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AGGRAVATE OF INTERFERANCE BETWEEN BLUETOOTH DEVICES

Ajit Singh Yadav[1], Achint Chugh[2]

Department Electronic & Communication, Mittal Institute of Technology, Bhopal, India[1,2]

Abstract: In this paper we investigated that Bluetooth wireless transmission standard accommodate a low-power data link between electronic devices over relatively abruptly ranges. These connections also known as Pico-nets transmit using frequency hopping spread spectrum (FHSS) to send data over the air. In many of Bluetooth technology becomes used the number of Bluetooth devices will continue to extending daily life. With this increase in use there will be a decrease in performance that can be blame to Bluetooth "inter-Pico-net" interference. Very small has been published on the subject of interpico-net interference. Previous to studies have derived mean packet error rates for an increase in the number of Pico-nets present. To analysis that the mean rate many papers make up the assumption that the probability of a Bluetooth device hopping to a channel is random. However making this examine does not explain what happens in actual time. This research gives some awareness into what really happens when multiple Pico-nets are interfering in day to day time. Bluetooth devices actually use a frequency hopping explanation to analysis hopping sequence. This explanation has been implemented in software to test various acts of looking aspects of interpico-net interference. Previous explanation has shown that synchronizing the clocks among neighboring Pico-nets will result in an increase in performance. This analysis shows there are cases where synchronization individual will not provide adequate improvement. Experimental testing has been conducted to validate some of the simulated results. Adjacent channel interference was analysis during experimentation. This dispute former research, which has accepted that adjacent channel disturbance, is inconsequential.

I. INTRODUCTION

While Bluetooth and wireless LAN also accept as WLAN were earlier marker as explanation technologies producer have discovered time to time that this is not demand the case. Some have explain for time to time for the emerge products that feature both technologies for example wireless access points. There is now large market satisfaction of both Bluetooth and WLAN. This has led to be more incidence of existing at the same time between the two, most usually in computer network technology Coexistence in the unauthorized 2.4 GHz band comes with a price. Unauthorized means that competing, or complementary technologies are not enslaved to operate in this frequency band which has in spell given rise to interference that providing on the quality of communication. To most users, worsening of quality may be more Unmistakable in voice centric applications than in data centric applications. For example one is more likely to be informed of poor sound quality during using Bluetooth devices than of the increased to which data packets must be retransmitted between one's notebook pc and network access point. The Bluetooth industry through the Bluetooth technology [1] has responded by taking measures to reduce interference in environments where multiple wireless technologies to be alive at the same time. Type style and fonts Version 1.2 of the Bluetooth stipulation, being attain in 2003, includes Adaptive Frequency Hopping technique proven to be an effective alternatives to the problem of interference in WLAN and similar environments Ease of Use.

II. AFH WORKING METHOLDOLOGY

Bluetooth devices developed anterior to the emergence of working AFH solutions employ another form of frequency hopping, which is random by design. These very first generation Bluetooth devices acquired 79 of the 83.5 available channels in the 2.4 GHz frequency band, hopping across the available

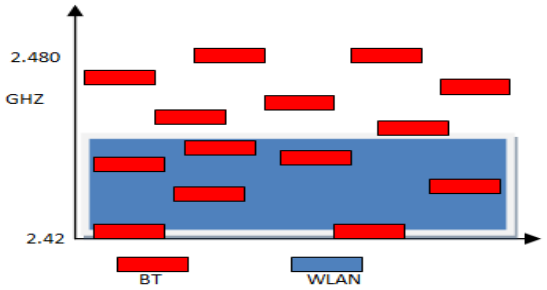

Figure.1:-shows the same description as explain above, but now with adaptive Frequency Hopping activated.

Channel in a random fashion and at a rate of 1600 times per second [2]. As time changes another wireless device is in existing into the environment this type of hopping results in occasional collisions. Without the use of AFH Bluetooth lesser be the ability to avoid these argument and thus to adapt to its environment. The result is analysis in Fig 1.1 showing environment where both Bluetooth (B Tan wireless LAN (WLAN) are in operation In analysis to the above Adaptive Frequency Hopping accept Bluetooth to attain the environment by identifying fixed sources of interference and increasing them from the list of available channels. The processes of remapping also used for reducing the number of channels to be utilized by Bluetooth. The Bluetooth fettled command a minimum set of at almost twenty channels.

