

METER READING AND MANAGEMENT SYSTEM

1. STRUCTURE OF DATA COLLECTION SYSTEM

According to the procedure for internal business operation of EVN, the process of distributing boundary meters (delivery/ receiving meter) amongst Power Generation Companies (GenCo), Transmission Companies (TransCo), Distribution Companies (DisCo), and Customers (including major customers who connect directly into the transmission network, commercial and industrial customers, and households) is described in the below Figure 1-1:

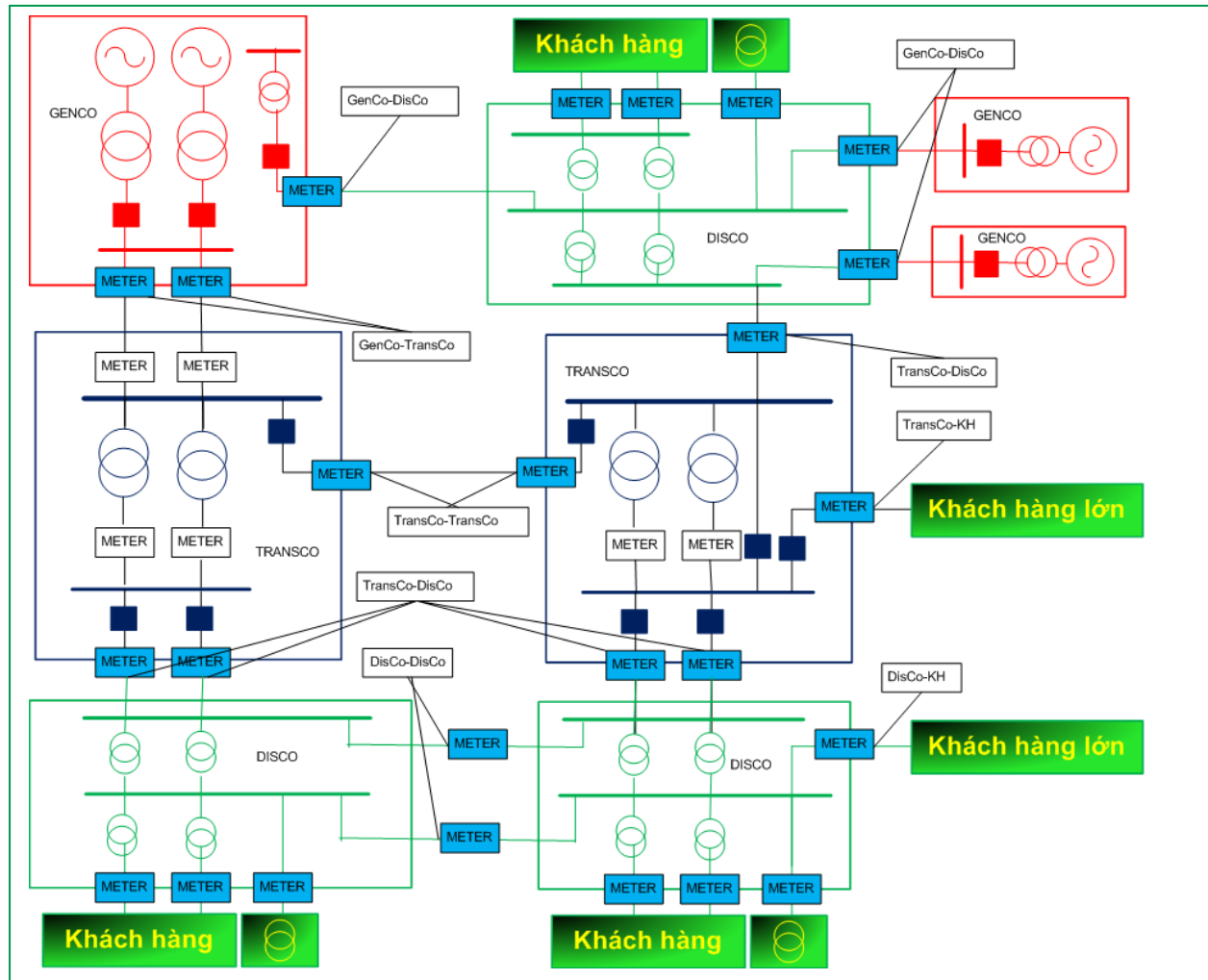


Figure 1-1: Layout Rule for Boundary Meters in Power System Operation

The current process of collecting metering data for the management of EVN’s business operation is mainly done by persons manually and periodically at power delivery points. This process is quite costly and from which we are unable to obtain data between two reading periods for applications despite the fact that many organizations have invested in smart meters which can provide all necessary data with real-time access.

