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INTEGRATED METALLIC AND DIELECTRIC POST-WALL WAVEGUIDES FOR MICROWAVE AND MM-WAVE FEED NETWORKS

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The design and implementation of RF feed networks to interconnect antenna elements and Transmit/Receive Modules is a critical aspect of integrated antenna design for which the use of EBGs is most promising. There are two design issues of particular interest: firstly the losses at higher frequencies using state of the art planar guiding structures are very high; secondly the efficient and cost effective transfer of signals from lower to higher feed planes in a multilayered structure is not straightforward.

An emerging technological solution capable of tackling both issues is the use of integrated waveguides. Two parallel metallic planes laterally bounded by periodically spaced, vertically oriented, metallic or dielectric pins form these structures.

In order to gain insight, an ad hoc Method of Moments solution of the pertinent integral equations has been implemented. This facilitates the analysis of the propagation characteristics of the integrated waveguides. Dispersion in metallic pin waveguides proved to be very similar to dispersion in equivalent solid wall waveguides. Properly dimensioned dielectric pin waveguides are also capable of supporting TE and TM modes. For both types of structure, wave propagation will be illustrated based on simulation.