Regular paper

Multiband Integrated Wideband Antenna for Bluetooth/WLAN Applications

Kunal Srivastava, Ashwani Kumar, Binod.K. Kanaujia, Santanu Dwari, Sachin Kumar

PII: S1434-8411(18)30036-0
DOI: https://doi.org/10.1016/j.aeue.2018.03.027
Reference: AEUE 52280

To appear in: *International Journal of Electronics and Communications*

Received Date: 4 January 2018
Accepted Date: 20 March 2018

Please cite this article as: K. Srivastava, A. Kumar, Binod.K. Kanaujia, S. Dwari, S. Kumar, Multiband Integrated Wideband Antenna for Bluetooth/WLAN Applications, *International Journal of Electronics and Communications* (2018), doi: https://doi.org/10.1016/j.aeue.2018.03.027

Multiband Integrated Wideband Antenna for Bluetooth/WLAN Applications

Kunal Srivastava[1], Ashwani Kumar[2], Binod. K. Kanaujia[3], Santanu Dwari[4], Sachin Kumar[5]

[1, 4]*Department of Electronics Engineering, Indian Institute of Technology (ISM), Dhanbad, Jharkhand–826004, India*
[2]*Department of Electronics, Sri Aurobindo College, University of Delhi, Malviya Nagar, New Delhi–110017, India*
[3]*School of Computational & Integrative Sciences, Jawaharlal Nehru University, New Delhi–110067, India*
[5]*Department of Electronics & Communication Engineering, SRM Institute of Science and Technology, Chennai, Tamil Nadu–603203, India*
[1]*kunal.1211@gmail.com,* [2]*ashwanikumar7@yahoo.com,*[3]*bkkanaujia@ieee.org,* [4]*santanu_dwari@rediffmail.com,*
[5]*gupta.sachin0708@gmail.com*

Abstract

The paper presents an O-shape multiband monopole antenna design (Antenna-I) with different patch orientations; 90-degree (Antenna-II) and 180-degree (Antenna-III). The proposed Antenna-I is a multiband integrated wideband monopole antenna with two integrated bands supporting modern wireless services such as Bluetooth and Wireless Local Area Network (WLAN) in addition to wideband covering upper Ultra-wideband (UWB) frequencies. The first band ranges from 2.05–3.05 GHz and second band from 3.65–3.92 GHzin the -10 dB impedance bandwidth range. The wideband covers upper frequencies (5.24–10.75 GHz) in the range of Ultra-wideband. Antenna-II resonates at 2.38 GHz (2.11–2.90 GHz) covering Bluetooth band and upper UWB region 5.18–10.86 GHz. The proposed Antenna-III covers 1.96–2.33 GHz and 3.74–10.46 GHz frequency bands. The antenna gain at integrated band is around 2.8 dBi and varies from 4 dBi to 8.03 dBi in the UWB region. The measured fidelity factor is 0.89 for face to face and 0.82 for side by side. Measured results are presented to validate the antenna performances.

Keyword: Integrated band, multiband, UWB, wideband

1. Introduction

In the modern era, rapid changes in wireless technologies needed an antenna that can support services such as Bluetooth, WLAN and UWB. These types of diverse antennas would be able to replace numerous antenna elements integrated on the chip of handheld devices consequently making wireless equipment portable and versatile. In the available literature, a number of multiband and wideband antennas are presented [1–5] but a very few antenna designs are proposed on the concept of integrating the two bands i.e. multiband and wideband [5–7]. Compact low profile multiband and wideband planar antennas are preferred for contemporary long range and short range wireless transmission; the only limitation with a multiband antenna is its narrow bands. Therefore, it is required to design an antenna which can achieve wideband as well as multiband radiation.

The wireless systems 3.6 GHz IEEE802.11y, WLAN (3.6575–3.69 GHz), 4.9 GHz public safety WLAN (4.94–4.99 GHz), 5 GHz IEEE 802.11a/h/j/n, WLAN (5.15–5.35 GHz, 5.25–5.35 GHz, 5.47–5.725 GHz, 5.725–5.825 GHz) operate within the UWB band [3–10]. But in handheld devices bands such as 4.9 GHz public safety WLAN (4.94–4.99 GHz) is not of that much use, hence the designed antenna must operate for useful bands while at the same time suppressing the unwanted frequency bands. One technique to design such an antenna is by covering all the frequency bands and subsequently notching the undesired frequencies [11–12], but by this method complexity in design get increases making antenna structure difficult to analyze. The