MW/mmW PHOTONICS FOR LARGE PHASED-ARRAY ANTENNAS

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SYNOPSIS

Spectacular advances in microwave/millimeter wave (MW/mmW) fiber optics & photonic integrated circuits (PICs) technologies made since the early nineties and a bevy of recently developed complimentary, innovative technologies such as MOEMS (Micro-Opto-Electro-Mechanical Systems), Nano-structures and meta-materials (EBG/PBG) could revolutionize traditional rf system design and packaging concepts. Today, a marriage of diverse materials and nano-technologies promises fast realization of commercially viable, high reliability, lightweight, compact, prime power efficient microwave/millimeter wave (MW/mmW) photonic hardware that are capable of meeting many demanding applications.

In this short course, use of photonics in MW/mmW beam forming and steering of large multibeam, multichannel phased array antennas will be discussed in detail. Presentation will include introduction to the basics of fiber optic communication, component technology, and systems architectures to demonstrate optical control/manipulation of MW/mmW signals. Also, feasibility of optical generation, transmission, block conversion (up/down), and distribution of high dynamic range MW/mmW signals in an optical feed network will be assessed. Relevant state-of-the-art optical/MOEMS/Nano-technologies, subsystems, and systems will be presented.

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