

# Wideband CPW-Fed Slot Antennas on Finite Ground Planes

R. Usaha and M. Ali\*

Department of Electrical Engineering, University of South Carolina, Swearingen Building, Columbia, SC, 29208. Email: [alimo@engr.sc.edu](mailto:alimo@engr.sc.edu).

Slot antennas are finding increasing applications in microwave and mm-wave wireless applications for their wideband characteristics compared to microstrip patches. Slot antennas have bi-directional radiation patterns. Unidirectional patterns can be achieved with the use of a reflector. This includes the cavity-back slot design or more recently slot antennas on PBG (photonic bandgap) substrates.

Recently CPW-fed slot antennas have been investigated by Hall *et al.* [A.U. Bhohe, C.L. Holloway, M. Picket-May and R. Hall: "Coplanar waveguide fed wideband slot antenna", *Electronics Letters*, Vol.36, No.16, pp 1340-1342, 3<sup>rd</sup> August 2000] among many other researchers. They have proposed an antenna that can provide 49% impedance bandwidth for a 40.3 mm by 27.5 mm by 1.58 mm antenna on a substrate with  $\epsilon_r=4.3$ .

In this paper we focus on miniaturized slot antenna design (21 mm by 7.9 mm by 1.5 mm). We propose a design that has an operating bandwidth of 5.5-7.5 GHz (31%). The proposed antenna consists of a folded slot and an additional adjacent slot. The combination of the two slots results in wideband characteristics. The antenna has been simulated using IE3D, a Method of Moments (MoM) based simulation software from Zeland. The antenna operates on 1.5 mm thick Rogers (RO4003) substrate ( $\epsilon_r=3.38$ ).

Compared to other slot design in the literature our proposed design is much smaller in size and thus can reduce the size of an array significantly. We also present a detailed parametric study of the antenna including current distribution, input impedance, radiation pattern, and gain. In addition we also present antenna performance variation as function of ground plane size. This is of particular significance for portable wireless devices since device miniaturization necessitates reduced PCB size. It has been observed that the PCB ground plane has significant impact on both the input impedance and radiation pattern of the antenna. Further detail will be presented during the conference.