At the present, the existing electronic meters in EVN’s power network include A1700 (ELSTER/ABB-UK), ZMD400 (Landis+Gyr-Switzerland), Nexus 1262 (EIG-USA), and mK6 (EDMI-Singapore), of which A1700 accounts for 80% of the total. The reason for using A1700 is that EVN depends on the proprietary softwares named DataLink and PMU provided by ELSTER. Power companies within EVN has deployed some methods for remote meter reading via telephone Modem and GSM using the software DataLink through a serial port (RS232/RS485). However, the results achieved are quite limited and lack the ability for widespread application due to its high cost and low reliability.

With a broad experience in the field of power system data collection and processing, ATS Company has proposed a solution for collecting data, which is described in Figure 1-2.

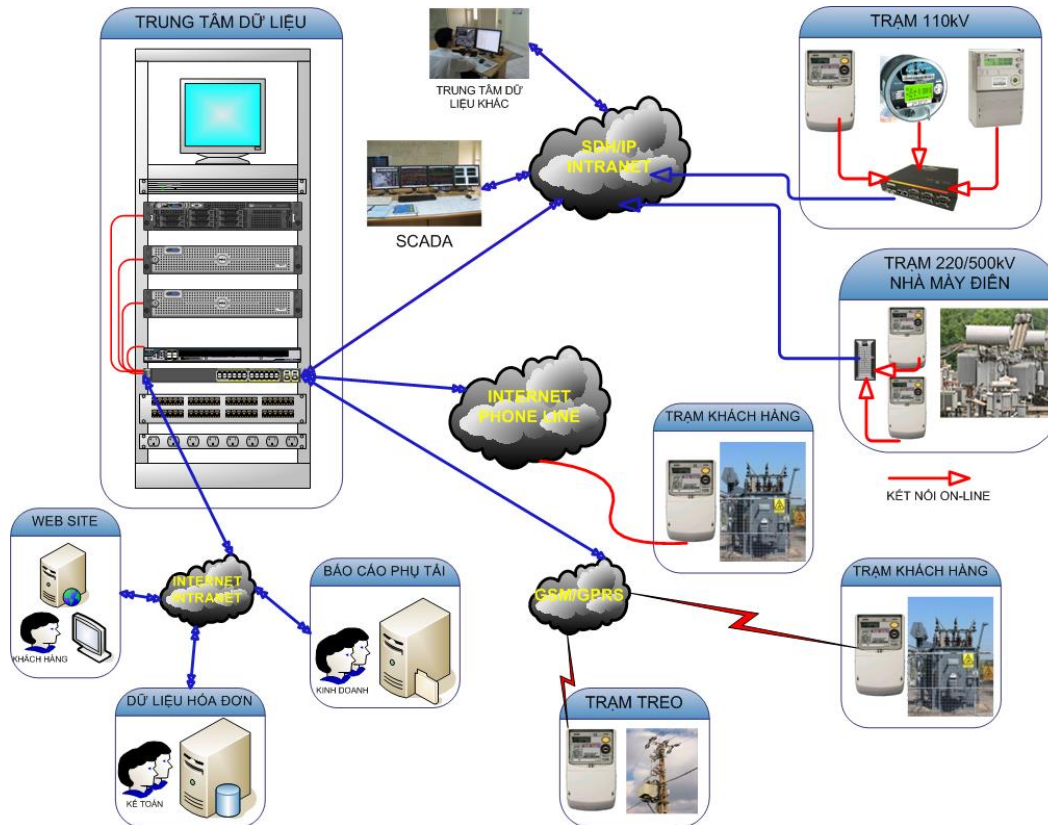


Figure 1-2: Communication solutions for Collecting Data from Meters

The basic solutions include:

