

Power Grids, Meet Strong Networks

Transforming utilities in a connected world



ERICSSON

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We're on the verge of a very different world for utilities as they face a dramatic business and technological transformation. Power, communications, transportation, infrastructure and even public safety are becoming interconnected and interdependent as utilities develop the intelligent grid.

Utilities need to examine their roles and consider how they can adapt in order to thrive—while ensuring that their grids remain secure and reliable.

Challenges within the utilities

Complex communications systems: A study by Ericsson and GTM Research ¹ found that less than a quarter of utilities have just one communications network to manage, with 58% of utilities reporting that they have between two and six networks operating, 14% with seven to ten networks, and 4% with ten or more networks.

As their networks have grown, utilities have tended to deploy a separate, dedicated network for each specific application. They end up with multiple networks that aren't compatible with one another. Further complications ensue when M&A activities introduce new systems, often in different regions.

Renewables: As renewable energy turns consumers into producers of energy, utilities must update the grid to manage two-way interactions. Furthermore, renewable energy sources such as wind and solar are intermittent, putting additional strains on existing grids. Their intermittence must be counter-balanced with more intelligence in the grid, base load power generation (hydro, nuclear), and storage.

Competition: As the industry moves from tightly integrated monopolies to open competitive markets, energy retailers must learn to compete in a market and fight for revenues.

Aging infrastructure: Large parts of the existing infrastructure dates back to the 1960s or even earlier and is reaching the end of its useful life. Equipment is under extreme stress during peak demand. Utilities companies must continue to invest in the upkeep of existing infrastructure while building new customer services and interfaces.

Consumer experience: Customers expect from their utilities the same quality consumer experiences they receive from other industries. Utilities companies need to step up their game.

"The electric industry is poised to make the transformation from a centralized, producer-controlled network to one that is less centralized and more consumer-interactive. The move to a smarter grid promises to change the industry's entire business model and its relationship with all stakeholders, involving and affecting utilities, regulators, energy service providers, technology and automation vendors and all consumers of electric power." — The Intelligent Grid, U.S. Department of Energy

¹ Trends in Utility Intelligent Grid Communications Management, A GTM Research Whitepaper, Sponsored by Ericsson, 2013

Intelligent grids need smart communications

Utilities of every size, type and location expect the number of endpoints to grow rapidly, to 1.53 billion in 2020. These devices range from meters, grid sensors and actuators to energy boxes and electrical appliances, used for applications such as grid monitoring and control, metering, asset management and tracking, and field force communications.

As electricity grid operations evolve from purely static to highly dynamic, utilities are seeking comprehensive, technology-agnostic solutions to help manage their multi-technology, multi-vendor communications networks.

The intelligent grid requires millions of smart meters, sensors and control devices that are connected via a pervasive communications network. As utilities deploy more intelligent endpoints and communications networks to support their intelligent grid activities, they're finding that today's homegrown and proprietary solutions are simply insufficient. Robust, central tools to manage communications can help utilities eliminate inefficiencies and support new services for customers.

To deliver reliable, secure electrical services, utilities must start thinking about network infrastructure in parallel with the electric grid structure.



Why Private LTE is the right choice

Existing mobile operator networks are ubiquitous, economical and already being used for many applications. So why shouldn't utilities outsource their networking to them?

Utilities do use operator networks—otherwise known as Public LTE—for non-mission-critical applications and for company IT applications. But for mission-critical Operational Technology (OT) applications, Private LTE has significant advantages:

Reliability and Resilience	LTE networks are reliable with well-defined performance indicators.
Coverage	Purpose-built coverage where the utility's assets are: generation plants, substations, transmission lines, etc.
Performance and Network Optimization	Able to be optimized and tuned for demanding requirements.
Security	Controlled by utility. Highly secure, with built-in security mechanisms. Can fulfill all NERC CIP requirements for utility use.
Network Operations	Provide near real-time feedback about network performance.
Economic Model	Can be CAPEX-centric or CAPEX/OPEX blend.
Life-cycle Management	Can conform to utility's own LCM requirements.



