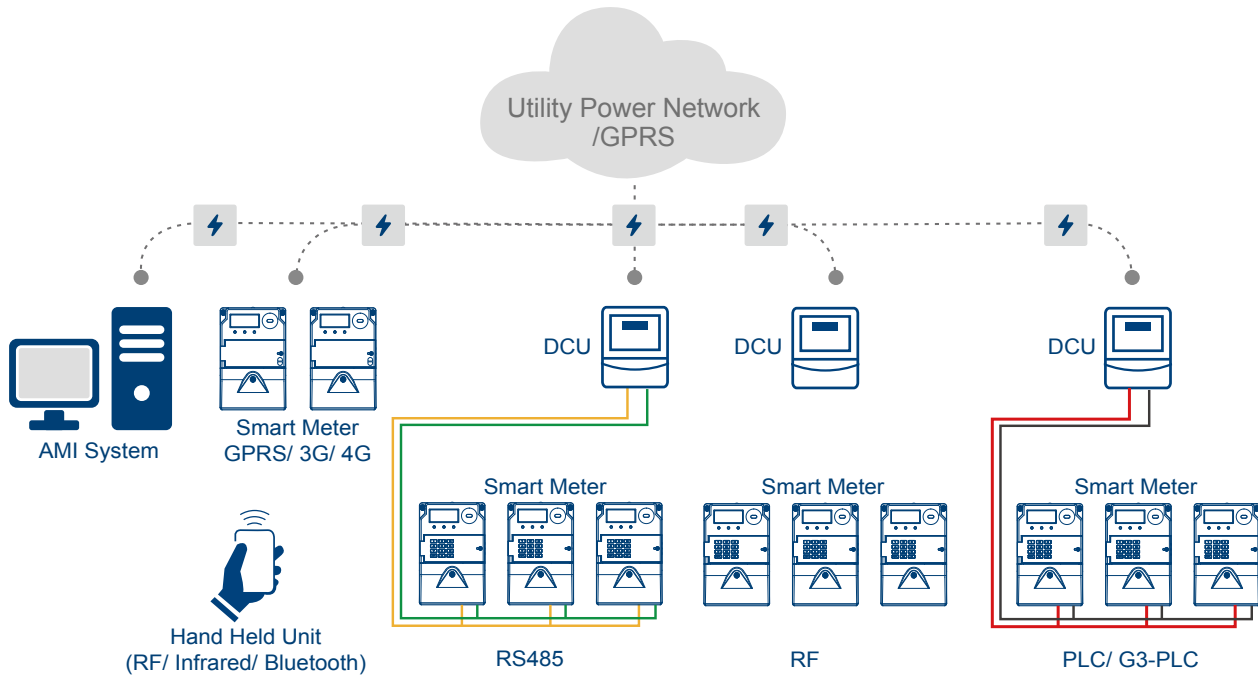# SmartAMI Solution
## (Smart Advanced Metering Infrastructure)

● AMI Solution

AMI is an integrated system of energy data acquisition HES (Head-End System) and energy data management MDM (Metering Data Management) system; when combined with smart metering device, they can form a comprehensive network and system of energy data. HES can realize automatic measurement and acquisition of energy data; and MDM can realize data verification, storage, analysis and application. Based on GIS map informa-tion, it provides archives of grid devices and electricity users, forming integrated data model covering from substations, feeder lines, transformers and electricity users, achieving data collection from metering devices in supply side, distribution side and vending side. It is a powerful information backup for load control, prepayment, power outage management, power quality management, line loss management and customer service.

AMI Solution helps to measure and visualize energy data information, which will greatly accelerate utility's operation mechanism and management workflow. Through AMI Solution, utility can establish a universal communication infrastructure and information integration system for more advanced application in the future, which will lead the electricity industry and grid network into a more smart direction. In the meantime, AMI Solution can work collectively with other fields in utility to improve the reliability of energy supply, closely connecting energy users with utility, continuously making progress regarding customer service.

SmartAMI Solution
(Smart Advanced Metering Infrastructure)

● AMI Workflow

| Establish | ➡ | Metering | ➡ | Validation | Estimation | Edit | ➡ | Storage | ➡ | Analysis |
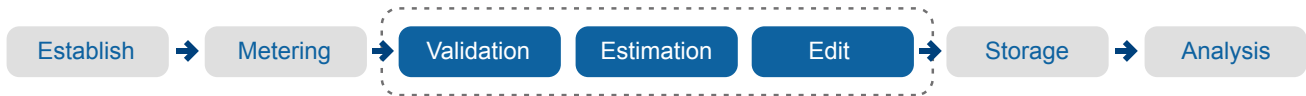
Establish: Establish user file in AMI system

Standardized User File Structure：According to the "Substation - Feeder Line –Transformer - Energy User" structure to establish complete power topology and energy user files, supporting one user with multiple meters. It establishes a basic model for line loss calculation and data analysis.

Metering: Include task-based automatic data collection and automatic re-collection

Task-based Automatic Data Collection Mechanism: Support collection by DCU or GPRS or multiple modes, stipulate correspondent reading tasks as per reading standards of various meters to realize automatic data collection.
Automatic missing data recollection Mechanism: Support automatic missing data recollection or manual recollection through hand held unit.

VEE: Validation, Estimation, Edit

Validation: Check collected data from meters to see if they are correct or not. "Validity check "is also called "plausibility check". Validity check is usually done on energy data (Watt-hour and VAR-hour) but seldom on instantaneous data such as current, voltage, frequency, power and so on. It can be done in real-time (checking data immediately after reading and before storing in data base); and validity check can be done on existing data (data collected from meters) also.
Estimation：When reading a meter, sometimes some data might not be able to be read due to communication problem. We call such situation "missing values". In this case, VEE module can estimate missing values and store these estimated values in data base.
Edit：Edit data in data base that are read from meters. VEE gives operator accessibility to edit and change values of data in data base. User can change values of parameters one by one or in bulk.

Storage: Save the validation results and the original data into the database

The original data：The data collected from meters or concentrator by AMI System.
The validation results：The data results from VEE, including the validation results, the estimated data and the edited data

Analysis: Analysis and statistics of the collected data

Outage events: A comprehensive blackout event report will be generated based on actual outage events, power restoration events. The report includes details such as outage time, restoration time, outage hours. Furthermore, energy users will be notified by receiving messages sending out automatically from SMS.
Power quality: Including voltage qualification rate, three phase unbalance rate, harmonic analysis, etc.
Meticulous management of Line Loss: Including both daily and monthly information of partial pressure line loss, partial line loss, sub-line line loss and sub-transformer line loss.
Load rate statistics: Can calculate the load rate of the transformer according to the established formula. Can detect overloaded transformers.

Others:

Distributed Processing Mechanism：Head-End Server uses distributed processing mechanism, Real-time processing batch data, the efficiency of processing is well guaranteed.
IEC61968 standard interface: Using IEC61968 international standard interface makes AMI system can be integrated with other manufacturers' MDM or HES systems.

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