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A REVIEW ON DIFFERENT BAND NOTCHING METHODS USED IN UWB SLOT ANTENNAS

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ABSTRACT:

According to federal communication commission (FCC) rules, the 3.1-10.6GHz band is allocated to the ultra wideband (UWB) applications. Notching will be helpful to avoid interference between UWB and some narrow band that are WiMAX (3.3–3.7GHz), C-band satellite downlink (3.7GHz–4.2GHz), WLAN (5.15–5.825 GHz), DSRC (5.50–5.925 GHz) etc. Different band notching techniques are discussed in this paper. Some techniques include adding parasitic stubs of different shapes, rectangular slits, and slots. In this paper comparative study will be done for different notching techniques.

INTRODUCTION:

According to FCC UWB is entitled to operate within 3.1–10.6-GHz unlicensed frequency band, there are some narrow bands that may interfere with the UWB system[i]. Due to the extremely large bandwidth of UWB, the interference between the narrow band and UWB system is a major challenge in UWB. Some narrowband communication standards occupy the UWB spectrum due to the power level limitation. Hence it causes interference between UWB and narrowband. Therefore band notching characteristics is one of the important techniques to avoid interference. The different band notching techniques are discussed in this paper.Ultra-wideband (UWB) technology become the most promising candidate for a wide range of applications that will provide significant benefits for public safety, business and consumers, and attracted a lot attention both in industry and academia.

LITERATURE REVIEW:

To reduce the effect of interference from narrow band systems like WiMAX and WLAN, UWB antennas with band notched characteristics are good solution.

A number of UWB planer antennas with different notching techniques such as embedment of different types of slot on the radiating patch or on the bottom side of ground plane to be done. Author Rezaul Azim, Mohammad Tariqul Islam proposed "Design of a Dual Band-Notch UWB Slot Antenna by Means of Simple Parasitic Slits" [ii]. In this letter, a compact tapered slot antenna is proposed for UWB applications. To filter out the WiMAX band, an angle-shaped parasitic slit is asymmetrically etched out along with the tuning stub, while two symmetrical parasitic slits are placed inside the tapered slot to create another notch band for WLAN. It is found that by appropriate selection of the parameters of the parasitic slits, the proposed antenna can achieve UWB band with dual notched bands of 3.35–3.8GHz and 5.12–5.84 GHz.

Author Mohammad Ojaroudi and Nasser Ojaroudi proposed "Ultra-Wideband Small Rectangular Slot Antenna With Variable Band-Stop Function"[iii].To increase the impedance bandwidth of the rectangular slot antenna and achieve UWB coverage, we use an inverted T-shaped conductor backed plane inside the rectangular slot on the other side of the substrate. Additionally, by using a coupled rotated C-shaped strip around the inverted T-shaped conductor backed plane, a frequency notched band performance has been obtained. Author Seyed Ramin Emadian and Javad Ahmadi-Shokouh proposed "Very Small Dual Band Notched Rectangular Slot Antenna with Enhanced Impedance Bandwidth"[iv].This antenna consists of a rectangular slot, a beveled rectangular patch, two S-shaped slits cut

in the ground plane and an elliptical ring slot (ERS) etched in the patch. The corners of a simple rectangular patch are beveled to improve the impedance bandwidth, especially at the middle frequencies of the band. In addition, a pair of semi-circle slots are etched in the ground plane to enhance the bandwidth to more than 23 GHz. A pair of S-shaped slits connected to the rectangular slot, and an elliptical ring slot cut in the beveled rectangular patch, are employed to create band notched performances in WiMAX and WLAN spectrum, respectively.

In [v], in order to create triple band-notched characteristics in 5.15–5.825 GHz for WLAN ,3.3–3.7 GHz for WiMAX , and 7.25–7.75 GHz for downlink of X-band satellite communication systems the antenna uses three open-ended quarter-wavelength slots. In [vi], the band rejection property is achieved by inserting an inverted V-shaped slot with folded ends. The proposed antenna covers the frequency range of 3.04–20.22 GHz for reflection coefficient below -10db, and band rejection of 5–6 GHz. In [vii], the UWB slot antenna, covering 3.1–11 GHz, is in the octagonal shape and is fed by a rectangular patch with a beveled bottom periphery. A stub, having quarter wavelength is attached to the high current area in the ground plane to create an extra band outside the UWB frequency range, centered at the 2.4-GHz (Bluetooth band). Two notch bands, centered at 3.5-GHz WiMAX and 5.8-GHz WLAN, are created by placing two similar stubs to that of the extra band.In reference[viii] the proposed antenna is fed by micro strip line, and it consists of square radiating patch on the top layer with a slotted-parasitic patch on the bottom layer of the antenna. The parasitic patch acts as a notch filtering element to reject the desired frequency band 5.15-5.825GHz.

