2. LITERATURE SURVEY

2.1. INTRODUCTION

In the previous chapter, we discussed about the introduction to OFDM, OFDM-OQAM systems and also about PAPR which is one of the major bottlenecks in the performance evaluation of these systems. So, it is very much essential to reduce PAPR to increase the efficiency and to obtain the satisfactory performance of any system. Another important feature that needs to be focused is the complexity of system. The complexity can be the searching complexity which is the number of iterations required for developing the algorithm. On the other hand, the complexity can be computational complexity which is given by the total number of IFFT operations performed.

Number of researchers proposed several algorithms for reducing PAPR in the recent past whose ultimate goal is to reduce PAPR. Some methods focus on the reduction of PAPR alone while some methods focus on reducing both PAPR and complexity. This chapter concentrates on the extensive literature survey of various existing PAPR and complexity reduction methods and their significance in reducing PAPR for improving the performance of the system.

2.2. SURVEY OF EARLIER SCHEMES FOR REDUCING PAPR

Reduction in PAPR of OFDM signals employing partial transmit sequence algorithm (PTS) is suggested by L. Cimini and N.R. Sollenberger in [2]. PTS technique is an efficient way to reduce PAPR as it uses an iterative routine to find the phase factors which are optimum without the restriction on the amount of subcarriers. Here the input data block is divided into disjoint sub-blocks and these sub-blocks are combined to minimize the PAPR of the transmitted signal. But the conventional or traditional PTS algorithm requires an exhaustive search of the allowed phase factors which increases the number of iterations to find the optimum phase factors. This in turn increases the searching complexity of the algorithm.

Xinchin Wu et al. in [3] proposed conjugate interleaved partitioning PTS scheme for PAPR reduction of OFDM signals. Because the interleaved partitioning PTS scheme has inferior PAPR performance as compared to that of adjacent partitioning PTS scheme, conjugate interleaved partitioning PTS scheme is proposed. Here some
conjugate operations are carried out on some sub-blocks thereby increasing the number of candidate signals. These result in improvement in PAPR reduction performance of conjugate interleaved partitioning scheme as compared to adjacent partitioning PTS scheme. Though the computational complexity is lowered by using this scheme, the searching complexity feature is not considered.

PAPR reduction of OFDM signals using a new PTS scheme which makes use of real valued genetic algorithm (RVGA) is presented by J.K.Lain et al. in [4]. By defining a cost function based on the amount of PAPR, PTS can be formulated as the optimization problem and solved by implementation of RVGA. Even though this algorithm achieves low computational complexity, the PAPR performance is inferior to that of conventional PTS algorithm. This algorithm mainly focuses on decreasing the computational complexity rather than PAPR reduction.

Jun Hou et al. in [5] developed a low complexity PTS scheme for reducing PAPR in OFDM systems. By making use of the similarity among the required signals generated in PTS, a new algorithm is developed which achieves low computational complexity compared to that of conventional PTS algorithm. However it does not concentrate on searching complexity and it has same PAPR performance as that of conventional PTS scheme.

Reduction in PAPR of OFDM signals using grouping and recursive phase weighting methods are presented by L.Wang and J.Liu [6]. The combination of these two techniques depends on decreasing the computational complexity. However the PAPR reduction performance by applying these two algorithms is same as the conventional PTS scheme. Moreover, the number of iterations required for searching the phase factors increases which increases the searching complexity.

PTS based Radix FFT method with low complexity is developed by A.Ghassemi and T.A.Gulliver [7]. Here the computational complexity is decreased by a new technique called decomposition PTS (D-PTS) where sub-blocks are assigned through different stages of the Radix FFT. This technique reduces both multiplicative and additive complexity thereby decreasing the computational complexity. But the PAPR reduction performance of the proposed scheme is inferior to that of conventional PTS scheme which means that the proposed scheme has high PAPR compared to conventional PTS.
C.P.Li et al. in [8] presented a novel low complexity selected mapping (SLM) schemes for decreasing PAPR in OFDM systems. In this scheme, it is cited that the computational complexity of the conventional SLM scheme is reduced by making use of the conversion vectors acquired by using IFFT. This discusses about three SLM schemes with low complexities which are based on the three novel classes of sequences. While the PAPR reduction performance is poorer than that of conventional SLM scheme, the computational complexity is decreased.

