Fully Converged Quintuple-Play Integrated Optical-Wireless Access Architectures

FIVER project proposes a novel integrated access next-generation network architecture for provision of quintuple-play service to the users’ premises: wired and wireless Internet, wireless HDTV, home security, and digital TV. The FIVER architecture is completely integrated as the fiber-to-the-home, the in-home optical distribution network and the radio link are part of the same hybrid access network.

**MOTIVATION / OBJECTIVE**

In the recent years, a clear advance in the deployment of fibre-to-the-home (FTTH) optical access networks around the world has been experienced. FTTH access is a flexible, future-proof access technology that enables the provision of Gb/s bit-rate per user.

The fully-converged quintuple-play integrated optical-wireless access architectures (FIVER) project aims to extend beyond the advantages of the simple FTTH concept by integrating the optical distribution path with the final short/medium wireless link, into the same complete end-to-end FTTH network architecture.

The integration of wireless and optical access networks in a single hybrid network has been identified as a powerful solution to address the dramatic demand increase for high data-rate wireless connectivity experienced along the last years. The full integration of the wireless and optical access networks can still be further exploited if the signal modulation formats of the signals used to transmit the wireless and wired services present similar features.

The FIVER project aimed at developing a novel integrated access next-generation network architecture reaching 100 km of optical fibre (indicated for long-reach passive optical networks, LR-PONs) employing only orthogonal frequency-division multiplexing (OFDM) modulation formats of the signals used to transmit the wireless and optical access networks can still be further exploited if the signal modulation formats of the signals used to transmit the wireless and wired services present similar features.

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**MAIN WORK DESCRIPTION**

The optimum power distribution between the multi-format OFDM-based signals transmitted along the LR-PON was identified with the target of maximizing the performance of each OFDM signal. Two technical approaches, namely, linearized external modulation schemes and digital pre-distortion, were proposed as possible solutions for linearization of the electro-optic converters. The channel sounding performed by a set of out-of-band RF-plots was proposed and demonstrated as a powerful centralized impairment compensation technique in OFDM-based LR-PONs supporting the quintuple-play service. Finally, the provisioning of the quintuple-play service in a multi-user environment served by a 100 km-long LR-PON employing the proposed centralized compensation approach was demonstrated in the laboratory prototype developed by IT.

**ACHIEVEMENTS**

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