

PROJECT SUMMARY

Proposal full title: Photonic components for Ultra-Wideband radio over optical fibre

Proposal acronym: UROOF

IST Research area: Photonic Components 2.5.1

The key goal for UROOF is to investigate building blocks for enabling the delivery of Ultra-wideband (UWB) radio signal over low-cost optical fiber. The aims are therefore to study, develop, test and implement very low cost conversion solutions for direct optical-to-UWB (O/UWB) and UWB-to-optical (UWB/O) based on innovative microwave photonic concepts. Unlike state of the art radio-over-fiber (RoF) technologies that are used in the backbone of the wireless access systems, UROOF will address the challenges of the low-cost wireless personal area networks (WPAN).

UROOF will study several approaches including: developing proof of concepts for O/UWB and UWB/O converters based on innovative optically controlled microwave converter (OCMC). A further study will address enhanced electro-absorption transceiver (EAT) to UWB applications. These converters will be integrated with the UWB radio frequency (RF) front-end and comprise the very low-cost access node for UROOF applications. Several UROOF applications will be investigated in the system validation: (i) range extension of WPAN over 1000m carrying real-world UWB signal with 480 Mb/s data rates and, (ii) very low-cost antenna distribution system (VL-DAS) for multi-cell WPAN applications.

We will provide detailed theoretical and practical analysis related to the design, performance, manufacturing and implementation of UROOF novel modules including: performance analysis of the different modulation schemes in UWB to determine the optimum RoF distribution configuration, evaluation of the impact of electro-optical device nonlinearities (pulse chirp / chromatic dispersion) on the UROOF distribution network, device suitability studies for multiple-access architecture VL-DAS, uncooled VCSEL-based design and optical-UWB link analysis. The UROOF partners form a highly balanced and complementary consortium, which has vast experience in the conception, design and manufacturing in both photonic components for RoF and UWB radio domains.