Improved selected mapping for decreasing PAPR of an OFDM system which performs post IFFT operations is discussed by M.A.Taher et al. in [9]. It makes use of a modified version of the SLM scheme which processes the data after the inverse fast Fourier transform block. The main objective of this method is to select the candidate signals having less PAPR and transmit them. It is demonstrated that this proposed modified SLM scheme achieves lower PAPR and computational complexity compared to that of conventional SLM scheme.

Insoo Sohn in [10] developed a new selected mapping scheme which makes use of a genetic algorithm for lowering PAPR in OFDM systems. SLM scheme, as we know, requires a set of inverse fast fourier transform blocks to obtain the required signals. This results in a high computational complexity which is a drawback. Here a new SLM scheme is developed based on a genetic algorithm that requires one IFFT module only. The proposed method achieves better PAPR reduction performance with lower computational complexity but requires more number of searches to search the optimum phase factors.

A modified SLM scheme with reduced complexity for decreasing PAPR is proposed by H.B.Jeon et al. in [11]. This scheme performs the addition of mapped signal sequences to OFDM signal sequences. The proposed scheme decreases the computational complexity without degrading the PAPR reduction performance compared to that of conventional SLM scheme. However, an additional memory to store the additive mapping sequences is needed in this scheme.

B.M.Lee and Y.Kim in [12] proposed an adaptive clipping and filtering technique for reducing PAPR of OFDM signals. The conventional iterative clipping and filtering technique is widely used to reduce PAPR as it is very simple to implement. But as the same signals are iteratively clipped with a clipping threshold in every clipping
operation, the PAPR reduction performance is degraded. Considering this, the authors have presented an adaptive iterative clipping and filtering technique which clips the signal with an adaptively modified clipping threshold in every clipping operation. This enhances the PAPR reduction performance compared to the conventional clipping and filtering scheme.

Mohammed Rakibul Islam in [13] developed PAPR reduction using pre-coding with clipping and filtering. The objective of this method is to introduce PAPR reduction technique in the uplink in the first step followed by clipping and filtering in the second step. As the number of clips is increased, the method achieves better PAPR reduction performance.

Iterative clipping and filtering (ICF) using optimization technique is cited by Y.C.Wang and Z.Q.Luo in [14]. Here the frequency response which is optimal is obtained for each ICF iteration. The objective of designing optimal filter is for minimizing the signal distortion and also to ensure that the PAPR is decreased. Also, the clipped OFDM symbols obtained by this method have lower out of band radiation than the conventional ICF. But the authors did not consider the complexity feature in their work.

Another important technique for decreasing PAPR is the tone reservation technique where a small number of unused subcarriers termed as peak reduction carriers (PRC’s) are reserved. The ultimate aim of tone reservation technique is to determine the optimum values of the PRC’s that are used to minimize the PAPR of the OFDM signal. Finding the optimum values of the PRC’s results in increase in computational complexity which is a drawback.

To solve this issue, cross-entropy method is introduced to find the optimum values of the PRC’s as suggested by J.C.Chen et al. in [15]. As compared to the conventional tone reservation scheme, this method results in better PAPR reduction performance and at the same time, the complexity is also reduced.

Reduction of PAPR of OFDM signals by employing cross-entropy based tone injection scheme is proposed by C.K.Wen in [16]. Generally, a tone injection scheme extends the original constellation to several equivalent points which reduces the PAPR. But, the conventional tone injection scheme requires an exhaustive search which is an optimization problem. To reduce searching complexity and
simultaneously the PAPR, the cross-entropy method provides a good solution to the complex optimization problem.

Md.Mahmudul Hasan in [17] developed a PAPR reduction technique using linear predictive coding (LPC). This method discusses about the use of signal whitening property of LPC as a processing step in OFDM. This method achieves considerable reduction in PAPR without degrading the power spectral level and computational complexity. It is also discussed that the proposed system can be applied to any number of subcarriers under additive white Gaussian noise.

Combination of selected mapping (SLM), constellation extension (CE) and Reed-Muller (RM) codes to develop a new technique known as RM-CE-SLM is proposed by H.Y.Liang in [18]. This technique uses RM codes to select the internal and external positions of constellation points and uses codeword elements in cyclic codes to obtain SLM scrambling sequences. The elements of scrambling sequences are based on codeword elements in cyclic codes. Though the PAPR performance is better than that of conventional SLM technique, the authors did not consider the complexity of the proposed technique.

An OFDM signal that has high PAPR results in in-band distortion and out-of-band radiation when passed through a power amplifier. M.Park et al. in [19] proposed PAPR reduction using Hadamard transform. Hadamard transform lowers the autocorrelation relation of the OFDM input sequences. From the Wiener-Khintchine relation, as the Fourier transform of the autocorrelation is the power spectral density, it in turn reduces PAPR of the OFDM signal transmitted. However using this method, there is a small reduction in PAPR.