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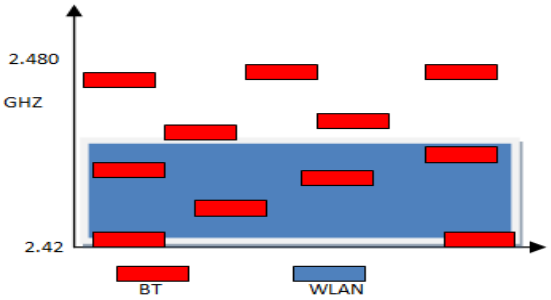

Figure 2: shows Collisions resulting from random frequency hopping Adapting to the environment

III. BLUETOOTH BASEBAND

Fig shown common block diagram of Bluetooth baseband The RF (Radio Frequency) components which is placed in the right-side of the given figure, modulates the frequencies from 2.4GHz ISM frequency band to the average frequencies. The data received by the RF module are desk wed and resample as the accurate 1MHz sampled data and given to the low pass filter to abstract the feasible noise after the sample to be passed into the baseband block. Data are sampled into 64-bit blocks the most important of which begins with '1010' or '0101'depending on the type of the packet. Serially introduce data are transformed to parallel data and separated into header and payload parts. Header and payload packets are examined in the error correction blocks respectively. FEC (Forward Error Check) scheme is used to examine the packets by the Bluetooth stipulation. There are two kinds of Bluetooth packet SCO (Synchronous Connection Oriented) and ACL (Asynchronous Connection oriented Link). SCO packets are used in those applications with the voice communication where real-time data slots. ACL packets are used to transfer timely adaptable data.

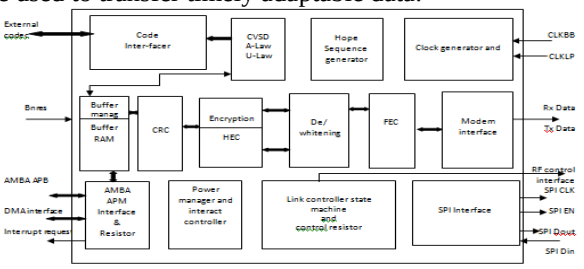

Figure 3: Bluetooth baseband core diagram

IV. ADAPTIVE FREQUENCY HOPPING

The suggestion adaptive frequency hopping arrangement follows the mechanism showed in Fig 2. At generally calculated hopping frequency [3] is preferable by reorganized of hardware devices and pick out the particular frequency coursing interference. These two methods are examining the interference frequency it is nothing but analogous frequency which cause interference. The main idea of remapping algorithm is that we save the pre analysis PERM5 output value the value of F, Y2, and E in a special purpose registers in the baseband processor unit. Also, we implement an efficient hardware allocate to calculate modulo N operation where N is a variable number.

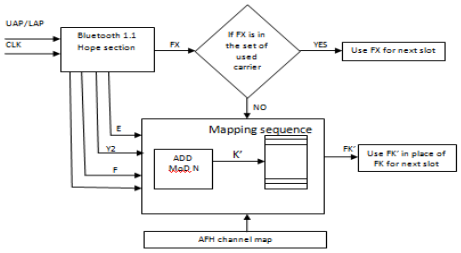

Figure 4: Block diagram of adaptive hop selection mechanism.

V. IMPLEMENTATION AND EVALUATION

We implemented two different forms of Bluetooth single (with integrated RF module) chip, one with the common frequency hopping mechanics the other with the nominated adaptive frequency hopping unit. The test without any adaptive frequency accommodation unit showed interference or collision between Bluetooth devices with another Bluetooth devices or wireless LANs when the devices tried to hop to the same frequency. However, with the accommodation adaptive frequency hopping unit the frequency collision didn't arise anymore since by manipulate the code in the firmware, either the Bluetooth device mechanically avoided the possible collision frequency or we could set the value of the frequency so that no collision accurse. Timing diagram used in adaptive frequency hopping block in the baseband signal or modulating signal between hardware and firmware input With the used of time discontinuity of microprocessor CPU (central processor unit) and baseband of the hardware system. In the settlement of adaptive frequency hopping part, only the variable modulo N calculation block is implemented with hardware, the other implemented with software (firmware) so that we can cope with sudden feasible problems with flexibility.

