Advanced Metering Infrastructure (AMI)

Different Situations, Different Requirements?

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- History of Meter Reading
- AMI
- AMI Functional Specification
History of Meter Reading
Evolution of Meter Reading: 0G $\Rightarrow$ 1G $\Rightarrow$ 2G $\Rightarrow$ 3G

- No metering (No meter reading)
- Manual Reading
- Off-site Meter Reading (OMR)
- Automated Meter Reading (AMR)
Basic Components for AMR

Meter
- Metrology
- Measurement
- Event/Alarm
- Configuration

Meter Interface Unit
- Communication Path
- Event/Alarm
- Configuration

Public Network

LAN

WAN

S/W

- Collection
- Processing
- Presentation
- Storage
- Integration
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AMI
AMI, Eve’s Diary?

AMR
Automated
Meter Reading

AMI
Advanced Metering Infrastructure

AMM
Advanced Metering Management

Smart Metering
Definitions of AMI

Federal Energy Regulatory Commission, USA

The full measurement and collection system. Full measurement and collection system includes customer meters, communication networks and data management system.

Ministry of Energy, Ontario, Canada

It includes the meter, AMCD, LAN, AMRC, AMCC, WAN and related hardware, software and connectivity required for a fully functioning system that complies with this Specification. With some technologies, an AMI does not include AMRCs. An AMI does not include the MDM/R.

Department of Primary Industries, Victoria, Australia

AMI means the infrastructure associated with the installation and operation of electricity metering and communications including interval meters designed to transmit data to and receive data from a remote locality;

Advanced Metering Management, OFGEM, UK

This describes metering arrangements that have two way communications between a meter and the data collector (electricity) or supplier (gas).
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AMI Configuration - I

Advanced Metering Infrastructure (AMI)

Communications Device (*)

Meters

LAN

Regional Collector

WAN

Control Computer

MDM/R Functions

Monitors And Displays

Customer Information & Billing Systems

Retailers, Energy Service Companies

Third Parties

(WAN)

(WAN)

(Source: Ministry of Energy, Ontario, Canada)
From AMR to AMI in Smart Grid

- Remote/Automated meter reading
- Tamper detection

- 2-way communication
- Smart Meter
- Demand response
- Remote supply control
- HAN interface
- PQ monitoring

- Microgeneration monitoring (import/export)
- Energy storage management
- PHEV charging/discharging management
AMI
Functional Specification
National/Provincial Standard

- Ontario, Canada – Functional Specification for an AMI v2 (Jul. 07)
- Victoria, Australia – Minimum AMI Functionality Specification (Oct. 07)
- Netherlands – NTA 8130 (e) (Aug. 07), DSMR
- SINTEF, Norway – Requirement specification for full-scale development of Advanced Metering and Management Systems (AMS) (two-way communication) (Oct. 08)
- Eskom, South Africa – AMI for residential and commercial customers - NRS049 (08)
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AMI Main Function

- HAN Interface
- Security (Network, Data)
- Remote Comm.
- Remote F/W Upgrade
- Time Synch
- Dis-/Re-connect
- Load Control
- Load Limiting
- Prepayment
- Power Quality
- Outage Monitoring
- Consumption
- Tampering Detection
- Alarm/Event
## Functions for Whom?

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<th>Customer</th>
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<td>Pay as you go!</td>
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HAN Interface

Purpose: Mainly to provide energy information

HAN device: IHD, CIU, UIU

Standardization: Korea, Saudi Arabia, Netherland, UK, Norway, Sweden

Considerations

- Who will pay for the HAN device? (ownership, maintenance ...)
- Which information should be provided?
- At what interval?
- Are your customers ready?
The Blue Marble

(Image source: NASA)
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Thank you