

Workshop

Reconfigurable Intelligent Surfaces: A Technology Enabler to catalyze 6G

Organizing Projects	
Structure	Half day, 6 regular papers, 2 invited, final panel
Organizers	Angeliki Alexiou, University of Piraeus, aalexiou@ieee.org

Background and Motivation

Sustaining a flexible and ubiquitously available network in the Tbit/s regime for backhaul and access in 6G systems will require the exploitation of THz frequency bands, the adoption of novel hardware technologies and advanced materials and the rethinking of Communication Theory framework and traditional design principles and architectures. In this way, in the 6G era, the conventional system concept of a 5G network as a universal resources (physical and virtual) manager will be transformed into the system concept of a fully adaptive (to environmental characteristics, volatility and user requirements), power-efficient distributed computer and highly reliable connectivity provider.

Communications beyond the Shannon paradigm in 6G are expected to be catalyzed by research breakthroughs realized in the areas of electromagnetics and smart materials, commonly referred to as Reconfigurable Intelligent Surfaces. 6G systems will be equipped by intelligent surfaces, in order to account for NLOS/obstructed LOS connectivity and guarantee connectivity reliability. The 6G communication system, as a whole, will be fully reconfigurable, by going far beyond adaptivity to varying conditions, towards making the wireless environment itself reconfigurable. It will thus become possible to make the most out of the ultra-high bandwidth resources, e.g. made available in the THz regime, and, at the same time, overcome impairments associated with propagation characteristics, usage scenario topology, energy and complexity limitations.

The adoption of a RIS based system concept in 6G networks opens up a wealth of research and technological opportunities and at the same time introduces several theoretical, algorithmic and hardware challenges. This workshop is expected to bring together academic and industrial researchers in an effort to identify and discuss the major technical challenges and recent breakthroughs related to RIS.

Topics of Interest

Topics of interest include but are not limited to:

- *Electromagnetic fundamental for RIS-based communications*
- *RIS based transceiver design and optimization*
- *Resources and power allocation and node placement optimization for RIS-based communication networks*
- *Channel measurements and modeling IN RIS based systems*

- *AI/ML methods for RIS design, configuration and optimization*
- *Artificial intelligence for RIS-based communications*
- *Experimental implementations and prototypes for RIS based systems*
- *Software controlled RIS*
- *Prototypes and test-beds for RIS-based communications*

Planned format of the workshop

Session 1 (1.5 hours):

- Workshop opening and brief introduction by organizer
- Invited speaker on RIS design and HW Technology issues
- 3 Technical presentations (on technology enablers)

Session 2 (1.5 hours):

- Invited speaker on 6G networks
- 3 Technical presentations (on systems aspects)

Panel discussion-Concluding Remarks (0.5 hour)

Acknowledge: *This workshop is hosted by the ARIADNE project consortium and is technically sponsored by the Wireless World Research Forum and intends to bring together academic and industrial researchers, in order to stimulate and shape further developments of RIS technology towards incorporation into 6G systems.*

