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Artificial Intelligence and Machine Learning

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This edition of the INGR is dedicated to the memory of Earl McCune Jr., who left us tragically and too soon on 27 May 2020. Earl was a microwave/RF guru, brilliant technologist, major industry/IEEE contributor, global visionary, keen skeptic, and all around fantastic human being. He was a major contributor to the INGR's early work on energy efficiency, millimeter-wave, and hardware. He worked for a technologically advanced yet more energy efficient world, and the contents of the INGR are a tribute to that vision. Rest in peace, Earl!

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ABSTRACT

In the evolution of artificial Intelligence (AI) and machine learning (ML), reasoning, knowledge representation, planning, learning, natural language processing, perception, and the ability to move and manipulate objects have been widely used. These features enable the creation of intelligent mechanisms for decision support to overcome the limits of human knowledge processing. In addition, ML algorithms enable applications to draw conclusions and make predictions based on existing data without human supervision, leading to quick, near-optimal solutions even in problems with high dimensionality. Hence, autonomy is a key aspect of current and future AI/ML algorithms.

This white paper focuses on the development and implementation of AI/ML technologies for 5G and future networks. The objective is to illustrate how these technologies can be smoothly migrated into 5G systems to increase their performance and to decrease their cost.

AI/ML applications for 5G are wide and diverse. In this document, some of the key areas are described which includes networking, securing, cloud computing and others. Over time, this white paper will evolve to encompass even more areas where AI/ML technologies can improve future network performance objectives.

Key words:

AI, ML, DL, CNN, DNN, RNN, GAN, GPU, Cloud Computing, MEC