



# Unlocking efficiency and reliability: Business and operations support solutions for utilities' private LTE and IoT

Rapid infrastructure evolution and the adoption of private long-term evolution (PLTE) networks and internet of things (IoT) technologies demand utility companies to leverage progressive automation for enhanced operational efficiency, reliability, and cost-effectiveness.

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# 01

## Abstract

This paper outlines the challenges of deploying, managing, and maintaining private long-term evolution (PLTE) networks and internet of things (IoT) devices for utility companies. The Ericsson portfolio offers resilient, reliable, and secure solutions for both telecommunications and non-telecommunications customers.

This paper introduces Ericsson's Operations and Business Support Systems (OSS/BSS) portfolio of solutions that define, monitor, and monetize connections toward IoT devices and partners using utilities' telecom assets. They provide a single platform to activate and oversee the 4G and 5G architecture across all domains. These solutions leverage artificial intelligence (AI) and machine learning (ML) to streamline operations and enhance efficiency, reliability, and automation across devices and the network infrastructure.



# 02

# Introduction



Meeting the communication needs of IoT devices is a key business case of PLTE networks. Utility companies collect and process large amounts of IoT data to manage and optimize their operations. A few thousand devices can be managed with basic tools, such as spreadsheets. However, the increasing number of devices requires more capable solutions for monitoring and automating business and operations and integrating AI/ML into the PLTE network and the IoT infrastructure.

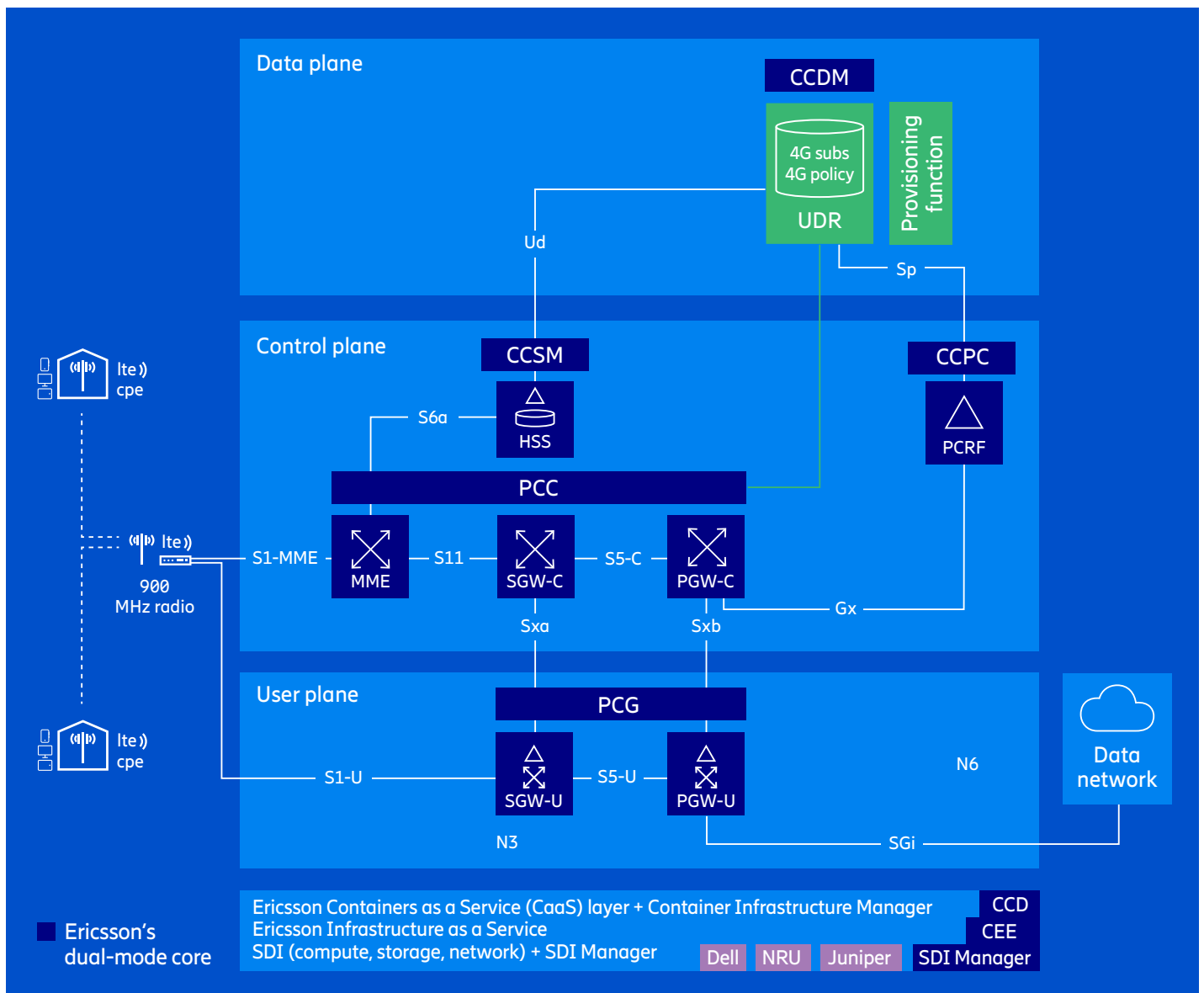
This paper explores some of the challenges and requirements that utilities face with PLTE networks and connections to IoT devices. It also demonstrates how Ericsson products and solutions can help to tackle them by automating business and operations, as well as by integrating AI/ML. This document addresses the challenges and requirements as well as Ericsson's OSS/BSS solutions for PLTE networks and connections in separate sections.

