Proposed Composite Location ID Code Needed for Asset management of Electric Distribution Networks

Ahmad M. Alkandari, Bader A Alkandari
College of technological Studies, PAAET, Kuwait
{alkandari1,alkandarib}@yahoo.com

Ayman Ahmad Sami[1], Ahmed Sami[2]
[1] Senior GIS Analyst Engineer, Openware
[2] Egyptian Electric Utility Regulatory Agency

Abstract— The absence of as built GIS map for low voltage (LV) electric network due to a very limited freeze period compared with the case of medium voltage (MV) electric network ,accordingly the location ID needed for asset management cannot be expressed purely spatial but the LV network topology should be incorporated with the spatial location ID of the related topologically MV network. As the LV network topology has a standard data model and generic naming conventions , accordingly the needed topological code can be created directly for each LV network elements and then the composite location ID can be identified simply for each element of electric network . The proposed approach is illustrated via selected case study.

***Index Terms*— LV network (end user network), spatial, topological parent and sons link, naming conventions, asset management, location ID**

I. Introduction

Asset management is a structured program to optimize the life-cycle value of the physical assets by reducing the cost of ownership, while providing the required level of service . The objective of an asset management system is to minimize the long-term cost of owning, operating, maintaining, and replacing the asset while ensuring reliable and uninterrupted delivery of quality service . The importance of GIS for efficient execution of asset management processes should be considered intensively during the planning process such as the evaluating and recording the kind, location, status and performance of the assets of distribution system , implementing the plans of planning maintenance, rehabilitation, renewal, repair and depreciation within distribution system , developing , implementing and improving the plans for simulating incidents and failures that might occur and the manner to deal with them . The location ID helps in building a timely response mechanism to address the issues of repair, recovery and replacement of these assets.

II. Proposed Composite Location ID Code

The absence of as built GIS map for the low voltage (LV) network due to very limited freeze period ,accordingly the location ID needed for asset management cannot be expressed purely spatial but the network topology should be incorporated with the spatial location ID of the related topologically network. As the network topology has a standard data model and generic naming conventions accordingly the needed topological code can be created directly for each network elements and then the composite location ID can identified simply for each element of electric distribution network .

a.1. The spatial location ID code consists of the following four parts : Utility code - Province code - City code – District or village code

a.2.The topological code consists of the following seven parts: Substation code - Distributer code - Kiosk or pole mounted transformer code - Main switch fuse box code - Sub-main switch fuse box code - Customer switch fuse box code - Customer meter code

III. Illustrative Example for Electric Network Proposed Composite Location ID Code

A single line diagram shown in Figure composed of five medium voltage cells. It shows two incoming cells, two outgoing cells, and one bus tie cell. Each cell is controlled and protected by one medium voltage circuit breaker and two isolating switches. The spatial location ID shown in TABLE I provides the operator with the illustrative specific location of each element of the concerned network starting from the electric distribution company to the concerned element i.e., distribution board, in each cell, etc. Each of the geographic areas or sites or department belonging to the concerned electric network are shown in TABLE II provided with the code of each.

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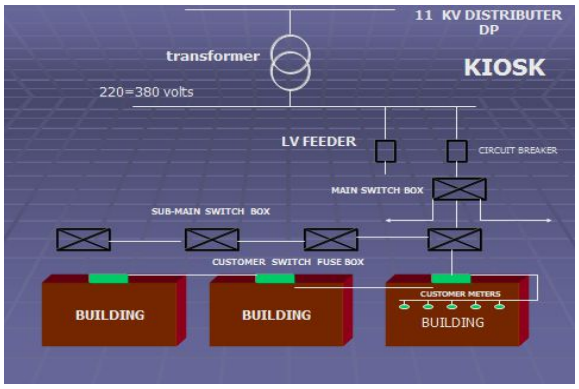


Fig. 1. LV Schematic Diagram

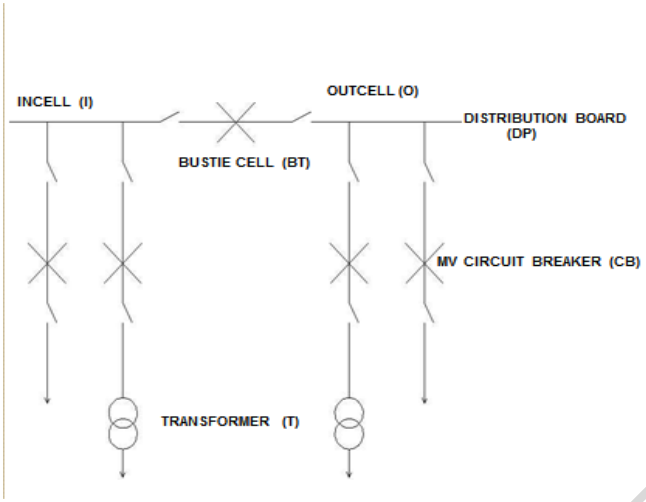


Fig. 2. LV Schematic Diagram

TABLE I. LIST F ABBREVIATIONS AND SYMBOLS

Name	Code
Electricity Distribution company	6
governorate	1
2nd district	02

Abbrev.	Meaning
SS	Transformer substation
DP	Distribution board
I	In cell
CB	Circuit breaker
O	Out cell
BT	Bus tie cell
A	Auxiliary Tr.- Out cell
T	Transformer
	Low voltage cell
CH	Charger
BA	Batteries
DC	DC current cell
LA	Lighting arrestor
E	Earthing
K	Kiosk
RM	RMU
BS	Load break switch
RT	RTU
OT	Oil transformer
DT	Dry transformer

Abbrev.	Meaning
SW	Switch box
M	Customer meter
C	Shunt capacitor
L	Lighting feeder
11KOH	Overhead line 11K
.4KOH	Overhead line .4K
11KUG	Underground cable
.4KUG	Underground cable
SP	Galvanized steel pole
PC	Photo cell
GL	Gas lamp
CC	Chock coil
XL	XLPE insulator
PV	PVC insulator
CJ	Cable joint
CU	Copper
	Aluminum
MU	Multi cores
SI	Single core
AR	Armoring

TABLE II. ITEM S AND LOCATION ID

No.	Item Name	Location ID
1	Distribution Board	6/1/02/DP05
2	In Cell	6/1/02/DP05/|1
3	MV Ciruit Breaker	6/1/02/DP05/|1/CB1
4	Out Cell	6/1/02/DP05/O1
5	MV Circuit Breaker	6/1/02/DP05/O1/CB1
6	Bus Tie Cell	6/1/02/DP05/BT1
7	MV Circuit Breaker	6/1/02/DP05/BT1/CB1
8	Low Voltage Cell	6/1/02/DP05/A1/LV1
9	Kiosk	6/1/02/DP05/O1/K1
10	Customer Meter: • Type (Mechanical-Digital-Prepaid-Smart) • Single/Three Phase	6/1/02/DP05/O1/K1/LV1/O1/SW01/M105

IV. CONCLUSION

In this paper the proposed composite location ID is applied for electric distribution medium and low voltage network where the spatial geographic map for medium voltage network is adjoined with topological information for low voltage network to generate the composite location ID for all elements of distribution network .The asset management for electric distribution network can be executed efficiently using the proposed composite location ID in case of the absence of as built GIS map for low voltage (LV) electric network due to a very limited freeze period compared with the case of medium voltage (MV) electric network.

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