Poster Session 2 – Thursday, 11.00-12.00

Optical Fiber Nonlinear Coefficient Measurements Using Four-Wave Mixing

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Optical fiber (OF) nonlinearity and the length are two the most important parameters that determine the amount of nonlinear phenomena occurrence in the optical waveguide. Therefore when considering specific telecommunications OF nonlinear characteristics it is very important to determine it's nonlinear coefficient – γ. It is different for various types of fibers because γ is dependent on the OF material characteristics and fiber profile that determines OF's effective area Aeff.
There are various methods how to determine OF's nonlinear coefficient mostly based on different nonlinear effects realization in the OF under test. In this research nonlinear phenomena four-wave mixing (FWM) is used to determine optical fiber's nonlinear coefficient. Measurement scheme is based on two laser sources – pump and signal. This is a realization of so called partially degenerate FWM in the fiber under test. Use of single pump source is chosen to prevent multiple idler component generations that complicates the γ calculation. To determine the fiber nonlinear coefficient the output signal spectrum from OF is analyzed.
Measurements were performed in the OF's zero dispersion region for gradually increasing pump and signal laser wavelength separation bandwidth Δλ. It has been established that measured nonlinear coefficient value is decreasing according to Δλ increase. This can be explained by phase matching condition deterioration as two optical components are located further away each from the other. But the change of γ depending on Δλ is different for various types of fibers. In this research we have carried out comparison of γ parameter between two types of fibers: DSF and HNLF.

Sub-VT Design of a Wake-up Receiver Back-end in 65 nm CMOS

Nafiseh Seyed_Mazloum (Lund University), Joachim Neves Rodrigues (Lund University), Ove Edfors (Lund University)

In sensor network applications, the use of duty-cycled ultra-low power wake-up receivers (WRxs) can significantly reduce overall power consumption. An important complement to previous investigations is to show that low-power WRxs with good enough detection performance can be realized in hardware. In this work we address this very issue by presenting the design, implementation, and sub-VT characterization of a digital backend for an ultra-low power WRx. The WRx listens to the channel periodically for any potential communication. The main receiver is activated whenever the WRx detects a wake-up beacon (WB). The studied WRx contains a low-power/low-performance analog front-end, an on-off keying (OOK) detector and a digital back-end which activates the main receiver. The WBs will be encoded with the identity of the destination node to avoid overhearing. Further, spread-spectrum will be used to compensate for the low performance of the low-power analog front-end. The spreading code are selected from an m-sequence due to its good correlation properties.
We evaluate the system performance, in terms of detection and false alarm probabilities, of the proposed WRx architecture for the given WB structure. The performed study shows that both high detection performance and low probability of false alarms can be achieved with the chosen WRx structure. Moreover, the digital back-end is realized by deploying a 65nm low-power high-threshold (LP-HVT) CMOS technology. According to the simulated results, the total power consumption of the digital back-end is negligible, considering 10 uW as the target WRx power consumption.

Performance Comparison of Fixed and Moving Relays under Co-channel Interference

Yutao Sui (Chalmers University of Technology)

We study and compare the outage probability (OP) of a vehicular user of dual-hop moving relay node (MRN) assisted transmission, dual-hop transmission assisted by a fixed relay node (FRN), as well as of the baseline single-hop direct transmission under of co-channel interference. For an accurate comparison, we numerically optimize the FRN position which minimizes the average vehicular user OP. When vehicular penetration loss is moderate to high, MRN assisted transmission is shown to greatly outperform transmission assisted by an FRN as well as direct transmission. Hence the