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Comments of Anterix
on
Draft 2019 New Jersey Energy Master Plan
Policy Vision to 2050

Anterix fully supports the goals of the *Draft 2019 New Jersey Energy Master Plan Policy Vision to 2050* (2019 EMP) to implement 7 strategies to address climate change and reduce the state's greenhouse gas emissions. The strategies appear to promote and expand upon existing policies with a view toward ensuring that New Jersey's current trajectory and efforts will be sufficient to reach the goals previously established. The purpose of Anterix's comments are to highlight the reliance upon critical system data and the often overlooked but essential need for private broadband spectrum. This lifeblood of wireless networks enables utilities and other critical infrastructure owners and operators to reliably and cost effectively transport critical data in order to reach these goals. An advanced communications network is needed for utility modernization and is a key component of the 7 identified strategies and their inter-dependencies.

Anterix, a New Jersey-based wireless company, is a provider of private broadband spectrum for utilities and critical infrastructure owners and operators. Anterix understands the challenges these entities face in protecting and managing their modern systems and connecting with their consumers. Central among these challenges is identifying radio spectrum that can meet utility requirements for security, reliability, and resilience while remaining cost-effective. In many cases ensuring success of the EMP will depend upon transmission of data from various new and evolving technologies in order to provide instantaneous situational awareness of critical systems. Coordinating all these devices in a secure, reliable, and timely manner ensures that when problems arise, appropriate responses are implemented.

The National Infrastructure Advisory Council supports establishing separate and secure networks for critical communications during emergency scenarios[i] and Anterix's comments will address the important role that an advanced communications network can provide in helping New Jersey meet the 2019 EMP's goals. Anterix will also demonstrate that safe, secure, and reliable communications networks are critical to reaching the 2019 EMP's articulated goals.

Reaching the 2019 EMP's goals requires a new level of coordination

The 2019 EMP recognizes the need for dramatically broader coordination among sectors and governmental agencies. Accordingly, the 2019 EMP includes rigorous goals and spans multiple sectors and governmental agencies – including the New Jersey Board of Public Utilities (NJBPU), the Department of Environmental Protection (NJDEP), the Department of Transportation (NJDOT), the Department of Community Affairs (NJDCA), the Department of Labor and Workforce Development (NJLWD), the Economic Development Authority (NJEDA), and NJ Transit. Similarly, each of the seven strategies must also reflect its own interdependencies with and impacts upon the other six strategies, not only to achieve the goals of the 2019 EMP, but also to optimize the use of energy and other resources within NJ.

For example, *Strategy 1: Reduce Energy Consumption and Emissions from the Transportation Sector* calls for the electrification of the transportation sector by 2050 with an early focus on light-duty (passenger) vehicles. Absent a more coordinated approach to charging electric vehicles (EVs), the new high current chargers could create new problems: at the end of the day, when all the EVs arrive home and everyone begins to recharge them simultaneously, even as families start cooking, taking hot showers, and heating or warming their homes, power demand could spike to challenging levels. While the physical infrastructure of electric utilities may be able to absorb the growth of EVs, the increases in peak demand may increase costs as utilities must tap into peak energy resources.

As part of the 2019 EMP's recognition that rate design and other programs might be appropriate, the 2019 EMP might also include a program that would sequence high-current devices to mitigate peak demand scenarios like the one described above—similar to the familiar sequencing of air conditioner compressors. Such a program could also respond to wind or solar conditions either increasing or decreasing use by certain resources as appropriate. As distributed energy resources and other new utility operational technologies grow significantly, the volume of devices requiring real-time data underscores the essential need for networks with higher speeds and higher bandwidth. Since fiber to all devices is cost prohibitive, private, uncongested dedicated spectrum below 1 GHz provides the optimal coverage and building penetration required to support the EMP's strategies and modernization of both the energy and water utilities.

Modern broadband data communications networks are critical to grid modernization and the success of the 2019 EMP.

