

The logo for Druid, featuring the word "Druid" in white text on a black, tilted rectangular background.

**Druid**



NEARBY  
COMPUTING



# Connecting the Grid: How 5G Enhances Electrical Substation Operations

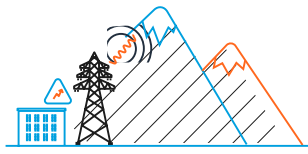
Automation, Orchestration & Management at your fingertips

## Introduction

Electric substations play a crucial role in the power distribution infrastructure. Energy suppliers operate across various fields and locations, frequently managing assets in remote areas lacking onsite personnel. Improved security and monitoring at the edge are critical in the energy and utilities sector for multiple reasons, including facilitating real-time monitoring, reduced latency, and better security measures. However, they face several challenges that can impact their efficiency and reliability.

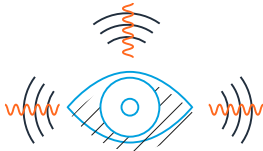
To address these challenges, energy suppliers could leverage edge computing technologies that enhance real-time surveillance, reduce latency, and improve security. These advancements are critical for maintaining the reliability and efficiency of energy management systems.

# Challenges



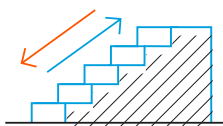
## Coverage and Connectivity

Due to geographical distribution, often in remote areas, electric substations face the challenge of maintaining robust connectivity. This is essential for facilitating communication and real-time data transmission across the power distribution infrastructure, which is critical for monitoring and control of the electrical grid maintaining reliability and efficiency of the power distribution network.



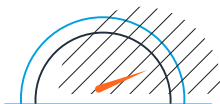
## Central visibility and management

Due to the remote & dispersed nature of substation, it is difficult for providers to have a centralised view and control over operations on a per-site basis. This may lead to issues such as lack of real-time data, inconsistent operations, poor visibility of complex asset management and resource-intensive operations.



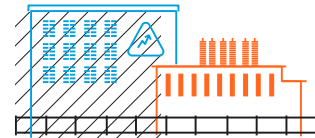
## Scalability

Cloud-based solutions may face scalability limitations when dealing with thousands of distributed electric substations.



## Response Time

Decisions in substations must be made quickly to prevent failures or interruptions in the power supply. Latency in data transmission negatively affects swift decisions on operational management, lack of real-time data increases response time which impacts the reliability of the grid and potential safety hazards.



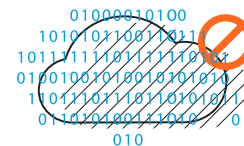
## Operational inefficiency and ageing infrastructure

Traditional electric substations, often hampered by outdated copper-based control systems that are prone to failures and increase maintenance costs. In addition outdated infrastructure poses challenges in monitoring the health and safety of equipment. Typically, grid operators must conduct physical inspections to identify and resolve issues.



## Privacy & Security

The increasing connectivity of substations exposes them to cyber threats that can disrupt operations. Data privacy is crucial for security, compliance, and efficient collaboration among substations within a network. As the substations are interconnected within a larger network, central management becomes necessary to maintain visibility and control across the networks.



## Operational Costs

Transmitting large amounts of data to the cloud can be costly in terms of bandwidth and resources. Additionally, the cloud is not always the best option for applications requiring low latency.

Integrating digital technologies and utilising **5G for high-speed** communications can significantly enhance grid reliability, increase worker safety, and reduce power outages. By replacing old copper wires with **5G private networks**, substations can leverage automated and real-time operations through **the Internet of Things (IoT), virtualization, and AI**.

Additionally, **edge computing** plays a crucial role in this transformation. **Edge computing** involves processing data at the edge of the network, closer to the devices generating it. This approach reduces latency and allows for faster decision-making. For example, sensors at substations can process data locally, identifying anomalies or potential issues without relying on distant servers.

As a result, **edge computing** improves the quality and quantity of data available, enabling more effective decision-making in both routine and emergency operations.

## The joint solution

The implementation of **5G Private Network (5G PN)** in an electrical substation is complex and requires specific tools to manage and automate the various infrastructures, network functions and applications. To make a viable solution, a robust and easy-to-use private cloud-native core is paired with a flexible and scalable solution that can orchestrate everything from a single site all the way to a widely distributed network, preferably from a single interface.

This document illustrates how to implement a **5G PN** in an electrical substation and enable the following use cases: video analytics and drone inspection with **Raemis™, Druid Software's 5G core, & NearbyOne's** automation platform.



Druid

### Druid's RAEMIS™ 5G core network platform:

**Raemis™** is a set of cellular software assets optimised for business critical use cases. **The platform harnesses 5G, 4G, 3G, 2G and Wifi radios** from any vendor to implement standalone cellular core network solutions. It also integrates with mobile network operators using standard interfaces giving access to all of the radio resources of these operators. **The Raemis™ platform** adheres to **3GPP** standards and stands out for its flexibility, slicing capabilities, interoperability, and simplified deployment and testing options, making it a compelling choice for private network deployments. **Druid's technology** enables organisations to deploy private networks on-premises, in the cloud, or at the edge with enhanced connectivity, robust security, exceptional reliability and cost-efficiency.