V. BLUETOOTH INTERFERENCE AWARE SCHEDULING

The Bluetooth Interference Aware Scheduling (BIAS) algorithm [4] is a delay policy implemented at the master device that postpones the transmission of a packet until a slot associated with a "good" frequency becomes feasible. The teacher device, which controls all data transmissions in the innovator, uses information about the state of the channel in order to avoid data transmission to slave accordance a "bad" frequency. In accessory since a slave transmission always follows a teacher transmission using the same precept, the master avoids receiving data on a "bad" frequency by escapes a transmission on a frequency preceding a "bad" one in the hopping pattern. This simple scheduling composition needs only be implemented in the master device and translates into the following transmission rule. The master transmits in a slot after it verifies that both the slaves receiving frequency and its own receiving frequency is "good". Otherwise, the master skips the current Transmission slot and repeats the procedure over again in the next transmission opportunity. Additional considerations including bandwidth requirements and quality of service guarantees for each master/slave connection in the pioneer can also be

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combined with the channel state information and mapped into transmission priorities given to each direction in the master/slave communication. Details on assigning transmission priorities are given in the algorithm's general steps are summarized below.

VI. CHANNEL ESTIMATION

Channel judgment includes BER calculation, packet loss, or frame error rate measurements performed by each receiver (master and slave device).

Table 1 application profile parameters

Parameters	Distribution	Value
Bluetooth FTP Percentage of Put/Get Inter-Request Time (seconds) File Size (bytes)	Exponential Constant	100% 5 2M
Bluetooth HTTP		
Page Intertribal Time (seconds) Number of Objects per page Constant 2 Object 1 Size (bytes) Object 2 Size (bytes)	Exponential Exponential Constant Uniform	5 5 10K (20K,600K
Bluetooth Voice Encoder		G.723.1
Bluetooth Video Frame Rate Frame/s Frame Size (bytes) pixels	Constant Constant	1 17280 (128 x 120
WLAN FTP Percentage of Put/Get Inter-Request Time (seconds) File Size (bytes) Connection Duration (seconds) Interval between Connections (seconds)	Exponential 1 Constant Exponential Exponential	0% 2M 20 20

Since in a Bluetooth Pico-net, the master device controls all packet transmission, the measurements gathered by the slave devices are sent to the master that decides to (1) either avoid data transmission to a slave experiencing "bad" frequency and/or (2) modify the frequency hopping pattern. While in the former case the conclusion remains local to the master, in the latter case the master needs to communicate the change to all slaves in the Pico-net in order to retain synchronization. Also the former technique falls into the scheduling policy category, while the latter is in the AFH category.

VII. FREQUINCY HOPPING TRANSMSMITTER AND RECEAVER

Frequency-hopped spread spectrum (FHSS) transmits radio signals by switching its carrier frequency among many possible frequencies that are determined by a pseudorandom sequence known to both transmitter and receiver. Because of its excellent security feature of anti-jamming & anti-interception it is used by military. It is also widely used in a number of today's non-combatant applications, i.e. Bluetooth Pico-net (IEEE802.15.1) and wireless local area network (IEEE802.11) in last 30 years an impressive amount of research has appeared in the literature in commerce with this topic over a wide range of disciplines system efficiency under various configurations (channel conditions, jammer setups, etc.) hopping sequence design and spectrum sharing multiplexing etc. However there is only confined amount of previous research dealing with the physical layer design of FHSS radios, particularly from the synchronization aspects. Moreover admirable number of the following study result and research results were based on the previous developed physical layer and most of the outcome were obtained by considering perfect synchronization. One of the digital technology called as frequency shifting key (FSK) is used for underlying modulation scheme in most of the abroad such as FHSS which is radio prototype as well as used as synchronization schemes can be detected as shown in the given figure 1.The M-array signaling is then shifted pseudo-randomly by the frequency synthesizer over some frequency hopping band. This system is called MFSK/FH system. The demodulation of a MFSK/FH signal can be divided into two footfalls. The first one is to de-hop the pseudorandom hopping sequence. The second one is to demodulate the essential FSK signal. The traditional frequency hopping modem implements the first footfall is by using analog mixers to down-convert the modulated FSK signal to the intermediate frequency or baseband, and then using an analog or a digital FSK demodulator to recover the received information".

Mixer block is considered in the process for suppressing the high sample frequency signal contain during the sampling process which cannot satisfied the nyquist criteria in which the frequency components can less than or equal to the twice of the information signal frequency for retain of the information signal at the receiver point.

