TESCO METERING

# Pros and Cons of Cellular AMI, RF and Powerline Carriers

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*North Carolina Meter School*
*Emerging Technologies*
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*2:45 PM*

# TESCO Nighthawk

**TESCO and Nighthawk** are a perfect fit. The leader in all things metering now offers the world a leader in affordable AMI metering. Nighthawk is the exclusive home to Adaptiv™, your Solution for AMI Cellular Mesh! Adaptiv™ provides the lowest ownership cost of any AMI provider.

## About Nighthawk

30-years of utility experience

100+ utilities served

## About Adaptiv™

Unique zero-infrastructure network

Cellular + Mesh Communications

verizon AT&T 1NCE

**Ideal for either incremental or rapid deployment**

**Lowest total cost of ownership in the industry**

# Introduction to AMI

## What is AMI?

- Definition: AMI enables two-way communication between utilities and electric, water and gas meters.

- Key components: Advanced meters, communication networks, headend/data management systems.

# Introduction to AMI

## AMI Importance

- Real-time energy usage
- Outage detection and restoration
- Time-of-use pricing
- Remote disconnect/reconnect
- Enhanced grid reliability

## AMI Communication Needs

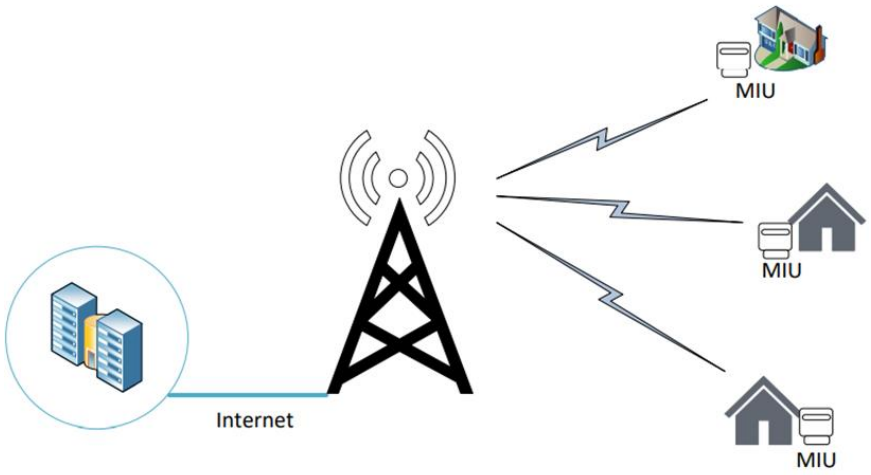
- High reliability
- Scalability
- Security
- Cost-efficiency
- Low latency and high data integrity

# Communication Technologies Overview

| Technology | Medium | Description |
|---|---|---|
| Cellular | Wireless | Uses public cellular networks (e.g., 4G/5G) |
| RF Mesh | Wireless | Private wireless mesh network using RF |
| PLC | Wired | Uses existing power lines to carry data |

# Cellular Communication

- Uses existing mobile network infrastructure (4G/5G)
- Public network managed by telecom carriers
- SIM-based communication modules in meters



# Cellular Communication

Cellular – Pros

Fast deployment

Wide area coverage (especially 4G/5G)

