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ENERGY

UTILITY C-SUITE TAKE NOTE

Private LTE Wireless Networks are Required to Address Cybersecurity Threats, Grid Modernization and National Disasters

“Once-in-a-Generation” Opportunity for the Power Utility Industry

Utility leaders today stand on the cusp of an historic inflection point. The electric power industry is being disrupted, gradually but inexorably, as load growth declines, distributed energy resource use grows, and new competition enters the fray. Simultaneously, the need for autonomous grid operations and greater situational awareness fueled by data collection, sensors, and increased control all depend on an advanced communications network. The clear path to mitigate risk and manage the future is a reliable, resilient private network. Management decisions made over the next few years will have long-lasting—arguably decades long—ramifications. They will determine whether and how their organizations survive and even thrive throughout this transformation.

The Fourth Industrial Revolution is unfolding. The purpose of this briefing paper is to underscore the critical role that private broadband networks will play in advancing utility transformation in this new digital era, while at the same time mitigating cyber threats, and to urge an organized industry push toward a coordinated adoption of private wireless networks nationwide. Secure, reliable and resilient broadband communication networks will be the foundation for advancements in delivering safe, clean and affordable energy. This is especially true for distribution utilities where the need for monitoring and control will extend to the customer premise. Advances in distributed generation, battery storage, electric vehicles and microgrids will require it. Those in utility C-suites must recognize and plan for this shift and build a private wireless network now to enable grid modernization and support digitization for decades to come.

Utilities are vulnerable. Indeed, as Navigant, a Guidehouse company noted in its [Energy Cloud 4.0](#) paper, “energy incumbents, especially utilities, have less than 5 years to reorient their products and business models around fast emerging technology ecosystems...or risk becoming a fringe player in the emerging energy economy.” Other studies suggest utilities are susceptible to disruption as a result of low R&D budgets, low revenue growth and low capital efficiency. In short, the protected and regulated monopoly model of the last century has left utilities risk averse and sluggish. The growing threat of cyber-attack and intensifying natural disasters further heightens the urgency with which utility leadership must act to modernize their business model and operations—throughout the grid and in the back office.



Going forward, Industry 4.0 applications such as advanced analytics, intelligent automated devices, real-time control, ubiquitous sensing, cloud connectivity, edge computing and more will be essential for utilities to remain secure and competitive. All of these depend upon (or will be limited by) the communications networks funneling data into these applications.

Utilities have recognized these realities in their generation and transmission segments, building robust fiber networks for secure, application-rich connectivity. Now that thinking must extend to wireless and the grid edge.

Gone are the days when siloed, application specific, single function narrowband networks will do. In order to stay relevant and compete in an era where technology behemoths like Alphabet and renewables giants like Tesla are storming the power industry wall, utility leaders must step up as dedicated agents of change and champion a futureproof, holistic strategy for utility connectivity.

Wireless Networks Complement Fiber Networks—Increasing the Value of Each

Utilities have widely embraced fiber deployment, to substations and beyond, acknowledging the value of owning and controlling the infrastructure. Owned fiber provides high-speed, reliable and secure connectivity to critical assets, but also represents a revenue generation opportunity, through dark fiber leasing. Particularly as 5G wireless networks proliferate, this could become a measurable opportunity.

Running fiber all the way to the grid edge (i.e. home), however, is not financially possible for many utilities. In order to tap the enormous potential of connected IoT devices throughout the distribution grid—for asset management, renewables integration, load forecasting, self-healing applications and more—utilities must extend their connectivity to the grid edge through secure wireless means. The eventual migration of numerous legacy narrowband networks onto a private broadband network will achieve the necessary security and control utilities require.

Private wireless networks based on 4G LTE technology, with a path to 5G, in a coordinated and secure, network of networks, built on dedicated licensed spectrum, represents utilities' best option to achieve these goals and maximize return on investment.

DEPLOYMENT OF STANDARDIZED TECHNOLOGY—IN A STANDARDIZED SPECTRUM BAND—IMPROVES ROI

Both availability and affordability have been hurdles to utility private spectrum access. Due to limited spectrum band options and carrier demand driving up costs, many utilities have been reluctant to own or lease spectrum in any meaningful way. Instead, they have typically relied upon narrowband and unlicensed spectrum-based solutions, many of which are becoming obsolete.

As the IoT becomes a reality, those unlicensed bands will be progressively overrun with data traffic, becoming even more congested and therefore less reliable. It will become increasingly difficult for utilities to rely upon the performance of these networks. Furthermore, cybersecurity threats will only grow in the unlicensed bands, where a multitude of diverse participants and devices (e.g. portable phones, baby monitors, garage door openers and a multitude of new sensors) will all share bands and channels.