## 2.1

# Typical PLTE networks for utilities

A typical PLTE network for utilities has a core network, such as Ericsson's dual-mode 4G or 5G Core solution, that is ready to underpin 4G today and 5G in the future. The figure below shows how Ericsson enables dual-mode core support, allowing devices to connect to the core services via the LTE radio access network (RAN). With this architecture, utilities can support electric grid applications, narrowband internet of things (NB-IoT), mission-critical push-to-talk (MC-PTT) as well as access to workplace communication and information technology (IT) or operational technology (OT) networks. PLTE networks include a container platform that can enable additional applications.

Figure 1: Ericsson's dual-mode core for PLTE networks

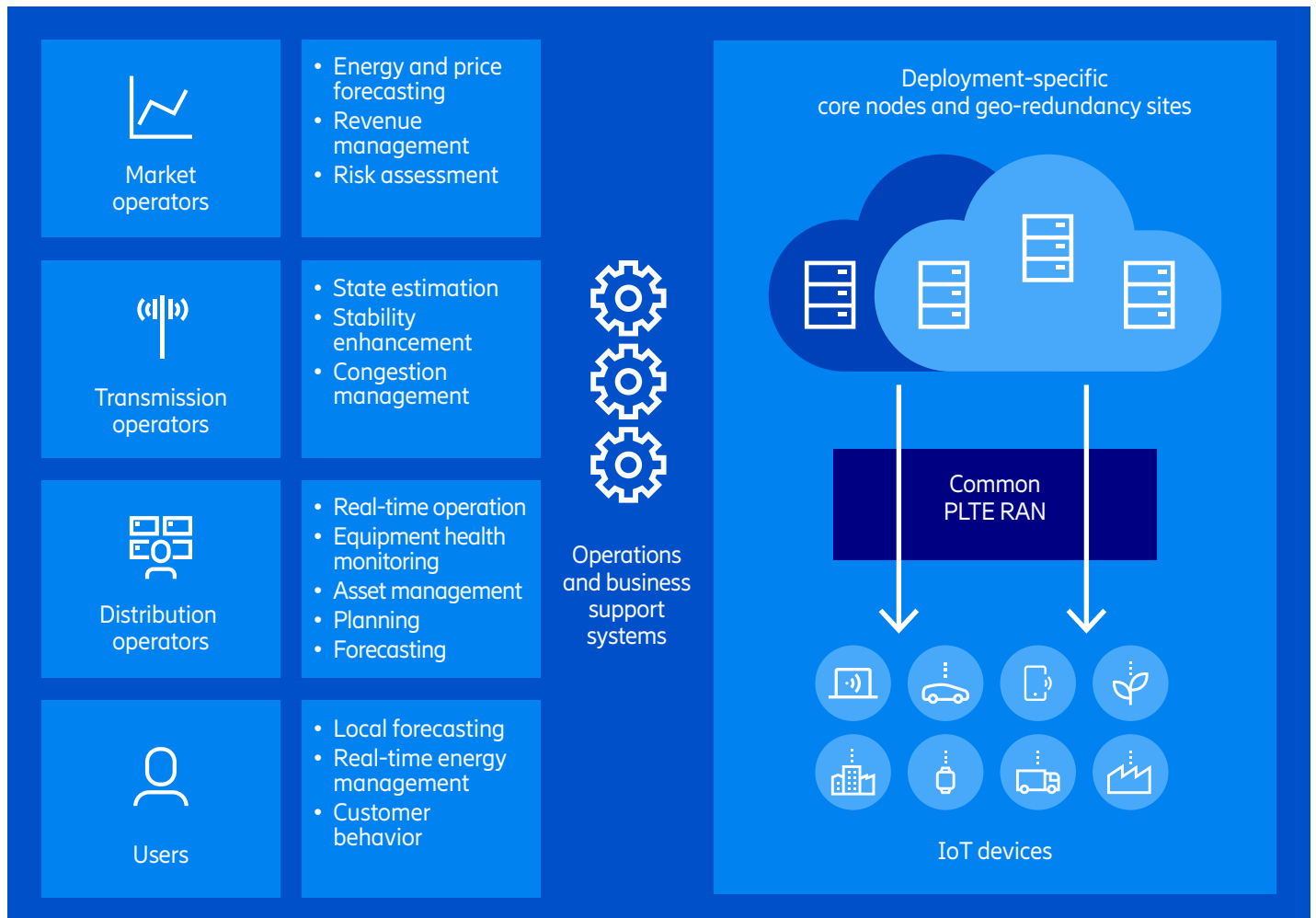


## 2.2

# The vital role of OSS/BSS

The primary focus of utility companies is to deliver safe, reliable power, and many have found that deploying private networks helps them to manage massive amounts of data more efficiently. OSS/BSS solutions must be capable of monitoring and controlling wireless and sensor networks, service order management, and billing. In addition, detecting and responding to network and IoT device faults and collecting data are critical to minimize downtime, optimize maintenance and repair activities as well as to facilitate outage detection, diagnosis, and restoration. OSS/BSS are vital within utility operations, for example, in managing roaming transmission distribution and users.