High bandwidth and low latency

Not responosible for network restoration after natural disaster

Low capital investment

# Cellular Communication

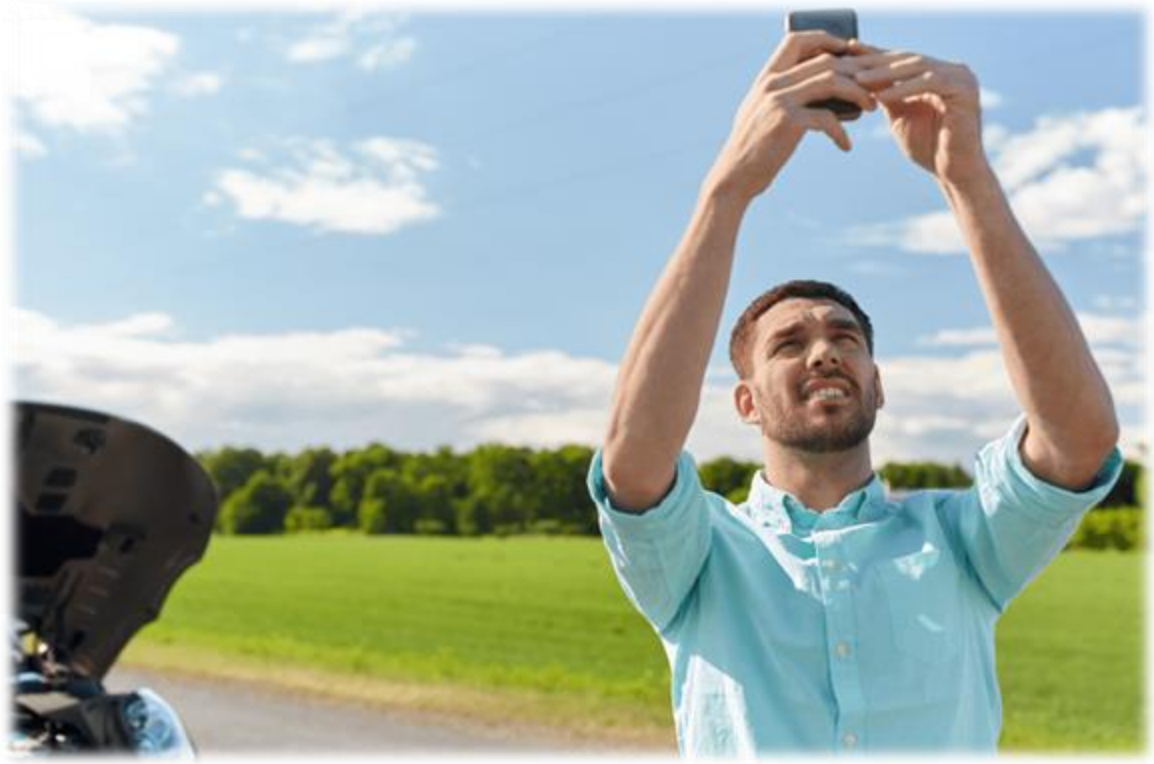
Cellular – Cons

Recurring data service fees

Coverage may be poor in rural/remote areas

Dependence on telecom providers

Less control over the network

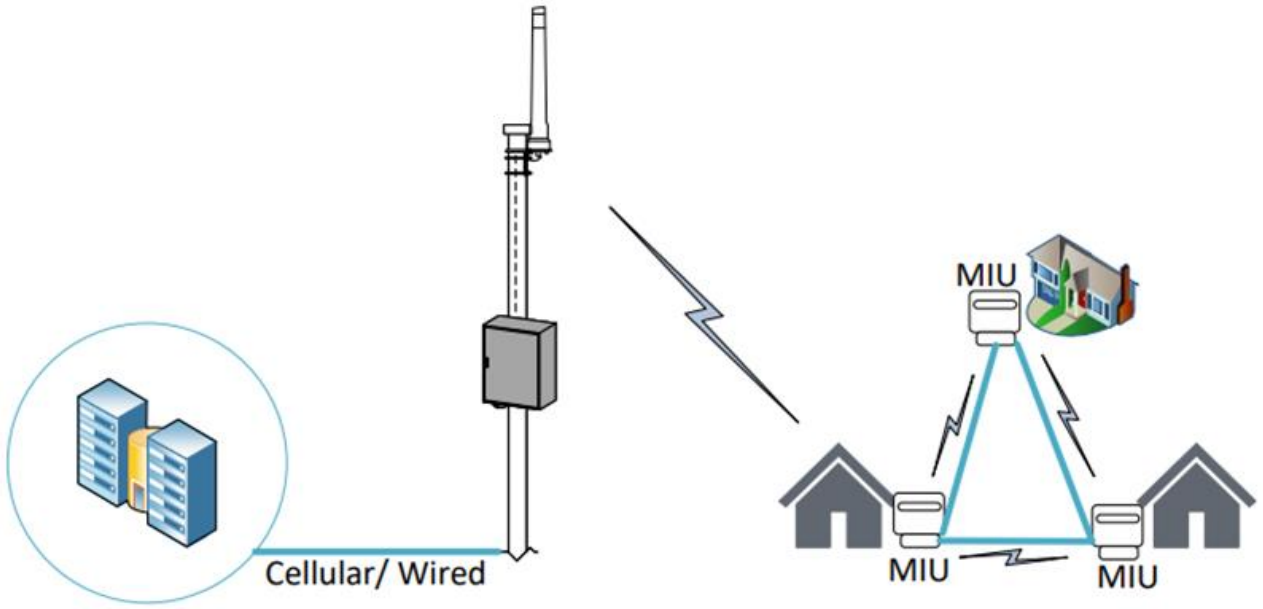


# RF Mesh Communication

Private network created by utility

Meters relay data to each other or directly to concentrator

Data routed through concentrators to head-end systems (typically cellular, fiber, ethernet backhaul)



