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Integrated Antenna for the Digital Audio Broadcasting and Digital Video Broadcasting by Orthogonal Frequency Division Multiplexing

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Abstract- Digital Audio Broadcasting (DAB) system is one of the high - definition radio with the ability to provide high audio quality and data - based services for stationary and mobile receivers. Digital Video Broadcasting (DVB) is the popular broadcasting standards that enable handheld receivers to receive high definition digital television transmissions. Orthogonal Frequency Division Multiplexing (OFDM) system is a digital multi – carrier modulation technique intend offers high spectral efficiency. The main aim set is to arrive as an efficient unified system for multipurpose wireless system that would cater to all existing standards. This paper presents the unified approach for designing an integrated antenna for DAB and DVB using OFDM system. In this paper DAB and DVB using OFDM system is designed individually and their performance is measured by Bit Error Rate (BER). Integrated antenna for DAB and DVB using OFDM system is designed and simulated radiation patterns are presented. The proposed unified approach produces the better BER performance and better gain as compared to individual standard design.

Keywords: AWGN, BER, DAB, DVB, OFDM, SNR.

I. INTRODUCTION

Existing wireless communication technologies demands abundant spectral efficiency and high robustness. OFDM system is an efficient digital multicarrier modulation technique which offers abundant spectral efficiency and high robustness [1]. OFDM system uses orthogonal subcarriers for the modulation. OFDM distributes the signal bandwidth into many narrow band orthogonal sub channels in which operation is performed by using an algorithm Inverse Fast Fourier Transform (IFFT) results into orthogonal sub-carriers with overlapped spectra [2]. OFDM system is used in many applications such as DAB, DVB, ADSL, LTE, Wireless LAN standards and Digital Radio Mondale [3-4]. The objective of this paper is to propose a unified approach to DAB and DVB using OFDM system. The proposed unified approach provides the high scalability, flexibility and cost effectiveness as compared to multiple design for different OFDM standards.

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Using the OFDM approach, the Bit Error Rate (BER) performance analysis of the DAB and DVB as well as the BER performance analysis of an integrated DAB and DVB systems are presented and discussed. MATLAB software is used to develop the unified system and simulation results are presented. Real time audio and video inputs are provided and the output simulation results for minimal bit error rate are observed. Comparisons are made between the theoretical values and obtained results.

This paper structure is as tails as follows: Section 2 deliberates the Orthogonal Frequency Division Multiplexing and Guard Intervals [GI]. Section 3 is an analysis on Digital Audio Broadcasting. Section 4 is a Review on Digital Video Broadcasting. Section 5 discusses the obtained results. Subsections describe the performance analysis of the DAB system and the DVB system through MATLAB simulations and presents the performance analysis of integrated DAB and DVB system using MATLAB Simulation. Section 8 confers the conclusion.

II. LITERATURE REVIEW

Farzamnia et al. [5] Presents the Bit Error Rate (BER) performance analysis of Orthogonal Frequency Division Multiplexing (OFDM) systems using QAM (4, 8, 16 and 64-QAM) modulation techniques and comparisons are made on Rayleigh fading and AWGN channels. The simulation results show that the modulation scheme QPSK offers the best BER performance in the OFDM system compared to the modulation scheme M - QAM. Arun Agarwal et al. [6] presents the designing of DAB with OFDM system. This paper uses the FEC channel coding technic. Results of simulation shows that FEC is practically well suitable for channel coding and DAB is the enabling radio broadcasting technology for great performance in the mobile environment. Syed Hassan Ahmed et al. [7] Proposes a DVB – T performance evaluation with OFDM under AWGN, Rician and Rayleigh fading channels in which comparison is through in terms of BER performance of various modulation methods and different SNR to find different parameters for 2k and 8k mode. This paper achieves the non line of sight communication and delay characteristics, Rayleigh is the least suitable and utmost affected multi - path environment, whereas Rician channel performance is better, while AWGN performance deceits between these two. In this paper simulation results deduce that 16-QAM is appropriate modulation scheme for 2k mode and 4-QAM modulation is ideal for 8k mode.

This paper confines the presentation of 2k mode to be better compared to 8k mode and is appropriate for video broadcasting due to fewer errors. P. C. F. Eggers et al. [8] Explore the properties in the wireless channel models in the Ultra - Reliable Communication regime and develop tail distribution approximations.

This paper offers a unified basis for statistical description of the wide range of wireless channel models that are practically important in the UR regime of operation.

A. A. Lysko et al. [9] Presents the analysis of DVB-T2 and LTE parameters to determine isolating distance and optimum configurations to protect DVB-T2 by LTE releases in 700 MHz digital dividend band. A model proposed and the criteria is based on the protection ratio are used to investigate the needs and to estimate the possibilities of using the LTE digital dividend one band for secondary use. The results obtained thus ensure that TV broadcasting and LTE are compatible.

III. ORTHOGONAL FREQUENCY DIVISION MULTIPLEXING

OFDM system is an efficient digital multi-carrier modulation technique offers great spectral efficiency and high robustness. This technique involves dividing the signal into several narrow sub - band channels at different frequencies [10]. Subcarriers of various frequencies are then used to modulate individual sub channels. OFDM modulation has found use in many applications as it provides high spectral efficiency and supports in combating multipath fading [11]. OFDM modulation technique is preferred over traditional modulation techniques due to its ability to manage available bandwidth efficiently. The OFDM technique ensures that each chosen subcarrier is orthogonally oriented with respect to the other. Orthogonal subcarriers helps to eliminate the cross talk among the subcarriers [12]. The orthogonality of two linearly independent signals [13] is expressed by equation (1).

$$\int_x^y X_p(t)X_q^*(t)dt = \begin{cases} K\ for\ p = q \\ 0\ for\ p \neq q \end{cases} \quad (1)$$

Where [x, y] is one symbol period.

