# REVIEW OF UNIT COMMITMENT

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**ABSTRACT:- This paper reviews the unit commitment ,its problem formulation optimization of unit commitment . The daily on/off scheduling of the system's energy resources is known as unit commitment.In this paper several optimization methord is also discussed for the problem of unit commitment that is genetic algorithms, simulated annealing, particle swarm optimization,lagrangianrelaxtion etc.**

## I. INTRODUCTION

Every day regional electricity networks deliver hundreds of GWh of energy from generating units to consumers. Demand varies rather predictably throughout the day, but it can also fluctuate significantly in real time. To ensure that the system remains secure and that power is reliably delivered requires careful planning. The daily on/off scheduling of the system's energy resources is known as unit commitment. It is a large-scale optimization problem that determines the operating status of hundreds of generating units based on a set of complicated constraints. Due to the scale of the problem and the frequency at which it must be solved, unit commitment has become a major research area in the past few decades.Unit commitment (UC) aims to schedule the most cost-effective combination of generating units to meet forecasted load and reserve requirements, while adhering to generator and transmission constraints. Generally, UC is completed for a time horizon of one day to one week and determines which generators will be operating during which hours. This commitment schedule takes into account the inter-temporal parameters of each generator (minimum run time, minimum down time, notification time, etc.) but does not specify production levels, which are determined five minutes before delivery delivery. The determination of these levels is known as economic dispatch and it is "the least-cost usage of the committed assets during a single period to meet the demand". Genetic algorithm for solving unit commitment problem involves various steps. In order to obtain a good convergence and high precision solution, the parameter coding, fitness function, genetic operation such as crossover, mutation and convergence criteria are selected according to the characteristic of Unit Commitment problem.

## II. OPTIMIZATION

Unit commitment is a large-scale problem, often dealing with hundreds of generating units in a region, making it difficult to find the optimal solution in an acceptable amount of time. Several optimization methods are currently used and many more are being researched. A recent literature review identified nine of these methodologies: priority list method, dynamic programming, Lagrangian relaxation , genetic algorithms, simulated annealing, particle swarm optimization , tabu-search method, fuzzy logic algorithm, and evolutionary programming [9]. This list of approaches is not exhaustive and does not highlight that much of the present research includes a combination of methods. In this section the primary focus will be on the two approaches most used in the US markets: mixed integer programming (MIP) and Lagrangian relaxation (LR). In 1999, unit commitment was solved primarily by linear programming (LP) and Lagrangian relaxation, but due to approximations yielded suboptimal solutions. At the time, the use of mixed integer programming had been dismissed because of the unacceptable solving time.

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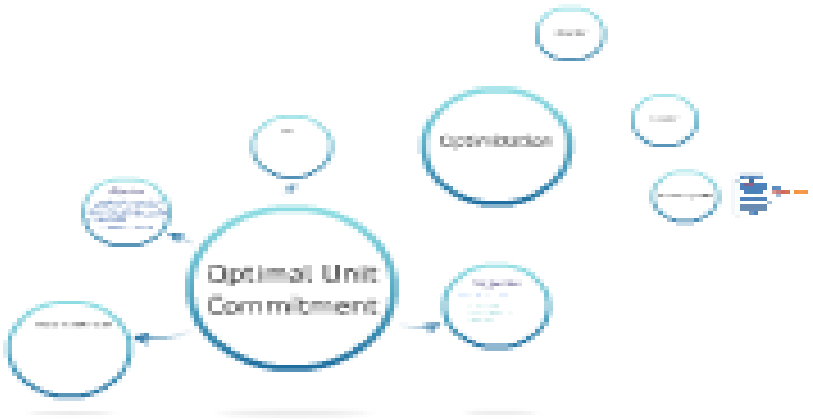
## III. MIXED INTEGER PROGRAMMING

To better understand the capabilities of mixed integer programming it is important to recognize that MIP is a special class of linear programming defines a linear programming problem as "the problem of allocating a number m of resources among 1,2,...,n activities in such a way as to maximize the worth from all the activities." In such a problem, all constraints and all relationships between decision variables and activities are linear. There are four implicit assumptions to the linear programming approach: proportionality, additivity, divisibility and certainty [10]. The. Momoh [10] assumption of divisibility states that decision variables do not have to be discrete values. Integer programming (IP) and mixed integer programming are the special cases in which all or some of the decision variables are discrete values. If the integer values can only be zero or one, as is the case in on/off scheduling, they are called binary decision variables. The three main approaches to solving LP problems are the graphical approach, variations of the simplex method and the approach.

Lagrangian Relaxation

In Lagrangian relaxation approaches, unit commitment problem is formulated in terms of 1) a cost function, that is the sum of terms each involving a single unit, 2) a set of constraints involving a single unit, and 3) a set of coupling constraints (the generation and reserve requirements), one for each hour in the study period, involving all units. Cohen and Sherkat have reported that an approximate solution to this problem can be obtained by adjoining the coupling constraints onto the cost of Lagrangian multipliers to form a Lagrangian dual function. The dual problem is using Lagrangian multipliers. The cost function (primal objective function)

of the unit commitment problem is relaxed to the power balance and the generating constraints via two sets then decoupled into small subproblems which are solved separately with the remaining constraints.




## IV. RESULT

Unit commitment (UC) aims to schedule the most cost-effective combination of generating units to meet forecasted load and reserve requirements, while adhering to generator and transmission constraints. Generally, UC is completed for a time horizon of one day to one week and determines which generators will be operating during which hours.

## V. CONCLUSION

Unit commitment is a process that receives inputs from and itself affects all stages of the power system (generation, transmission, market). The two main challenges of the UC optimization continue to be the large scale of the problem, which increases complexity, and determining a globally optimal solution, which would best satisfy the competitive markets. The current approach used in most of the US markets is currently mixed integer programming, but many researchers have been developing new methods that combine a variety of optimization techniques,

## REFERENCES

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