The general FHSS receivers allow from analog artifacts which utilized the system arrival as well as decreased flexibility to execute innovative signal options. As mentioned previously the demodulation of a MFSK/FH signal requires two steps de-hopping and MFSK demodulation. Commonly analog signal is used for the process of de-hopping the signal. It consists of an analog mixer whose center frequency changes conform to the hopping pattern determined by the PN sequence and a low-pass analog band limiting filter whose bandwidth is agree to the MFSK signal bandwidth.

The de-hopping indication cause is an aggregation by converting down and after filtering the process this can be down by using an *M*-path down converting channelize. Furthermore, the task of demodulating an MFSK signal is to determine the frequency deviations which is commonly obtain by implementing a bank of band-pass filters and envelop detectors.

This region we first review the thought of the MultiMate polyphone down converting channelizes then we exhibit the proposed demodulator structure based on MultiMate channelize.

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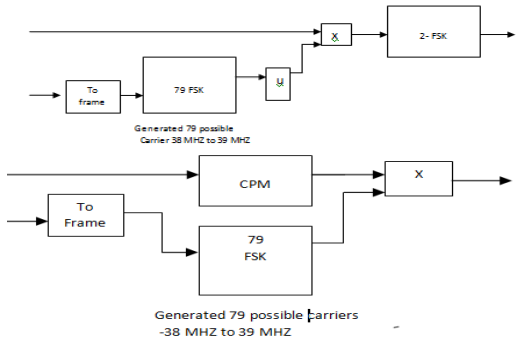

Figure 5: Frequency hopping transmitter and receiver.

IX. PERFORMANCE EVOLUATION

Various applications and topologies are used in the above section and simulated to obtain desired performance of AFH process in the realistic atmosphere. In the process of AFH system we used main four system FTP, HTTP, voice, and video and also used TCP(UDP)/IP protocol for implementation of stack in the op-net library and after configure ate provided by application parameters. In the FTP process the parameters of put get and the inter request time and file size are considered in the percentage form. The number of time in which the put gat command is run in FTP connection over the number of and the other half are get to obtained put/gate in the percentage. the overall output by considered of half of the FTP run command in percentage and the inter request time period of the two FTP and file size which is generally in bytes in percentage by considering each page and number of purpose in each page and the bite size and the page interracial time to obtained HTTP profile G.723.1 specifications are considered for voice application and for video we used 1frame/s and the frame size are 17280 bytes as shown in given table 2. The case where no any algorithm is used in that case BIAS and AFH refers to used BIAS and AFS for Simulations and each application and algorithm combination. By examine the packet lass, delay measured in TCP layer (in second) follow by channel efficiency attainment of system con be deliberated according to commemorate that draft IEEE approved exercise on coexistence in which AFH-IEEE conform to the AFH algorithms [5] the normalized sampled data block collected subtracted the number of packet loss and the duplicated data collected is neglected in that way the channel efficiency can be measured.

Table 2: Bluetooth FTP performance. (Experiment-1)

	None	Bias	AFH	AFH-IEEE
Packet lost Delay(second)	0.1633	0.0009	0.0748	0.0721
	0.0201	0.00178	0.0167	0.0184
	0.6921	0.99981	0.9306	0.9336

For calculation of the average of the time period of 900 second considered 10 sample of the baseband band signal. Master device is driver which is drive to slave device in that way the packet loss and channel efficiency are calculated follow by slave device in that TCP access delay is measured. The data loosed and in the similar fashion TCP access delay is measurer at slave device which is also called as application server.

Table 3 Bluetooth HTTP performance (Experiment-1)

	None	Bias	AFH	AFH-IEEE
Packet lost Delay(sec.)	0.1487	0.0012	0.0585	0.0445
	0.0171	0.0112	0.0109	0.0107
	0.6948	0.9976	0.9453	0.553

Table 4 Bluetooth video performance (Experiment-1)

	None	Bias	AFH	AFH-IEEE
Packet lost Delay(sec.)	0.1310	0.0043	0.0455	0.0269
	0.6974	0.9914	0.9503	0.9611

Table 5 Bluetooth video performance (Experiment-1)

	None	Bias	AFH	AFH-IEEE
Packet lost Delay(second)	0.1359	0.0091	0.0400	0.0212
	0.6901	0.9840	0.9631	0.9722

Table 6: Bluetooth FTP performance. ((Experiment-2)

