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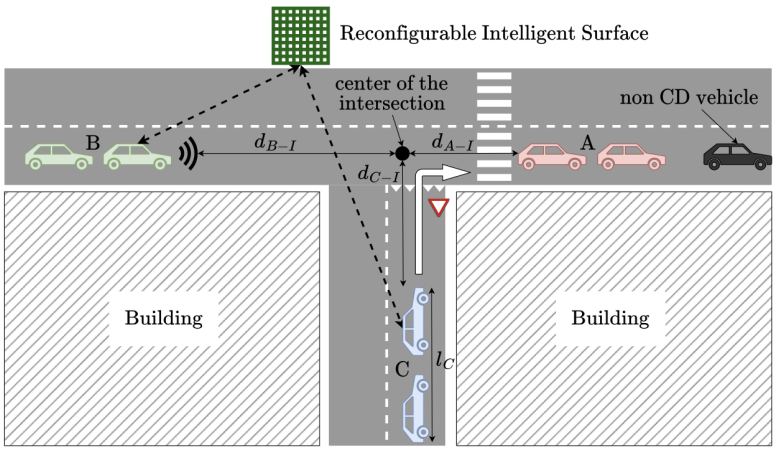
Master's Thesis

Impact of Interference by Reconfigurable Intelligent Surfaces on Inter-Vehicle Communication

Abstract

Reconfigurable Intelligent Surfaces (RISs) are devices capable of reflecting wireless signals towards a desired, reconfigurable direction. They have been proposed to solve the signal blockage problem typical of mmWave and THz communication technologies. The principal envisioned use case is coverage extension of mmWave cellular base stations, enabling to reach users "hidden" behind objects such as buildings. Recently, they have also been proposed for vehicle-to-vehicle communications to enhance cooperative driving in urban scenarios or enable data transfer for vehicular edge computing. While the benefits seems clear, the community did not investigate potential drawbacks yet. With respect to cellular networks, each mobile operator might deploy its own surface, and RISs belonging to one operator might cause unwanted reflections that interfere with users of another one. With respect to vehicular networks, local communication signals on a specific road might be reflected towards another one, generating additional interference on the channel.



The thesis directly builds upon the paper my Segata et al. [1] and will be in cooperation with Michele Segata, University of Trento.

Content

The aim of this thesis is to quantify to which extent RISs generate additional interference and potentially finding a solution to the problem. Such analyses will be carried on through discrete event simulation frameworks such as Plexe, Veins, and OMNeT++.

Requirements

Basic wireless communication, interest in vehicular application fields and novel 6G-related communication principles, C++

[1] Michele Segata, Marios Lestas, Paolo Casari, Taqwa Saeed, Dimitrios Tyrovolas, George K. Karagiannidis and Christos Liaskos, "Enabling Cooperative Autonomous Driving Through mmWave and Reconfigurable Intelligent Surfaces," Proceedings of 18th IEEE/IFIP Conference on Wireless On demand Network Systems and Services (WONS 2023), Madonna di Campiglio, Italy, January 2023.

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