

AI-based Radio Resource and Transmission Opportunity Allocation for 5G-V2X HetNets: NR and NR-U Networks

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Abstract : The capacity of fifth-generation (5G) vehicle-to-everything (V2X) networks poses significant challenges. To address this challenge, this paper utilizes New Radio (NR) and New Radio Unlicensed (NR-U) networks to develop a heterogeneous vehicular network (HetNet). We propose a new framework, named joint BS assignment and resource allocation (JBSRA) for mobile V2X users and also consider coexistence schemes based on flexible duty cycle (DC) mechanism for unlicensed bands. Our objective is to maximize the average throughput of vehicles while guaranteeing the WiFi users' throughput. In simulations based on deep reinforcement learning (DRL) algorithms such as deep deterministic policy gradient (DDPG) and deep Q network (DQN), our proposed framework outperforms existing solutions that rely on fixed DC or schemes without consideration of unlicensed bands.

Keywords : vehicle-to-everything (V2X), resource allocation, BS assignment, new radio (NR), new radio unlicensed (NR-U), coexistence NR-U and WiFi, deep deterministic policy gradient (DDPG), deep Q-network (DQN), joint BS assignment and resource allocation (JBSRA), duty cycle mechanism

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