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Under Frequency Load Shedding by Considering Instantaneous Voltage and Priority of Loads

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***Abstract* – Load shedding is the latest and most expensive operation action in order to prevent the loss of voltage and frequency of electricity networks. In this paper LS (load shedding) is occurred by means of four-step frequency relays and five-step frequency and voltage relays which consider the importance of loads and their priority.**

***Index Terms* –under frequency load shedding, four step under frequency relays, priority of loads.**

I. Introduction

Nowadays, increasing the electrical demand causes the monumental detriments on power system, which necessitates the employment of demand side management strategies [1]. Load Shedding (LS) is the lasts operation applied in order to prevent a drop in frequency of power systems network. Really, when power electric consumption is larger than its production decreased in frequency occurs. In practice this Phenomenon Occurs when for some reason the network has lost some of its production at this time, the grid generation to consumption dropped. Due to the capacity of the generators and transmission lines on the network is limited the process of load shedding is started [2, 3]. One of the parameters by which can detect the fault is voltage profile .According to [4, 5], Voltage profile and power factor near the load that fault occurs there, Impressive affected. So voltage drop could have the same frequency as a measure for load shedding process. According to [6] Using data frequency relays (ROCOF) focuses on factors that are not usually considered as the deviation of the active power that affect the frequency gradient.

The importance of the time delay consideration and voltage profile between the operation of load shedding stages are:

The importance of voltage profiles discussed in some articles that they will be discussed briefly in this section. Reduction in active power, is often accompanied by a change reactive power that would affect their impact on the voltage profile. According to [7] Voltage instability at a local event, if it is ignored it can spread to other parts of the network and disrupt.

Another thing that the efficiency of operations of load shedding process once overshadowed the delay time between the operations of load shedding. This the time delay not only the collapse of frequencies in the shortest time possible prevent, but also allows the frequency range from its authorized some deviate [8]. If the delays are not considered true when the network on frequencies outside the nominal frequency longer works Leading to changes in network operating frequency generators and thus the amount of its authorized exits This leads to the output of the generator circuit-protection system corresponding to the (Cascading Event). If the time delay is considered very small, there will be the possibility of sighting frequency transient profiles [8], [9].

The method presented in this paper is based on under-frequency load shedding (UFLS). As proposed to [10] there is no specific pattern of regulation this relays and operations protection by adjustment of such relays to the size of the error and the distance to the fault location dependent, not an easy task [4]. In this paper, load shedding process done by two method (in conventional method by relay frequency four-stage) and by Frequency relays five-step in addition to frequency, voltage operation is considered as well as the importance for loads to improve recovery and reduce the amount of deterministic time-frequency grid will be conducted.

At the conventional method operation of load shedding occurs in 4 stage which details represent in Table III.

II. Simulation and Result

In this paper, for the simulation of the standard 39-bus network is used [8], [11] and [12]. The following is the dependency load voltage:

$$p = p_0[s_i.(\frac{v}{v_0})^{e_i^{pv}} + s_c.(\frac{v}{v_0})^{e_c^{pv}} + s_p.(\frac{v}{v_0})^{e_p^{pv}}] \quad (1)$$

$$Q = Q_0[s_i.(\frac{v}{v_0})^{e_i^{qv}} + s_c.(\frac{v}{v_0})^{e_c^{qv}} + s_p.(\frac{v}{v_0})^{e_p^{qv}}] \quad (2)$$

Where

v	Bus voltage
v_0	Bus voltage before occurring fault
S_i	Percentage of type of ith load
S_c	Percentage of type of cth load
S_p	Percentage of type of pth load
pv	Amount of active power dependency to voltage
qv	Amount of reactive power dependency to voltage