

# **Electro-magnetic field exposure aware radio thanks to reconfigurable intelligent surfaces and backscatters**

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## **Abstract**

To support the continuous growth of the Internet traffic, each new generation of mobile network (3G, 4G, 5G) is improved with respect to the previous generation, in terms of spectral efficiency, capacity and energy efficiency. However, each new generation also adds its own cost in terms of spectrum and energy consumption to the costs of all previous already deployed ones. Moreover, it adds its own contribution to the overall Electro-Magnetic Field (EMF) exposure. In most countries, national regulators define the EMF limits based upon the guidelines published by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). However, some countries or cities have adopted more stringent limits; sometimes ten times lower than the ICNIRP guidelines. 6G, currently still at Research stage, has the opportunity to be the first generation to take into account EMF exposure in its design. We believe it is now the right time to start exploring disruptive approaches for transmitting more with EMF exposure awareness. In this talk, we explore two promising new types of devices that do not generate any additional wave: Reconfigurable Intelligent Surfaces and Ambient Backscatters. Reconfigurable Intelligent Surfaces improve the link budget of on-going communications by performing reflected beamforming, whereas Ambient backscatters send messages by backscattering ambient waves from on-going communications. We will provide first insights on use cases, deployment aspects, performance evaluation studies and experiments.

## **Bio**

Dr. Dinh-Thuy PHAN HUY is currently a research project manager in Orange Innovation/Networks entity. She received the degree in engineering from Supelec, in 2001, and the Ph.D. degree in electronics and telecommunications from the National Institute of Applied Sciences of Rennes, France, in 2015. In 2001, she joined France Telecom R&D (now Orange Innovation), Châtillon, France. She led the national French collaborative research projects TRIMARAN (2011-2014) and SpatialModulation (2016-2019). She participated to the following 5G PPP projects: METIS, Fantastic 5G, mmMAGIC and 5GCAR. She is co-inventor of more than 40 patents and the co-author of more than 40 papers. She is the recipient of several awards in France: “Prix Impact Economique des Rencontres du Numérique 2016” from the French National Research Agency, “Grand Prix de l’Electronique du General Ferrié 2018” from the French Society of Electricity, Electronics and Information and Communication Technologies and the “Prix Irène Joliot Curie 2018 – catégorie Femme-Recherche-Entreprise” from the French Ministry of Education and Research. Her research interests include wireless communications and beamforming, time reversal, spatial modulation, backscattering and intelligent reconfigurable surfaces. She is involved in the EU Flagship project on 6G Hexa-x and leads the work package on sustainability and security in RISE-6G EU project on reconfigurable intelligent surfaces for 6G. She is an IEEE senior member and an Orange Senior Expert.