Each of the seven strategies of the 2019 EMP underscores the importance of modern broadband data communications networks. Above, Anterix has given an example of how these networks are implicated in *Strategy 1: Reduce Energy Consumption and Emissions from the Transportation Sector*; similar use cases exist for the bulk of the other strategies, as well. But ultimately, *Strategy 5: Modernize the Grid and Utility Infrastructure* encompasses a large number of use cases and possibly the most critical use cases as well. Utility modernization, with advanced communications networks are already providing new applications. In short, modern broadband data communications networks are a requirement for New Jersey grid modernization and for the successful realization of the 2019 EMP vision.

The 2019 EMP correctly characterizes utilities as the "air traffic controllers" in the new distributed marketplace. It's an apt analogy—utilities operating without an advanced communication network is like trying to perform air traffic control without radar. For their most critical ("air traffic control") operations, energy and water utilities require networks that are safe, secure, reliable and resilient. In planning for the upgrades necessary to handle increased electrification and growing reliance upon data to support modern grid capabilities, regulators and others must address the need for robust, secure data connectivity and the spectrum needed to enable such connectivity.

Achieving a new level of coordination among energy users and producers.

Utility grid modernization includes a movement toward a more analytical and data-driven approach to meeting utility obligations to customers and shareholders. Critical infrastructure sectors like energy and water utilities rely upon data from devices throughout their systems to improve reliability, security, and efficiency. Data from smart meters allows utilities to be more responsive to consumers by providing more accurate and detailed usage information. Reading smart meters remotely also helps the utility avoid the costs of door-to-door or even drive-by meter reading; importantly, it also helps utilities pinpoint outages, isolate problem areas and be more efficient in crew dispatch and restoration. The new era of high speed data also provides significant safety benefits, for example by enabling a utility to de-energize a broken transmission or distribution line before it hits the ground. For water and gas utilities in particular, data can help improve safety by measuring transient pressure in water and gas lines, thus identifying and averting potentially disastrous problems.

Though much of the focus in modernization efforts is on the sensors that generate the data (like smart meters and synchrophasors) and applications that analyze the data, underlying all of it is the communications network that carries that data. Where fiber infrastructure is too costly, as in many rural areas or to individual homes, wireless broadband is the only option.

Utilities don't have the wireless data networks they need.

Utilities simply do not have the wireless data networks they need for today's modern grid—or tomorrow's. The electric utility industry is changing, evolving from centralized generation and distribution to a more efficient and resilient distributed model, where energy and data flow both in two directions. Data connectivity is the nerve system that makes this coordinated, interactive approach possible, but today's amalgam of narrowband and limited application networks is too inefficient, complex, and capacity-constrained to sustain utilities for current usage—much less to support future modernization efforts.

Adding to the problem is the amount of data being required to meet grid modernization goals. According to Navigant Research, electric utilities will increase the number of connected data generating devices by a factor of eight in the next decade[ii], and the amount of data each device generates will also grow. The modern grid offers benefits such as green distributed energy resources and new consumer service capabilities, but those rewards must be balanced against the risks that accompany the increased reliance upon data communications. Robust, secure, high-capacity wireless broadband data networks reduce that risk and support a balance that best serves the public interest. In short, without such networks, utilities will be unable to bring consumers much of the potential value of the modern grid, which, in turn, would undermine the ability to achieve many of the goals identified in the EMP.

Utility networks must be utility-grade.

Wireless broadband service is readily available to most consumers, but consumer-grade wireless is inadequate for utility mission-critical applications, which require greater security, reliability, and speed (lower latency). Commercial networks provide "best efforts" service; utility networks must be hardened to help prevent compromise by human actors or natural disasters, reliable so that they work even under emergency conditions when commercial networks are congested or not working, and resilient to quickly recover from setbacks and support power restoration efforts. On commercial networks, traffic competes for limited bandwidth; electric utilities require dedicated bandwidth so that critical grid communications can get through every time, even when millions of consumers clog commercial networks during disasters or even large public events.

Though today's utilities do rely upon dedicated, private networks to support their grid operations, they are generally low-capacity networks that support only one or a few grid functions using legacy technology in diverse spectrum bands. As a result, many utilities maintain multiple networks, sometimes a dozen or more—a situation that is costly with increased risk. And importantly, these diverse networks are not interoperable, either within a single utility or across neighboring ones, much less nationwide.