H.Chen and H.Liang in [20] combined selected mapping and binary cyclic codes for decreasing PAPR in OFDM systems. This process of combining serves for both error correction and reducing PAPR. The binary cyclic code is decomposed into sum of two cyclic sub-codes. The correction sub-code is used for error correction and the scrambling sub-code is used for PAPR reduction. The candidate signals having minimum PAPR is chosen from the set of binary cyclic code words. The proposed modified SLM scheme achieves good PAPR performance.
Active constellation extension is another technique for decreasing PAPR in OFDM systems. Here, the constellation points are extended such that PAPR is minimized and the minimum distance of the constellation points does not decrease.

Effective improvement of the active constellation extension (ACE) for decreasing PAPR in OFDM systems is suggested by A.Kliks and H.Bogucka in [21]. The authors in this work presented modification of the ACE which considers overlapping of the data symbol pulses. It results in better PAPR reduction and lower computational compared to that of conventional ACE scheme.

Y.Wang et al. in [22] developed a non-linear companding transform for reducing PAPR in OFDM systems. The main objective of this scheme is to transform the Gaussian distributed OFDM signals into a specific statistics form. By properly selecting the parameters of the companding transform, this scheme results in more flexibility in the companding form such that a favorable trade-off is achieved between reduction of PAPR and computational complexity. It can also obtain better PAPR reduction performance compared to that of conventional companding schemes.

A companding technique with trapezium distribution for PAPR reduction in OFDM system is presented by S.S.Jeng and J.M.Chen in [23]. Both the basic schemes namely uniformly distributed and piecewise companding schemes cannot decrease PAPR considerably. Hence, in this work, the distribution of OFDM signal is transformed into trapezium distribution and the general formulae for the proposed scheme are derived to enable desired performance of the system by controlling the required parameters. The proposed scheme offers efficient PAPR reduction compared to uniformly distributed and piecewise companding schemes but the complexity of the developed scheme is not discussed.

Clipping is effective in reducing PAPR and is simple to implement. However, clipping suffers from out-of-band radiation. On the other hand, peak windowing reduces the out-of-band radiation. So, an efficient PAPR reduction technique by combining peak windowing and clipping is proposed by R.K.Singh and M.Fidele in [24]. The proposed technique offers better PAPR performance compared to that of conventional peak windowing and clipping.

H.B.Jeon et al. in [25] discussed about a novel PAPR reduction scheme using parabolic peak cancellation for OFDM systems. The proposed scheme performs peak
canceling in time domain without iteratively performing IFFT and can be applied to active constellation extension effectively. If the required parameters of the peak reduction tones are properly selected, this technique reduces the out-of-band radiation and maintains the PAPR reduction performance. But the PAPR reduction performance is same as that of conventional active constellation extension method.

Aiming at reducing PAPR and complexity in OFDM systems, a residue number system based OFDM parallel transmission scheme is presented by Yi Yao et al. in [26]. The main idea of the presented scheme is to utilize the parallel property of residue number system to convert the input signals into smaller residue signals so that they effectively contribute for reducing PAPR. A generalized performance of the presented scheme is analyzed in this work which includes the main issues such as PAPR reduction and computational complexity. It is demonstrated that the proposed scheme achieves desirable PAPR reduction.

A reduced complexity PTS scheme using adaptive differential evolution algorithm for PAPR reduction in OFDM system is presented by C.Weng et al. in [27]. This work presents a new approach to decrease the computational complexity which is based on the relation between phase vectors and transmitted phase vectors. A novel scheme is developed based on a stochastic optimization technique called adaptive differential evolution to search for the optimal combination of phase factors. It is seen that the proposed scheme achieves reduction in computational complexity while maintaining better PAPR reduction.

Robin shrestha et al. in [28] proposed modified phase realignment techniques (MPR) for PAPR reduction in OFDM systems. The suggested techniques suppress the out-of-band radiation compared to that of original OFDM signal and have moderate amount of computational complexity. Here, the phase of a constellation point beyond the allowable phase margin is restored to the respective phase threshold defined by the phase margin. The amplitude and phase margins are optimized to balance the trade-off between PAPR reduction and computational complexity. Also, the proposed technique has good PAPR performance.

