507. Title:Bandwidth scalable, coherent transmitter based on the parallel synthesis of multiple spectral slices using optical arbitrary waveform generation

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Abstract:We demonstrate an optical transmitter based on dynamic optical arbitrary waveform generation (OAWG) which is capable of creating high-bandwidth (THz) data waveforms in any modulation format using the parallel synthesis of multiple coherent spectral slices. As an initial demonstration, the transmitter uses only 5.5 GHz of electrical bandwidth and two 10-GHz-wide spectral slices to create 100-ns duration, 20-GHz optical waveforms in various modulation formats including differential phase-shift keying (DPSK), quaternary phase-shift keying (QPSK), and eight phase-shift keying (8PSK) with only changes in software. The experimentally generated waveforms showed clear eye openings and separated constellation points when measured using a real-time digital coherent receiver. Bit-error-rate (BER) performance analysis resulted in a BER < 9.8 × 10-6 for DPSK and QPSK waveforms. Additionally, we experimentally demonstrate three-slice, 4-ns long waveforms that highlight the bandwidth scalable nature of the optical transmitter. The various generated waveforms show that the key transmitter properties (i.e., packet length, modulation format, data rate, and modulation filter shape) are software definable, and that the optical transmitter is capable of acting as a flexible bandwidth transmitter.