For substations or locations which have WAN/LAN/Internet network:

- Direct connection through a Terminal Server:
Meters at these locations are centrally connected to a terminal server via RS232/RS485/ Ethernet; the data collection system will directly access these meters through various different communication network such as SDH (E1/T1)/IP/FR/TDM. Metering Data and Alarm of the meters are collected in a cycle updated every 5 seconds, and the direct access to the meters are made in accordance with the authority of the individual user/group of users with different levels of password.
- Indirect connection through a Data Concentrator:
The main feature of this solution is that all meters will be connected to a device that centralizes and processes data. This device packages all data and returns them to the centre via a Wide Area Network (WAN) or other information transmission method appropriate for the locations of installation.

For substations that do not have connection to a WAN/IP/Internet network:

- Connection via the mobile information network GSM/CDMA using GPRS service:
Meters are connected directly or via gateway device to GPRS modem to perform online access and to retrieve all metering and alarm data as well as event logs. The advantage of this solution is that payments are only made on the data amount without requiring connection fees. ATS has tested this system, and the results have shown that with a 1 minute of interval time, the charge for a data collection location is approximately 25,000 VND/month depending on the package of the provider. Another advantage of this solution is that it can be deployed in a short time since there is no need to create a separate network or deploy telephone cables to the locations of meters. With the use of GPRS service on the platform of GSM network, we can performs metering and monitoring operations at pillar substations to obtain better solutions for the management of overload, cos ϕ , technical loss

and non-technical loss of branches and loads. This solution is especially useful when power companies need to monitor large loads in reducing non-technical loss.

- Connection through normal telephone and mobile GSM/CDMA networks using the method of direct dialing:

In cases where there are areas that do not have mobile coverage with GPRS services, meters are connected using the normal dialing method. However, with the solution of connecting via WAN/IP/Internet/GPRS network as is described above, approximately 95% of the current meters that need EVN's monitoring can be connected directly in an effective manner with its data being collected in real-time.

At the present, ATS can connect with all types of electronic meters in current use in EVN's power network.

2. SOFTWARE STRUCTURE

Nowadays, the electrical power industry are facing with an increasing demand for better power quality and distribution service quality from the consumers and the society. In addition, due to the aim of reducing power loss and improving operation efficiency, there is also a need for a modern management system for the power business operation, which are to include collection, processing, and storing processes as well as advanced applications. ATS has successfully researched and developed a Meter Reading and Management System based on the approach of an advanced metering infrastructure (AMI). The system is devoped for the below objectives:

- This is a telemetry system with management softwares appropriate for the current metering system of the power industry, complying to the regulations on power business operation, and meeting emerging demands when the Competitive Power Market becomes fully operational in 2010-2011.
- To collect data in real-time directly, the Meter Reading System can connect to the meters currently used in EVN's network system through various different communication channels.
- The management and application software system has the capability for a two-way communication with the current business management systems of power companies, the ability to provide data to business management systems of various levels (such as the SCADA systems), and the ability to provide data and information access service in real-time to registered customers through a Web interface.

To meet the above objectives, based on the development direction for the architecture of metering data management systems and dispatch centres in Vietnam's power system, and in reviewing the current trend and IEC 61986 standard for data and information standardization in the power industry, ATS has designed the structure of the Integrated Metering Information System @IMIS as is shown in the below Figure 2-1.