Table 1: Comparison between band notch antennas

Antenna Type	**Notched Band**	**Techniques Used**	**Ref. Paper**
Slot antenna	WiMAX(3.35–3.8GHz)WLAN (5.12–5.84 GHz)	an angle-shaped parasitic slit	[ii]
Slot antenna	WLAN(5.03-5.94GHz)	By using a coupled rotated C-shaped strip around the inverted T-shaped conductor backed plane	[iii]
Slot antenna	WiMAX(3.1–3.9GHz), WLAN (5.15–5.85GHz)	A pair of S-shaped slits connected to the rectangular slot and an elliptical ring slot	[iv]
Printed monopoe antenna	WiMAX (3.3–3.7 GHz),WLAN (5.15–5.825 GHz) and X-band downlink (7.25–7.75 GHz)	three open-ended quarter-wavelength slots	[v]
Slot antenna	WLAN(5–6 GHz)	embedding an inverted V-shaped slot	[vi]
Slot antenna	WiMAXCenter freq.(3.5 GHz) WLAN (5.8 GHz)	placing two stubs	[vii]
Microstrip fed UWB Antenna	5.15-5.825GHz	Parasitic element	[viii]

CONCLUSION :

In this paper, we have reviewed multiple types of UWB antennas with band notched characteristics. To minimize the potential interference between the UWB system and coexisting wireless systems, a number of UWB antennas with band nothed characteristics has been discussed in this paper.Most of these designs focus on the rejection of narrow frequency bands like WiMAX,WLAN,X-band satellite communication and C-band satellite communication that may cause serious interference with the UWB system.

REFERENCES:

i. *Federal Communication Commission revision of Part 15 of the commission's rules regarding ultra-wideband transmission systems*, FCC, Washington DC first Report and Order FCC, 02.V48,2002.

ii. Rezaul Azim, Mohammad Tariqul Islam, Senior Member, IEEE,and Ahmed Toaha Mobashshsher, "*Design of a Dual Band –Notch UWB Slot Antenna by Means of Simple Parasitic Slits,"*IEEE ANTENNAS AND WIRELESS PROPAGATION LETTERS,VOL. 12,2013.

iii. Mohammad Ojaroudi and Nasser Ojaroudi, "*Ultra-Wideband Small Rectangular Slot Antenna With Variable Band-Stop Function,"*IEEE TRANSACTIONS ON ANTENNA AND PROPAGATION,VOL.62, NO.1, JANUARY 2014.

iv. Seyed Ramin Emadian and Javad Ahmadi-Shokouh, *"Very Small Dual Band Notched Rectangular Slot Antenna with Enhanced Impedence Bandwidth,*" DOI 10.1109/TAP.2015.2456905, IEEE Transaction on Antenna and Propagation.

v. Dang Trang Nguyen,Dong Hyun Lee,and Hyun Chang Park, "*Very Compact Printed Triple Band-Notched UWB Antenna With Quarter-Wavelength*

Slots," IEEE Antennas And Wireless Propagation Letters,Vol.11,2012.

vi. S. Mohammadi, J. Nourinia, C. Ghobadi and M. Majidzadeh, "*Compact CPW-fed rotated square-shaped patch slot antenna with band-notched function for UWB applications,"* Electronics Letters ,24th November 2011 Vol. 47 No. 24.

vii. Mohammad Mehdi Samadi Taheri, Hamid Reza Hassani, and Sajad Mohammad Ali Nezhad, "*UWB Printed Slot Antenna With Bluetooth and Dual Notch Bands,"* IEEE Antenns And Wireless Propagation Letters, Vol. 10, 2011.

viii. N.H.M. Sobli and H.E.Abd-El-Raouf, "*Design of a Compact Printed Band-Notched Antenna for Ultra Wide-band Communications,"* Progress in Electromagnetic Research M, Vol.3, 2008, pp.57-78.