Performance Evaluation in Spectral Efficiency in the Broadcast Communication Based DVB RCS2 System Transmission

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Abstract— Achieving the improved digital communication systems with the cancellation of Non-Linear Distortion Noise is difficult task. Transmitting the digital video broadcasting through air interface through the interleaved Frequency-division multiple access scheme is possible. The comparative study is need to be done with the consideration of single carrier frequency division multiple access schemes and orthogonal FDMA schemes with the satellite uplink. The High Power Amplifiers should be operated in the K Band and S Band. The multiuser environment has to be developed to demonstrate the performance of synchronous and asynchronous LFDMA, IFDMA and OFDMA. The performance results of the Frequency Division Multiple access should be evaluated. In fact the Iterative Frequency Division Multiple Access is regarded as the outperforming scheme. The Inter Block Interference is causing the most sensitive degradation for asynchronous reception. To achieve the non-linear distortion in the large envelope fluctuations OFDMA is regarded as the best scheme among the other schemes like IFDMA and LFDMA. The proposed paper is focusing on the OFDMA performance and its better advantages in comparison with other schemes. The main aim of the paper is to suggest the best technique to reduce the linear and non-linear distortion in Integrated Terrestrial and Satellite Systems.

Key words: Digital Communications Systems, OFDMA, IFDMA, LFDMA, Non-Linear Distortion Noise

I. INTRODUCTION

Non-Linear Distortion Noise is an obstacle in Digital Communication systems. Broad Band access is establishing the internet service provision to all small and home networks in the world. Instead of providing the internet services thorough the broad band connections the new way of providing the connectivity is through Integrated Terrestrial and Satellite Systems. Using this Integrated Terrestrial and Satellite Systems an integrated network solution can provide the Digital Subscriber Line networks and satellite communication systems. The introduction of this Integrated Terrestrial and Satellite Systems have given un-interrupted services to the subscribers with internet with low latency and high-bandwidth. The high bandwidth like 100 mbps to 1000 mbps can be provided by the Integrated Terrestrial and Satellite Systems through the link from satellite and providing the quality of services. The state of the art communication systems have been established by the Integrated Terrestrial and Satellite Systems with the help of satellite links by providing the high bandwidth. In Integrated Terrestrial and Satellite Systems the major setback is distorted noise. The higher throughput should be provided even when the higher traffic is prevail. The bandwidth and connectivity should provide excellent bandwidth according to the user data rates, flexibility to adapt to traffic demand in the destinated networks and coverage area. The predominant point in providing the higher data provision can be possible with decrease the cost per transmitted bit. There are several challenges are addressed in providing the efficient bandwidth in the Integrated Terrestrial and Satellite Systems network with higher frequency bands are using Q and V radio frequency bands by using the significant hardware implementation. At this juncture the hardware utilization is creating the significant distortion. The distortion should be nullified using signal processing techniques. The receiver and transmitter used in this Integrated Terrestrial and Satellite Systems connected to the satellite systems for transforming the higher band width should be refined with the cancellation of distorted noise in the networks. The suitable noise cancellation techniques are need to be implemented to achieve the better digital communication standards.

The digital communication transmitted from the satellite is experiencing the linear and non-linear distortion. The main cause for this distortion is from the non-linear transfer from the high-power amplifiers arranged and functioning from the satellites as well as at the user terminal points. These mis functionality and mismatch between the satellites and terminal points creates the adverse effects. This causes the damage to the power and spectral efficiencies and transfer the internet in the wave forms. Time division multiplexing is one of the best techniques used to increase the efficiency of the wavelet transformation from satellites to user receiver points.

In this paper the Non-Linear Distortion Noise is emphasized and different methods have been suggested to cancel the same in the Integrated Terrestrial and Satellite Systems. To prove this concept the paper has exemplified the cancellation of distorted noise in the digital communication networks and extracted the outputs. The main advantage of this technique is to reduce the Low Hardware complexity with DVB-RCS2. By implementing this method there will be a possibility to find the congestion occurrence with big intervals.

II. LITERATURE REVIEW

Svilen Dimitrov (2016) has suggested a cancellation technique for noise distortion with the digital transmission schemes. The paper has focused on iterative cancellation of Non-Linear Distortion in digital communication system with the help of symbol clustering and warping techniques. In this paper the non-linear ka-band solid state power amplifier is improvised with terminal satellite return links. The input amplitude and output amplitudes are improvised with characteristics of and SSPA. (Svilen Dimitrov (2016))

The local training case to transmit the signals from satellite to the user multiplexing filters can cause the distortion. The paper has illustrated different approaches to exemplify the indirect learning architecture. The signals are

transmitting from the IMUX to frequency Translator, TWTA and OMUX translators. The satellite transponders will send the signals to the user receivers equipped with multiplexers. The hardware transmission causes the output back-off and reduction in clarity and reduce the transponder output power. The transmission will be reduced by the OPEX and CAPEX. The usage of more transponders will cause the efficiency. But the hardware cost will be increased (Ali Behravan et.al. (2016)).

