Abstracts

Multiwavelength optically controlled phased-array antennas

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A novel multiwavelength scheme is proposed and demonstrated for one-dimensional (1-D) and two-dimensional (2-D) optically controlled phased-array antenna (OCPAA) systems with true time delay (TTD). This hardware-compressive architecture employs a multiwavelength laser source in conjunction with a programmable dispersion matrix (PDM) and switched optical delay lines (SODLs) to generate all the required time delays for beam steering in 2-D phased-array antenna systems. Independent control of elevation and azimuthal scan is achieved by combining wavelength-dependent and wavelength-independent time delays. An experimental prototype of 4/spl times/2 array with 2-b/spl times/2-b resolution is constructed to demonstrate the feasibility of the multiwavelength OCPPA (MWOCPAA). Broadband linear RF phase shift is measured in both elevation and azimuthal planes over the entire bandwidth of the electro-optic (EO) modulator. System issues such as insertion loss, array size, and channel isolation are discussed. Extension of the multiwavelength scheme to a common transmit/receive (T/R) module with TTD is also described.

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