

PROJECT / High-Capacity SDM Solutions for Optical Backhaul in 5G Networks and Optical Data Center Connectivity

OPTICAL 5G

Main Objective:

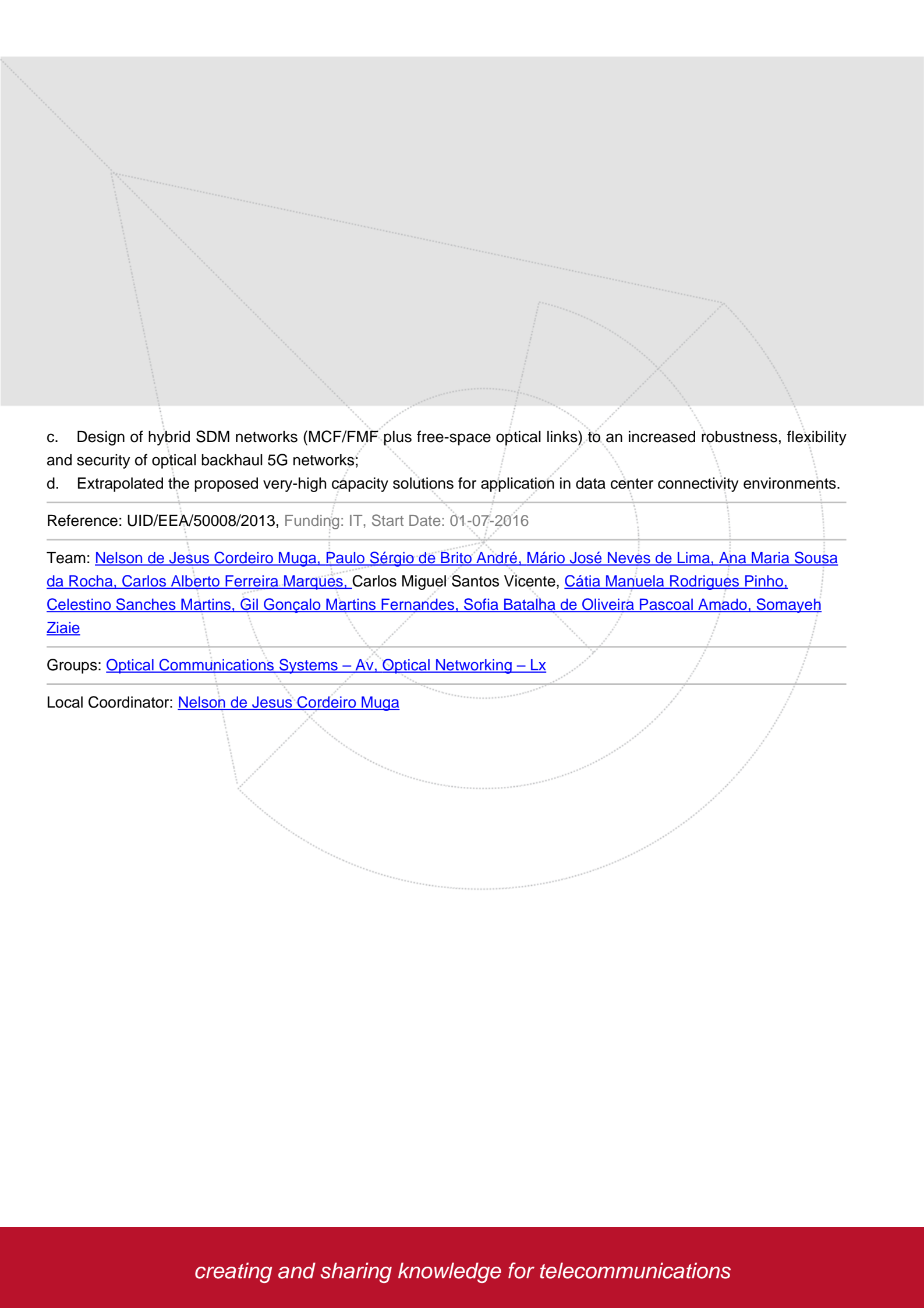
This project embraces the investigation of enabled optical networks based on spatial division multiplexing (SDM) for optical backhaul in 5G network infrastructure and data center connectivity. The SDM analysis is going to comprise the investigation of very high capacity optical systems supported by multicore (MCF) and few-mode fibers (FMF), complemented by optical free-space connections.

By introducing an additional orthogonal multiplexing dimension, the space, along with advanced modulation formats we are proposing optical backhaul solutions with very-high capacity, spectral efficiency, and energy efficiency, and low cost per bit. Such kind of solution will reveal of most importance to face the increasing bandwidth demand and challenging requirements arising from new applications in very high capacity future 5G networks.

Due to the short distance involved in such optical backhaul links, the proposed very high capacity optical systems will be extrapolated for application in data center connectivity environments, where a high bandwidth is needed to sustain the increase of network traffic due to cloud computing and other emerging web applications.

The main scientific objectives of this project are:

- a. Develop a complete set of numerical tools to fully emulate very high capacity optical backhaul systems, supported by MCF and FMF, for 5G networks;
- b. Propose new low-complexity and modulation format agnostic digital signal processing (DSP) techniques for flexible and customizable optical coherent systems, employing variable bit rate hybrid quadrature amplitude modulation (QAM) schemes;

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- c. Design of hybrid SDM networks (MCF/FMF plus free-space optical links) to an increased robustness, flexibility and security of optical backhaul 5G networks;
 - d. Extrapolated the proposed very-high capacity solutions for application in data center connectivity environments.

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