



Navigant Study Finds that Private Spectrum for Distribution Automation Networks Offers Attractive Total Cost of Ownership

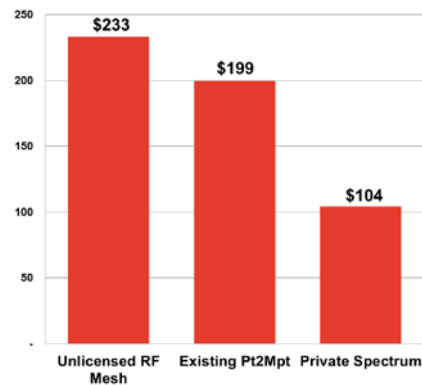
For SCADA, Volt/VAR Control, Feeder Automation, Line Sensors, Solar Integration or AMI Fill-in/Backhaul, Private Spectrum Offers Competitive Cost, Utility Control, and Security with Minimal Risk of Interference

Total Cost of Ownership per Meter Under Various Networking Scenarios: 15-Year Lifecycle

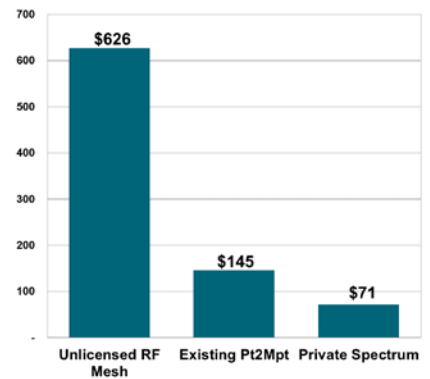
Dedicated DA Network, Typical IOU



Dedicated DA Network, Typical Muni



Dedicated DA Network, Typical Coop



(Source: Navigant Research)

Utilities today have several field area networking options available. Most of these, however, were created with specific applications (e.g., mobile workforce communications or advanced metering infrastructure [AMI]) in mind. As a result, many utilities today find themselves managing an increasingly complex set of networks serving multiple purposes.

As the necessity of greater grid edge awareness and connectivity becomes increasingly clear, forward thinking utilities are considering a more holistic approach to their networking needs. The proliferation of distributed solar, electric vehicles, community microgrids, etc., combined with more stringent reliability requirements and a growing need for more and better customer engagement mean that, more than ever, utilities need to extend their connectivity—and thus control—deep into the distribution grid.

Forward-thinking utilities are considering more holistic approaches to their networking needs.

EXISTING NETWORKS MAY OR MAY NOT WORK

Advanced metering systems are now operated at utilities serving half of all United States meters. Many will try to leverage those existing networks for distribution automation (DA) or other advanced applications. In some cases, this may be a cost-effective approach. In other cases, however, ongoing maintenance costs and more dense equipment requirements will result in high costs over time. But there is another option, one which provides the utility with greater control, security and flexibility over time.

Private spectrum ownership provides utilities with greater control, security, and flexibility over time.

Private spectrum ownership is now an affordable—in some cases the most affordable—option for a utility looking to deploy a variety of distribution automation use cases across a large or varied territory. When used for a combination of AMI, DA, and even substation connectivity needs, the control and flexibility that private spectrum offers can be very attractive.

PRIVATE SPECTRUM PROVIDES AN AFFORDABLE ALTERNATIVE

Navigant Research performed a comprehensive, 15-year total cost of ownership (TCO) analysis for the most common field area networking technologies available under a variety of use cases. We interviewed both vendors and utility networking managers to understand the architectures and costs associated with each technology, and also for the emerging solution sets for private spectrum. Assumptions were developed related to the ongoing maintenance and equipment replacement costs for each technology along with the costs for initial system deployments and spectrum leasing for existing point-to-multipoint (Pt2Mpt) solutions.

The results of the study—performed for a typical investor-owned utility (IOU), a typical municipal utility, and a typical cooperative—are outlined in the table below.

TCO/Meter and Suitability by Application and Networking Technology, 15-Year Lifecycle

Notes on the Analysis

- Meter nodes are not yet available for all private spectrum options. Especially for Munis and Coops, however, available bands would theoretically accommodate AMI, DA, and SA traffic.
- Spectrum leasing fees (or purchase) are included in existing Pt2Mpt analysis.
- In the shorter-term, cellular pricing may be attractive, but for critical applications, signal priority, and continuous operation under outage situations may be questionable.
- RF mesh solutions typically leverage unlicensed spectrum that will become crowded as the IoT becomes reality. Unlicensed RF solutions are also not optimal for sparsely populated, rural territories due to power limits.

Total Cost of Ownership for Various Utility Networking Scenarios 15-Year Time Horizon

Typical IOU, ~600k meters, 4k square miles

	New Private Spectrum	Existing Pt2Mpt	RF Mesh	PLC	Cellular
AMI	218	192	215	131	205
DA	19	53	79	17	3
AMI + DA	223	197	220	135	208
DA + SA	22	56	82	20	9
AMI + SA + DA	227	200	223	138	214

Typical Muni, ~11k meters, 100 square miles

	New Private Spectrum	Existing Pt2Mpt	RF Mesh	PLC	Cellular
AMI	326	340	358	178	258
DA	104	199	233	24	3
AMI + DA	333	347	363	184	261
DA + SA	133	228	260	53	58
AMI + SA + DA	361	375	390	212	316

Typical Coop, ~21k meters, 3k square miles

	New Private Spectrum	Existing Pt2Mpt	RF Mesh	PLC	Cellular
AMI	288	281	759	159	258
DA	71	145	626	35	6
AMI + DA	300	292	769	168	263
DA + SA	117	190	671	81	55
AMI + SA + DA	346	338	814	214	313

Attractive **Viability** **Not Attractive**

(Source: Navigant Research)

This analysis was sponsored by Select Spectrum and performed by Navigant Research.

For further information on the regional availability of licensed spectrum, contact Robert Finch at Select Spectrum, rfinch@selectspectrum.com. For further information on the Navigant Research Total Cost of Ownership Analysis, contact Richelle Elberg, richelle.elberg@navigant.com.