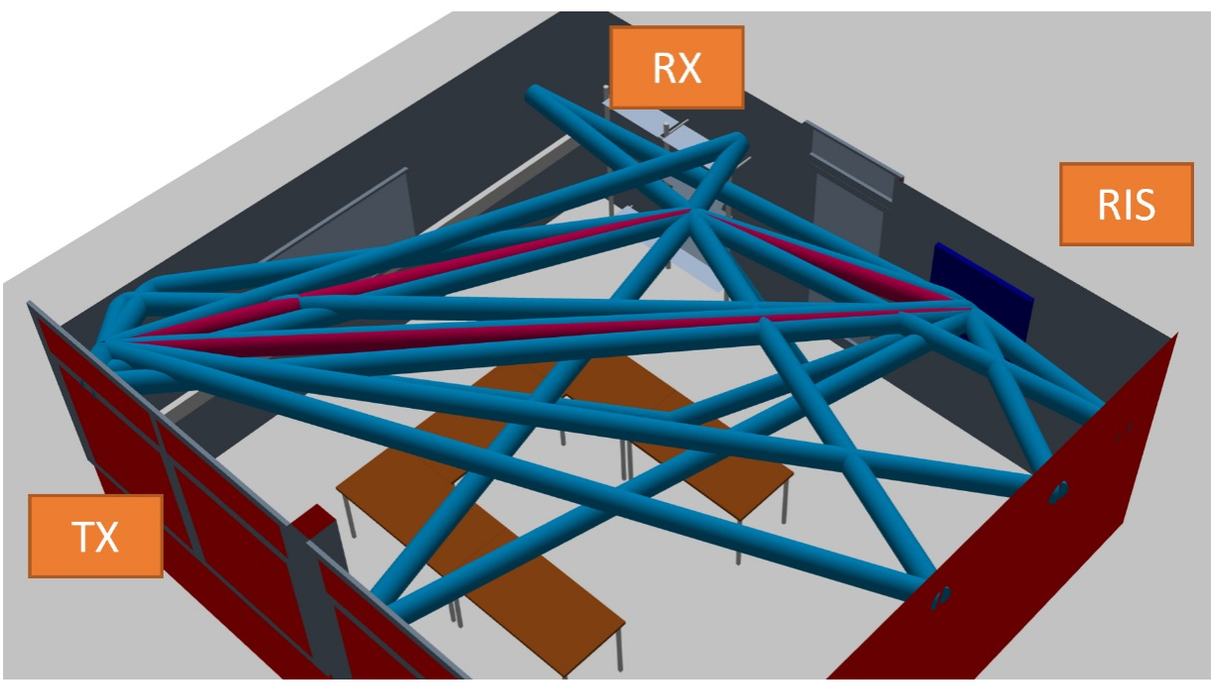
How can we shape the radio environment to create a more favorable communication scenario?



Using the ray-tracing module of the simulation framework SiMoNe, the performance of IRS-assisted communication links can be analyzed. In the shown case, SiMoNe's integrated 3D-visualization framework shows the complex multipath propagation in a small meeting room scenario featuring an IRS-assisted connection between a transmitter and a receiver as it might be used to enhance the physical layer security by circumventing possible eavesdropper spying on the direct link.

KEY FINDINGS

As communication systems strive to use ever higher frequencies, they face challenges such as a high free space pathloss, high penetration loss and sensitivity to weather effects that impede communication. Intelligent network elements such as Intelligent Reconfigurable Surfaces (IRS) are one of the considered solutions to shape the radio environment favorably and enable communication even in challenging non-line-of-sight scenarios. Further discussed benefits are improved physical layer security, interference mitigation and integrated communication and sensing. SiMoNe, the Simulator for Mobile Networks, is currently being extended to provide system- and link-level simulation of communication scenarios including intelligent network elements. Its modular design makes it a suitable test bed to analyze the performance of theoretical models of IRS, simulation data and measured hardware prototypes in the context of communication networks. The integrated 2D- and 3D-visualization frameworks of SiMoNe furthermore enable demonstrations of various properties of IRS in smart radio environments on link- and system-level. This can include but is not limited to coverage, receive signal strength, delays and richness of the multipath environment.

C. Herold and T. Kürner, "A Concept for the Efficient Integration of Reconfigurable Intelligent Surfaces into a Ray Tracing Framework," 2023 48th International Conference on Infrared, Millimeter, and Terahertz Waves (IRMMW-THz), Montreal, QC, Canada, 2023, pp. 1-2

] T. Kürner & B. K. Jung & C. Herold, "On the Requirements on Reflective Intelligent Surfaces in THz NLOS Backhaul Link," 2023