Abstracts

Spatial optical beam-forming network for receiving-mode multibeam array antenna - proposal and experiment

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This paper proposes an array antenna for multibeam reception with a beam-forming network (BFN) that uses spatial optical signal processing and also presents experimental results. In this antenna, signals received at individual antenna elements are converted to optical signals, and are optically divided from the directions of signal arrival by means of optical spatial Fourier transformation, and then the optical signals are reconverted into microwave signals at the BFN. In this BFN, to maintain optical path-length conditions, an optical integrated circuit is employed. We have experimentally investigated the optical signal processing performances of the BFN for multibeam reception. The experimental results show that optical beam direction is changed according to the signal arrival direction of an array antenna. Two multiple RF signals with different phase distributions are separated. The sidelobe level of the optical signal is reduced when amplitude distributions of optical signals are Chebyshev distributions. We also present the signal transmission behavior of this BFN. The measured carrier-to-noise-ratio degradation of this BFN is 2 dB at BER=10/sup -6/ when 118.125-Mb/s QPSK modulated signal is input into the BFN.

❑ Return to main document.