Figure 2: Example of OSS/BSS-enabled capabilities for utility companies



## 2.3

# Introducing Ericsson's OSS/BSS solutions

Ericsson's PLTE networks and solutions cater to diverse sectors such as utilities, manufacturing, mining, transport, and aviation. By leveraging our solution ecosystem, utilities can expedite innovation in resilience and reliability, as well as scale effectively, benefiting from cross-industry expertise and products. Additionally, Ericsson can accelerate LTE and 5G solutions for power, gas, and water utilities, leveraging our extensive experience in collaborating with this sector.

Ericsson's OSS/BSS solutions enable them to plan, manage, monitor, and analyze PLTE networks and IoT devices. The portfolio includes a workflow engine designed to automate manual tasks, such as device and SIM ordering, activation, and bulk provisioning, and to integrate AI and ML features to boost operational efficiency.

The OSS/BSS are suites of products and solutions that work together cohesively to promote successful digital transformation. The components are tightly pre-integrated end-to-end, yet loosely coupled to leverage the benefits of modularity. Ericsson delivers cloud-native solutions supported by open application programming interfaces (APIs), accompanied by a comprehensive range of services designed to advise, build, operate, and ensure. The portfolio offers telecommunications-grade products and solutions with high availability, geo-redundancy (GR) as well as proven resiliency, reliability, and security.