# RF Mesh Communication

RF Mesh – Pros

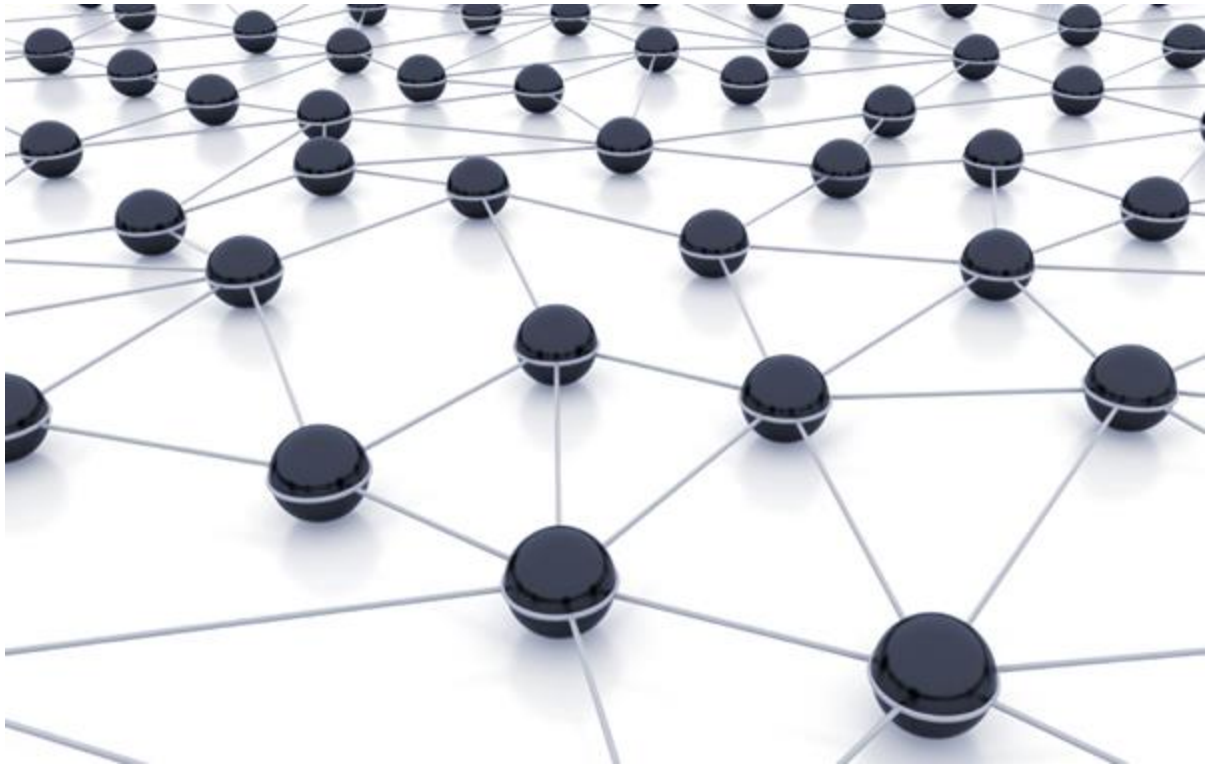
Self-healing, redundant paths

Reach hard to read areas through multiple hops

High reliability in dense deployments

Utility-owned and managed

Scalable and secure



# RF Mesh Communication

RF Mesh – Cons

Higher initial infrastructure costs (propagation studies, tower/gateway/antennae/collector installation)

Potential Right-of-Way issues with Tower-based P2P

Potential costly joint use agreements using 3rd-party poles/towers (collector/router/gatekeeper)

Requires dense meter population

Performance affected by terrain/buildings

Susceptible to changes in foliage/ season changes

Complex maintenance and planning (Meter techs morph into RF techs)

# Power Line Carrier (PLC)

**PLC Technology Overview**

Data travels over existing electrical power lines

Minimal additional wiring needed

Often used in rural or legacy systems

# Power Line Carrier (PLC)

PLC – Pros

Cost-effective in areas with long distances

Leverages existing power infrastructure / No reliance on external carriers

Often less expensive over the life of the system

Automatic establishment of communication during the installation process

No antenna tuning or adjustment of antenna direction is required.

Communication is reliable in extremely difficult meter locations (metal shielded cases, deep underground installations, etc.).

No extra installation effort (such as external antenna installations, not counting substation equipment)

No changing environmental conditions due to seasons/weather that affects signal strength once devices are installed.

# Power Line Carrier (PLC)

**PLC – Cons**

Susceptible to electrical noise and interference

Outage information is compromised when the distribution network is disrupted

Limited bandwidth

Slower communication speeds

Signal weakens over long distances

Sometimes requires additional boost

| Feature | Cellular | RF Mesh | PLC |
|---|---|---|---|
| Bandwidth | High | Medium | Low |
| Latency | Low | Medium | High |
| Scalability | High | High | Low-Medium |
| Cost (CapEx) | Low | High | Low |
| Cost (OpEx) | High | Low | Low |
| Security Control | Medium | High | Medium |
| Best Application | Urban/Suburban | Suburban | Rural |

# Security Comparison

- Cellular: Secure via carrier encryption (e.g., LTE)
- RF Mesh: Custom utility encryption, higher control
- PLC: More vulnerable to signal tapping and noise, requires robust encryption