The mathematical definition of OFDM symbol [14] can the expressed as given in equation (2).

$$c(t) = \sum_{x=0}^{N-1} S_x(t)\sin(2\pi f_x t) \quad (2)$$

where Sx(t) = symbol mapped toward select constellation, N = FFT length, fx = orthogonal frequency.

Figure 1 illustrates an OFDM system functional block diagram. The Symbol mapping block endorses one to one mapping by accepting binary streams as the input and does mapping every bit to a complex number in the constellation. Different types of modulation schemes applicable to this stage are: BPSK, and 16, 64, 128, 256 QAM based on the user requirements. The symbol remapping stage of the receiver transforms the complex number to binary data in the form of their respective phase and amplitude values. Serial symbol sequences in serial into parallel converter block are transformed into parallel sequences, sequences of data symbols are reorganized into smaller data symbol sub - sets. Parallel into the serial converter block, parallel data set is transformed to serial sequence and reorganization of the data symbol into the original form is also used. Pilot carriers are inserted into the OFDM symbol in the pilot insertion block. Pilot carrier does not carry information as the Pilot carrier is a non - information carrier. Pilot carrier is the complex number and it is the point categorized in the constellation. Basically, pilot carriers are used to reduce the error in frequency and timing. Pilot carriers helps to estimate the start of every OFDM symbol. IFFT block produces the OFDM symbols which is a real and multiplexed sub-carriers. IFFT stage transforms the symbols of the frequency domain into a waveform of the time domain. IFFT produces a combined set of multiplexed and orthogonal subcarriers. Insertion of the guard interval reduces the effects of ISI and ICI [15] by prefixing a guard interval in the start of every OFDM symbol. Figure 2 illustrates successive OFDM symbols using guard intervals prefixed. The GI is eliminated from the OFDM symbol using the guard removal block [16].

Parallel OFDM Symbols are converted to serial sequence of OFDM symbols in the Parallel into serial block, forming the real-value OFDM waveform. Complementary operations occur in the receiver end in the reverse order, thus transforming these serial OFDM waveforms into their corresponding parallel sequence. Equation (3) provides the mathematical expression to calculate the length of serial sequence OFDM:

$$Z_{len} = S\,[N_{GI} + N_{FFT}] \quad (3)$$

Where, Z_{len} indicates the OFDM frame length, NGI represents Guard Interval Length, NFFT designates the length of OFDM symbol and S refers to the number of OFDM symbols [17].

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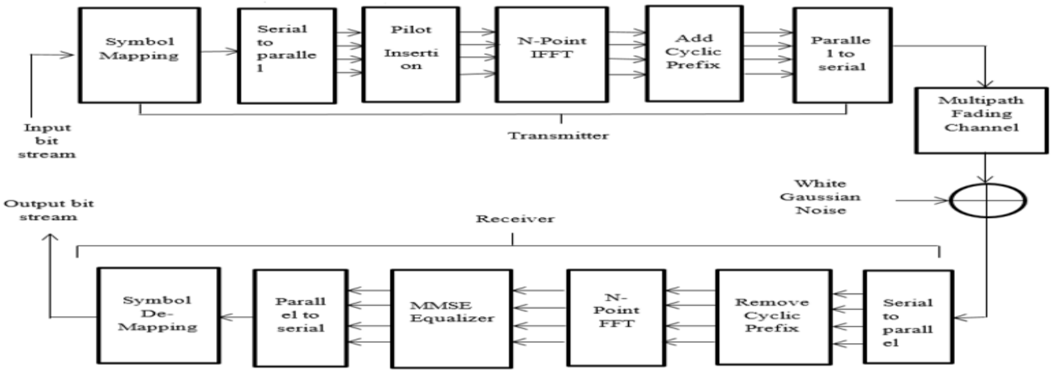

Figure 1: Functional diagram of OFDM System.

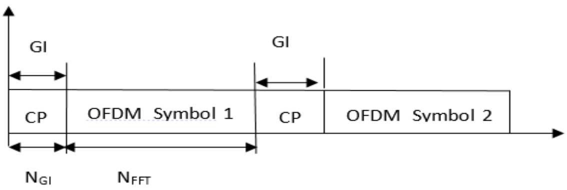

Figure 2: Time-domain illustration of OFDM symbols using guard interval.

IV. ANALYSIS ON DIGITAL AUDIO BROADCASTING

Although FM has many advantages over AM, it also exhibits drawbacks such as Multipath fading and ISI. Due to these factors, mobile reception on FM suffers from loss of broadcast quality. Therefore, FM is found to be more suited for fixed reception than mobile reception. These problems are addressed in Digital Audio Broadcasting (DAB), which is defined as a high-definition radio where analog audio is encoded to digital signal and further broadcast over a FM frequency range. DAB is intended to offer a high digital audio
quality and a data based services to varying range of communication systems including fixed, mobiles and hand-held devices. It is standardized as Eureka 147 DAB system [18].

Figure 3 illustrates the schematic of a DAB transmitter. Overall DAB transmission is distributed in to number of functional blocks and these blocks routes the input signal and Produces the complete DAB signal. The audio signal or data signal is fed as input to MPEG layer-2 encoder which produces the encoded data. Energy dispersal scrambler uses modulo-2 addition and PRBS for appropriate energy dispersal in the transmitted signal.