III. METHODOLOGY

In this paper we propose a novel methodology to compare the functionality of wireless communication with TDMA, OFDMA and SCFDMA waveforms. The cancellation of non-linear distortion in the wireless communications. Iterative receiver functionality is predominantly focused in this project. This functionality is predominantly did the cancellation of non-linear distortion in the wireless communications. The iterative receiver functionality is operated on time division multiple access (TDMA), orthogonal frequency division multiple access (OFDMA) and single-carrier frequency division multiple access (SC-FDMA) waveforms. Even! though! a! return! link! setup! is! considered,! the! receiver! is! equally! applicable! in! the! forward! link, taking! into! account! the! differences! in! the! data! multiplexing! and! the! channel. Analytical! modeling! of! the! received! electrical! signal-to-noise! ratio! (SNR)! is! carried! out! for! OFDMA! with! one! iteration! of! non-linear! distortion! noise! Cancellation.

The performance is assessed in terms of power efficiency and spectral efficiency, where the total degradation (TD) of the received SNR in a non-linear channel is minimized. The modulation formats of the DVB-RCS2 satellite return link standard and a respective non-linear channel have been used. OFDMA shows the highest power efficiency gain of 1.1–2.5 dB with 2 iterations of non-linear noise cancellation across the Different modulation orders. In SC-FDMA, the gain is in the range of 0.3–1.1 dB, while gains of 0.1–0.8 dB and 0.2–1.9 dB are presented In TDMA with 20% roll-off and 5% roll-off, respectively.

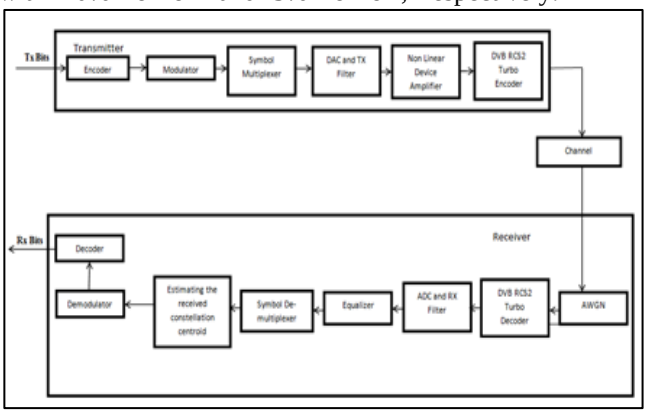

Fig. 1: Performance Evaluation in Spectral Efficiency with DVBRCS2.

The next generation of interactive satellite terminals is going to play a crucial role in the future of DVB standards. As a matter of fact in the current standard, satellite terminals are expected to be interactive thus offering apart from the possibility of logon signalling and control signalling also data transmission in the return channel with satisfying quality. Considering the nature of the traffic from terminals that is by nature bursty and with big periods of inactivity, the use of a Random Access technique could be preferred. In this paper **Random Access congestion control** in DVB-RCS2 is considered with particular regard to the recently introduced Contention Resolution Diversity Slotted Aloha technique, able to boost the performance compared to Slotted Aloha. The extension analyzes the stability of such a channel with particular emphasis on the design and on limit control procedures that can be applied in order to ensure stability of the channel even in presence of possible instability due to statistical fluctuations.

In SC-FDMA, the bit sequence is mapped Onto N complex modulation symbols in the first step. Commonly used baseband modulation schemes In upcoming LTE standard include QPSK, 16-QAM and 64-QAM. In general, transmitter adopts The modulation scheme to match the particular Channel conditions and characteristics for the certain time instance. Afterwards, block of N data symbols are Applied to a size N Discrete Fourier Transform (DFT). This operation is in the literature also Described as a DFT-precoding operation . Application Of DFT-precoding at the transmitter side is a promising solution for the reduction of the envelope Fluctuation of the original OFDM signal. The next Stage of SC-FDMA procedure is to shift the Baseband DFT representation of the time-domain SC-FDMA symbol to the desired part of the overall Channel bandwidth. Since the signal is now represented As a DFT, assigning individual subcarriers to the User is only matter of frequency shifting and copying The N bits into a larger DFT M bits space that Can be up to the size of the system channel bandwidth. In LFDMA, each user terminal adopts Consecutive adjacent subcarriers for the transmission. As a results of this fact, particular mobile terminal use only A fraction of the overall bandwidth and only a small fraction of frequency diversity is used for details. This fact is a special relevance for The systems, where channel state information is Perfectly know for the each time instant, hence no further kinds of diversity is necessary to use.

