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Title

Demonstration of a Flexible Bandwidth Optical Transmitter/Receiver System Scalable to Terahertz Bandwidths

Source

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Abstract

This paper demonstrates a flexible bandwidth-modulation-capable and bandwidth-scalable transmitter and receiver technique based on dynamic optical arbitrary waveform generation (OAWG) and measurement (OAWM). This technique generates and receives broadband arbitrary optical waveforms by dividing the waveform spectrum into overlapping spectral slices of bandwidth manageable with existing electronics. The OAWG transmitter produced 2-ns, 60-GHz data waveforms using only 5.5 GHz of analog bandwidth by coherently combining six 10-GHz spectral slices. Measurements were performed using an OAWM receiver with two 30-GHz spectral slices using 15 GHz of analog bandwidth. Experimental demonstrations verify the modulation format independence and flexible bandwidth capabilities of OAWG transmitters and OAWM receivers through the generation of the following waveforms: binary phase-shifted keying (BPSK), coherent wavelength division multiplexing (CoWDM) with 5 and 15 BPSK subcarriers, and orthogonal frequency division multiplexing (OFDM) with 54 BPSK subcarriers. All waveforms had a bit-error-rate performance better than  $7.8 \times 10^{-5}$ .