Smart metering systems

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Agenda

1. Smart Static Meter technologies
2. Communication technologies
3. Case studies
4. Q&A
Smart Static Meter Technologies
Smart Residential Static Meter - Electro-magnetic Principle

Michael Faraday (1791 – 1867): English chemist and physicist

- magnetic field (B)
- water flow
- force

Emf = Bvd

rectangular measurement section
Smart Residential Static Meter – Full Life Time Value

- R800 metrology across all sizes (DN15-40)
- Linear accuracy and very low starting flow at around 1 l/h
- Every drop of water is counted - captures all volumes even at lowest flow rates
- Unchanged metrology curve during its whole life time
- 15 years battery life
Smart Residential Static Meter – Resistant to any water type

Sensus has tested iPERL extensively to withstand a variety of water conditions

- Bio slime
- Lime scale
- Fertilizers
- Sand particles
- Extensive testing over more than 2 years
- No impact on metrology

iPERL can deal with air/water mixtures

- Magnetic inductive technology counts (water) ions instead of measuring speed (of sound)
Smart C&I Static Meter – Key Features

- Unparalleled measurement accuracy irrespective of water quality or contamination
- R1000 turndown ratio means precision is maintained irrespective of water flow variation
- 20 year lifetime with consistent fault-free accuracy throughout
- U00D0 capability for simpler installation
- 12l/h starting flow detection permits even the smallest consumption to be detected
- Flat parabolic fin (FPF) technology ensures all the water flowing through the meter is measured
- 128-bit AES cryptography on all data transmissions for strong security
Communication Technologies
Data Collection Segments

Product Type
- Systems

Collection Method
- Mobile Reading
  - Walk-by
  - Drive-by
- Fixed Network
  - Radio/Wireless
  - Wired
Meter Data Communications: Radio (Metering and Monitoring Data)

Bidirectional with LAT*

1. Request
2. Request to iPERL
3. Extended data from iPERL

BUP via Bluetooth

SIRT lined via Bluetooth with handheld device

*LAT: Local Area Transmission
Radio Modules for Water Meters

Clip-on Module

Integrated Radio Module with electronic display
### Types of Metering & Monitoring Data Available via Radio

<table>
<thead>
<tr>
<th>BUP data</th>
<th>SEMI data</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Meter ID</td>
<td>• Meter type</td>
</tr>
<tr>
<td>• Meter Index</td>
<td>• Current flow</td>
</tr>
<tr>
<td>• Alarm flags</td>
<td>• Min/Max flow value and time</td>
</tr>
<tr>
<td>• Signal level*</td>
<td>• Backward volume</td>
</tr>
<tr>
<td>• Time stamp*</td>
<td>• Leak start/end</td>
</tr>
<tr>
<td></td>
<td>• Magnet tamper start/end</td>
</tr>
<tr>
<td></td>
<td>• Backflow start/end</td>
</tr>
<tr>
<td></td>
<td>• Broken pipe start/end</td>
</tr>
<tr>
<td>*via receiving device</td>
<td>• BUP interval</td>
</tr>
<tr>
<td></td>
<td>• LAT interval</td>
</tr>
<tr>
<td></td>
<td>• OMS status</td>
</tr>
<tr>
<td></td>
<td>• OMS interval</td>
</tr>
<tr>
<td></td>
<td>• Data logger settings</td>
</tr>
<tr>
<td></td>
<td>• Alarm activation</td>
</tr>
<tr>
<td></td>
<td>• Broken pipe detection parameters</td>
</tr>
<tr>
<td></td>
<td>• Remaining battery</td>
</tr>
<tr>
<td></td>
<td>• Time since low battery detected</td>
</tr>
<tr>
<td></td>
<td>• Data logger information</td>
</tr>
<tr>
<td></td>
<td>(historical data of 2-13 chosen data parameters)</td>
</tr>
</tbody>
</table>

*Data logger information is available via receiving device.
Data Collection Segments

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  - Drive-by
- Fixed Network
  - Radio/Wireless
  - Wired
SensusRF Radio / wMBUS (License free spectrum)

Walk-by meter reading

Drive-by meter reading
DIAVASO Application Suite for Sensus RF / wMBUS

DIAVASO AMR solution
• Walk By Drive By
• Modular Applications
• Multi language
• Licence Free Radio channels

DIAVASO supports SensusRF as well as OMS wireless Mbus radio messages
Data Collection Segments

Product Type

Collection Method

Technology

Systems

Mobile Reading

Walk-by

Drive-by

Radio/Wireless

Fixed Network

Wired
Integrated Systems – Fixed-Network
Fixed Networks

SensusRF

FIXED NETWORK

Water MDM

Water Utility

Gateway

Gateway

GPRS/Ethernet

Repeater
FlexNet Fixed Network

Water Utility

Device Manager

Water MDM

Database

FlexApp Router

Network Control

WIDE AREA NETWORK

Base Station

LICENSED SPECTRUM

FlexNet™
LONG RANGE RADIO

SensusRF
WBDB & FIXED NETWORK

SensusRF

MDM
HHD
SIRT
640C
640C
iPERL
MeiStreamRF

SBDB & FIXED NETWORK

FlexApp
Router

Network
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SBDB & FIXED NETWORK
Case Study 1 – Smart metering Fixed Network for high rise building
Case Study 2 – Walk By / Drive By (AMR) for inaccessible meter read
Case Study 3 – Pune Smart Meters Deployment
Experience of Indian Water Utilities for Metering

SITE CHALLENGES:-

• Space constraint at Installation- Electromechanical Meters need to be Installed in Horizontal direction – Any change in Installation angle leads to inaccuracy in measurement.
• Drift in accuracy over period of time due to wear/tear of moving parts.
• Meters stop recording due to obstacles/dirt in meter.
• Meter tampering- Reverse connection, Magnetic Tamper.
• Starting flow rate –30 l/hr ( R-80 metrology)
• Air flow measurement- Intermediate water supply
• Stealing of Meter- High scrap value of Brass

Resulting in……
Increase in Non-Revenue Water, Increase Site visits, Increase Maintenance, Customer Complaints
Case Study 3 - SensusRF AMI Pilot at Pune

• Gateway based system
• 662 meters polled at a interval of 15 minutes
• Above ground & in pit meter installation
• Covering the meters in a DMA
• Without Repeaters
• Fully automated.
Case Study 3 - SensusRF AMI Pilot at Pune

- Pune Municipal Corporation (PMC) was earlier supplying 10 lakh litres of water per day in Ganesh Nagar DMA
- This number has reduced to 7.80 lakh litres
- Unaccounted for water (UFW) has reduced from 80% to 22%

https://www.sakaltimes.com/pune/water-supply-improved-24x7-project-pmc-46080

FINDINGS OF DMA OF GANESH NAGAR (BOPKHEL)

Ganesh Nagar District Metering Areas (DMA)

- Pipeline network .............................................. 1,807 metres
- New pipelines laid by L & T ............................. 800 metres
- Residential population ................................. 5,500
- Commercial population ............................... 50
- Automatic water meter installed ................. 662
- Initial UFW of zone .............................. 80% (March 2019)
- UFW of zone ................................................. 65% (July 2019)
- UFW of zone ................................................. 43% (Dec 2019)
- Current UFW of zone ................................. 22%
Let’s Solve Water

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