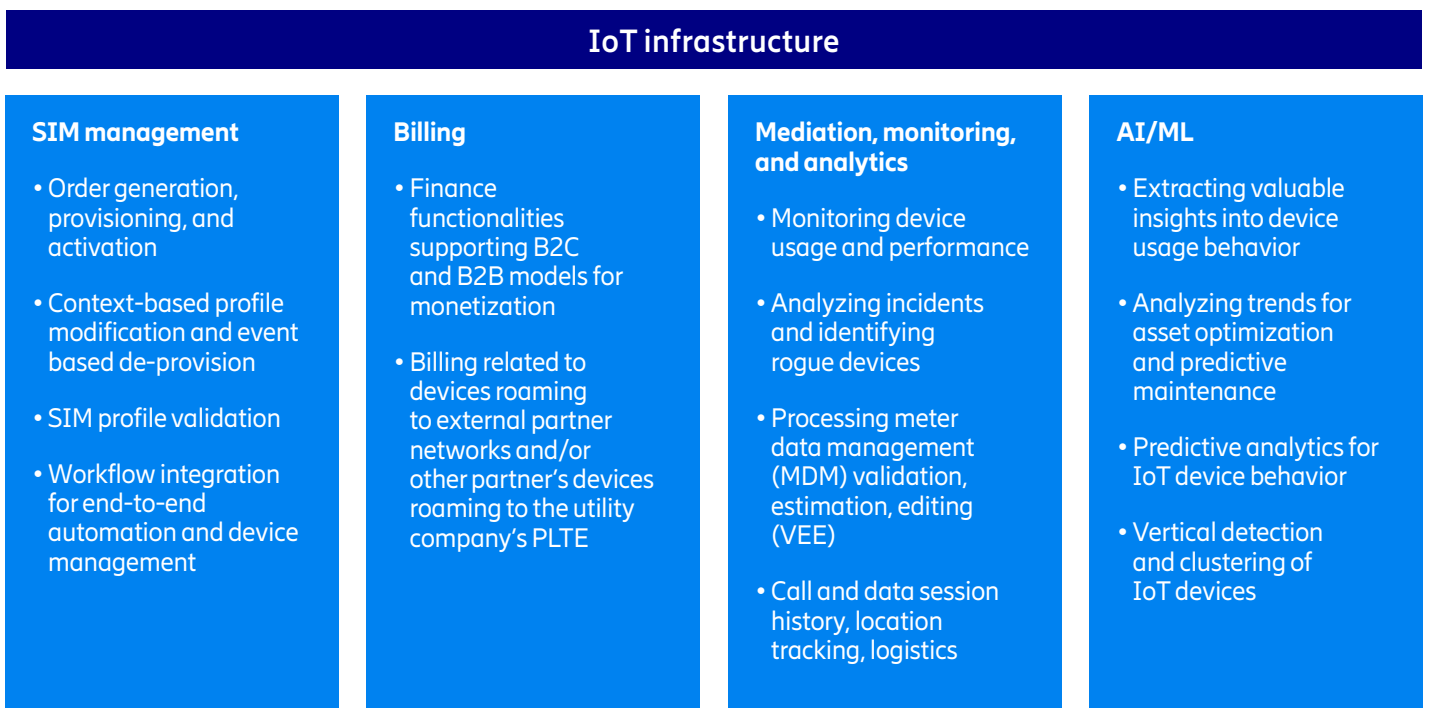


## 03

# OSS/BSS in IoT infrastructure management

IoT is a critical investment for utilities. It enables digital transformation in multiple areas by supporting processes, such as generation, transmission, distribution, workforce enablement, and metering, as shown in the figure below. This section explores the operational and management requirements of IoT devices in this sector. For example, SIM and device provisioning, analytics, billing, policy management, and network operations need to be automated when tens of thousands of advanced metering infrastructure (AMI) are added to the network. OSS/BSS solutions can help utilities address the requirements listed and grouped in Figure 3.