To enhance the spectral efficiency and increase data transmission rate in digital broadcasting systems, OFDM systems employing offset quadrature amplitude modulation (OFDM-OQAM) systems are widely used. These systems have the
advantage of high spectral efficiency and lower side lobes in the power spectral density. Similar to OFDM systems, OFDM-OQAM systems have the disadvantage of high PAPR. So, focus is made on reducing PAPR and simultaneously complexity of OFDM-OQAM systems.

PAPR reduction of OFDM-OQAM signals by employing segmental PTS scheme with reduced complexity is discussed by Chen Ye et al. in [29]. Here, overlapped OFDM-OQAM signals are divided into a number of segments and then some disjoint sub-blocks are divided and multiplied with different phase rotation factors. For conventional PTS scheme, this phase rotation operation is made use of independently for each transmit signal. Compared with the conventional PTS scheme, this proposed scheme attains better PAPR reduction with lower computational complexity. But by padding more zeroes for each segment, the data rate may be decreased.

The filter bank multicarrier with offset quadrature amplitude modulation (FBMC-OQAM) is a strong wireless standard for fourth generation wireless systems. A PAPR reduction scheme for FBMC-OQAM system is presented by H.Wang et al. in [30] which makes use of multiple data block PTS and tone reservation (TR) schemes. In the hybrid PTS-TR scheme, the data blocks are divided into several segments. In each segment, the optimal data block with minimum PAPR is selected and transmitted. The peak reduction tones are used to cancel the peaks of the segments in FBMC-OQAM signals.

PAPR reduction of OFDM-OQAM signals using adaptive clipping based active constellation extension scheme is cited by V.Sandeep and S.Anuradha in [31]. The basic ACE based clipping technique is simple and attractive to reduce PAPR in OFDM-OQAM system. But when the target clipping level is below optimum value, it cannot achieve satisfactory PAPR performance. To overcome this, the authors have developed novel ACE with adaptive clipping. Here, an adaptive procedure is used to control the size of clipping level and also to increase the convergence speed. But the complexity feature is not considered in this work.

S.S.Krishna et al. in [32] suggested dispersive tone reservation technique for PAPR reduction in FBMC-OQAM systems. This tone reservation technique reduces PAPR by considering the overlapping nature of FBMC-OQAM signals. It designs the peak cancellation signal that cancels the unwanted peaks. This scheme yields better
PAPR reduction performance compared to that of conventional tone reservation scheme.

FBMC-OQAM systems are suited for next generation wireless systems. The main drawback of these systems is high PAPR. Tone reservation is one of the popular techniques for reducing PAPR for these systems. Direct application of tone reservation to FBMC-OQAM systems is not effective due to the overlapping structure. Hence Shixian Lu et al. in [33] proposed sliding window tone reservation technique for decreasing PAPR. This technique utilizes peak reduction tones of various successive data blocks to cancel the peaks of FBMC-OQAM systems inside a window. Also, this technique controls the peak re-growth caused by peak cancellation. This proposed technique has better PAPR reduction performance than that of conventional tone reservation technique.

Tone injection is a PAPR reduction technique where equivalent constellation points are added to the original constellation points such that PAPR gets reduced. Companding is described as compression of large amplitude signal and the expansion of low amplitude signal. R.Gopal in [34] proposed a PAPR reduction scheme for FBMC-OQAM systems which is the combination of tone injection and companding techniques. It is established that the combined technique gives better result in PAPR reduction compared to that when tone injection and companding are considered separately for reducing PAPR.

Reduction in PAPR of OFDM-OQAM signals using overlapped SLM (O-SLM) technique is presented by J.P.Javaudin et al. in [35]. O-SLM technique is an adaptation of SLM technique which considers the overlapping introduced by OFDM-OQAM pulse shaping. The authors demonstrated that PAPR reduction using O-SLM technique is superior to that of conventional SLM technique.

A modified PTS scheme by employing multi-block joint optimization (MBJO) is proposed by Daiming Qu et al. in [36]. In PTS scheme, each data block is divided into sub-blocks and each sub-block is multiplied by a phase rotation factor. Unlike the PTS scheme, which independently optimizes the data blocks, the MBJO based PTS scheme utilizes the overlapping structure of FBMC-OQAM signal and jointly optimizes multiple data blocks. It is observed that this scheme can obtain considerable
reduction in PAPR and it outperforms the PAPR performance of conventional PTS scheme implemented for FBMC-OQAM system.

