Key Considerations in the Planning, Design, and Rollout of Large AMI Systems: U.S. Perspective with Insights From EDX Wireless

Critical factors for deploying Advanced Metering Infrastructure

Comparative Analysis of India and USA

**Challenges in Smart Meter Deployment**

Both India and the USA encounter significant challenges in deploying smart meters, impacting efficiency and accessibility.

India's Mass Deployment Strategy

India focuses on mass deployment of smart meters across diverse terrains, aiming for widespread accessibility and integration.

USA's Phased Approach

The USA adopts a phased approach to smart meter deployment, utilizing existing infrastructure for gradual integration.
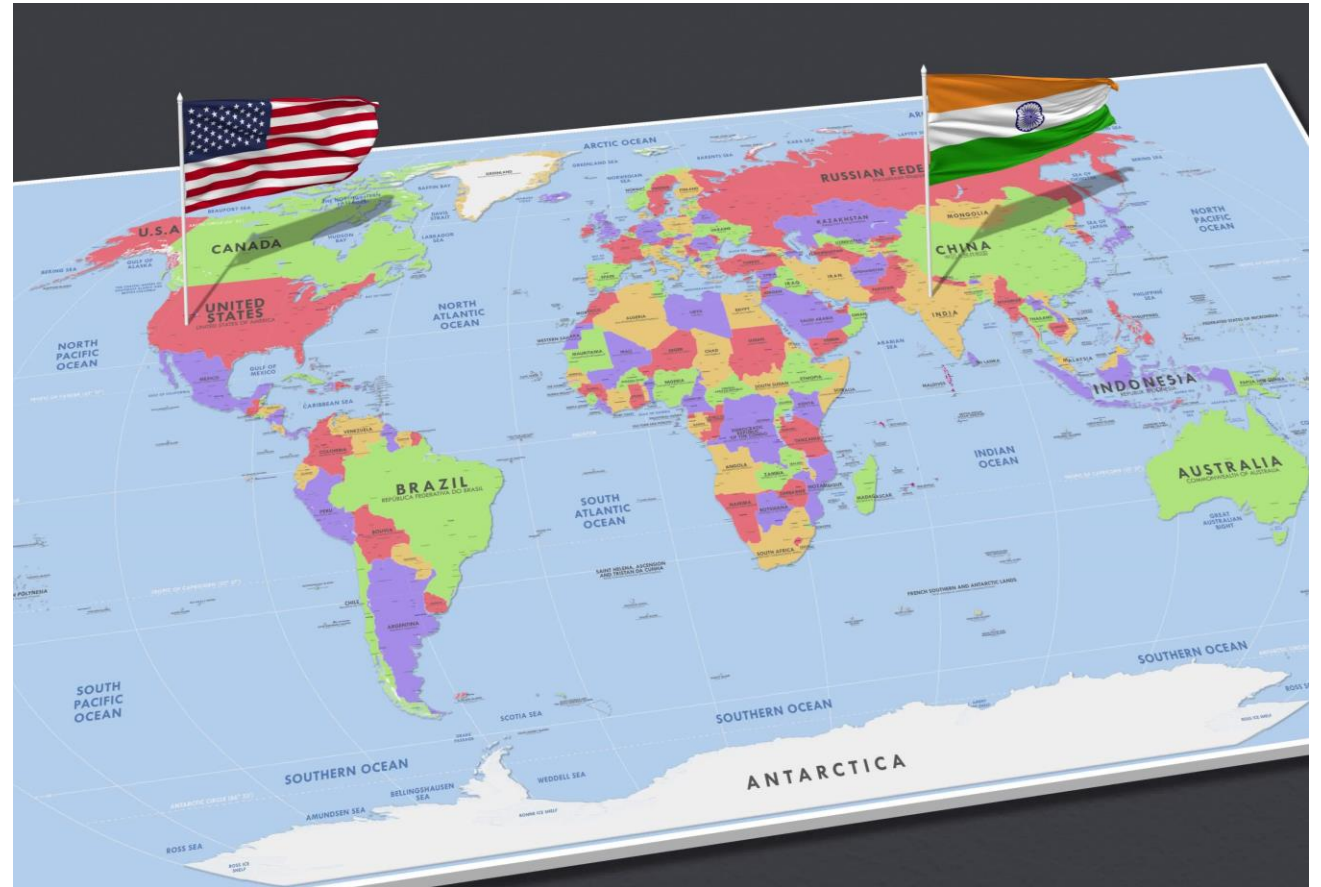
Strategic Planning & Phased Rollouts

EDX WIRELESS

Large AMI deployments should be executed in phases to identify and resolve issues early.

PG&E's phased approach helped refine RF planning and meter installation logistics.

Lesson for India: A phased approach allows adjustments before full-scale implementation.

Phase 1: Pilot & Technology Validation (2006-2007)
- Tested **RF Mesh reliability & smart meter accuracy** in select regions.
- Identified **early technical challenges** (e.g., RF interference, network dropouts).
- **Refined deployment strategies** before scaling up.

Phase 2: Early Mass Deployment (2008-2010)
- Expanded to **1M+ meters per year** while optimizing network configurations.
- Strengthened **customer education & outreach programs**.
- Improved **load forecasting & regulatory compliance**.

Phase 3: Full-Scale Rollout (2011-2013)
- Completed **9M smart meter installations** across urban & rural areas.
- Integrated **real-time monitoring & predictive analytics** for proactive maintenance.
- Achieved **higher operational efficiency & cost savings**.

Hybrid Connectivity Models for Large Regions

- A single AMI communication technology is insufficient for vast regions.