Figure 3: OSS/BSS requirements for IoT infrastructure



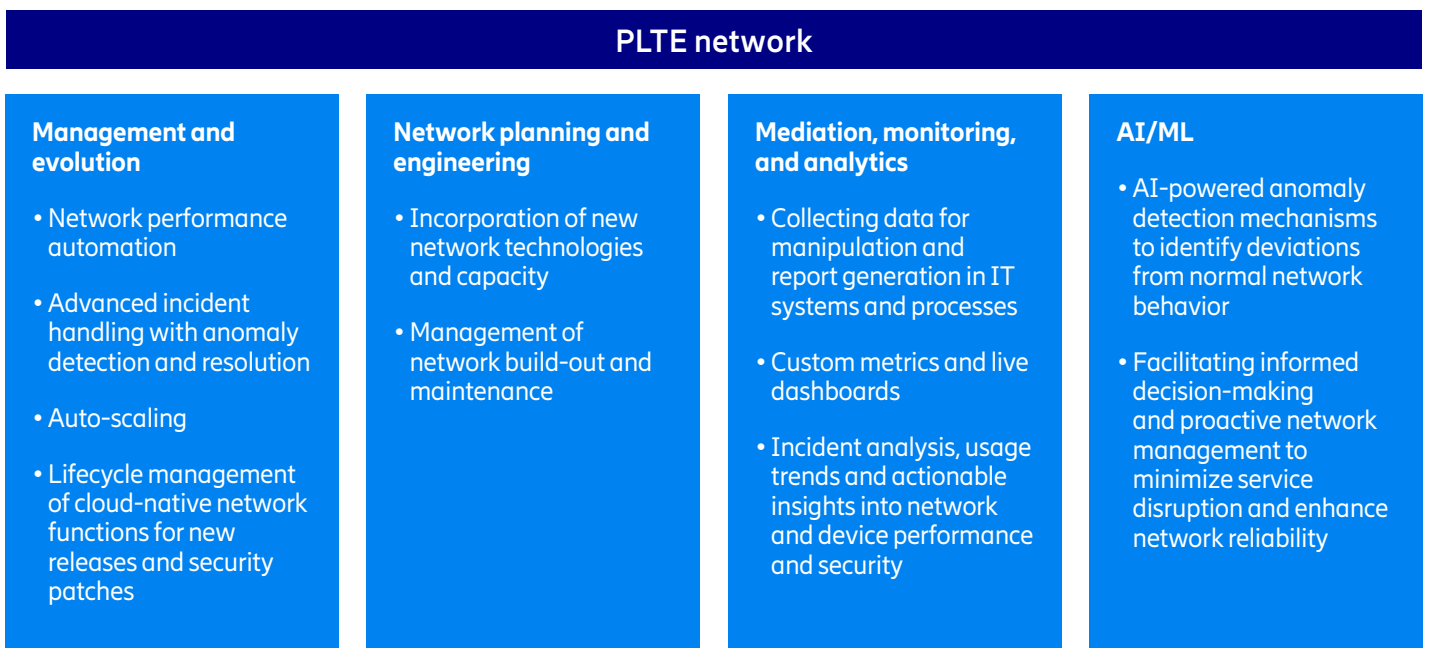


# 04

## OSS/BSS in PLTE management

PLTE networks enable utilities to manage communications and connections across various IoT devices in a secure and reliable way. They need OSS/BSS tools to fully leverage the capabilities of the PLTE network and attain operational agility by navigating new complexities and enabling automation to replace manual touchpoints. Figure 4 shows the operational and management requirements that utilities need to consider when managing PLTE networks.

