Enhanced Control of Power System by using Smart Grid and Possibility of Applying it in Iraq

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Abstract— the best control of power system very important for High quality energy. And the smart grid technology so need for Solve more problem about stability in electrical power system. In This paper present one problem in Iraqi electrical system it is unstable problem in electrical power system. And this problem Effected to control of power system and this problem effect to Economic of Iraq because more time happened the total shut Down in Iraqi electrical system. So by using Smart grid will do Enhance to control of power system. And check if can be Applicability the smart grid in Iraq.

Index Terms-- Power, Smart grid, systems, control, students conference on engineering and systems (SCES).

I. INTRODUCTION

Power systems are fundamentally reliant on control, communications, and computation for ensuring stable, reliable, efficient operations. Generators rely on governors and automatic voltage regulators (AVRs) to counter the effects of disturbances that continually buffet power systems, and many would quickly lose synchronism without the damping provided by power system stabilizers (PSSs). Flexible AC transmission system (FACTS) devices, such as static var compensators (SVCs) and high-voltage DC (HVDC) schemes, rely on feedback control to enhance system stability. At a higher level, energy management systems (EMSs) use supervisory control and data acquisition (SCADA) to collect data from expansive power systems and sophisticated analysis tools to establish secure, economic operating conditions. Automatic generation control (AGC) is a distributed closed-loop control scheme of continental proportions that optimally reschedules generator power set points to maintain frequency and tie-line flows at their specified values. [1]

II. IRAQ ELECTRICAL POWER SYSTEM PROBLEM

The Iraq electrical power system one electrical grid have (19)/ 400 KV bus bar and (27) 400 KV transmission line
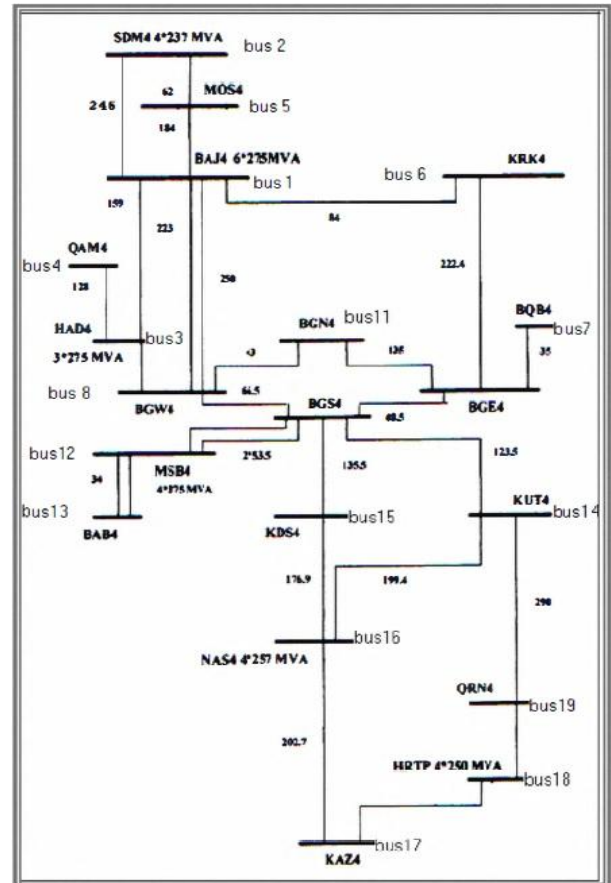

Fig. (1). IRAQ ELECTRICAL GRID [2]

The Iraqi electrical power system have big problem this it is unstable frequency the figure (2,3,4,5) showing one day state frequency curve is Y-axis frequency value and X-axis hour for one day .
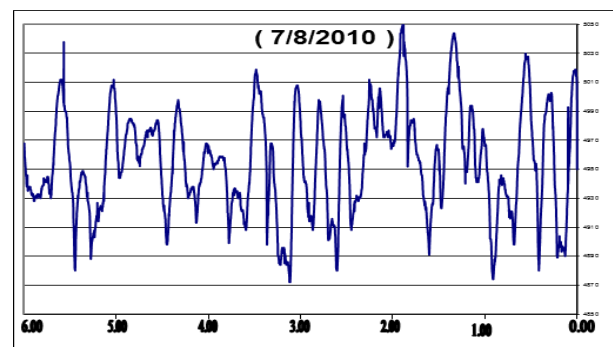