- Duke Energy used a Hybrid AMI Connectivity Model
  - Urban Areas:
    - RF Mesh for high-density, low-latency communication.
  - Suburban Areas:
    - Cellular LTE (4G, LTE-M, Private LTE) for flexibility and scalability.
  - Rural Areas:
    - PLC (Power Line Communication) to leverage existing infrastructure.
  - Remote Areas:
    - Satellite connectivity to ensure universal smart meter coverage.

- Lesson for India: Combining NB-IoT, RF Mesh, Private LTE, and Satellite can ensure seamless coverage.

Duke Energy's AMI Hybrid Connectivity Model
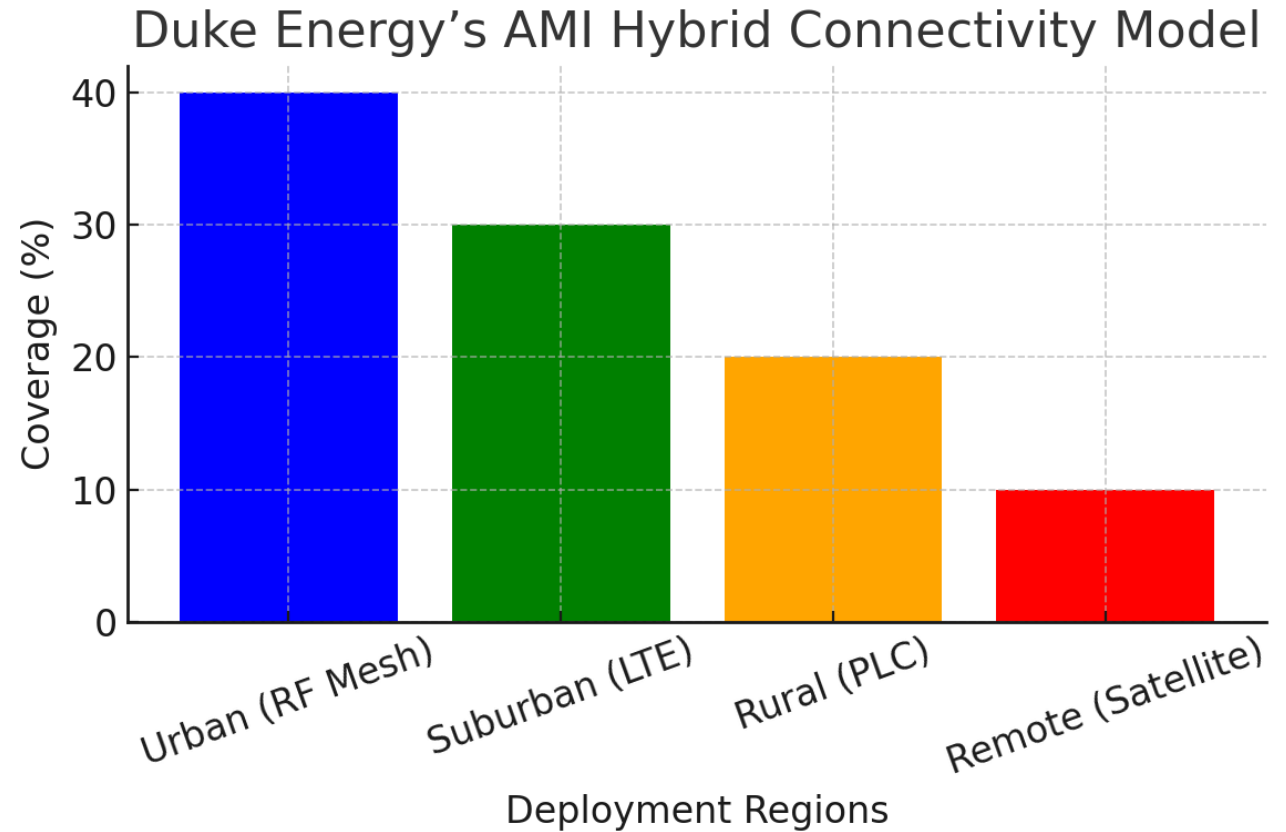
RF Planning is Critical to Avoid Coverage Gaps

- Poor RF network design leads to dead zones and higher costs.

- Before deploying smart meters, CenterPoint conducted extensive RF propagation studies to ensure optimal placement of network access points.

- Lesson for India: Comprehensive RF modeling must be done before deployment.

Avoiding Costly Post-Deployment Adjustments

GIS-Driven Planning

Implementing GIS-driven planning allows organizations to visualize data and make informed decisions before deployment, minimizing errors.

Proactive Implementation

Proactive planning and foresight result in smoother implementation, reducing the need for costly adjustments later on.

Resource Management

Effective resource management through GIS helps allocate resources efficiently, preventing wastage and enhancing project success.

Enhanced Mapping Accuracy

EDX Wireless' tools significantly improve the accuracy of meter density mapping, ensuring reliable data for planning.

Streamlined Planning Process

Utilizing these mapping tools streamlines the planning process, saving time and resources for project managers

Case Studies of Predictive Planning Benefits

Successful Implementation

Case studies demonstrate successful implementation of predictive planning across various industries, leading to improved outcomes.

Lessons Learned

Valuable lessons from these case studies illustrate effective strategies and common challenges in predictive planning.

Benefits Showcase

The benefits of predictive planning include enhanced decision-making, resource optimization, and risk mitigation.

Key Takeaways for India's AMI Rollout

- Phased rollouts prevent large-scale failures.

- Hybrid AMI models (RF Mesh, LTE, Satellite) improve connectivity.

- Pre-deployment RF planning reduces unexpected costs.

- Customer education is essential to drive acceptance.

- AI-driven analytics enhance smart grid efficiency.

- Long-term AMI sustainability planning is critical.