Figure 4: OSS/BSS requirements for PLTE



## 05

# Overview of Ericsson's solutions for utilities

Ericsson offers cloud-native solutions that help utility companies improve how they monitor, control, and optimize their operations. As they adopt an increasingly data-driven approach, combining integrated systems is critical for driving agility and operational efficiency. The table below summarizes Ericsson's products and solutions that support utilities to meet IoT infrastructure and PLTE network requirements.

Domain	Requirements	Ericsson product/solution
IoT infrastructure	SIM management	Ericsson Order Care, Ericsson Catalog Manager, Ericsson Dynamic Activation, and partner solution
	Billing	Ericsson Billing
	Mediation, monitoring, and analytics	Ericsson Mediation, Ericsson Expert Analytics
	AI/ML	Ericsson Expert Analytics
PLTE network	Management and evolution	Ericsson Virtual Network Function Manager, Ericsson Network Manager
	Network planning and engineering	Ericsson Adaptive Inventory
	Mediation, monitoring, and analytics	Ericsson Mediation, Ericsson Expert Analytics
	AI/ML	Ericsson Expert Analytics

**Ericsson Order Care** automates product and service order management through validation, decomposition, routing, status tracking, and fallout management. It also facilitates order submission by sending SIM information to one or more SIM vendors. Device-specific SIM attributes can be modeled in Ericsson Catalog Manager.

**Ericsson Dynamic Activation (EDA)** can provision SIMs on the core network, performing individual or bulk SIM provisioning requests submitted from Ericsson Order Care.

**Ericsson Mediation** collects, transforms, and distributes data from the network, IoT devices and IT systems for a range of purposes, such as charging and billing, service assurance, fraud detection, and statistics. Usage and network data can be processed in various ways to extract key performance indicators (KPIs), location, and service quality. Processed data can be reported, stored, distributed, presented in live dashboards, and used to generate notifications and trigger service requests based on specific conditions. Ericsson Mediation enables the tracking of the start and stop of data sessions, as well as other identifying information. It collects this data from multiple nodes in the Ericsson Core to create dashboards that provide usage information in the core network. This data is utilized by Ericsson Billing or the utilities' billing system.

**Ericsson Expert Analytics (EEA)** is an end-to-end, real-time analytics and troubleshooting solution. It gathers multi-domain—RAN, core, and transport—network data effectively and correlates them at a network and device level, providing comprehensive insights into problems, as well as the devices and users that are affected by them. With AI/ML capabilities, EEA offers instant actionable insights for overseeing both network and IoT devices across varied technologies, ensuring IoT service monitoring in real time. EEA utilizes AI algorithms to continuously track network data, detecting and proactively flagging anomalies in real time. EEA can provide access to rich information, which can be filtered by network technology, service type, and location for reporting and service-level agreement (SLA) management purposes. EEA helps identify the protocols used by different devices, commonalities in incidents, and potential unauthorized access to the network.

**Ericsson Virtual Network Function Manager (EVNFM)**

provides lifecycle management support for cloud-native network functions (CNFs) in the PLTE network.

**Ericsson Network Manager (ENM)** is a unified network management system with universal applications for all network technologies. ENM enables seamless and efficient operation between networks and network layers and provides a set of unified applications and tools to securely manage radio access, transport, and core networks.

**Ericsson Adaptive Inventory (EAI)** is a platform for planning, designing, assigning, rearranging, and documenting the inventory of complex, multi-technology physical and logical resources and services from Ericsson and third-party communications service providers (CSPs). EAI also enables fast troubleshooting by visualizing layers from service to resource and provides impact analysis to quickly determine scale.

**Ericsson Billing** offers resource management, collection, rating, and billing functionalities. It supports billing for all usage, including one-time and recurring charges for a defined period. Ericsson Billing generates business documents in user-friendly and readable formats, such as HTML or PDF, and supports LTE/IoT as well as 5G technologies. This is particularly useful for tracking usage across various operating companies within a utility. It also facilitates accounting for network usage between different businesses and municipalities that utilize a network hosted by a utility.