Punctured convolutional encoder block performs the forward error correction and convolutional encoding by taking scrambled bit stream as input. Interleaving block reorganizes the coded bit-stream. The purpose of using time interleaving is to upsurge the robustness of the transmitted data. Time interleaved data is fed to QPSK modulation block which binary data stream is fed as the input and every bit is to be denoted as complex number in the constellation and performs one to one mapping. After the QPSK modulation, symbols are given to OFDM block where final DAB transmission signals are generated [19].

V. ANALYSIS ON DIGITAL VIDEO BROADCASTING

Figure 4 demonstrates the transmitter of the DVB system. Source encoding transmits the audio, video and data. A program stream is a multiplexed video, audio and data container format. The transport stream will be the container format for transmitting and storing the video, audio and data, like TV channels such as news, movies etc. The initial protection in the transmitter is offered by the encoder block. Encoder block performs the detection and correction of multiple symbol errors. The type of encoder technic used is the convolution encoder. Convolution encoders performs error detection and error correction. Block inter leaving rearranges the data sequence to provide the robustness. Mapper stage performs symbol mapping on one to one basis. QAM is a type of hybrid modulation technique and it is the combination of both amplitude and phase modulation [20]. 16 QAM indicates the number of constellation message points which is 4 bits per symbol. QAM modulation is employed in the proposed system.

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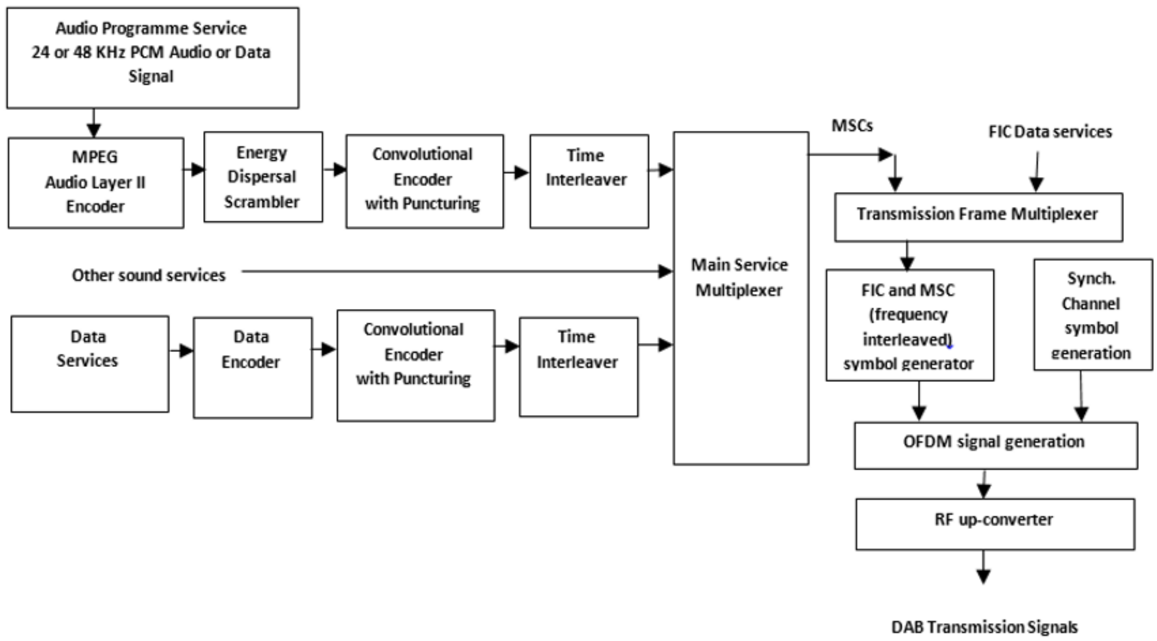

Figure 3: DAB transmitter block diagram

VI. RESULT AND DISCUSSION

A. *DAB system performance analysis using MATLAB simulation*

DAB system is modeled and simulated using MATLAB programming. The objective of the proposed method to estimate BER and SNR of the DAB system by applying convolutional coding using puncturing method. Puncturing method uses standard rate 1⁄2 encoders and decoders to encode and decode higher rate codes. The simulation parameters for DAB mode II are listed in Table I. The simulation model incorporates Frame based processing under AWGN channel for the performance analysis.

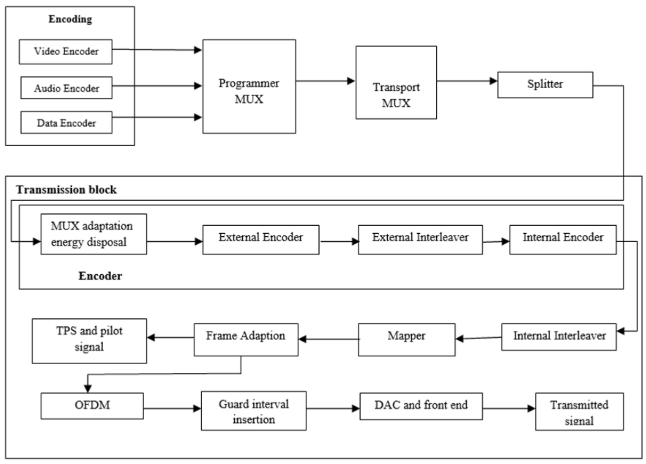

Figure 4: Block diagram of DVB

DAB frame structure is designed by using one synchronization channel for transmission frame synchronization and transmitter identification, three symbols of Fast Information Channel [FIC] facilitates quick access to information in the receiver and 72 symbols of main service channel provides the audio and data services. This section illustrates the simulation results of DAB system for AWGN channel. An audio input is given to the DAB system which is shown in figure 5. An audio signal is processed and transmitted under AWGN channel.