Power grids, meet strong networks.

Utilities are looking for a solution where they can collapse the current multiple disparate networks onto one simplified and unified network platform and cost-effectively add support for new OT applications including broadband and OT/IT convergence. This is the promise of LTE technology.

Long-Term Evolution, or LTE, is the network technology of choice for 4G deployments and is well positioned to pave the path to 5G. LTE's ability to cost-effectively provide fast, multimedia mobile data services offer many benefits over other wireless technologies that have traditionally been used for utility applications. Those benefits include:

A single communications platform for all services

LTE technology forms a single platform that supports a multitude of services, including broadband data, massive IoT/sensor communications, voice, text, push-to-talk (PPT), and video.

An open standard with a global ecosystem

LTE is deployed in more than 2.5 billion devices worldwide today and projected to grow to 5 billion by 2022. As an open, global standard defined by 3GPP, LTE ensures interoperability across vendors and

networks, which is increasingly important for enabling a wide variety of devices.

Reliable and predictable communications

Fully owned and monitored by the utility, the Private LTE network is highly reliable, with well-defined performance indicators.

Low latency and high capacity

Private LTE delivers low latency today and improving further as new 5G techniques are introduced. It's also a high-capacity technology: An LTE radio cell can support over 1,000 connected users with total throughput up to 1 Gbps.

Highly secure

LTE is a highly secure system designed with strong cryptographic techniques and security mechanisms built into its architecture natively. Properly implemented, a Private LTE system can fulfill all NERC CIP requirements for utility use.

Agile and flexible

The Private LTE system is virtualized and modular and supports many different formats, spectrum bands and channel bandwidths. Private LTE is therefore easy to deploy for different use cases and environments.

Future-proof

Because it's designed to meet 3GPP standards, LTE will continue to evolve, with functionality continuing to be added to support broadcast, machine-type communications, unlicensed spectrum and device-to-device communication.

Ericsson is a market leader in providing Private LTE with reliability, low latency, high throughput, and security required by power utilities. For instance, we recently completed a dedicated LTE grid modernization project with Southern Linc, a subsidiary of Southern Company and an Atlanta-based regional wireless carrier with network coverage in the major metro and rural areas of Alabama, Georgia, southeast Mississippi and northwest Florida.

As security requirements became more stringent and communications needs were growing, dedicated LTE was the clear choice. Ericsson provided the complete Evolved Packet Core (EPC) inclusive of the IMS solutions required for Voice over LTE and Voice over WiFi capabilities as well as the radio access network for the LTE network.

Utilities Communications Service Requirements

		Requirements						
		Data Capacity	Latency Allowance	Jitter Allowance	Time Sync	Reliability	Security	Importance
Application	Smart Metering	Low per feed/ Aggregated high	High(s)	High>10ms	100ms	Medium	High	Medium
	SCADA	Low	Low 100ms	Low	1ms	High	High	High
	GOOSE (e.g., Teleprotection)	Low-Bursty	Very Low <10ms	Very Low	0.1–1ms	High	High	High
	Distributed Energy Management	Medium	Low	Low	-	High	High	High
	Video CCTV	High	Medium	Low	10ms	High	High	Medium
	LAN Data	Medium	Medium	Medium	-	Medium	Medium	Medium
	Emergency Voice	Low	Low	Low	-	High	Medium	High

Outages are out of the question.

With so much of our public safety, business, health and social lives dependent on the grid, providing an uninterrupted and secure energy supply is absolutely mission-critical for power utilities.

Teleprotection in an intelligent grid network means the ability to react to rapid changes in the supply or usage of resources (such as electricity, water and gas) to avoid transient system failures that can damage equipment or cause customers power outages. It therefore requires extreme low latency and latency asymmetry constraints.

