

Project: IEEE P802.15.7a OCC TG

Submission Title: Design of a Power-domain Optical Non-orthogonal Multiple Access (PDO-NOMA) Mechanism with Ultra-massive-link Setup for the OCC System

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Abstract: We propose the power-domain optical non-orthogonal multiple access (PDO-NOMA) technique in the vehicular OCC system.

Purpose: The main goal of this contribution is to increase the capacity of OCC networks, PDO-NOMA technique can be implemented as a promising candidate.

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1. Introduction

- ❑ PDO-NOMA allows sharing the same time and frequency slots by different users by changing the transmission power.
- ❑ The transmitter sends the signals of different power levels by applying superposition coding. More power is allocated to the receiver at longer distance and vice versa [1].
- ❑ To apply this PDO-NOMA technique in vehicular OCC system, the vehicle LEDs are set to flicker at different power levels in accordance with the signals.

2. PDO-NOMA Concept

1.1 Proposed Idea

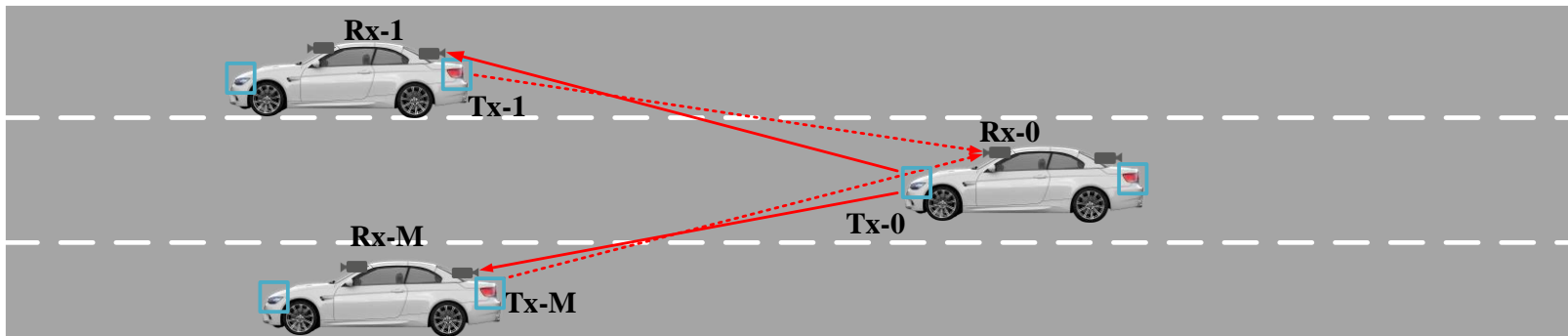


Fig 1. Scenario of applying NOMA in Vehicular OCC

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3. Block diagram

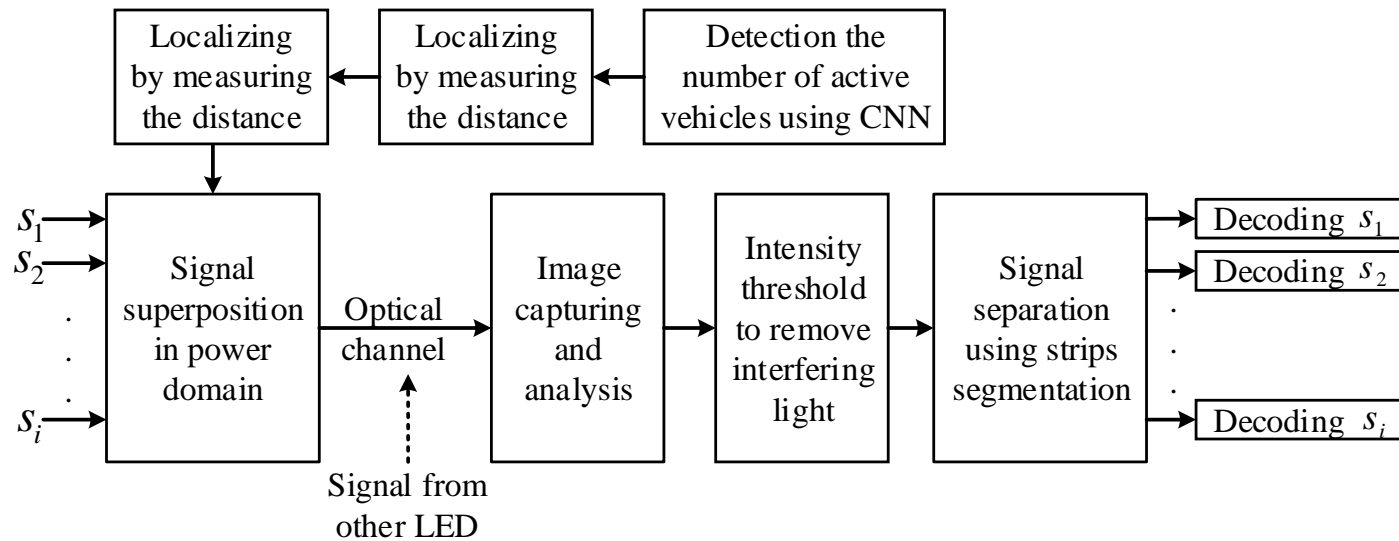


Fig 2. Block diagram of the process

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4. Technology Advantages

Advantage of the novel PDO-NOMA technique for bi-directional hybrid vehicular OCC system using dual camera.

- Data transmission considering massive-link setup on the basis of PDO-NOMA in OCC.
- Development of a new localization mechanism based on counting vehicles and their relative positions and accuracy improvement
- Development of a highly efficient and real-time power allocation scheme based on the number of active cars inside the field of view of the camera.

References

- [1] M. Shahjalal, M. K. Hasan, M. M. Islam, M. Z. Chowdhury and Y. M. Jang, "A Two-Stage Power Allocation-Based NOMA Architecture for Optical Camera Communication," in IEEE Systems Journal, doi: 10.1109/JSYST.2020.3015766.