Table I: Parameters of DAB - Mode II

Parameter	Value
Number of Subcarriers	384
FFT Length	512
Subcarrier Spacing	4 kHz
Transmission Frame duration	24 ms
Symbol duration	321 µs
Guard Interval	62 µs
Null Symbol duration	324 µs
OFDM symbols by frame of transmission	76
OFDM Symbols by SC	1
FIC : No. of OFDM Symbols	3
MSC : No. of OFDM Symbols	72

AWGN channel.

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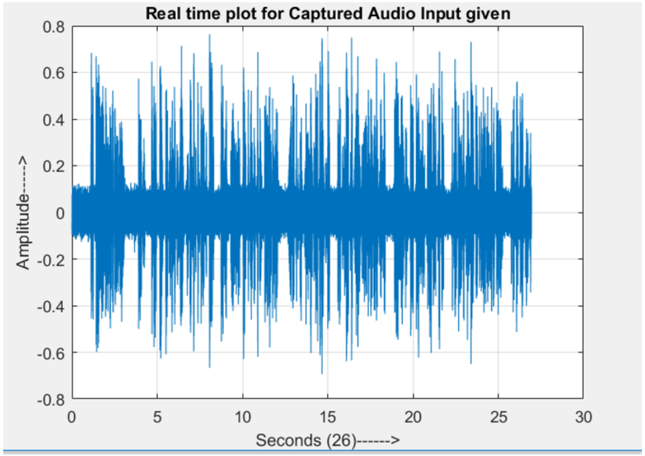

Figure 5: Audio input to DAB system

The QAM digital symbol mapping block is used for mapping serial bit streams in each data block into a digital constellation according to the DAB standard QAM modulation scheme. QAM encodes 4 bits per symbol. The examples shown in the constellation diagram are based on noise-free 16-QAM modulation. It depicts that the there are no distortions in the mapped symbols. Table II denotes the evaluation of the results of the proposed method with the existing techniques [6]. By comparing proposed method DAB Mode II under AWGN channel utilizing convolutional encoding with puncturing techniques with three existing techniques, DAB Mode II under AWGN channel using without Forward Error Correction method (FEC), DAB Mode II under AWGN channel using convolutional encoding without Puncturing technique and DAB

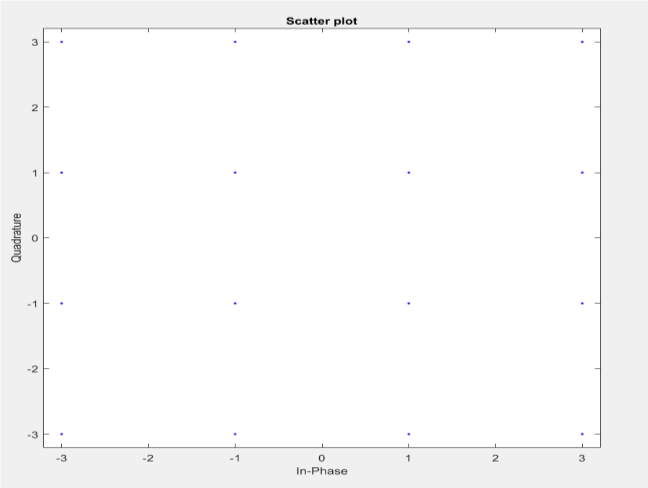

Figure 6: QAM modulation Scatterplot

Mode II under AWGN channel using convolutional encoding with Puncturing technique which are designated in the table II, it is concluded that DAB Mode II under AWGN channel utilizing convolutional encoding with puncturing techniques exhibits best BER performance of 10-6 and SNR of 16dB.

Figure 7 illustrates BER vs. SNR for DAB system. Plot depicts that as SNR increases BER decreases. Simulation result shows that improved SNR of 16dB and reduced BER of 10^{-6}.

B. *Performance analysis of DVB system using MATLAB Simulation*

In DVB system, the video input is characterized into the finite number of frames. The frames are then converted from parallel stream into serial stream. The serial streams of data is encoded using cyclic encoder. In DVB system to provide higher security, two levels of encoders used are external encoder and internal encoder. Two levels of inter leaver used in the proposed system are external inter leaver and internal inter leaver. The interleaved data is modulated using 16 QAM modulation method. DVB – T simulation parameters are listed in Table III. This section illustrates the simulation results of DVB system for AWGN channel. A video input is transmitted under AWGN channel. Figure 8 illustrates the video processing of DVB system.

