Abstracts

Wide-band channel sounding at 24 GHz based on a novel fiber-optic synchronization concept

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This paper describes a novel fiber-optic synchronization concept used in a versatile channel sounding system called the ETH channel sounder operating at 24 GHz (ECHO 24). ECHO 24 achieves a 2-ns path delay resolution and allows the measurement of complex channel impulse responses with Doppler frequencies <200 kHz based on a correlation method. Moreover, an antenna array together with an appropriate signal-processing scheme yields the angle of arrival of the impinging waves at the receiver (Ex) site. The intolerable frequency offset due to the operation of locally separated oscillators in the transmitter (Tx) and Rx can be overcome by a remote Tx and Rx supply with a common carrier generated in a control unit. The problem of line attenuation in coaxial cables at millimeter-wave frequencies is circumvented by the generation of appropriate optical signals, which are fed to the Tx and Rx via thin and flexible fibers. The absence of mixers and frequency multipliers yields rather small Tx and Rx modules and, therefore, reduces the deformation of the electromagnetic field to be investigated. ECHO 24 exhibits a dynamic range of 55 dB. Measurements are presented to demonstrate the versatility and precision of ECHO 24.

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