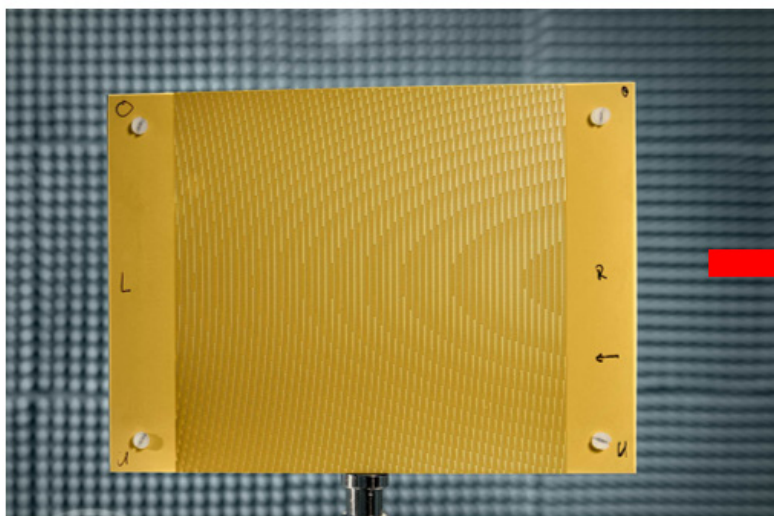


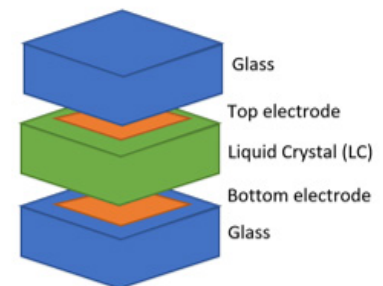
D-Band IRS investigation and development

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Which technology is the proper one to realize IRS in D-Band?



Static Reflector



LC-based IRS

Way of IRS design, from static to reconfigurable IRS. Left side static reflector with zero power consumption for first investigation on radiation pattern and side lobe pattern. Furthermore, modulation schemes can be investigated. On the left side reconfigurable IRS based on Liquid Crystal technology. An explosion figure of a stack up of one-unit cell is shown

KEY FINDINGS

In the context of 6G high bandwidth is required to achieve higher data rates for application in the domain of telemedicine and digital twin. Due to the increased path loss at higher frequencies smart radio environments with IRS are a good solution to overcome path loss issues. The investigations on technology to realize D-Band IRS two steps are taken. In first step, a design of static reflector done to verify the design procedure and to setup a measurement environment to characterize the performance of IRS. Within this investigation several phase shifting elements were investigated. The major advantage of static reflector is zero power consumption, the major disadvantage is that static reflectors are not reconfigurable. It was shown that static reflectors can be realized by well-known and cheap PCB technology and this technology can be scaled up to D-Band.

In the next step a reconfigurable IRS should be realized with Liquid crystal technology. Based on these prototypes different radiation scenarios can be performed. Furthermore, different modulation schemes can be applied to IRS to investigate the effects of IRS on the modulation.

E. Tohidi, R. Stöcker, J. -M. Köszegi and S. Stańczak, "D-Band RIS as a Reflect Array: Characterization and Hardware Impairments Study," 2023 International Balkan Conference on Communications and Networking (BalkanCom), Istanbul, Turkiye, 2023, pp. 1-5

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