	None	Bias	AFH	AFH-IEEE
Packet lost Delay(sec.)	0.3431	0.0183	0.1524	0.1542
	00322	0.0213	0.0218	0.0242
	0.4500	0.9648	0.8486	0.3552

Table7: Bluetooth HTTP performance. (Experiment-2)

	None	Bias	AFH	AFH-IEEE
Packet lost Delay(sec)	0.2535	0.0.169	0.1350	0.1172
	0.0181	0.0191	0.0160	0.0152
	0.4725	0.9705	0.8665	0.3349

EXPERIMENT 1: WLAN INTERFERENCE

Modulation algorithm is present with interference which is represented the packet loss 16% and bias is summarized by comparison to base .first the packet loss in signification levels is decreased by reducing the delay by 3 MS efficiency is raised by 30% in similar way AFH is characterized by lower packet loss to 7% delay (6.7 MS) and more efficiency (93%) the difference in productivity is visible to maintain with BIAS and AFH ARE closer .by

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copy transmission more packet are communicate with AFH . analysis notice for FTP is also elastic with HTTP as shown in the table III as the BIAS decreased than packet loss will be zero and access is delay by 6 MS to 11 MS due to which the appearances is raised by 30% to 99%

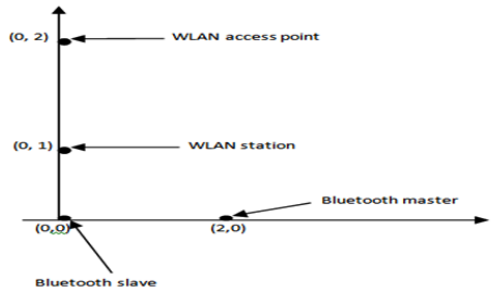

Figure 6: Two WLAN devices and one Bluetooth Pico-net.

When no interference in the moderation algorithm is present which represents a base case the packet loss is Efficiency can be raised to 20% by manipulating the packet loss of 5%and by reducing the delay to 3 MS the output is generating as shown in the table IV. In this way BIAS is inconsequential data destruction and due to which efficiency is raised by 99%.AFH reduces the data loss to 4.5% to 2.6 % for AFH and AFH-IEEE reduces to 13 %. Due to large frequency because of large frequency it is used more AFFH-IEEE duration it is utilized for high packet destruction and it will effect channel efficiency for imprecise and communicates the changes is usually longer in corresponding of BIAS guidance. To lead higher good put by conveys the number of packet transmission is due to the copy transmission and at the end it is neglected to the destination for conveys higher good put. The accomplishment analysis of AFH and AFH-IEEE is used in which AFH is used to expand in which total data transmission at the cost of more packet loss and this less the efficiency is analysis by accomplishment of AFH and AFH-IEEE where AFH is used to expand the total data . For AFH versus BIAS depend on the type of application in case of the large bandwidth is used such as AFT and HTTP in which AFH is used to increase the total number of data packet transmitted in communication channel at the cost of more packet loss due to which the less the efficiency but it is not consider in time real time application.

Experiment 2: MULTI-WLA INTERFERANCE

In this experiment our goal is to study the performance of AFH in a multi-WLAN environment where the Bluetooth hopping sequence is further reduced. Two WLAN systems such as the input is considered as source and sink as destination and are operated on no overlapping frequency in which each WLAN system operating with different frequency as demonstrated Topology 2 illustrated in Figure 5. We use the same traffic parameters described in Table I. Since there are two WLAN systems occupying about 16 frequencies each, that leaves about 47 frequencies in the band to be used by Bluetooth. With BIAS, the Bluetooth Pico-net only transmits on "good" frequencies and therefore has to skip approximately 1in every 3 operation with AFH the frequency hopping sequences is modified in order to include only "good" frequency. Therefore one expects consequential throughput and delay improvements by using AFH. Our main aim is to verify our earlier analysis result of AFH and BIAS still hold. Table VI gives the results for the Bluetooth FTP application. The packet destruction when no algorithm is used about 34% for Bluetooth. Remember that it is more than as comparison of double the packet destruction obtained in the Experiment number 1 packet loss is calculated is percentage is about 1.8%, 15.24%, 15.42% with BIAS, AFH and AFH-IEEE respectively. Delays with AFH and BIAS are comparable (21ms on the other side the channel efficiency is calculated of 84% and 85% with AFH is around 96% with the used of BIAS. Table VII gives the results for the Bluetooth HTTP application. The results consistent of FTP results for the most part and also additional delay improvements by using AFH. As shown in Tables VIII and IX give the results for the video and voice applications and there is general trends observed in Experiment 1 are still valid in which BIAS leads to lower packet loss and higher or equal channel efficiency than AFH.