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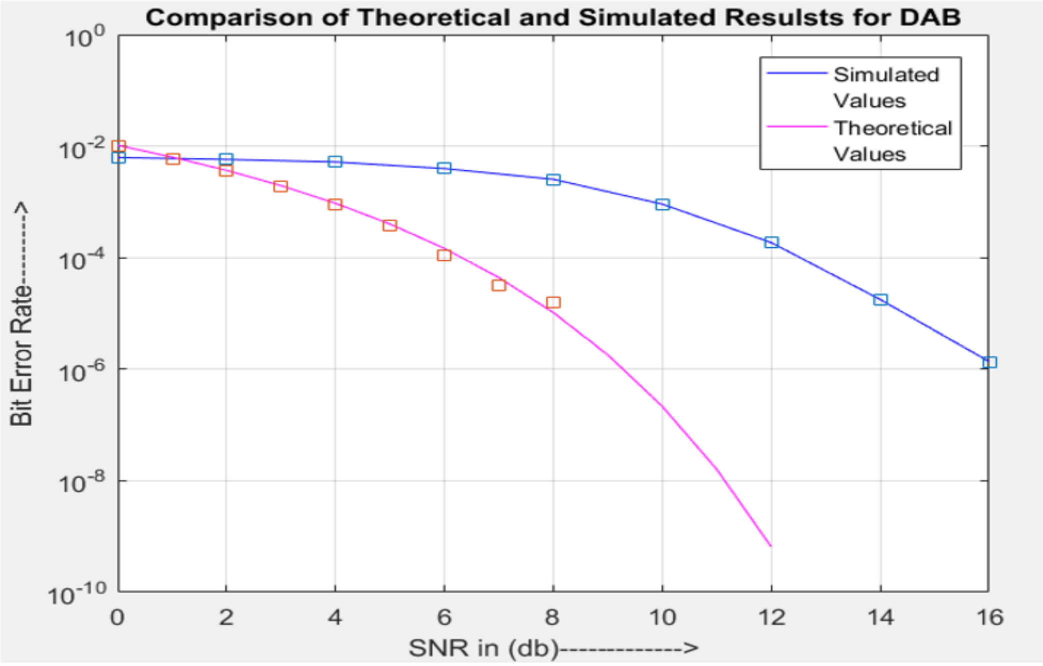

Figure 7: BER vs. SNR for DAB system under AWGN channel

Table II: Comparison of results achieved from proposed method with subsisting techniques.

Sl .NO	Method	FFT length	BER	SNR
1	DAB Mode II under AWGN channel using without Forward Error Correction method (FEC)	512	$10^{-2.9}$	15dB
2	DAB Mode II under AWGN channel using convolutional encoding without puncturing technique.	512	10^{-4}	8dB
3	DAB Mode II under AWGN channel using convolutional encoding with puncturing technique.	512	$10^{-4.8}$	15dB
4	DAB Mode II under AWGN channel using convolutional encoding with puncturing technique.	512	10^{-6}	16dB

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Table III: Parameters of DVB - T system

Parameter	Value
Number of Subcarriers	2K mode:1705 8K mode:6817
Sub-carrier Spacing	2K mode:4464 Mode-8K:1116
Channel spacing [MHZ]	6,7,8
Symbol length, Tu(μs)	Mode -2K :224 Mode-8K :896
Guard Interval	1/4, 1/8, 1/16, 1/32
Sub-carrier spacing Δf=1/ T_u Hz	Mode -2K :4464 Mode-8K :1116
Net bit Rate, R(Mbit/S)	4.98-31.67(typically 24.13)
FFT Length [K=1024]	2K 8K
Sub-carrier modulation technique	QPSK 16-QAM or 64-QAM
Symbol length, T_u(μs)	Mode -2K :224 Mode-8K :896

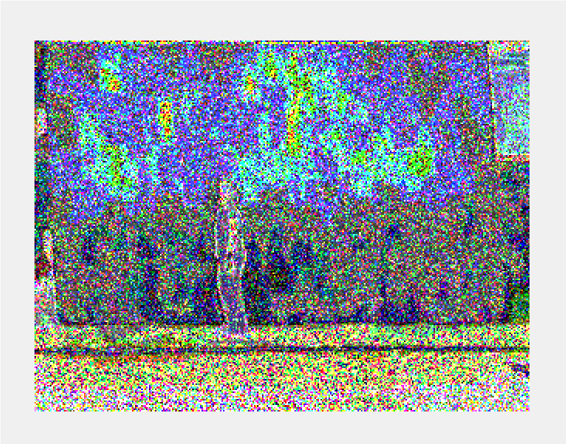

Figure 8. Video processing of DVB system under AWGN channel

Table IV shows the comparison of results achieved from proposed method with subsisting techniques [21]. By comparing proposed method DVB –T under AWGN channel by 16-QAM modulation technique and convolutional encoding technique with two Subsisting techniques DVB –T under AWGN channel by modulation technique 64-QAM and convolutional encoding technique and DVB –T under AWGN channel using modulation technique 16-QAM and convolutional encoding technique, it is concluded that proposed DVB –T under AWGN channel by16-QAM modulation technique and convolutional encoding technique exhibits best BER performance of 10^{-6} and SNR of 14dB which is designated in table 3. Figure 9 illustrates BER vs. SNR for DVB system. Plot depicts that as SNR increases BER decreases. Simulation result shows that improved SNR of 14 dB and reduced BER of 10^{-6}.