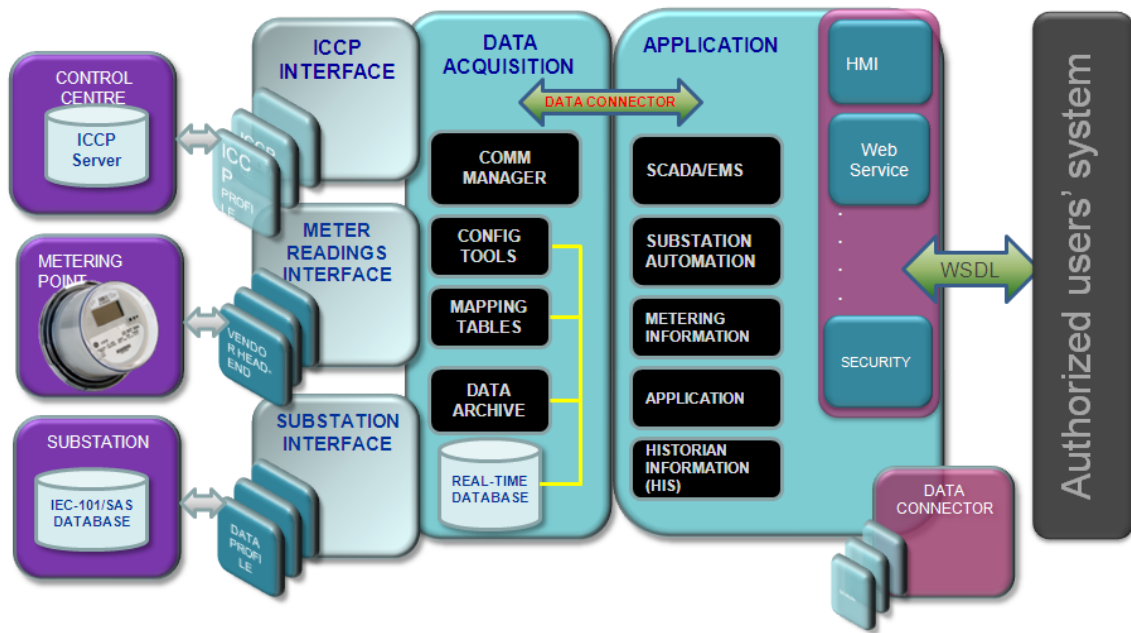


Figure 2-1: Structure of the Integrated Metering Information System

The basic modules of the software system include:

- Metering data collection and communication management module
- Report-generation module
- Meter system and asset management module
- Human-machine interface module
- Other systems interface module
- Data accuracy verification module (Validation, Edit, Estimate – VEE)
- Historical data management system
- Load study and monitoring module
- Customer and asset management on data map module (GIS)
- Web services and Real-time portal

