High Capacity and Low Latency
Backhauling in 5G: The 5G STEP-FWD Vision

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Introduction
5G STEP-FWD project objective to propose a novel optical-wireless networking solution for the provision of high speed connectivity to end users. Features of the new architecture, based on the utilization of Ultra-Dense Wavelength Division Multiplexing (UDWDM) Passive Optical Networks (PON) as the backhaul network, providing access to hyper dense mm-wave networks. Software Defined Network (SDN)-based architecture proposes the connection of small cells to different PONs through fiber links between two Optical Line Terminals (OLTs), point-to-point fiber links, small-scale fiber protection rings among locally adjacent Optical Network Units (ONUs), where all available resources from access and backhaul networks are collected into a joint pool and are managed and controlled by a unified SDN control plane.

5G STEP-FWD CHALLENGES

Wireless Challenges:
- Achieve fundamental trade-offs between spectrum and infrastructure sharing.
- Challenges to refer radical changes in the mm-Wave network, by develop a practically viable transmission technology for cellular networks

Optical Challenges:
- Passive optical network PONs cost-effective solution for the provision of huge bandwidth.
- Achieve high spectral efficiency and high data transmission rates by the UDWDM technology.
- Minimize nonlinearities and achieve ultra-dense channel spacing.
- Design a coherent UDWDM PON with simple and low-cost processing components that provides connectivity to a large optical network units population, which is compulsory for connecting ultra-dense small cells.

Applications:
- Automotive cars
- Autonomous robots
- IoT
- Industry 4.0

References