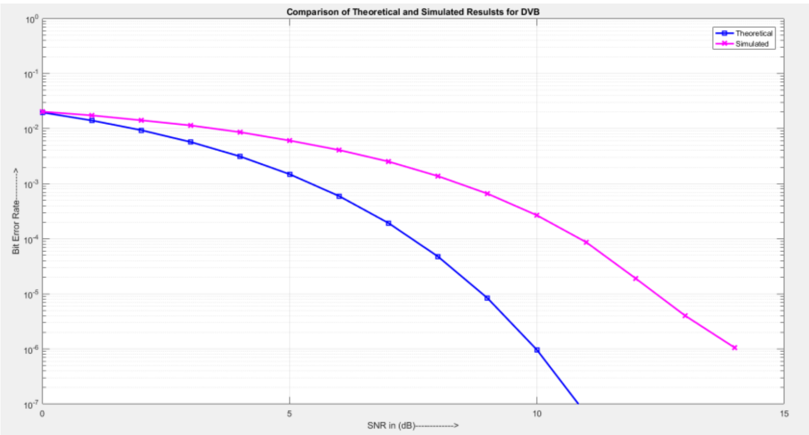

Figure 9. BER vs. SNR for DVB system under AWGN channel

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Table IV: Comparison of results achieved from proposed method with subsisting technique

Sl.NO	Method	FFT length	BER	SNR
1	DVB –T under AWGN channel using modulation technique 64-QAM and convolutional encoding technique	8192	$10^{-4.2}$	10dB
2	DVB –T under AWGN channel using modulation technique 16-QAM and convolutional encoding technique	8192	10^{-5}	12dB
3	DVB –T under AWGN channel using modulation technique 16-QAM and convolutional encoding technique	8192	10^{-6}	14dB

C. *Performance analysis of integrated antenna for DAB and DVB system using MATLAB Simulation*

This section illustrates the simulation results of integrated antenna for DAB and DVB system for AWGN channel. A video input is transmitted under AWGN channel. Figure 10 illustrates BER vs. SNR for integrated antenna for DAB and DVB system. Plot depicts that as SNR increases BER decreases. Plot shows that the integrated antenna for DAB and DVB system produces superior BER performance when compared against the DAB and DVB system. Audio and video signals are received by a single integrated antenna using OFDM. The antenna type used in the simulation is a dipole antenna. Figure 11 illustrates the simulated radiation pattern in Cartesian Plot of the integrated antenna for DAB and DVB system. Cartesian plot is represented by an angle Ɵ (degrees) versus normalized power. The proposed method results shows that the lower side lobe level (SLL) characteristic of this antenna array is down to -23dB inceptions to antenna performance with higher efficiency. The obtained plot shows that the negative return losses which designates the lesser reflections and produces the better radiation. Figure 12 illustrates the 2D Plot of the integrated dipole antenna for DAB and DVB system. The plot is represented with polar angle Ɵ (degrees) versus normalized power. The plot depicts that the unified dipole antenna radiates the maximum amount of signal in the required direction.