OFDM-OQAM system has drawn significant interest in recent years due to its high spectral efficiency and applicability to next generation wireless systems. Many researches are going on to alleviate the problem of high PAPR in these systems. In this process, a modified scheme known as overlapped segmental active constellation extension (ACE) is developed by S.Anuradha in [37]. Here the input signals are divided into number of overlapped segments and then ACE is applied for each segment. This scheme can obtain better PAPR performance than conventional ACE scheme used in OFDM-OQAM system and OFDM systems. But the authors did not analyze the complexity of the scheme.

Y.Xia and J.Zhang in [38] presented joint SLM (J-SLM) technique for PAPR reduction in OFDM-OQAM signals. Unlike the SLM scheme which optimizes each data block individually, this scheme multiplies the real and imaginary parts of each data block with different phase rotation factors and then applies sequential optimization to jointly optimize them. Simulation results obtained denote that the proposed scheme has significant and better PAPR reduction performance compared to the conventional SLM scheme.

Trellis based SLM (TSLM) technique is an efficient technique for reducing PAPR of FBMC-OQAM systems. But the drawback is it has high computational complexity and more hardware memory. Addressing these issues, Hamaied shaiek et al. in [39] developed modified TSLM technique. A comparison is also made with the existing probabilistic schemes such as overlapped SLM and dispersive SLM. Though this suggested scheme obtains better PAPR reduction compared to that of existing schemes, there is a trade-off between reduction of PAPR and complexity issues.

OFDM-OQAM is promising multi-carrier technique for the transmission of signals over multipath fading channels. To alleviate the problem of high PAPR in these systems, a novel and improved SLM scheme is proposed by G.Cheng et al. in [40]. Unlike OSLM technique which is applied to real valued data and all overlapped symbols are considered, this technique is applied to combined real and complex valued data and it considers the overlapping in the most relevant symbols. It is seen that this proposed technique outperforms the OSLM technique. But the scheme attains
the PAPR performance similar to that of SLM scheme in OFDM system which is a drawback.

Aiming at decreasing PAPR in OFDM-OQAM systems, L.Kaiming et al. in [41] proposed pre-treated partial transmit sequence (P-PTS) scheme, which is based on a two-step optimization scheme. The first step uses multiple joint optimizations of the overlapping symbols where the phase rotation factor for current symbol is determined according to previous overlapped symbols. The second step uses a segmental PAPR reduction scheme based on PTS technique. The proposed scheme achieves better PAPR performance and a good trade-off is established between PAPR reduction and computational complexity.

An overlapped segmental clipping scheme for decreasing PAPR in OFDM-OQAM systems is cited by J.Wang et al. in [42]. Here the input signals are divided into a number of overlapped segments and then clipping operation is carried out on each segment. It is observed that the proposed scheme outperforms the conventional clipping scheme directly used in OFDM-OQAM systems and even performs much better than the conventional clipping scheme employed in an OFDM system. But most of the authors who developed the above described schemes for PAPR reduction in OFDM-OQAM systems did not consider the complexity issue into consideration.

Single carrier FDMA (SC-FDMA) system that utilizes single carrier modulation has similar performance and the equivalent complexity as that of OFDMA system. Like in OFDM systems, high PAPR is disadvantageous in SC-FDMA system which diminishes the efficiency of power amplifier. The inherent advantage of SC-FDMA is the lower PAPR achieved by it due to its single carrier structure. SC-FDMA transmits single carrier signal which has lower PAPR than that of OFDMA system which transmits multicarrier signal having higher PAPR. Also, SC-FDMA is a strong candidate for uplink transmission in the 4G LTE standard.

Many authors have proposed and developed suitable schemes to alleviate high PAPR in SC-FDMA systems. The influence of radio resource allocation and pulse shaping on PAPR of SC-FDMA signals is analyzed by G.Huang et al. in [43]. In this, the influence of radio resource allocation and pulse shaping is analyzed especially for Localized FDMA (LFDMA) and Distributed FDMA (DFDMA) algorithms. Assume that in a SC-FDMA system, there are $M$ DFT outputs to be allocated in a total $N$
number of subcarriers. In LFDMA algorithm, \( M \) successive outputs are filled and the remaining unused subcarriers are filled with zeroes. In DFDMA algorithm, \( M \) outputs are allocated over the entire range of \( N \) subcarriers alternatively and the rest are allocated with zeroes. It is observed that pulse shaped DFDMA algorithm attains lower PAPR compared to that of LFDMA algorithm.