Fig. (2). Frequency state chart for six hour from (from 00:00 to 06:00)[3].
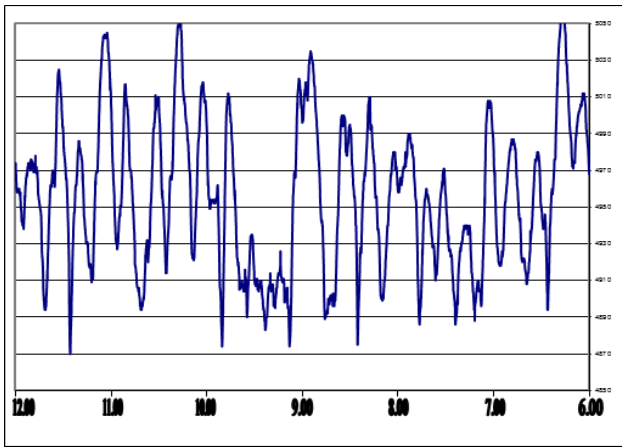
Fig. (3). Frequency state chart for six hour from (from 06:00 to 12:00)[3]
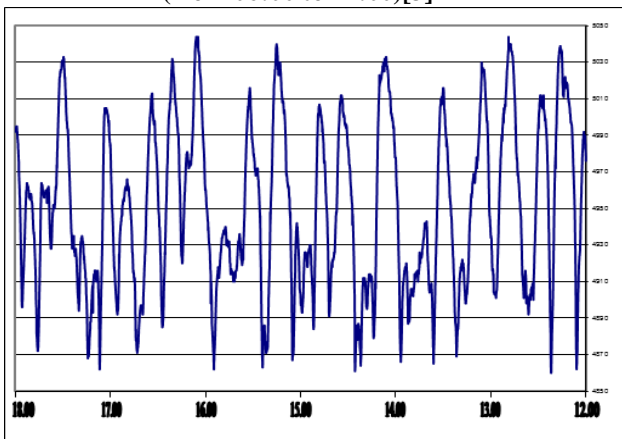

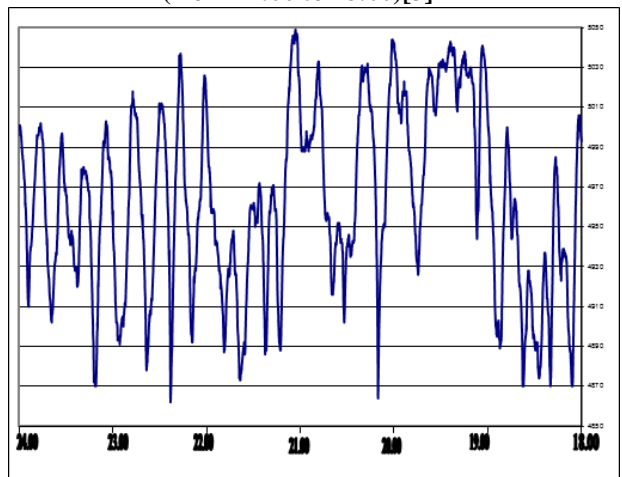**Fig. (4). Frequency state chart for six hour from (from 12:00 to 18:00)[3]**

Fig. (5). Frequency state chart for six hour from (from 18:00 to 24:00)[3]

In the above charts for one day frequency state for Iraqi electrical system (IES) it is showing the problem for this system the frequency unstable and this state for more days .

III. SMART GRID

The smart grid one technology very important for solve Iraq stability problem in electricity grid. Because the smart grid using high speed control and automatic control by using big central processor, this processor receiving Every data from all terminal of the power system and from all meter and all sensor by high speed bas data in fig (6, 7) showing the steps processing of smart grid technic.
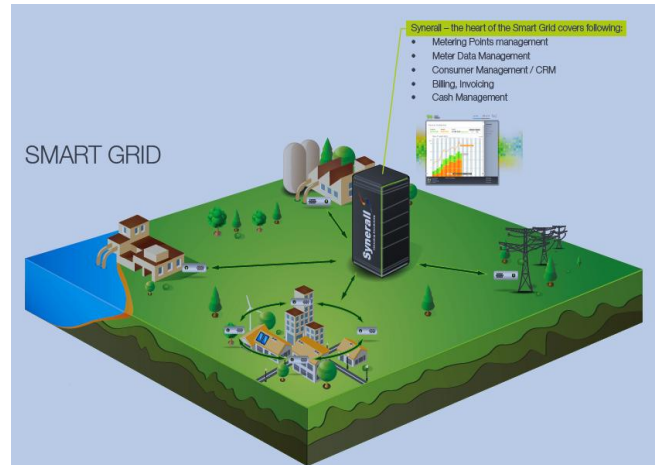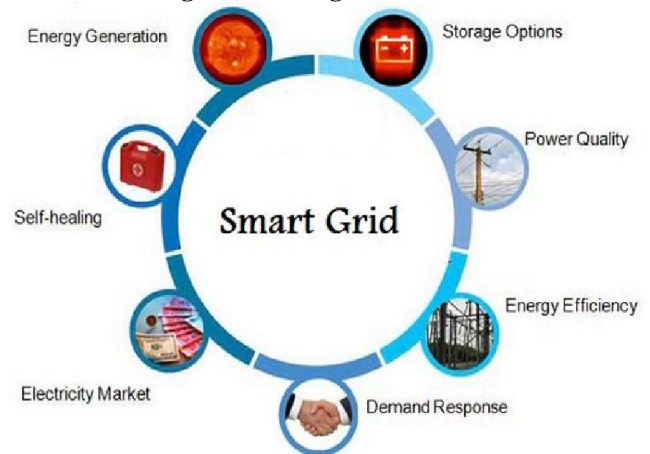

