

# ANTENNAS AND PROPAGATION

*Modeling, Simulation & Measurements*

Edited by

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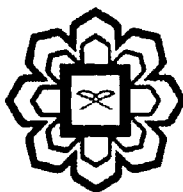
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## Chapter 11

# Tuning Fork Type Planar Antenna

AHM Zahirul Alam<sup>1</sup> and Md. Rafiqul Islam<sup>1</sup>

### 11.1 Introduction

Ultra Wideband is a carrierless short range communications technology which transmits the information in the form of very short pulses. This former military technology has gained a lot of popularity among researchers and the wireless industry after the FCC [1] permitted the marketing and operation of UWB. UWB has promised to offer high data rates at short distances with low power, primarily due to wide resolution bandwidth. The FCC in the USA has allocated a frequency band 3.1 GHz to 10.6 GHz for UWB transmission and released a mask which dictates the power levels to keep the narrow band incumbents spectrum free from interference. The UWB community is balkanized into three major groups; Multiband which is a consortium of companies led by Intel, Direct Sequence CDMA, pioneered by Freescale Semiconductor and C-Wave Technology, invented by Pulse Link. They are each racing to standardize their technology into an IEEE 802.15.3a standard. Compact and cheap ultra wideband antennas are needed for numerous UWB applications like wireless communications, indoor positioning and medical imaging. The printed planar monopole antennas are good candidates as they can be easily fabricated; they aid integration by being printed on the same board as transceiver and are low cost and light weight. There are several UWB planar antenna designs, including planar metal-plate antenna [2-3], half-disk antenna [4], and planar horn antenna [5], and many other structures [6-9], which have been reported.

In this chapter an UWB tuning fork structure antenna is presented with acceptable return loss and bandwidth over most of the UWB frequency band. The design steps are elaborate to design such antenna.

### 11.2 Antenna Design

The structure of the antenna is shown in Figure 11.1. A rectangular patch of dimension 12.45 mm×16mm is on one side of an FR4 substrate of thickness 1.6 mm and relative permittivity 4.4 with the partial ground plane located on the other side. The dimension for the substrate is 32 mm×28mm. The antenna plate is fed by a microstrip of 50Ω feedline of width 'W' and placed 'L' distance from one edge of the substrate to obtain. The width of the partial ground is 'G'. The parameters 'W', 'L' and 'G' are optimized to operate the antenna within UWB. The cut part is shown in the rectangular patch. The width of the cut part is 8mm and the length of the cut part is L<sub>c</sub>, when L<sub>c</sub>=14 mm, the rectangular patch becomes tuning fork type patch.

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