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Future Communication Systems for Railway: the AB4Rail project in H2020 Shift2Rail Programme

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Abstract

In the last few years, the railway community has been working on the replacement of GSM-R technology used within the ERTMS/ETCS system. It is crucial to identify alternative communication technologies able to replace GSM-R guaranteeing the same requirements of QoS/QoE, security, and safety. For this purpose, the two most promising approaches are based on FRMCS and ACS systems. The Eu-Rail JU H2020 AB4Rail project (Alternative Bearer For Rail) aims to investigate the possibility of extending the set of communication bearers that can be integrated into the FRMCS/ACS systems. In this paper, the authors describe the main results obtained in AB4Rail research activities and adopted methodologies. From AB4Rail project investigations, it has emerged that the most promising candidates are: Free Space Optics (FSO) and innovative aerial communication technologies including LEO HTS satellites and HAPS.

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1. Introduction

The EU programme of a Single European Railway Area (SERA) intends both to facilitate traveling across Europe for passengers and rail operators and to respect the environment by drastically reducing carbon emissions. Efficient railway systems are enabled by telecommunication infrastructures for supporting advanced train management and control services such as the European Rail Traffic Management System/European Train Control System (ERTMS/ETCS). The GSM-R is the actual communication technology used in the railway and will be dismissed by

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