Fig . (6) Smart grid technic [4]

Fig. (7) Smart grid ring [4]

3.1. SMART GRID STANDARDS

It is important to note that smart grid standards will extend across the entire grid (i.e., need interoperability standards (top down) and building block standards (bottom up). As an example smart grid equipment standards will be Needed to handle information data management, Communications and control. As another example, flexible Smart grid system interoperability design and operational Standards will allow near term and long term smart grid Evolution. See Figure 4. To develop these standards, a Wide variety of experts are needed in a variety of Disciplines. Similarly, a number of standards developing Organizations will also need to be involved including those with a base of standards already supporting the current grid Infrastructure, and those with standards which can support The functional requirements of future applications. Development of a body of smart grid standards will be Evolutionary based on past, current, and future standards That will be technically and operationally practical, useful [5]

IV. POSSIBILITY OF APPLYING SMART GRID IN IRAQI ELECTRICITY SYSTEM

For application smart grid in any power system grid must be need many requirement for that so in below mention what the requirement for application the smart grid and also can be using in Iraq .

A. *smart grid requirement*

The table below shows the main requirement:-

Table no. (1). important Smart Grid (SG) requirements [6]

Smart Grid requirements
Meter Read
Direct load control
Service Switch
PHEV
System updates
Distributed GEN
Distributed Storage
Outage Events
Tamper Events
Meter Events
Demand Response
Pre-Pay Metering
Field Force tools
Distribution automation support
Transmission automation support
Pricing TOU / RTP/ CPP
Configuration mgmt
Accounting Mgmt
Performance Mgmt
Security mgmt.
Fault mgmt.
Volt/VAR Management

And also below the table very important requirements for applicability to SG

B. *state of Iraqi electricity system*

The table below shows the state of Iraq power system with possibility application smart grid:-

Table no. (2) Check Iraqi electricity system with requirements of SG.

Smart Grid requirements	Iraqi electricity system state
1- Meter Read	yes=1
2- Direct load control	no=0
3-Service Switch	yes=1
4-PHEV	no=0
5-System updates	yes=0
6-Distributed GEN	yes=1
7-Distributed Storage	no=0
8-Outage Events	yes=1
9-Tamper Events	no=0
10-Meter Events	no=0
11-Demand Response	no=0
12-Pre-Pay Metering	no=0
13-Field Force tools	no=0
14-Distribution automation support	no=0
20-Transmission automation support	no=0
23-Pricing TOU / RTP/ CPP	no=0
24-Configuration mgmt	yes=1
25-Accounting Mgmt	yes=1
26-Performance Mgmt	yes=1
27-Security mgmt.	yes=1
28-Fault mgmt.	yes=1
29-Volt/VAR Management	yes=1
Total requirements = 29	positive Total mark (yes=10)

V. THE POSSIBILITY OF APPLYING IT SG IN IRAQ

By the equation below clearing the Idea:-

P.A.SG.R = POSSIBILITY. APPLYING. SMART GRID. RATE

$\mathbb{C}$ = P.A.SG.R

$\mathbb{C}$ = TOTAL REQUIREMENTS − POSITIVE TOTAL MARK ⁄ TOTAL REQUIREMENTS

$\mathbb{C}$ = (29-10/29) * 100%= 65.517 %

Then:-

$\mathbb{C}$ = 65.517 %

VI. CONCLUSION

The Smart Grid technic so important for enhanced the stability of power system by supporting control of power system. Iraqi electricity system very needed the applying Smart Grid technic for solve unstability problem by increasing the controllability on each elements in the power system. And the possibility of Applying the Smart Grid in Iraqi electricity system it is

The $\mathbb{C}$ = 65.517 % and this rate acceptable rate and can be increasing by preparing every Smart Grid requirements.

ACKNOWLEDGMENT

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AUTHORS PROFILE

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