IV. RESULTS

Non-linear distortion can be extracted from the digital communication system with the help of constellation wrapping and Symbol clustering as inputs from the demodulator as a receiver. The IMI is basically influenced by the signal waveform to be rich with the useful information of transmitted signals. Generally the analog carriers are found in smaller number can be modulated into TDMA with the digital transmission schemes. The interfering components are correlated with the transmitted symbols generated from the process. In this process every constellation point will be warped, scaled and rotated severally. This process of getting correlations Treated as noise. In this paper, the following decomposition of the signal and the interfering component is employed, where the output of the non-linear device is given as:

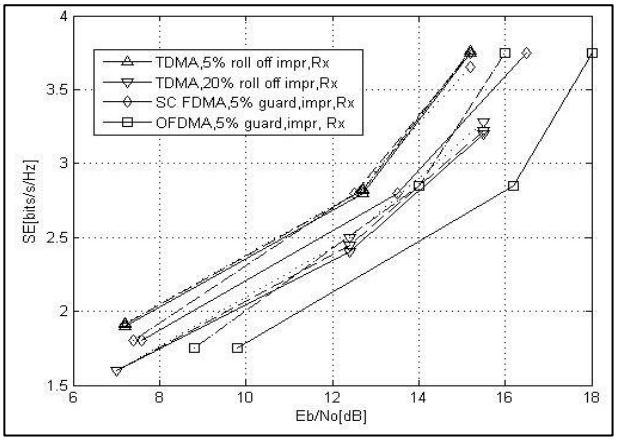

Fig. 2: Spectral efficiency vs. electrical SNR requirement of digital transmission schemes with an SSPA and AWGN in return link

In the process of Digital Video Broadcasting of second generation the RCS2 can be calculated on the functions of Energy dispersal, Addition of a cyclic redundancy check which is known as CRC, coding and interleaving techniques, unique word and known pilot insertion,

The process will be using the linear modulator or continuous phase modulator in generating the RCS2 results. The process will be starting from Frame PDU then the process goes to the state of Energy Dispersal then the process will be undergoing for the Cyclic Redundancy Check. Once the CRC is completed the Coding and interleaving will be established. In this process Inclusion of Known symbols can be formulated and then finally the Modulation process can be completed.

In this process we focus on the energy dispersal. In this process MF-TDMA return link data stream will be transforming in bursts. The bit stream in a burst will be varied by scrambling. This process is done in accordance with the ITU Radio Regulations. This process is necessary to ensure adequate binary transactions and to reduce the probability of monotonic bit sequences. In this bit sequence process a PRBS sequence is established and incorporated. In this process the Polynomial expression 7-1 specifies the pseudo random binary sequence. In this process 15 register linear feedback shift register will be used to streamline the distribution of binary forms of 010101 format.

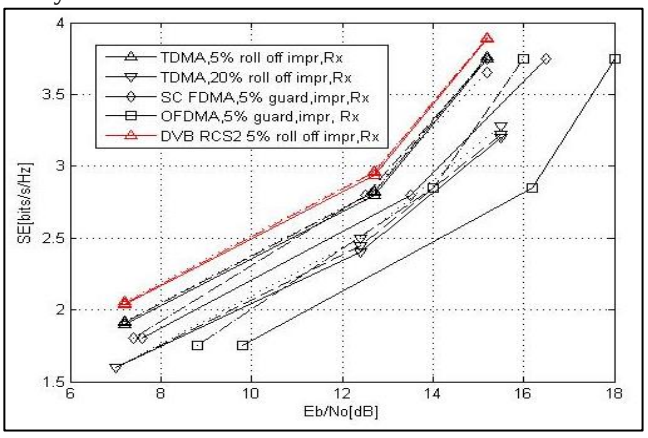

Fig. 3: Spectral efficiency vs. electrical SNR requirement of digital transmission schemes with an SSPA and AWGN in return link with DVB RCS2 transmission

The above results have been extracted from the text bed from the pseudo-random sequence. The results are demonstrating the SR-1 to SR-15 registers taken from the given data. The data is of Fixed fields with specific structure. The interaction field type is taken from the contiguous sequence. The results have been extracted on the basis of flexible data structure. The bit values are taken from the 1 and 0 values only. The mobile RCST values are obtained from the sample which are generated from the requirements for the Control and Monitoring functions notified in the applicable regulatory documents. The interference avoidance has been calculated from the ETSL and mobile RCST

V. CONCLUSION

Achieving the improved digital communication systems is the main objective of the paper. The finest results have been achieved with the cancellation of Non-Linear Distortion Noise in the digital Communication systems. In this paper the comparative study has been done with the consideration of single carrier frequency division multiple access schemes and orthogonal FDMA schemes with the satellite uplink. the results have been achieved from the multiuser environment to demonstrate the performance of synchronous and asynchronous LFDMA, IFDMA and OFDMA. The performance results of the Frequency Division Multiple access have been successfully evaluated. Non-linear distortion in the large envelope fluctuations DVB RCS2 based OFDMA is proved to be the best scheme among the other schemes. The results have been evaluated and demonstrated the objective of the project.

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