X. RESULT

BLUETOOTH FREQUENCY HOPPING

Bluetooth technology is emphasis practiced for span distance communication it is emphasis in many application that conviction no any other frequency is allotted. the demonstrated technology in which the information signal is first modulated by adding carrier signal and by using one of the digital technology such as GPSK (Gaussian frequency shifting key) and using the radio channel with maximum capacity of S1mbps. we can obtained sample time of about 1Mbps by considering the time period of 625 microsecond By manipulating the frequency hopping technique in which the total frequency it is 79 MHz is used for deteriorated clashing with other communication devices.

STRACTURE OF THE MADEL

The demonstrated model are mainly contain a pair of master/ slave and one of AWGN (Adaptive white Gaussian noise) in between them for correcting the error a encoder is used, a GPSK (Gaussian frequency shifting key) for frequency hopping, CPM (Continuous phase modulation) for modulation the signal, MFSK (Multiple frequency shifting key) and one of the demodulator block for recovered the information.

BERNOULLI BINARY GENERATOR

Bernoulli distributed random binary number is obtained by using one of the digital devise called Bernoulli distributer.

DESCRIPTION

Binary number can be produce by using Bernoulli binary generator in which the parameter p generated zero with the probability of p and another one is 1-p and distributer has base value of 1-p and variance of P (1-p).Probability of zero is designed by p and its valuation is lies between one and zero. The crystalline of the output is obtained in 2D mainly depends on the valuation of row and columns of

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the matrix.

BINARY CYCLIC ENCODER

Cyclic encoder is used to obtaining the systemic cyclic code of length K and code length of N. The code length can create 2^M-1output combination, where M is the integer value providing for formation of required no of output combination in that case we can take 3 values and output can be obtain exactly K element.

It must considered in coulombs heading of the matrix in that way the output is N. In this way we can analysis the cyclic code by using the binary vector data.

BUFFER (ASSEMBLE PACKETS)

Sample delay can be comfortable calculated and analysis by using the rebuffed it is also converting the lower sample data to the information signal and opposite process can be perform by buffer.

CPM Modulator Baseband

signal of pulse coded con be obtain by using a carrier signal in this process we can combined the base band signal and continuous signal called carrier signal in which the carrier signal change it shape according to baseband signal and information signal is covered an envelope to information signal.

Output signal can be represented in M-array system where M is the size of the input information.

It must contain 2^K positive integer values where K value it is continuous phase modulation by using the pulse shaping signal to smooth the phase transition of the baseband by using the rectangular, raised cosine, spectrum raised cosine and also from Gaussian pulse.

AWGN Channel

Add white Gaussian noise to input signal The AWGN Channel block contain white Gaussian noise to a real or complex input signal if the input sample is real this block involve real Gaussian noise and provide a real output signal but when the input sample is complex, this block includes complex Gaussian noise and produces a complex output signal.

Block is estate its sample time from the input signals and uses the Signal Processing Block samples Random Source block to produce the noise. Noise signal can be generated by using the random source block.

Ziggurat method is used for random numbers by using the MAT-LAB Random function noise signal can be used for initialized the source the source must be in scalar or in vector form and the length is match by the input. Information signal can be double or signal to drive the block port data is used.
Note: All values of power assume a nominal impedance of 1 ohm.

M-FSK MODULATOR BASEBAND

M-array frequency shifting key process is using for modulation the signal.

LIBRARY

In FM digital modulation it is sub library of modulation

DESCRIPTION

M-FSK DEMODULATOR BASEBAND

The process of M-FSK Modulator Baseband block modulates using the M-array frequency shift keying method. The output is a base band delineation of the modulated signal. The M-array number parameter M represents number of frequencies in the modulated signal. While calculating the separate distance between two signals successive frequency is obtained. The sampling frequency must be greater than M multiplied by the Frequency separation or the output signal will be pseudonym. By dividing the input time period of the signal to obtain the samples of the signal and phase is calculated by using continuous. Modulated signal include a portions of M sinusoids of different frequencies a change in the input value might create a change in the phase of the modulated signal.