Ericsson's MINI-LINK is the world's leading microwave solution, particularly well-suited for utilities. MINI-LINK's high system gain and low latency guarantee the availability, speed and resilience of your network.

The MINI-LINK portfolio, including the new MINI-LINK Supercompact, provides high modularity, capacity, low delay, high

security, quick deployment and low TCO needed for power utilities to evolve their legacy network and acquire the benefits of the intelligent grid.

This industry-leading portfolio has been deployed in 175 countries to 840 customers, with 3.5 million MINI-LINK radio units delivered. From single hop applications to large aggregation nodes, the portfolio supports all migration scenarios from TDM via Ethernet to IP and MPLS.

It's new territory for utilities.

Fortunately, we've already been there.

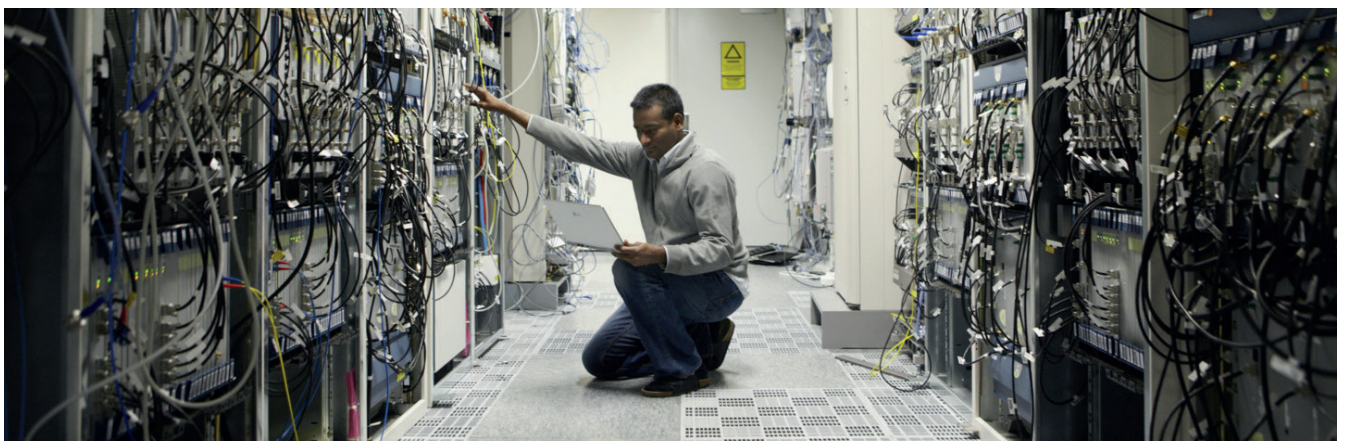
Ericsson has extensive experience helping utilities develop robust, highly secure, end-to-end utility communications. We designed and deployed the first 4G LTE network for intelligent grid and field force communications. From Private LTE to teleprotection to a connected microgrid ecosystem with profitable subscription

management, Ericsson has the experience and the tools to help utilities satisfy their stringent requirements for security and reliability and expand their portfolio into new services.

Ericsson is determined to apply our experience and our technology towards a simple mission: to make technology easy to use, adopt and scale, and to build an ecosystem together with our customers where change is easy and the full value of connectivity can be realized faster than ever.

That's why, for utilities, we bring an integrated approach of tailored communications network and strong IT skills to make everything play nicely together. Private LTE's speed and flexibility make our energy grid efficient. Robust reliability and security make it strong.

Let's work together to build and protect your utility's network as though lives depend on it. Because they do.



About Ericsson



Ericsson enables communications service providers to capture the full value of connectivity. The company's portfolio spans Networks, Digital Services, Managed Services, and Emerging Business and is designed to help our customers go digital, increase efficiency and find new revenue streams. Ericsson's investments in innovation have delivered the benefits of telephony and mobile broadband to billions of people around the world. The Ericsson stock is listed on Nasdaq Stockholm and on Nasdaq New York. www.ericsson.com