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CFO compensation method for coherent optical OFDM system by electro-optic feedback

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We investigate feasibility of carrier frequency offset (CFO) compensation method using optical feedback path for coherent optical orthogonal frequency division multiplexing (CO-OFDM) system. CFO compensation is one of most important issues in OFDM system, since the CFO breaks orthogonality among OFDM subcarriers and it causes critical degradation in signal quality. In CO-OFDM, the CFO tends to be high because of laser instability. Thus wide CFO compensation range is essential. Recently proposed CFO compensation algorithms provide wide CFO estimation range. They compensate CFO after analog-to-digital converter (ADC). Then, CFO compensation range is limited by sampling rate of the ADC. Thus, the sampling rate should be much higher than CFO and/or data bandwidth. Because of high price of ADC, it is not affordable in practical CO-OFDM. To solve this problem, we propose a CFO compensation method having optical feedback path. The measured CFO is used to control local oscillator's wavelength for CFO compensation. Since the CFO is compensated before ADC, the compensation range is not affected by the ADC. Residual CFO can be compensated by conventional CFO compensation methods. The feasibility of the proposed method is experimentally investigated. We showed that the practical CFO compensation range can be extended to the sampling frequency range, regardless of sampling rate of ADC. Although the proposed method is based on OFDM, the proposed method works in all coherent modulation formats with minor modification.

Biography

Sang-Rok Moon has received his BS degree in Physics in 2008 and his PhD degree in Electrical Engineering in 2015 from Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Korea. He is working at Electronics and Telecommunications Research Institute (ETRI) from 2015. His current research interest includes, orthogonal frequency-division multiplexing (OFDM) and optical communication in metropolitan/access network.

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