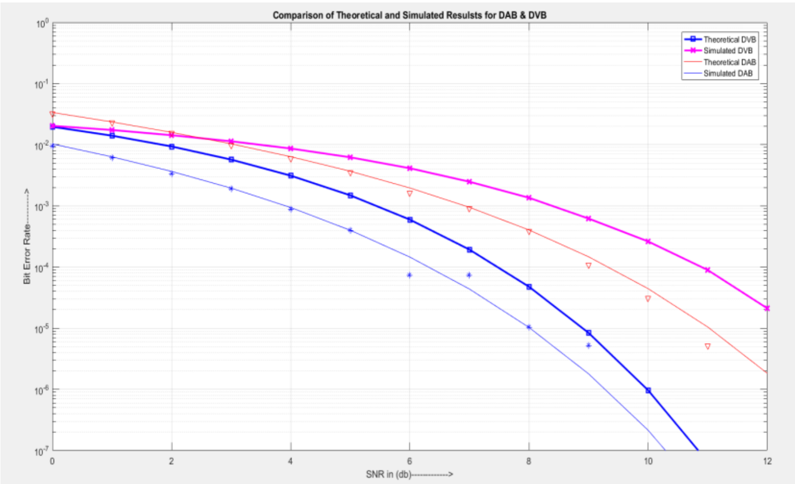

Figure 10. BER vs. SNR* integrated antenna for *DAB and DVB system

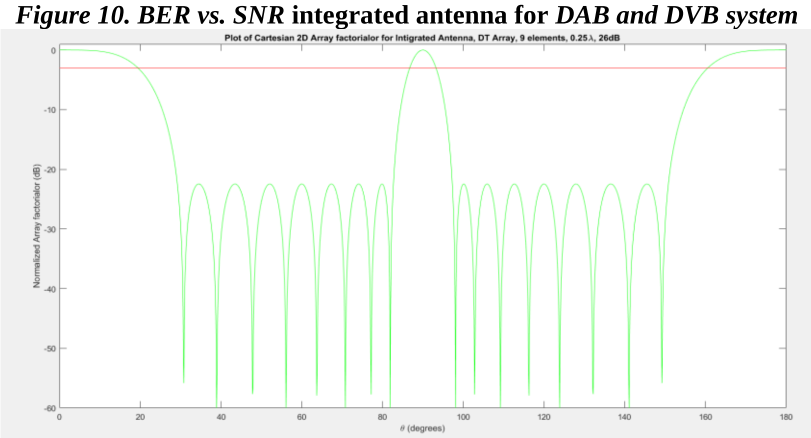

Figure 11. Cartesian Plot of the integrated antenna for DAB and DVB system

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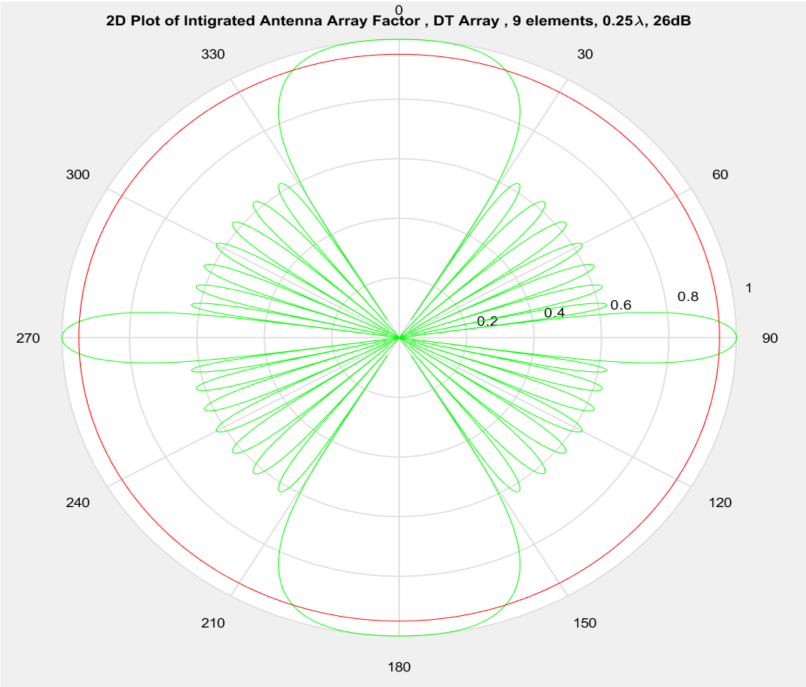

Figure 12: 2D Plot of the integrated dipole antenna for DAB and DVB system

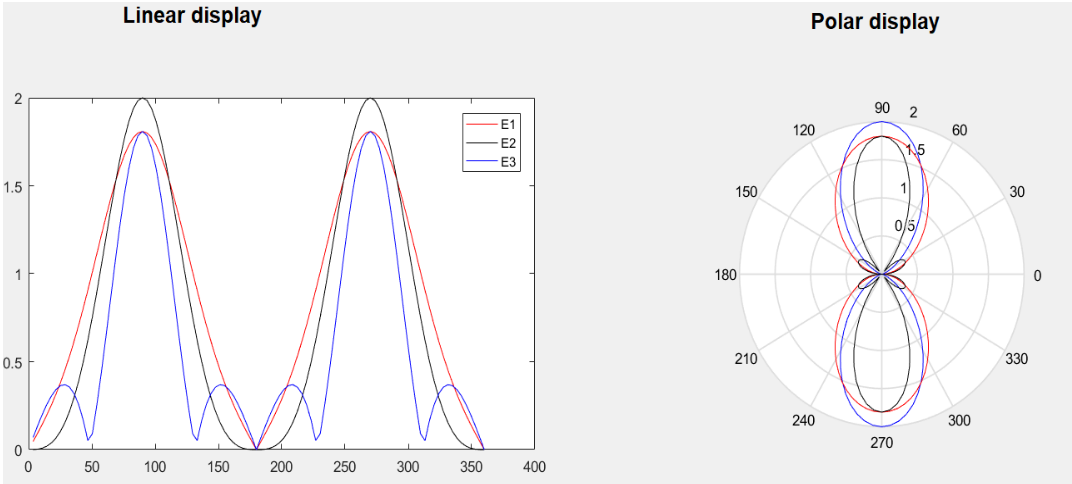

Figure 13. Radiation pattern of the integrated antenna for DAB and DVB system

In a dipole antenna the normalized radiation intensity is a function of both the polar angle and the azimuth angle. In the elevation plane radiation intensity is a function of different polar angles θ, and can be plotted as a rectangular plot.

Figure 13 illustrates the simulated radiation pattern of rectangular plot and polar plot of the integrated antenna for DAB and DVB system. In a dipole antenna the normalized radiation intensity is a function of both the polar angle and the azimuth angle. In the elevation plane radiation intensity is a function of different polar angles θ, and can be plotted as a rectangular plot as shown in figure 14. Polar plot is represented by an angle Ѳ (degrees) versus gain.

The proposed method result shows for the DAB –E1, DVB – E2 and Integrated antenna for DAB and DVB system – E3. Dipole antenna for DAB system produces the gain of 1.5 dBi and Dipole antenna for DVB system produces the gain of 1.5 dBi. Integrated antenna for DAB and DVB system produces the better gain of 2dBi as compared to DAB and DVB system.

VII. Conclusion

This paper presents a DAB, DVB system and integrated antenna performance analysis for DAB and DVB system based on simulations. OFDM system is used in many applications as it offers high spectral efficiency, high robustness and combats multipath fading. Outcome of the proposed system will be confirmed by unified and extended simulation based experiments in OFDM. Unified approach produces the better BER performance as compared to specific design. Integrated antenna for DAB and DVB system produces the better gain as compared to DAB and DVB system. The proposed unified approach provides the high scalability, flexibility and cost effective as compared to individual design for different OFDM standards.