Other significant characteristics of a utility-grade network include:

1) Never co-locating primary and secondary fiber and other communication network infrastructure in order to avoid having a single catastrophe destroy both networks.
2) Complete coverage of remote locations where generation and transmission facilities are located but which are far from highly populated commercial carrier coverage areas. Covering "90+% of the population" does not mean that the carrier covers 90+% of the geographic area.
3) Fueled generation at tower locations. Warehousing portable generation for distribution when the roads are clear following an emergency isn't sufficient for utility-grade networks that need to be up and running during an emergency rather than a week later.
4) Localized utility owned LTE networks can provide the extremely low latencies, often 5 milliseconds required to control an electric grid that operates almost at the speed of light. Commercial networks can route data outside the utility area and increase latency beyond acceptable requirements. While this additional latency may be unnoticeable in many applications, such delays can create major problems when electric utilities require a fraction of a cycle to avoid a potential problem.

Wireless broadband networks require both spectrum and infrastructure

Perhaps the most visible part of the infrastructure of a wireless broadband network is the cell tower. In addition to other infrastructure elements, including backhaul transport (both fiber and microwave), the physical equipment that comprises the core network, and end-user devices, wireless broadband networks also require spectrum: a critical input that is rarer and less tangible than infrastructure but equally essential and often far costlier. Without access to spectrum (radio channels) for the use of the infrastructure, there is no wireless broadband service.

But not all spectrum is the same: it can affect both the amount of infrastructure the network needs (tower density) as well as the network's ability to meet the utility's performance requirements. For example, the time required for new sensor data to reach a control system on the grid (latency) can make the difference between a successful mitigation and a catastrophic event.

Among mature mobile wireless broadband technologies, the most advanced—and the one that supports the lowest latency—is LTE, the same technology deployed by commercial carriers worldwide. A vast ecosystem of LTE products already exists for use in specified spectrum bands. Choice of spectrum will affect a utility's ability to take advantage of the wide selection and economies of scale LTE offers.

Cyber threats lend urgency

Cyber threats lend urgency to developing utility data networks that provide modern, utility-grade cyber protections. Energy and water utilities and other critical infrastructure owners and operators are attractive targets for cyber-attack, whether from independent hackers or highly sophisticated nation states, and those attacks have been increasing in number. In 2016 alone, DOE's Industrial Control Systems Cyber Emergency Response Team (ICS-CERT) reported that it completed work on 290 cybersecurity incidents affecting industrial control systems. Of those, 59 were against the Energy Sector, including "the first known cyberattack to result in physical impact to a power grid[iii]." To help secure the modern grid, utilities must modernize their communications systems, including today's diverse, hard-to-manage deployments of outdated network technologies.

In planning presentations, the modern grid is often depicted as including sensors, control systems, users, physical assets and many other features. Sometimes communication among them is shown as lines connecting one endpoint to another; more frequently the lines all meet in a cloud-shaped icon at the center of the diagram. Rarely is that central cloud described—sometimes it is just labelled "network." Even cursory review of the diagram indicates that communications is a foundational element of the modern grid, but that's as much detail as it gives. Nowhere does it explain what that network is or how utilities will obtain it.

Anterix urges the Commission to recognize that the modern, private data communications network is the platform upon which both the utility modernization objectives and meeting the identified EMP goals depends, and to build that recognition into 2019 EMP. Because if utilities cannot obtain the networks they need, the state's ability to fully realize its energy vision will be jeopardized.

Respectfully Submitted,

Andrew J. Bordine
Vice President, Energy Markets & Innovation

Anterix
3 Garret Mountain Plaza, Suite 401
Woodland Park, NJ 07424

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i Securing Cyber Assets, Addressing Urgent Cyber Threats to Critical Infrastructure August. 2017, The President's National Infrastructure Advisory Council.
ii The Urgent Need for a Licensed Broadband Spectrum Allocation for Critical Infrastructure 2018, Navigant
iii Industrial Control Systems Cyber Emergency Response Team 2016, ICS-Cert Year in Review, National Cybersecurity and Communications Integration Center.