Multiband UWB Trapezoidal Antenna Using U and Pi-Shaped Slots.

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***Abstract*— This paper presents the analysis of CPW-fed trapezoidal monopole antenna added with parasitic elements and slots. From previous work, the proposed antenna altered by adding parasitic elements to enhance the operation bandwidth and achieved frequencies from 3.2GHz to 11.5GHz which covered Ultra Wide Bandwidth. This antenna is fabricated on FR4 for real measurement. Next experiment continues with slots insertion to generate notch and reconfigure frequency. U and π slots applied on trapezoidal patch. The antenna's performance observes through adjustment of slot's dimension.**

Keywords—notch frequency, parasitic element, dimension adjustment, U and π slots.

I. INTRODUCTION

Federal Communication Commission (FCC) released that UWB communication system operating in frequency range from 3.1GHz to 10.6GHz. In our previous work, the parasitic elements implemented to CPW-fed trapezoidal antenna to enhance the operation bandwidth [1]. This technique produces wide bandwidth which is from 3.2GHz to 11.5GHz. However, UWB applications can co-exist with other narrow band services that occupy the same spectrum such as the IEEE 802.16 WiMax operating at 3.4GHz–3.69GHz and IEEE802.11a WLAN operating at the 5.15GHz–5.825GHz band[2]. These bandwidths will create an interference and many methods introduced in an effort to get rid of such frequencies such as embedded omega slot and fractal shaped ground plane [3], U-shaped slot line [4, 5], slot and metallic ring [6], split ring resonators (SRRs) [7] and electromagnetic band gap structures (EBGs) [8].

In this paper, U and π slots are implemented on CPW-fed trapezoidal antenna added with parasitic element. The changes of band-notched frequency will be observed through adjustment of slot dimensions. At this stage the model has been simulated using the time domain solver, Computer Simulation Technology (CST) Microwave Studio.

II. ANTENNA STRUCTURE AND DESIGN

Fig. 1 shows the geometrical structure of CPW-fed trapezoidal antenna added with parasitic elements and slots. This antenna's total size is 38mm x 51mm x 1.6mm and designed on a substrate with dielectric constant 4.4. The dimensions of antenna are M = 38mm, N = 51mm, P = 32mm, L1 = 7.8mm, L2 = 19mm, L3 = 11.2mm, L_r = 5mm, L_t = 4mm, g = 0.2mm, h = 1.6mm and all these values are fixed.

U and π slots are loaded on the antenna in order to achieve the desired impedance. Slots dimensions are experimentally adjusted to find the effects on frequency and to achieve a notch bands that covered WLAN and Wimax operations. U slot is placed at 3mm from the upper edge of trapezoidal patch while π slot is placed at 10mm. These positions are fixed and adjustment is done only for slot dimensions.

The width of U slot, W_n is gradually transformed from 3mm to 2mm by decrements 0.5mm. Every changes of W_n value accompanied with adjustment of U slot length, L_n which is adjusted from 15mm to 11mm by decrements 2mm. The adjustment of π slot width, W_p is done from 3mm to 1mm by decrements 1mm and accompanied by the changes of π slot length, L_p which is adjusted from 16mm to 18mm by increments 1mm.

The experiments for both slots are not done simultaneously and were combined after we get the desired notched bands.

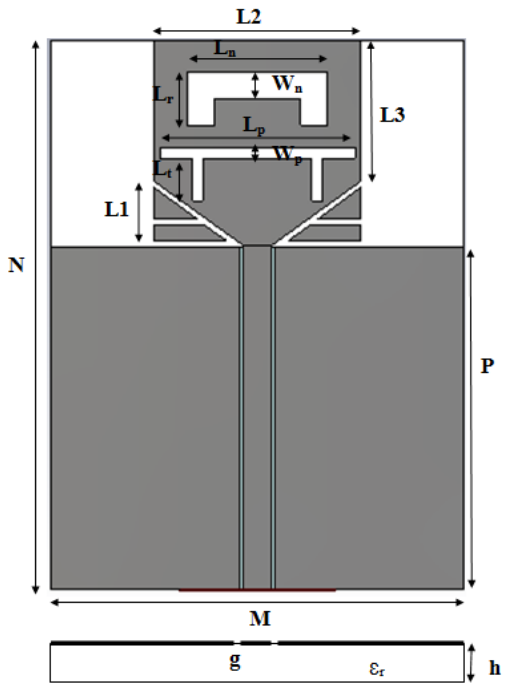

Fig. 1. Geometry of the proposed antenna