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WINGS TO YOUR THOUGHTS.....

Digital Signal Processing: Radio Frequency Applications

A. A. Nain¹, N. M. Z. Hashim², N. M. Saad³
N. A. A. Hadi⁴, A. Salleh⁵, A. S. Ja'afar⁶

^{1, 2, 3, 4, 5, 6} Centre for Telecommunication Research and Innovation (CeTRI)
Faculty of Electronic and Computer Engineering
Universiti Teknikal Malaysia Melaka
76100 Hang Tuah Jaya, Durian Tunggal
Melaka, Malaysia.

¹fiq_rie9@hotmail.com, ²nikzarifie@utem.edu.my

Abstract: Nowadays, radio frequency is commonly use in many field of work and equipment. In this paper, the used of radio frequency actually very important to all and especially in communication field, is proposed. But there are some issue about radio frequency which is about the range and the frequency value. All this method that proposed here are from the source of frequency information and data about the common radio frequency. Value of frequency can be different and lot of value. Radio frequency is form when there are electromagnetic field is created. When this happened, it will propagate the frequency through the space.

Keywords: electromagnetic, frequency, radio, radiation.

1. INTRODUCTION

Radio frequency is one of the techniques that used propagated technique to transmitting the frequency. This paper is focused on common information about radio frequency and it frequency range. The generated electromagnetic field that using alternating current as an input is suit for wireless broadcasting. This will happened when the antenna that propagated the electromagnetic in the air is powered by the current of the frequency [1]. Radio frequency also can be known as the numbers that vibrate per second. Other than that, all this process which is the counting process and determination process is included in the time interval.

In radio frequency, there is cognitive radio antenna that is a reconfigurable frequency. This is usually for overlay spectrum approaches, the dual port antenna system[2]. The most popular known in industries for application is the radio frequency identification (RFID)[3].

Radio frequency identification can have more advantage such as the automatic data collection and identification which is using the non line of sight technology. In radio frequency field also, it have multi mode or multi band. The dynamic reconfigure is response to instantaneous signal to noise ratio (SNR) levels [4].

2. CONSIDERATION OF RADIO FREQUENCY FUNDAMENTAL

In radio frequency, there are certain types of ways to generate the frequency. One of the techniques can be used to calibrate frequency is by using the standard terms which is the standard in times by the calibration as the pieces cut of quartz crystal is maintain in the continuous of the vibration of the valve circuit. It is the design to make the value of frequency 100kc/s, where the suitable value in a quartz dimensions.

Table 1 Frequency of Radiation Spectrum [5]

Spectrum of Electromagnetic Radiation	
ULF – Ultra Low Frequency	0 Hz to 3 Hz
ELF – Extremely Low Frequency	3 Hz to 3 KHz
VLF – Very Low Frequency	3 KHz to 30 KHz
LF – Low Frequency	30 KHz to 300 KHz
MF – Medium Frequency	300 KHz to 3 MHz
HF – High Frequency	3 MHz to 30 MHz
VHF – Very High Frequency	30 MHz to 300 MHz
UHF – Ultra High Frequency	300 MHz to 3 GHz
SHF – Super High Frequency	3 GHz to 30 GHz
EHF – Extremely High Frequency	30 GHz to 300 GHz

The Table 1 showed the frequency radiation spectrum. The lowest value of frequency is the Ultra Low Frequency (ULF) with 0 Hz – 3 Hz. The moderate frequency that we can see is the Medium Frequency (MF) with 300 KHz – 3 MHz. On the other hand, the highest frequency with the value of 30 GHz – 300 GHz is the Extremely High Frequency (EHF).

The radio frequencies are implemented by using a reconfigurable Digital Signal Processor (DSP), then following by a wideband radio frequency of analog digital converter at receiver. Meanwhile, for the transmitter it will have a radio frequency of a digital to analog converter. There are two sampled the continuous time input signal can be form. First is the direct sampling instantaneous numbers in the radio frequency voltage source. The others are converting radio frequency input voltage to current [6]-[9].

Table Table 2 showed that the wavelength and frequency are in opposite direction. The wavelength of the spectrum will increase from the Extremely High Frequency (EHF) to the Very Low Frequency (VLF).

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Table 2 The Frequency Wavelength

VLF	Navigation	100km	3KHz
LF	Navigation	10km	30KHz
MF	AM Radio	1km	300KHz
HF	Shortwave radio	100m	3MHz
		10m	30MHz
		1m	300MHz
VHF	FM radio, VHF Television	10cm	3GHz
		1cm	30GHz
		1mm	300GHz
UHF	GPS, WIFI,4G		
SHF	Satellite communication		
EHF	Radio Astronomy		

↑

Increasing Wavelength

↓

Increasing Frequency

Meanwhile, for the frequency it will increase from the Very Low Frequency (VLF) to Extremely High Frequency (EHF). Most of the VLF and LF are used in the navigation system or maritime communication radio. For MF, it is used in AM radio. HF used in shortwave radio. VHF used in FM radio or VHF television. Meanwhile UHF used in GPS system, WIFI and 4G. Other than that, SHF is used in satellite communication. The EHF used in radio astronomy.

3. SYSTEM ARCHITECTURE HOPING SYNTHESIZER

The frequency hopping is one of a method that can transmit the radio signal rapidly to more than one channels, by implement this method it can help to reduce in slow of telecommunication and also the interception that unauthorized. The important part in this hoping is the synchronizer module, because the main function of the synchronizer is synchronizing the receiver and also the transmitter part [10].

The system architecture that consists of Pseudo Random number generator, frequency table and also the DDS are most important part to create the system.

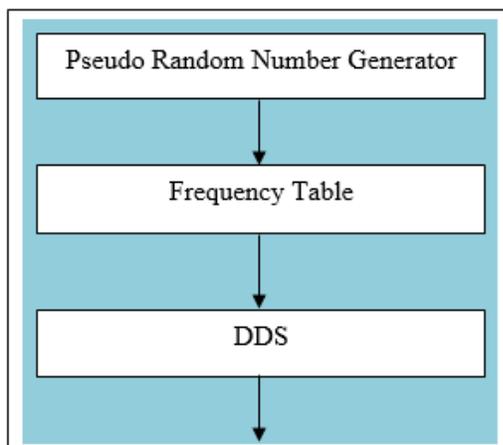


Figure 1 Block Diagram of System Architecture

From the above system architecture, the random number that generated by BBS algorithm number generator will be converted by the frequency table which change the numbers to the corresponding words that will sent it to the DDS module which is generate the carriers.

4. CONCLUSION

The work describes the radio frequency in many ways. The secure in frequency hoping is important to be implemented for wireless radio. Every radiation spectrum had different value of frequency and it will have different speed of radiation. The wavelength and frequency value are different for every spectrum. The speed in frequency is also different by following the types of frequency. The frequency that propagates can be used to sent information or data. The types of frequency that want to used are different depending on how far it will go. There are also obstacles that can disturb the frequency propagation. In this open space of air, there are many free frequencies that propagate through the space. Frequencies are produce by the energy, on the other way we can actually transform this free flow frequency to be a source of energy. By doing some research on the frequency, we will realise that the frequency that propagate freely in the air is actually can be out source of future energy without depending on other source of energy.

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