# 5.1

# Evolution to 5G

5G-enabled Ericsson OSS/BSS solutions are poised to support the device ecosystem's evolution toward low latency while preserving utilities' investments. 5G private networks facilitate slicing business cases, allowing for tailored configurations based on specific requirements. For instance, certain devices, such as line monitoring equipment, need low latency and instant network response times, while others, such as smart meters, can operate with higher latency and transmit data at preset intervals. Additionally, certain devices may have elevated security needs.

The solutions within Ericsson's portfolio seamlessly support 5G private networks and the IoT infrastructure. To effectively deploy new business cases centered on 5G, network slicing, and edge computing, robust coordination is essential for planning, designing, and implementing services.

The Ericsson Service Orchestration and Assurance platform offers:

- end-to-end lifecycle management of network services from design, ordering, and fulfillment to assurance
- multi-domain network slice orchestration, including RAN, core, and transport networks
- common topology services for the complete visibility of network statuses and resources



# 06

## Data collection and processing beyond monitoring with AI and ML

Data monitoring offers a comprehensive perspective on the environment under observation, drawing insights from various sources. In contrast, sensor data provides raw measurements or detailed, granular data about the physical environment by gathering information directly from the devices.

Collecting data from IoT sensors and generating actionable reports are crucial for utilities to harness IoT technology. This process involves various scenarios, such as generating alerts based on sensor data. For instance, IoT sensors that monitor obstruction lighting could detect a failure and trigger a repair alert based on the collected data. In other cases, more advanced techniques, such as AI and ML, may be required:

1. **Predictive maintenance:** By analyzing data from IoT sensors monitoring equipment health and performance, AI/ML algorithms can predict when critical assets, such as transformers, generators, and pumps, will likely fail.
2. **Grid and asset performance optimization and control:** AI/ML algorithms can optimize grid operations and the performance of utility assets, such as turbines, pumps, and valves, by reporting adjustments to parameters, such as voltage levels, power flow, and distribution routes based on real-time data from IoT sensors.
3. **Fault detection and localization:** AI/ML models can analyze data from IoT sensors to automatically detect and localize faults in the utility infrastructure, such as power lines.

To improve data mediation capabilities, Ericsson offers a centralized tool for data collection to utilities and service providers. By combining Ericsson Mediation with Ericsson Expert Analytics, utilities have access to a comprehensive solution not only for monitoring network and IoT infrastructure but also for supporting AI/ML business cases that drive operational efficiencies through IoT sensor data. With the progress of Ericsson's solutions, the current strategy involves leveraging EEA for network and IoT monitoring, expanding its functionality to be adaptable for data collection from sensors, and implementing analytics capabilities.

# 07

## Conclusion

Improved coordination helps utilities deploy flexible and scalable solutions to keep pace with the evolving energy infrastructure and support the shift to renewable energy and the digitalization of power grids. Managing the IoT infrastructure is crucial for utilities using PLTE. To make PLTE and IoT infrastructure management more efficient and reliable, they need to coordinate various network support systems and OSS/BSS.

Utilities can achieve immediate gains by automating workflows currently managed with spreadsheets. Prioritizing tasks, such as SIM management and the monitoring of PLTE networks and IoT devices, and implementing AI/ML technologies allow utilities to reduce the operational costs of network and grid management and prepare for the transition to 5G technology.

Ericsson's pre-integrated cloud-native solutions—founded on open standards—enable utilities to customize, adapt, and seamlessly integrate these solutions into their existing or new tools within the automation ecosystem for PLTE networks and IoT devices.

Ericsson remains committed to cooperating closely with utilities and working together with customers and partners to keep up with the evolving utility solutions and meet emerging business cases and requirements.

# 08

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# 09

## Author



### **Alka Srivastava**

Business and Operations Support Systems  
Solution Manager, Ericsson North America

Alka specializes in defining the integration of operational and business support solutions to optimize telecom operations, drive digital transformation, and modernize legacy systems. Her focus is to help customers innovate, achieve operational efficiency, and reduce total cost of ownership.