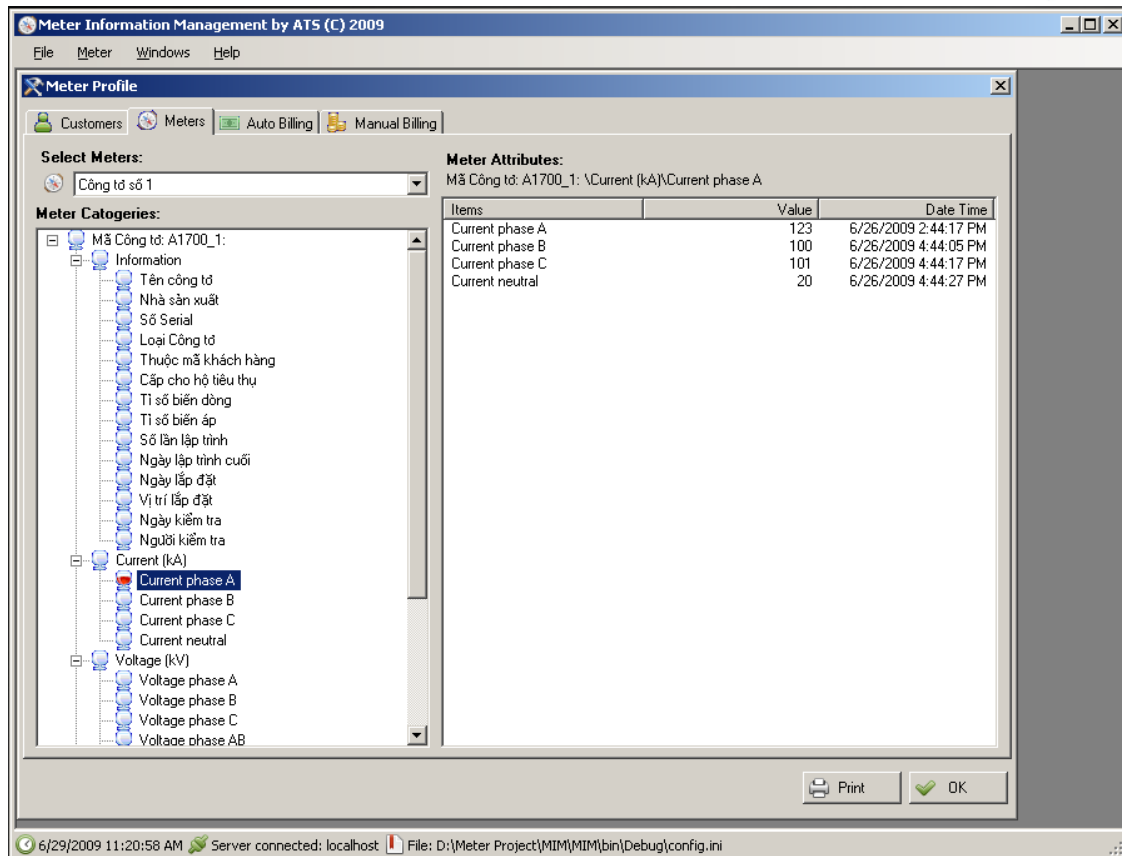


Figure 2-2: Meter Information Management Software developed by ATS

The above figure shows the data from an A1700 meter updated in real-time via GPRS service as well as related management data.

3. ADVANTAGES OF @IMIS SYSTEM

- Metering/Alarm data is collected in real-time, serving various applications of various users during the business operation management of the power industry. Data is centrally processed and distributed to different applications in compliance with IEC standards and the Common Information Model (CIM), making metering data available to different function groups and users in EVN as well as to customers and involved regulatory authorities.
- The Historical Information System (HIS) is a special type of database used for the storing and management of data obtained from continuous-process operation over time, particularly suitable for the power system and the storing of metering data. Even the operators cannot modify these data once they are entered into the system, thus this database can be used in auditing and handling disputes.
- Providing multiple services on the same communication channel, thus optimizing the use of the channel capacity based on the existing telecommunication infrastructure. Can be used to coordinate different programs to effectively manage power utilization, discharge remote load in DSM programs, monitor power failure, monitor loads, and control mobile capacitor banks, etc.
- Compatible with various types of communication channel, such as: DDS, T1/E1, IP, FR, TDM, and GSM. Complying with security standards on information transmission and communication within the power system, such as NERC/CIP. The solution based on GPRS service can be deployed at a greater speed, lower cost, and higher reliability compared to the method of dial-up via GSM or telephone line.

- Has a highly open structure and is independent of meter manufacturers, communication protocols, and providers of communication services. Capable of reading all types of meters without constraint and of resolving the issue of dependence on ABB's DataLink and PMU softwares.
- Suitable for the current utilization demand, habits, and skills of business staffs in power companies. Maintenance and service upgrades meeting regulation changes for power operation and business process will be conducted precisely and speedily by a team of experts who have years of experience working with Vietnam power industry.

Tran Anh Thai

Email: thaita@ats.com.vn

Cell Phone: 0913201168

Website: www.ats.com.vn