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Utility telcos and private wireless services

Many power utilities today use their market presence and existing asset corridors to provide wholesale and retail telecom services to under-served communities. Utilities' fiber networks are thus monetized to help pay for communications investments and fund smart grid innovations, as well as bringing many other benefits to their communities. With their adoption of 5G private wireless technologies to further improve their operations, there is an emerging opportunity to offer private wireless services as well.

Private LTE/5G network for the smart grid

Climate change goals and the plummeting cost of renewables are quickly transforming power generation and distribution. Distributed energy resources and fast frequency reserves are growing in importance. To manage the intermittency, utilities are using advanced connectivity and data analytics to automatically ramp, balance, diagnose and heal the distributed microgrid faster and more efficiently. Distributed energy resources management systems (DERMS) use data streams from wirelessly connected assets, smart meters and grid sensors to manage behind the meter generation and power storage, as well as to make quicker decisions and even to predict outcomes.

Critical to the adoption of these big data technologies is the availability of a new breed of private wireless technologies. Until recently, many utilities employed application-specific wireless FANs utilizing narrowband and broadband point-to-point (PTP) and point-to-multipoint (PTMP) systems, as well as broadband mesh networks. But there is now an emerging consensus that 4.9G/5G cellular technology will be the foundation for the next-generation FAN.

4.9G/5G has the security and reliability needed for mission-critical networks and supports very high bandwidth and ultra-low latency as well. It also has specific support for low-powered IoT devices. This allows utilities to consolidate many separate application-specific networks onto a single 4.9G/5G network — increasing efficiency and integration.

A smart city platform

As well as being essential to the management of the new smart grid, these transformative technologies — 5G wireless, edge computing, AI and machine learning and IoT sensors — are also an ideal platform for supporting smart city projects. Many utilities, whether owned by municipalities or not, can provide the advanced communications platform to power the smart city. They can use their existing assets and 5G to introduce new services that transform their business model.

Using their existing fiber networks to backhaul data, utilities can provide the connectivity needed for municipal security CCTV cameras and smart pole services such as smart EV charging, municipal Wi-Fi, directional signage and tourist information screens. These services can be connected to the existing utility fiber using any combination of passive optical networks (PON), microwave and, even, 5G. Small cell 5G radios can also be used for wirelessly connected IoT sensors doing traffic sensing, asset monitoring or environmental sensing, as well as for smart transit systems, waste bin monitoring, autonomous vehicles, service robots and drones.

In commercial and industrial parks, utilities can also provide support for advanced manufacturers who need private wireless for automating their various processes. Municipal waste and water treatment infrastructure can also use 5G wireless to connect IoT sensors with the goal of better monitoring and automating operations.

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Public safety, smart agriculture

5G private wireless can also extend broadband connectivity to first responders providing mission-critical push-to-talk and push-to-video services. It can stream data from connected PPE, bodycams and vehicle mounted cameras to provide crisis control centers with on the ground situational awareness during emergency incidents. Data such as building or infrastructure schematics can be downloaded to first responder devices and provide augmented reality information using heads-up displays.

In rural areas, utilities can provide fixed wireless services over 5G to extend broadband access to remote subscribers, as well as mobile wireless services to farms for field sensors, monitoring conditions such as moisture levels, soil nutrients and ground temperature. Using this information farmers can direct smart irrigation, fertilizer systems and implement targeted pest control. 5G can also be used for sensors tracking animals and monitoring their health, as well as connecting drones and autonomous farm machinery.

Nokia industrial-grade private wireless solutions

Unlike other enterprise wireless technologies, 5G was designed to provide coverage in noisy radio environments. This makes it the best solution for the physical radio environment typical of most smart city applications, which are prone to high levels of interference.

As well as providing superior coverage, 5G is also far more reliable. The 5G core network has sophisticated technology for managing device access, sharing bandwidth and monitoring service levels. Unlike Wi-Fi, which is a best-effort technology, 5G provides deterministic QoS (quality of service).

With 5G it is also possible to create network "slices", which are separate logical instances running over the same physical infrastructure, each with custom parameters. Utility telecom managers can set up slices dedicated to utility operations and then separate slices for other services, such as smart city services, broadband for educational networks, municipal operations, etc. A slice for security cameras and drone video might be configured for high bandwidth, whereas a low latency slice can be dedicated to automated machinery for a factory. For first responders, a high priority or guaranteed bandwidth slice could be reserved for critical push-to-talk and push-to-video services. Slices ensure that each use case receives the level of service needed for its applications, and it is secure and private.

Nokia provides 5G wireless systems that are optimized for utility use. The core network can fit on a single server rack or in a desktop mini-PC enclosure. Small cell 5G radios are the size of typical Wi-Fi access points, although they provide much superior coverage serving the same indoor or outdoor area as 8–10 Wi-Fi radios and 20X the number of concurrent users or devices.

Why Nokia?

As the world's leading private wireless network solution provider, Nokia has already implemented hundreds of private wireless networks for customers worldwide. These include private wireless networks for Industry 4.0 use cases in factories, mines, ports, smart cities and railways as well as support for utility power grid management, wind farms and power generation.

The Nokia Digital Automation Cloud (DAC) solution enables utilities to meet their needs with a private-wireless-as-a-service solution that includes everything they need, from radio access points and spectrum options to edge computing hardware, a catalog of applications and a ruggedized device portfolio. The DAC edge cloud supports local data analytics for AI-driven process optimization, while ensuring confidential data stays on premises. The end-to-end solution is simple to deploy, and the flexibility of the management tools give utility telecom managers exactly the degree of control they want. The Nokia DAC services team will explain the underlying technologies during set-up and operational training and undertake whatever ongoing operational management tasks the utility chooses.

Make your move to a future-ready communications platform with industrial-grade private 5G from Nokia. Accelerate your transformation to new business models, expand the services you can offer your customers and quickly realize the benefits of your Industry 4.0 and Smart City strategies.