AMI Communication – Future Trends

Swapnadeep Banerjee
Solutions Architect - India

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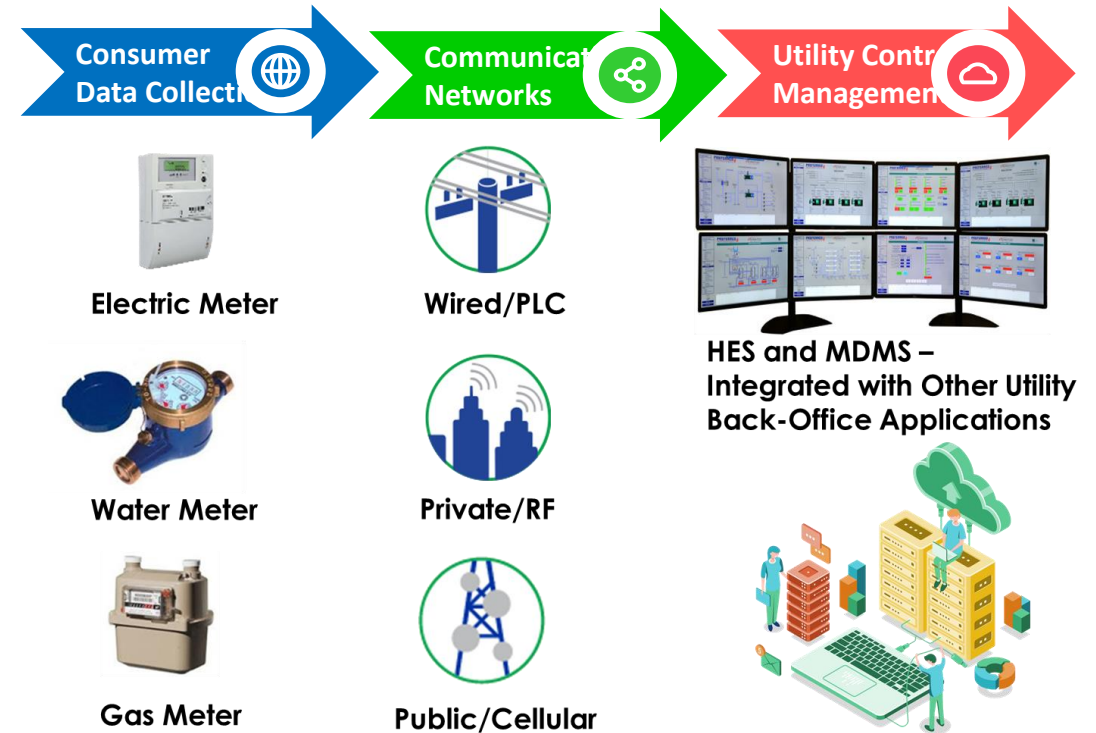# Advanced Metering Infrastructure KEY BUILDING BLOCKS

Advanced Metering Infrastructure (AMI):

- The implementation of two-way integrated components, networks and systems that provides an intelligent connection between consumers and system operators to remotely administer:

  - Meter Data Collection
  - Meter Data Analysis
  - Control & Management
  - Billing of Energy Usage

AMI includes:

- Smart Meters at the consumer's location
- Two-way Communication Networks between consumers and Utility Service Providers
- Data Aggregation, Control & Management Systems at Utility Data Centre

Consumer Data Collection → Communication Networks → Utility Control Management

Electric Meter

Water Meter

Gas Meter

Wired/PLC

Private/RF

Public/Cellular

HES and MDMS – Integrated with Other Utility Back-Office Applications

What is AMI 2.0?

AMI 2.0 is designed to address the evolving challenges and opportunities in the utility industry. It's built to help utilities meet today's goals of sustainability and efficiency

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AMI 2.0 Solutions

AMI 2.0 system is not only recording consumption, but also enabling a better understanding of how electricity is being used or generated behind the meter, in real time. This is enabled by modular communication capabilities.

This supports

- Increased Intelligence that is necessary to manage the expansion of complex energy–producing and energy–consuming devices in households worldwide.

- Handle local power generation from solar panels, home battery systems, and eventually electric vehicles being able to transmit electricity back to the grid is becoming more common.

