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## **Beam Scanning Leaky-Wave Antenna Based on a Composite Right/Left-Handed Transmission Line**

### **Abstract**

Leaky-wave antennas (LWAs) have been in existence since the 1940s, recent activity in the field has been stimulated by the surge of interest in metamaterials, which has inspired new sorts of construction and new ways of thinking about these antennas. Leaky wave antennas (LWAs) are wave-guiding structures that use a travelling wave as a radiating mechanism to leak power all along the structure, with power seeping out gradually as it propagates along the structure. A leaky wave is created by a guiding structure with a continuous or periodic discontinuity that permits energy to leak into the surrounding environment. Structures that support one or more leaky waves are known as leaky-wave structures (LW). The LWA is based on the concept of a travelling wave, unlike traditional resonating wave antennas. When a radio-frequency signal is supplied to one of the input ports, the travelling wave begins to lose energy as it moves toward the second port. A leaky wave antenna (LWA) is a device that supports leaky waves, which are often associated with strong directivity.

A novel substrate integrated waveguide (SIW) leaky wave antenna (LWA) is presented. The design starts with realizing the unit cell of the SIW-LWA using the concept of CRLH TL. The proposed LWA operates between 3.5 - 6 GHz with excellent radiation properties. The design, simulations and pre-fabrication studies of LWA is done using CST Microwave Studio. Fabrication of proposed structure is done using photolithographic technique. The S-parameter measurements of the metamaterial unit cell and the meta-surface is performed using Anritsu MS2038C Vector Network Analyser.