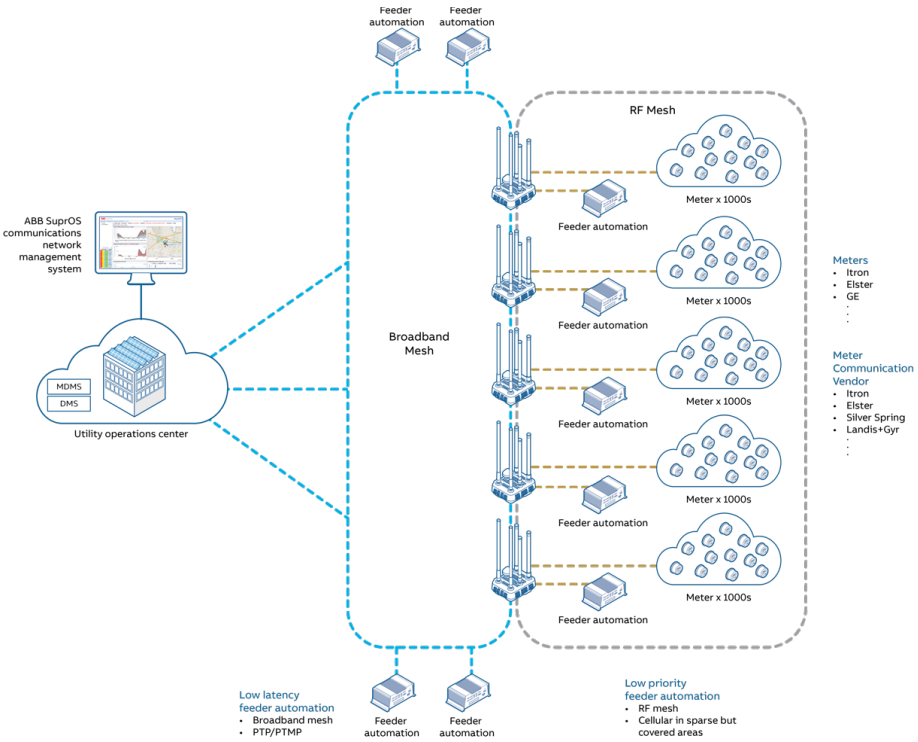
SOLUTION OVERVIEW

Utility field communications evolution

Enabling new capabilities while extending the life of past investment with the ABB Wireless mesh architecture



Interoperability and interchangeability with multiple meter vendors

ABB wireless mesh architecture vision	Current industry status	Vision benefits versus current status
Interoperable, multi-vendor, RF mesh	Proprietary, vendor-specific RF mesh	Greater flexibility and customer choice
Greater bandwidth per RF mesh connected device	Limited bandwidth per RF mesh connected device	Enables FA, advanced AMI, and more, extending life of RF mesh investment
RF mesh access point integrated into private broadband mesh backhaul	RF mesh access point typically in different enclosure than cellular backhaul	Reduced O&M expense, higher reliability, control of technology lifecycle, more capacity, QoS
FA devices can connect to PTMP, broadband mesh or RF mesh	FA devices connect to narrowband PTMP	Can choose technology that best suits needs of devices and applications
Manage entire field network from a single console	Separate management screen for each network or device	Enhances operational efficiency, accelerates problem resolution

Enabled applications

- Advanced metering infrastructure (AMI) for power, water, gas
- Feeder automation (FA), both low latency and low priority
- Outage management
- Leak detection
- Streetlight control

The smart grid is one of the first large-scale implementations of the Industrial Internet of Things. For many electric utilities, the first phase of their smart grid rollout focused on AMI, which enabled centralized meter reading, improving operational efficiency and reducing costs. In many instances, these projects were deployed in isolation with a focus on this single application. As such, decisions regarding communication network infrastructure lacked holistic thinking. Typically, meter reads were done once a day at most, generating less than a kilobyte of data for each read. With bandwidth requirements relatively low, an RF mesh for connecting meters to metering collectors are an ideal solution.

Table 1: Smart Grid Application Bandwidth and Latency Requirements

What is connected	Supported applications	Bandwidth	Latency
Data Centers Transmission Substations Operations Centers Large Generation Contact Centers	Tier 1 Apps and DR PMU,RAS, EMS MPAC Protective Relaying SCADA Masters Metering Backhaul	High ≥ 1 Mbps	Protective Relaying Very Low ≤ 1 msec Others Low/Med ≤ 17 msec/ ≤ 100 msec
Medium Transmission Substations Large Distribution Substations Large Service Centers Medium Generation	Telephony/radio Video MPAC SCADA DMS	High ≥ 1 Mbps	Low ≤ 17 msec
Medium Distribution Substations Medium Service Centers Small Generation Field Equipment (e.g., IEDs, smart transformers) Mobile Worker	SCADA VoIP Field Switches Cap Banks Re-closers FLISR	Medium 100 kbps – 1 Mbps	Medium ≤ 100 msec
Remote Offices Distributed Generation Small Office Small Distribution Substations	Meter Reads Remote Line Equipment Sensors PHEV Distributed Storage/ Gen	Low 10 kpbs – 100 kbps	Med/High ≤100 msec/ ≥ 100 msec

Legacy utility communication networks stressed by demands of third wave of smart grid investment

The third wave of smart grid investment is focused on next-generation AMI (more frequent meter reads, demand response implementation, etc.) and advanced FA (automatic feed circuit reconfiguration, transformer health monitoring, dynamic volt/VAR control, line and fault sensing, load control, etc.). These new applications have changed communication network requirements. There is now a need for higher bandwidth, lower latency and higher reliability. Table 1 above shows the bandwidth and latency requirements of smart grid applications being deployed in the third wave of investment.

Rolling out communications for the third wave of smart grid investment

The challenge facing many utilities is how to preserve their existing investment in the RF mesh used for AMI and in the narrowband PTMP used for FA while rolling out advanced AMI and FA applications. This is where the ABB wireless mesh architecture comes into play.

The ABB wireless mesh architecture integrates RF mesh access points from a variety of meter communication vendors with private broadband mesh backhaul. In the ABB architecture, there is no rip and replace. All existing equipment continues to function in network. The addition of new technology and products to the communication network is gradual and incremental, as dictated by the utility's evolving application needs.

Another advantage of the ABB wireless mesh architecture is that all portions of the field communication network, including the RF mesh and broadband mesh, can be managed by the SurpOS communication network management system. Being able to manage the entire field communication network from a single pane of glass enhances operational efficiency and hastens problem resolution.

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