“By standardizing not only on LTE technology, but also on the spectrum band in which it is deployed, utilities nationwide for the first time have an opportunity to optimize their wireless networks so that they are both interoperable and futureproof.”

Within the same timeframe, the criticality of the Industry 4.0 applications outlined above will grow exponentially. **A licensed broadband solution with adequate bandwidth, latency and security for critical utility applications, owned and controlled by the utility, is the only long-term answer for filling the gap between fiber assets and the grid edge.**

Additionally, the secure, utility-owned and controlled network, built on a combination of private fiber and licensed broadband spectrum using standard LTE wireless technology, opens up an important opportunity for utilities to generate revenue by leasing communications capacity to other utilities (e.g. water and gas) and commercial, industrial and enterprise entities across their territories. This opportunity grows exponentially if it is coordinated across utilities territories, allowing organizations operating in multiple locations to tie into compatible, coordinated networks.

Perhaps most importantly, the ability of grid operators to respond quickly and effectively during catastrophic events such as Superstorm Sandy or major wildfires will be improved radically. With coordinated and standardized wireless technology, field crews brought in from outside the area can communicate seamlessly with native crews during emergencies. Situational awareness can be extended across utility territories. Preventive action can be taken throughout a region, regardless of utility territory boundaries, to minimize the impacts of natural disasters on communities and their economies, and to save human lives.

Utility leaders today are in a unique position to make this vision a reality. Proactive efforts today could open the floodgates, driving the industry toward a nationally coordinated and compatible—but independently controlled and operated—network of utility owned networks for the benefit of all stakeholders.

An Unprecedented Opportunity at 900 MHz

The Federal Communications Commission (FCC) has recognized the critical infrastructure need for dedicated spectrum and is acting. It is in the final stages of approving a band realignment in the 900

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MHz band which will make 6 MHz (3x3 paired channels) of private spectrum available to utilities.

[The FCC's 900 MHz proceeding holds] "the potential to have a defining, once-in-a-generation impact on the ability of utilities to continue to deliver safe and reliable power to their customers for decades to come."

— Southern California Edison

These swaths of spectrum at 896 MHz-901 MHz and 935 MHz-940 MHz, are perfectly suited for utility deployment of a private LTE network—and the band will be available across the United States. This presents utilities today with an unprecedented opportunity to coordinate their technology choices and control their own destiny in the Industry 4.0 age. In fact, in its comments to the FCC, Southern California Edison (SCE) said that it "views the current proceeding as holding nothing less than **the potential to have a defining, once-in-a-generation impact on the ability of utilities to continue to deliver safe and reliable power to their customers for decades to come.**" But utility leaders must act now, before other industrial verticals recognize this opportunity and move to secure the spectrum.

Why 4G LTE at 900 MHz

4G LTE is a well-established technology, used by public wireless carriers around the globe serving billions of customers. As a result, there is a large ecosystem of LTE manufacturers and vendors. Economies of scale for LTE equipment and software systems have already been achieved. Utilities can benefit from those economies while maintaining control and gaining security in a private LTE deployment.

Furthermore, the next generation of wireless technology—5G—is an evolutionary overlay to existing 4G LTE networks. These new standards will allow for both public and private LTE network operators to transition to 5G networks in an incremental fashion, eliminating the obsolescence issue that has plagued industrial users of cellular technology in the past.

By standardizing not only on LTE technology, but also on the spectrum band in which it is deployed, utilities for the first time have an opportunity to optimize their wireless networks so that they are both interoperable and futureproof. A utility which deploys a dedicated private LTE network in the 900 MHz band will enjoy resilience, control and security at the individual utility level, and will also benefit from roaming capability across the territories of other utilities.

Without a standardized wireless broadband strategy, utilities will be limited in their ability to leverage their networks and infrastructure as part of a larger, coordinated network—for both operational benefits and revenue generation. These are major opportunities, and the investments are protected by the evolutionary features of 4G LTE.

As organizations move to more advanced 5G technologies, the backward compatibility aspect of the 4G to 5G transition will sustain those interoperability and roaming benefits.

Spectrum at a Fair Market Value

Over the course of the FCC proceeding, the proposal to realign the 900 MHz band to accommodate broadband channels has been carefully studied by utility managers nationwide. It is now widely embraced.