H.G.Myung et al. in [44] discussed about the PAPR reduction of SC-FDMA signals using raised cosine pulse shaping. The authors analyzed three DFT spreading algorithms namely LFDMA, DFDMA and IFDMA. In Interleaved FDMA (IFDMA) algorithm, \( M \) outputs are filled over total of \( N \) number of subcarriers in equal intervals. It is inferred that IFDMA algorithm will have least PAPR, and next comes the DFDMA algorithm. LFDMA has higher PAPR because of the phase rotations that result from the choice of the roll-off factor and there by resulting in the variations in the output mean power.

An overview of the importance of SC-FDMA systems in decreasing PAPR is done in [45] by P.A.Thomas. The authors found that SC-FDMA system is very efficient in the uplink transmission of LTE. Compared to OFDMA, it can significantly reduce PAPR because of its single carrier structure. It is also used in various applications like interactive broad systems, aeronautical telemetry, land mobile satellite communication systems, etc.

A novel linear combination of Nyquist-I pulse shaping is proposed by N.A.Moghaddam and A.R.Sharafat in [46]. The PAPR performance of the proposed scheme is compared with that obtained from raised cosine and root raised cosine pulses. The PAPR is reduced significantly compared to that of the existing pulse shaping techniques. However, the complexity issue is not discussed in their work.

C.A.Azurdia-Meza et al. in [47] performed PAPR reduction in SC-FDMA by pulse shaping by making use of parametric linear combination pulses. Here, the authors developed a linear combination between two parametric linear pulses so as to obtain a new family of Nyquist pulses. The new pulse contains the required design parameters to minimize PAPR for a given roll-off factor and single carrier transmission scheme. The suggested pulse shaping filter has a simpler impulse response compared to that for the existing filters.
It is seen that the proposed optimum filter provides better PAPR reduction performance compared to the existing filters like raised cosine and root raised filters.

PAPR reduction of SC-FDMA signals using optimized additive pre-distortion is proposed by Kun Wu et al. in [48]. The main idea is to add a pre-distortion vector to the SC-FDMA signal to modify a few modulated symbols. The pre-distortion vector is optimized to minimize the in-band distortion and out-of-band- radiation. The proposed technique attains better and desired PAPR reduction for SC-FDMA systems compared to that of conventional methods.

The findings of some authors which motivated us in developing the efficient PAPR reduction algorithms are shown in Table 2.1.

Table 2.1 : Some important findings by the authors and the limitations

<table>
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<tr>
<th>S.No.</th>
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2.3. MOTIVATION

From the extensive literature survey that is carried out, one of the major technical challenges in OFDM, OFDM-OQAM and SC-FDMA transmissions is high PAPR of the signal transmitted. Lower PAPR increases the efficiency of power amplifiers thereby increasing the performance of the system. In addition to reducing PAPR, the total complexity of the system which is the sum of computational and searching complexities must be reduced.

In the literature survey, we discussed about various PAPR reduction techniques and their development. However many of the authors did not consider the PAPR reduction and complexity reduction at the same time. Even though some authors have considered them simultaneously, they could not achieve significant reduction in PAPR compared to the conventional methods. Some authors obtained reduction of computational complexity but the performance of suggested methods is same as that of the conventional methods.

The major problem of PAPR reduction along with complexity reduction motivated us to carry out the research work. In our work, focus is made on PAPR reduction as well as complexity reduction. The PAPR analysis and complexity analysis is carried out. The ultimate goal is to improve the performances of OFDM, OFDM-OQAM and SC-FDMA systems by alleviating high PAPR.

In the next section, we discuss briefly about the aims and objectives of carrying out the research work. The aims and objectives are the important initiatives in developing suitable techniques for achieving the ultimate goal.

2.4. OBJECTIVES

The objectives for carrying out the research work is first to reduce PAPR and total complexity of an OFDM system by employing optimized PTS technique with low complexity. Then in the second work, the reduction in PAPR and complexity of an OFDM-OQAM system is to be achieved by using low complexity modified alternative signal sequence with sequential optimization (MAS-S) algorithm. Also, in the third work, good PAPR reduction performance of an SC-FDMA system is to be obtained by employing Gaussian pulse shaping. The ultimate objective is to reduce
the PAPR of the given system and increase its efficiency. The performance of the system is also to be enhanced by decreasing the complexity.

As discussed in section 1.5, the problem definition requires that the PAPR should be reduced by developing suitable PAPR reduction algorithms. The main objective is to reduce PAPR and at the same time complexity.

In the next chapter, we focus on reducing PAPR in OFDM systems by developing optimized PTS scheme with reduced complexity.