Demodulate FSK-modulated data

DESCRIPTION

The process M-FSK Demodulator Baseband block demodulates a sample signal that was modulated using the M-array frequency shift keying process. The input and output signal are separated by time while input is a baseband of the modulation signal.

The sample which is taken as an input may be scalar or vector it can be process by using frame based on column of single or double. The M-array number parameter M is the number of frequencies in the modulated signal and Frequency parting parameter is the distance in Hz between two successive frequencies of the modulated signal. For demodulation of M-FSK no coherent energy detector is implementing.

M-ARRAY NUMBER

The assessment of modulation signal or information signal is depending on M-array assessment.

OUTPUT TYPE

The output sample contain integer or group of bits so the M-array parameters will be 2^K for positive value of K

SYMBOL SET ORDERING

For Judgment of the block maps of each of the numeral data is to cluster of output sample bits by manipulating the cause.

FREQUENCY SEPARATION (HZ)

The difference between the two sample values is the successive sample frequency of the output of the block.

SAMPLES PER SYMBOL

The sample version of the input signal is that sample which is adjusted for decline the base band signal.

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BINARY CYCLIC DECODER

With the used of symmetric cyclic code binary information is restore which in the form of binary vector data.

DESCRIPTION

Binary cyclic decoder block come around a message vector for a code word vector of a binary systematic cyclic code. For the purpose of decoding the block value must be proper match to the corresponding binary cyclic encoder block value. block value can be calculated by using the given relation that is 2^M-1where M value must be consider as greater than or equal to 3 in which the code word length is N and cyclic code length is K input sample must contain exactly N elements. If it is in contrive based which is column vector than output value is a vector of length K by manipulating this process it will constitute systematic cyclic coding arrangement in one of two ways. For constitute an [N, K] code enter N and K as the first and second dialogue parameters respectively. The block computes are suitable to generator polynomial to constitute a code with code word length N and a particular degree (N-K) binary generator polynomial taking N as the first input parameter and a binary vector as the second guidelines. The vector represents the generator polynomial by incline its coefficients in order of rise exponents Communication toolbox is used for the generation of the above litigation

SPECTRUM SCOPE

Estimate and display period gram of each input signal

DESCRIPTION

The sample signal which is considered as an input signal or frame is represent in vector form or it is also represented in matrix form. The plot between amplitude and time period is display by using the device called spectrometer or spectroscope.

Note When the Buffer input and Specify FFT length parameters are both cleared, the block input length must be a power of two.

Scope Properties Pane

To compute power spectrum density or mean square spectrum and the information of scaling parameter, error rate calculation is estimate by practiced Spectrum parameters. Estimates bit error rate or symbol error rate of input data.

DESCRIPTION

In FM digital mod Error rate calculation is done by comparison of input data transmitting and receiving during the process of communication. During the process of communication total data is dividing into the no of unique slots and transmitting at communication and at the destination point no of data received using a single communication channel by comparison the result of no of sample receiver and transmitting we can easily find out the bit error rate calculation.

BER

The ration of the number of errors divided by the total no of transmitting in the process of communication bits time interval and the bit error rate it is expressed in percentage bit error rate is also called as error ratio or bit error ratio.

XI. CONCLUSION AND FUTURE WORK

The Bluetooth technology is an emerging communication modal that is appropriate for low range wireless technologies. Wireless system is generally has low cost, low power consumption, and simple to use. Bluetooth system is less security and also less confidential many researchers is trying to overcome these difficulties generally two methods are acquired first one is using encryption and another one is by adopting of frequency hopping method but all those difficulties it is more popular because of simplicity and easily handling facilities make it popular for general users. Two methods are preferable for protection of data transmission in Bluetooth device without collision i.e. encryption method in which additional stream bit called cipher is used for collecting the data packet without overlapping and another one is frequency hopping in this method the device is enabling by Bluetooth device for collect the packet data by using the pseudo packet. For protecting of steamship information for confidentiality two techniques are used such as encryption and frequency hopping. One is using a flow of bits called as encryption for encrypt the information received by Bluetooth collecting device and in frequency hopping technique which is rarely working by the researcher in this method it does not appending any extra bit first it enable the device for communicating establishment. Pseudo random fashion is the process in which a particular slot is allotted for data used for broadcasting and a particular slot is allocated for each sequence by using random selection processor accessing wireless device which make it for attacker for assuming the next sequence is to be utilized and in that way it is not difficult for capturing the data successfully.

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