- Manage Increased Electricity consumption require to power electric transportation including cars, commercial vehicles, bikes, and scooters

Government of India, Revamped Distribution Sector Scheme (RDSS), with the objective of improving the quality and reliability of power supply to consumers is enabling the AMI deployment

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AMI 2.0 Solutions – Key features

- **Reliability:** *Improved power quality and resilience*

- **Grid Modernization:** *cloud, microgrid, and intelligent automation*

- **Customer Engagement:** *Improved customer awareness of consumption*

- **Communication Network:** *Secured Network with low latency and high bandwidth*

- **Edge Computing:** *Access to the raw data for high resolution*

- **Real Time Data:** *For DER enablement Integration of rooftop solar and Electric Vehicle*

- **Enhanced Grid Resilience:** *Enabling utilities to strengthen weak points and improve overall resilience*

- **Demand Response:** *Allow customers to analyze their device-level usage*

- **Enhanced Cybersecurity:** *Advanced cybersecurity technologies*

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AMI 1.0 Vs AMI 2.0 – Communication

AMI 1.0	AMI 2.0	Key Advantage
OQPSK	OFDM	Resilient to RF impairments
100 bytes	1,260 bytes	Increase payload
250 kb/s	Multi-rate from 50 to 2,400 kb/s	Adaptive rate; Increased throughput
Single channel	Frequency Hopping	Resilient to external interference
CSMA/CA	Time-Slotted Channel Hopping	No self-interference
Proprietary protocol	IPv6	Public & Open protocol
Shared secret	PKI, Elliptic curve, DTLS	Modern Security

Importance of Data - in Artificial Intelligence
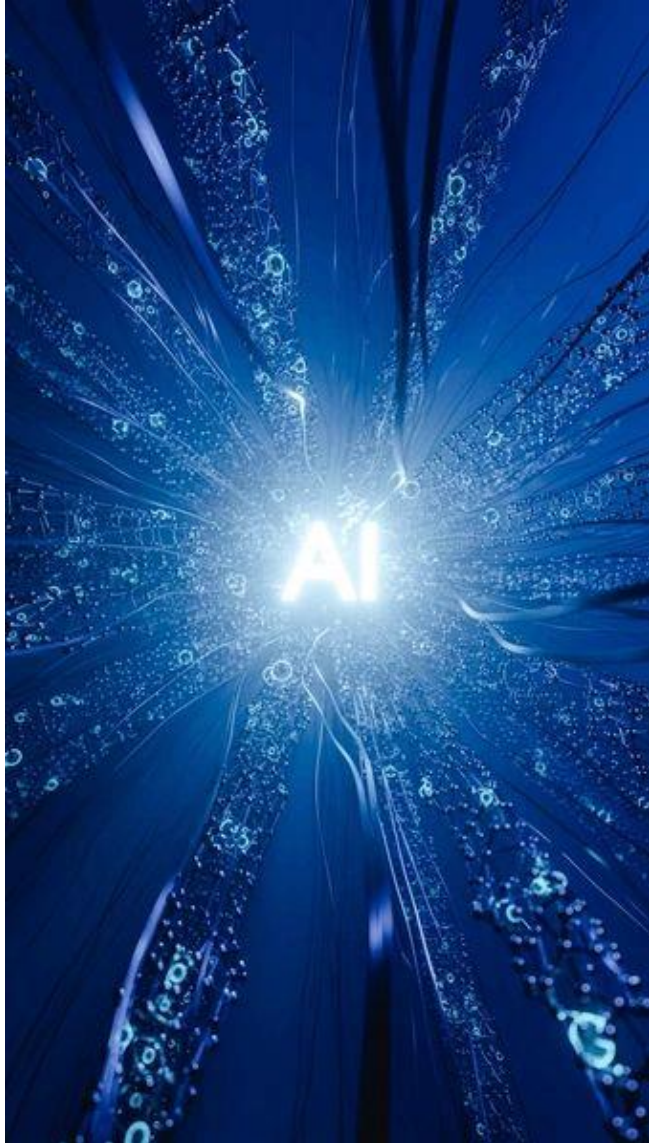
- **Predictive Maintenance:** *AI algorithms analyze data from sensors and meters to predict equipment failures before they occur*

- **Real-Time Decision Making:** *AI can process vast amounts of data quickly, enabling grid operators to make informed decisions in real-time.*

- **Demand Forecasting:** *AI improves the accuracy of demand forecasts by analyzing historical consumption patterns and external factors like weather.*

- **Energy Management Systems:** *AI-driven systems optimize energy consumption in real-time, balancing loads and reducing costs for consumers while enhancing grid stability*

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Thank you

Q&A

✉ Swapnadeep.Banerjee@trilliant.com

📱 +91 9830977117

🌐 www.trilliant.com

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