For example, Ameren said in its supportive comments, "The need is now for creating timely access to a broadband solution [that] is critical in enabling Ameren to address its evolving communication needs and capabilities." San Diego Gas & Electric indicated its desire to make use of the band, noting, "This will improve the overall reliability of SDG&E's communication network, which is **critical for fire prevention and public safety.**"

Furthermore, while the FCC's current Notice of Proposed Rulemaking (NPRM) on the band realignment proposes a 6 MHz swath, it has also sought comment on a realignment of the entire 900 MHz band, which would create a 10 MHz broadband segment. This expansion has been supported by several large utilities, including SCE and Duke Energy.

As the largest holder of 900 MHz spectrum and the only nationwide licensee, Anterix is advocating for a coordinated network of private utility LTE networks controlled by utilities and like-minded critical infrastructure enterprises.

Anterix has expressed its interest in working with the industry to make this critical spectrum available to utilities—before other industrial entities stake claims—with an open and transparent process for determining the fair market value of the spectrum.

Anterix has publicly announced that it will make the spectrum available to utilities via a capital lease model, which should allow utilities to earn a rate of return on the spectrum investment. The value of the spectrum in these agreements will be established based on standard spectrum valuation practices using market comparables from prior spectrum sales, both through FCC auctions and private transactions.

A unique window of opportunity presents itself and industry leadership is urged to step up with vision and foresight.

INDUSTRY LEADERS MUST BAND TOGETHER FOR MUTUAL SUCCESS

The benefits of individually owned private broadband networks that are industry coordinated and nationally interoperable are too great to allow this opportunity to pass. Immediate access to such a network is crucial for security, resiliency and mutual aid. Indeed,

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in its August 2017 report *Securing Cyber Assets*, the President's National Infrastructure Advisory Council (NIAC) urged enterprise to take the lead, stating that, **“Cyber is the sole arena where private companies are the front line of defense in a nation-state attack on US infrastructure.”**

If a nationally available, standardized private broadband wireless option does not emerge soon, utilities will be forced to continue deploying a potpourri of incompatible, and often, less secure unlicensed wireless solutions.

Beyond the cyber threat, the industry's current incompatible and unlicensed solutions will not stand the test of Industry 4.0 and the competitive environment in which many utilities will soon operate. There is precedent for utilities coming together for mutual benefit—consider, for example, EEI's Mutual Assistance and the Spare Transformer Equipment programs.

Today, the industry must band together in support of a coordinated connectivity strategy, one that combines the benefits of rapidly deploying fiber with those of secure, private, licensed LTE wireless for an end-to-end solution.

By working together, industry leaders can expedite access to the realigned 900 MHz band and start enjoying the advantages of a wide-range of compatible, cost-effective broadband LTE capabilities. The industry will quickly benefit from standardized, interoperable networks that meet utilities unique needs. Grid hardened devices and critical services such as push-to-talk capabilities will come to market more rapidly and at a lower price thanks to the already large LTE ecosystem.

Utility Leaders Must Take Action

- Identify economic benefits and risk mitigation impact from the deployment of a private broadband wireless network.
- Band together to accelerate the FCC proceeding with rules favorable to utility needs.
- Collaborate through industry associations on the development of cost-effective solutions for mission critical use cases.
- Create networks for utilities that interoperate for individual and combined benefit including increasing security and improving customer reliability.

900 MHz is not the only band utilities will likely leverage—but it should be considered foundational. As a sub-1 GHz spectrum solution, choice of the 900 MHz band ensures a lower cost to deploy the network than if higher bands are used. Higher band spectrum signals do not propagate as far as sub-1 GHz signals, meaning that higher site density (more towers and cell site locations) is necessary to achieve the same coverage. The licensed 900 MHz band can provide an economic, standardized, interoperable option for utilities across the US—and creates a path to future generations of even more powerful 5G networks.

Don't Wait Too Long

Now more than ever, utility CEOs and industry leaders must take action and define their industry's destiny. By banding together to promote the finalization of the FCC proceeding around realignment of the 900 MHz spectrum band, they can dramatically accelerate industry access to this sought after private licensed spectrum. By working together in a coordinated effort to adopt 900 MHz LTE, they can shape the service rules and accelerate the development of this dedicated, owned, controlled and interoperable broadband wireless utility network of networks.

This coordinated system will create scale for equipment procurement, maximizing the existing economies of scale and financial benefits that come with LTE. As the energy transformation continues, this network will be a critical, foundational element of the next-generation utility's technological platform, supporting mission critical applications, new services, revenue generation opportunities and, importantly, customer satisfaction and loyalty.

Utility industry C-suite executives nationwide are urged to band together now to make the most of this critical but finite asset—spectrum—and the interoperable network of networks it will support. The industry's long-term success, even its very survival, is at stake.