

Common Ground: Smarter Grids, Public Networks

By Sam Sciacca

As utilities build more sophisticated power grids, they will require new, improved data networks for a variety of roles, many of which could be served by telecom providers.

Because these two industries have different market drivers and technology paths, they have had an uneasy history of collaboration. But developments on both sides have produced new opportunities.

Having worked with both sides, I can offer a sense of power utilities' technical requirements, as well as insights on utility culture and a thumbnail history of how the power and telecom industries have interacted over the years.

These insights should provide telecom executives with a better understanding of how to work with their new partners in grid modernization.

Power utilities: where we've been

Traditionally, power utilities have built their own private, dedicated networks to meet their need for reliability and security. The Public Utility Holding Company Act of 1935 gave power companies that right because telecoms then could not provide the dedicated utility networks needed.

The one application where utilities did use telecom facilities was leased copper lines from local telecoms, where it was cost effective to do so.

Over time, collaboration was sporadic, driven by the utilities' view of the costs and benefits. Meanwhile, the telecom industry naturally moved to technologies and markets based on its own business drivers. In the 1990s, telcos marketed control channel on cell towers for a data service known as cellular digital packet data or CDPD. Some utilities began adopting this for non-critical SCADA (supervisory control and



data acquisition), but as the telcos marketed that service to other parties, performance dropped and the service no longer met the utilities' needs. Ultimately, a number of telco CDPD offerings were abandoned by the providers, leaving the utilities to unwind the investment they had made in the system. Utilities

require service offerings that will last decades; the CDPD experience was further indication that utilities need to insulate themselves from short-term telecom strategies and commercial drivers outside of their control.

Similarly, cable companies tried to sell bandwidth to utilities for distribution automation but found entertainment

more profitable and didn't offer the level of support that electric utilities required. Different details, same result.

More recently, some telcos have announced the phasing out of the copper wire business. Utilities who use these circuits for mission critical services must now incur the expense and labor to engineer their systems to use other technologies, underscoring the vulnerability they face by adopting third-party communications offerings due to changing telco market directions.

Utilities had, and continue to have, very specific requirements for support. If a network goes out, they need it addressed immediately, not "soon." The timeframe for support can be measured in minutes, possibly hours, certainly not days.

In the past, there has also been a divergence of objectives between the utilities' telecom needs and



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the telco's commercial offerings. Telecom networks' profits were driven by content and billed by the minute. Utilities required iron-clad availability. They didn't generate a significant volume of data traffic, but the data they sent had to "get there." So the two industries' drivers were fundamentally different.

As telcos marketed network ubiquity, bandwidth and speed, utilities asked for service guarantees that telcos could not meet.

What's changed?

Today, grid modernization is driving exponential growth in data traffic, which is driving a need for bigger, better, faster networks, primarily wireless ones. The pace and scale of network growth for utilities is outpacing their traditional willingness and ability to build those networks for themselves. Thus utilities are taking a second look at partnering with telcos.

Today, every major telecom company has a business division and technology support dedicated to power utilities. The most common question on their minds is: What do we need to do to provide network services to a power utility?

The good news for telcos is that while certain applications such as protective relaying and SCADA still require high availability and time critical message delivery, some newer Smart Grid applications do not require these high levels of time-critical reliability.

For example, if a small percentage of smart meters' usage data doesn't reach the system's head-end on one read, they'll make it through on another. Meter data traffic is not mission-critical. On demand, remote access to substation IEDs (intelligent electronic devices) provides operators with the ability to implement software updates, receive diagnostic data on the asset's condition and schedule maintenance accordingly. Again, speed and reliability are not critical.

So we're seeing the network needs of a smarter grid align more closely with the sorts of products and services that telcos can and want to provide to utilities. Opportunities abound where standards for reliability and security on the utility side dovetail with reliability

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and security on the telco side. Fruitful areas for collaboration include backhaul for automated meter reading, demand side response, interconnection to distributed resources and interconnection to electric vehicle charging points.

There's some thinking in the utility industry that interval meters (a.k.a. "smart meters") may not be the means of connecting customer to utility. Some believe that the primary connection between utility and customer will be the Internet, not the meter. Meters might serve only to count kilowatt hours consumed and as line sensors for distribution system voltage optimization and outage notification. That

data might get rolled up by a device in the home and communicated via wireless networks and the internet to the utility.

Hurdles remain

Yet traditional hurdles remain. Telcos will migrate from technology to technology based on their

fundamental market drivers. To utilities, that migration spells "stranded asset."

When it comes to technology that relies on wireless frequencies, utilities remain leery. The Federal Communications Commission holds jurisdiction over the airwaves and periodically reassigns frequencies. So, wireless itself remains an area of concern to utilities, even as they adopt those services in their hybrid, private-public networks.

I just mentioned "hybrid, private-public networks," which are the likely model for utilities' data networks. Utilities will always own and operate private networks for functions such as inter-substation protective relays and for their SCADA systems. The latter use some leased telco lines, but not switched networks.

In summary, telcos will need to recognize utility concerns and constraints to work effectively with the

power industry. Telcos must ensure timely responses when network additions are needed by a utility; traditionally, telcos have been averse to making network changes on demand.

Data privacy and security remain a concern to utilities considering using a public network and telcos will need credible measures to assuage those concerns. Should a privacy breach occur, public utility commissions will hold one party responsible - the utility. Perhaps virtual private networks (VPNs) are the answer.

A word on the international opportunities: though the drivers of grid modernization remain roughly the same worldwide, each country and utility may have their own focus and priorities and telcos would do well to tune in to local circumstances in pitching their services. One might say the same thing for the 50 state-level public utilities commissions in the United States; some encourage and some discourage utilities in building their own networks.

The good news for telcos is that while certain applications such as protective relaying and SCADA still require high availability and time critical message delivery, some newer Smart Grid applications do not require these high levels of time-critical reliability.

If telcos understand the concerns and constraints of utilities and offer sustainable services that are cost-effective and fit the utilities' hybrid communications needs, the two sectors should enjoy a long and fruitful collaboration..

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