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NEXT GENERATION PHASED ARRAY ANTENNAS FOR SATELLITE COMMUNICATIONS

Abstract

Phased arrays are subject of increased research interest around the world to accommodate the need for flexible antennas design solutions for increased satellite communications bandwidths. Phased array antenna consists of many identical radiating elements each with a phase shifter. High power radiating beams are formed by shifting the phase of the signal emitted from each radiating element, to provide constructive/destructive interference and steer the beams in the desired direction. It has long been recognized that phased arrays provide in principle an attractive solution among antenna architectures for satellite communications, with the potential for unlimited flexibility in allocation of power to beams and of beam size and shape, with no theoretical limit on the number of beams generated.

This paper describes the use of new design techniques and circuit topologies for the design of phased array antennas to support space based platform from P-Band up to Ka Band. This includes GaN semiconductor technologies for Transmit/Receive architecture and metasurface based flat-panel holographic antennas, enabling significant reduction in size and weight, while delivering superior performance compared to existing GaAs based systems.