REFERENCES

1. T. Hwang, C. Yang, G. Wu, S. Li and G. Y. Li, "OFDM and Its Wireless Applications: A Survey," in IEEE Transactions on Vehicular Technology, vol. 58, no. 4, pp. 1673-1694, May 2009.
2. Christian Ibars, Yeheskel Bar-Ness, "Inter-Carrier Interference Cancellation for OFDM Systems with Macrodiversity and Multiple Frequency Offsets", Wireless Personal Communications, 2003, Volume 26, Number 4, Page 285
3. A. S. Bhosle and Z. Ahmed, "Modern tools and techniques for OFDM development and PAPR reduction," 2016 International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT), Chennai, 2016, pp. 290-292.
4. R. Umar, F. Yang and S. Mughal, "BER performance of a polar coded OFDM over different channel models," 2018 15th International Bhurban Conference on Applied Sciences and Technology (IBCAST), Islamabad, 2018, pp. 764-769.
5. Farzamnia, N. W. Hlaing, M. Mariappan and M. K. Haldar, "BER Comparison of OFDM with M-QAM Modulation Scheme of AWGN and Rayleigh Fading Channels," *2018 9th IEEE Control and System Graduate Research Colloquium (ICSGRC)*, Shah Alam, Malaysia, 2018, pp. 54-58. doi: 10.1109/ICSGRC.2018.865750.
6. Arun Agarwal and S. K. Patra "Modeling and Performance prediction of Eureka-147 OFDM based DAB system", International Journal of Electrical and Electronics Engineering (IJEEE), ISSN (PRINT): 2231 – 5284, Volume-I, Issue-II, 2011.
7. Syed Hassan Ahmed, Syed Muhammad Umar Talha, Aamir Khan, Member, IAENG "Performance Evaluation of DVB-T Based OFDM over Wireless Communication Channels", International multi conference of Engineers and computer scientists 2012 Volume I, IMECS 2012, Hong Kong. ISBN 978-988-19251-1-4.
8. P. C. F. Eggers, M. Angjelichinoski and P. Popovski, "Wireless Channel Modeling [5] Perspectives for Ultra-Reliable Communications," in *IEEE Transactions on Wireless Communications*. doi: 10.1109/TWC.2019.2901788
9. *A. A. Lysko and G. Dludla, "Considerations for Coexistence: DVB-T2 Broadcasting and LTE Basestations in 700/800 MHz bands in South Africa," 2018 IEEE 4th Global Electromagnetic Compatibility Conference (GEMCCON), Stellenbosch, South Africa, 2018, pp. 1-6.doi: 10.1109/GEMCCON.2018.862860*
10. N. LaSorte, W. J. Barnes and H. H. Refai, "The History of Orthogonal Frequency Division Multiplexing," *Global Telecommunications Conference, 2008. IEEE GLOBECOM 2008. IEEE*, New Orleans, LO, 2008, pp. 1-5.doi: 10.1109/GLOCOM.2008.ECP.690 doi: 10.1109/TLA.2016.7430062
11. C. Yu, C. H. Sung, C. H. Kuo, M. H. Yen and S. J. Chen, "Design and implementation of a low-power OFDM receiver for wireless communications," in IEEE Transactions on Consumer Electronics, vol. 58, no. 3, pp. 739-745, August 2012. doi: 10.1109/TCE.2012.6311312
12. Telenor R&I R (7/2008) "OFDM(A) for wireless communication", pp. 2–23. J.-P. Gabardo (2011) 'Orthogonal Functions and Fourier series', PP. 7-8, McMaster University, Hamilton, ON, Canada
13. Y. Mostofi and D. C. Cox, "Mathematical analysis of the impact of timing synchronization errors on the performance of an OFDM system," in IEEE Transactions on Communications, vol. 54, no. 2, pp. 226-230, Feb. 2006.doi: 10.1109/TCOMM.2005.861675
14. Drakshayini M N, Dr. Arun Vikas Singh, "A Review on Reconfigurable Orthogonal Frequency Division Multiplexing (OFDM) System for Wireless Communication", 2nd InternationalConference on Applied and Theoretical Computing and Communication Technology(iCATccT), 978-1-5090-2399-8/16, 2016 IEEE.
15. B. Miskovic and M. D. Lutovac, "Influence of guard interval duration to interchannel interference in DVB-T2 signal," *2012 Mediterranean Conference on Embedded Computing (MECO)*, Bar, 2012, pp. 220-223.
16. X. Liu, "Set of binary sequences of length eight applied to reducing OFDM PMEPR," in Electronics Letters, vol. 44, no. 22, pp. 1331-1332, 23 October 2008. doi: 10.1049/el:20081376.
17. A. Agarwal and S. K. Patra, "Performance prediction of OFDM based DAB system using block coding techniques," 2011 International Conference on Emerging Trends in Electrical and Computer Technology, Nagercoil, 2011, pp. 792-796. doi: 10.1109/ICETECT.2011.5760226
18. Drakshayini M. N, Dr. Arun Vikas Singh "An Efficient Orthogonal Frequency Division Multiplexing (OFDM) System and Performance Analysis of Digital Audio Broadcasting (DAB) System", International Journal of Computer Applications (0975 – 8887) Volume 148 – No.8, August 2016.
19. Drakshayini M N, Arun Vikas Singh, Vyshanava Nandini S, "Performance Of Digital Video Broadcastingterrestrial (Dvb-T) Using Ofdm As System", IJRET: International Journal of Research in Engineering and Technology, eISSN: 2319-1163, pISSN: 2321-7308, Volume: 05 Special Issue: 04, ICESMART-2016, May-2016.
20. M. Rizwan and A. R. Siddique, "Performance Analysis of Terrestrial Digital Video Broadcasting (DVB-T) in AWGN Channel Using M-QAM," *2011 7th International Conference on Wireless Communications, Networking and Mobile Computing*, Wuhan, 2011, pp. 1-4. doi: 10.1109/wicom.2011.6040062.
21. Prakash Patel, Dr. Snehlata kothari, Dr. Dipesh Kamdar"Performance of Digital Video Broadcasting (DVB-T) using Filter for 64- QAM", International Journal of Engineering Trends and Technology (IJETT), V38(2),71-74 August 2016. ISSN:2231-5381. www.ijettjournal.org. published by seventh sense research group

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