# Real-World Use Cases

Cellular: Used by utilities in areas with adequate LTE coverage

RF Mesh: Often deployed by larger utilities with adequate resources

PLC: Common in rural systems

# Hybrid Network Strategies

**Many utilities combine technologies:**

PLC for remote areas

RF Mesh in neighborhoods

Cellular for backhaul or sparse areas

Improves reliability and performance

# Decision-Making Factors

Geography and terrain

Meter density

Budget and funding model

Long-term scalability

Existing infrastructure

# Conclusion

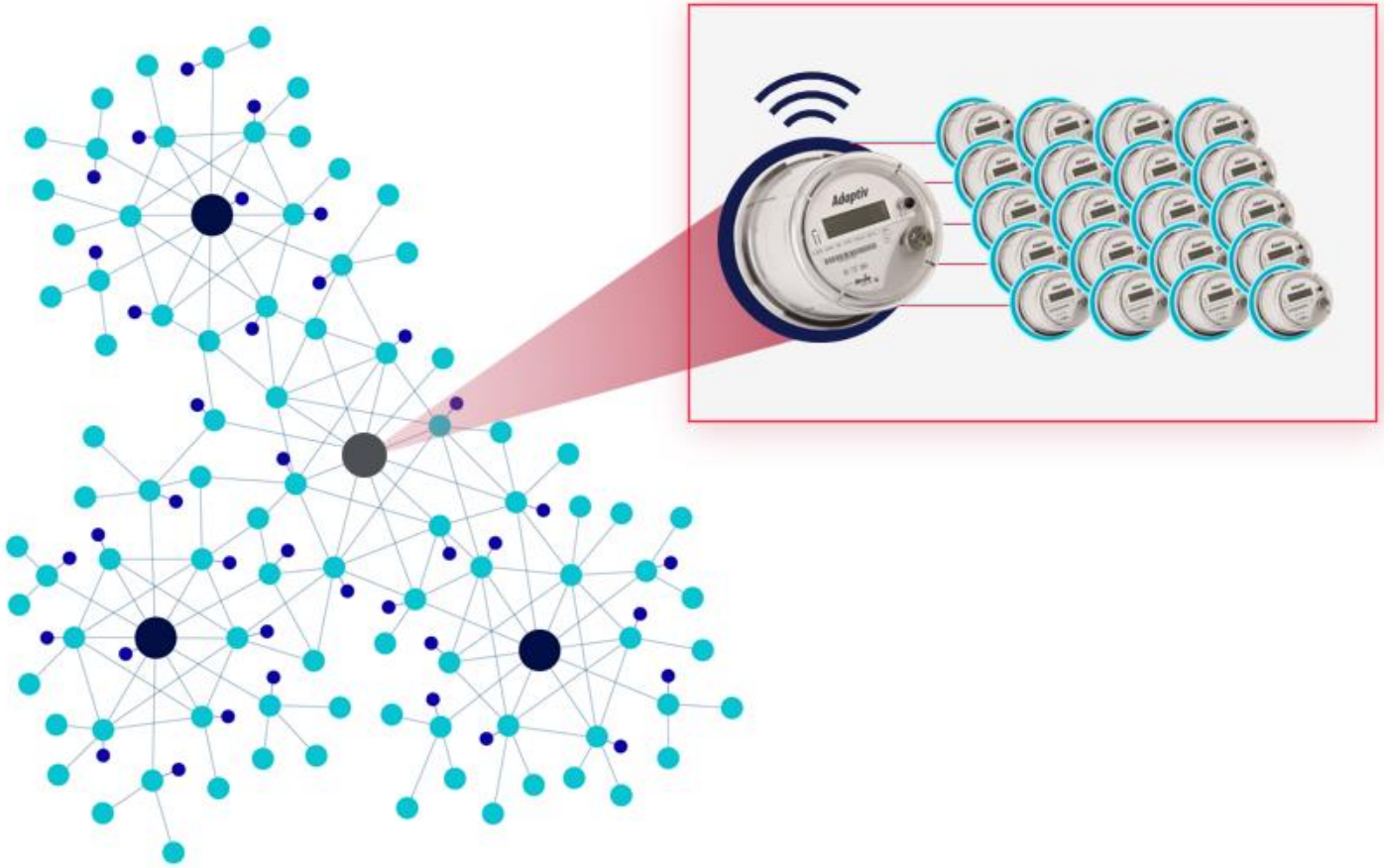
No one-size-fits-all

Cellular: Great for fast deployment in coverage areas

RF Mesh: Best for dense, scalable, secure deployments

PLC: Ideal for rural, cost-sensitive areas

Recommendation: Consider a hybrid approach for optimal performance and cost



# Questions and Discussion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