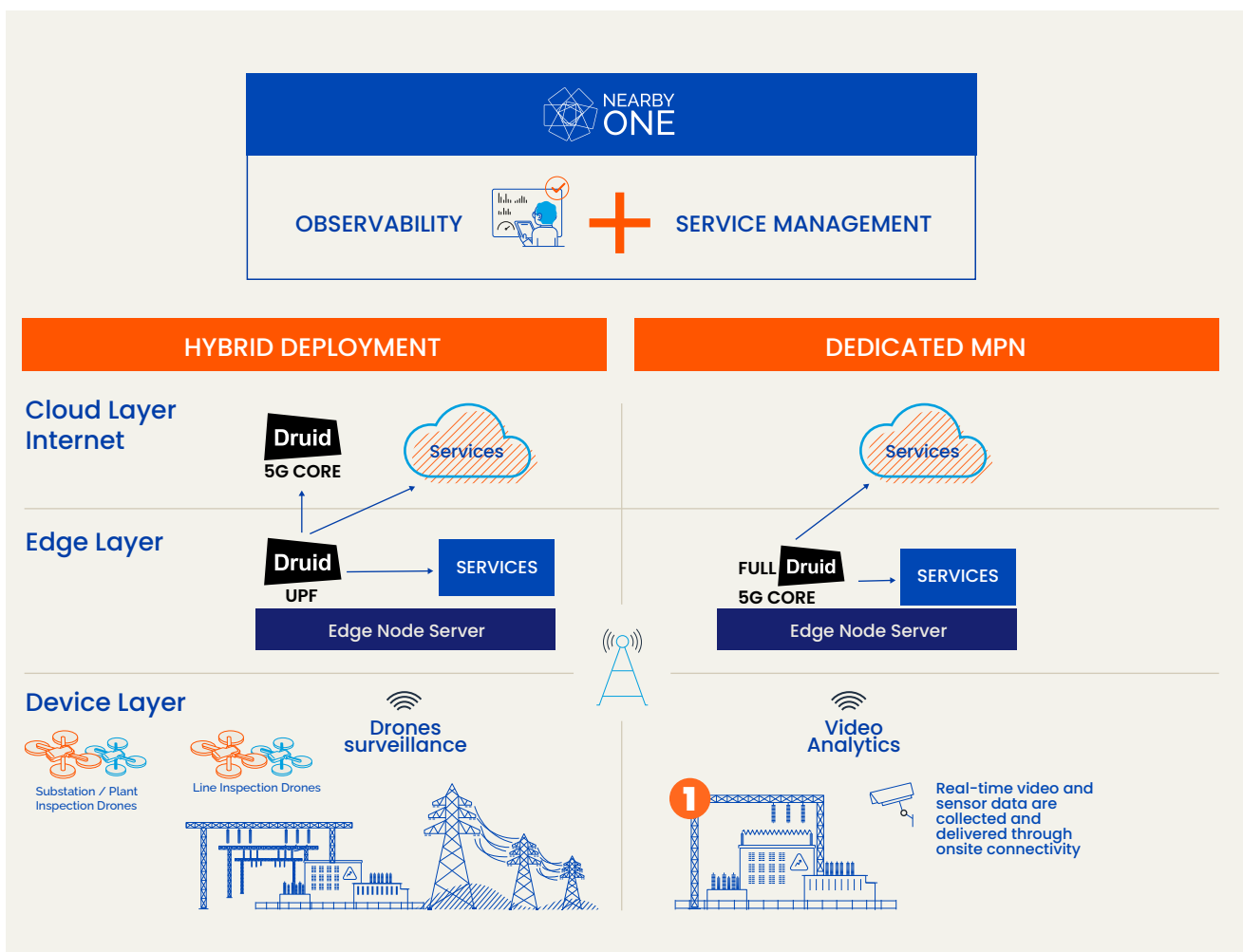
### The automation platform, NearbyOne

will deploy **Druid's core** in different environments, from any hyperscaler infrastructure to private clouds and on-premises, ensuring a fully streamlined Day-0 deployment and automated lifecycle management, saving up to 90% of operation time and minimising operation costs. In addition, **NearbyOne** orchestrates **Druid's** core slicing allowing multiple network slices to be created on top of a common physical infrastructure. Each slice can be allocated based on the specific needs of the applications, use case, or customer. Furthermore, thanks to the automation, **services on the MPN** can be exposed, or not, to specific slices automatically. That is, when a new slice is added, the orchestrator will ensure to expose all those services bound to all slices plus those bound to the new slice. Finally, **Druid's core, UPF, and slices** can all be managed from the same dashboard used to manage services and infrastructure; providing a single-pane of glass to manage the entire **MPN**.

## Value proposition

- The joint solution between **Druid Software** and **NearbyOne** offers the most complete, flexible, economic and reliable **5G private connectivity**, giving access to edge computing application management in minutes.
- By deploying **Druid's 5G Core with NearbyOne** orchestration platform, enterprises can significantly reduce costs through automation which helps to complete tasks in minutes significantly reducing required resources. This partnership gives end-users numerous advantages **including Druid's streamlined Day-0 deployment and NearbyOne's automated lifecycle management**. Together these features result in up to a 90% reduction in operation time ensuring swift and automated deployment and management of the 5G Core.
- Due to the nature of the solution, operators can also pivot to provide value-added services from all locations leveraging **the 5G private network to communities** located around all the distributed sites. These can be for example fixed wireless access services (last mile solutions) integration of smart metering solutions, backhauling services for local authorities, and many other services, allowing operators to generate extra revenue from their existing infrastructure.
- Energy suppliers seeking private connectivity and services at their production sites will benefit from the most powerful and reliable yet compact **Private 5G solution**, deployed in minutes instead of weeks, and will gain immediate access to managed **Edge Computing applications**, enhancing efficiency and productivity.

## Solution Architecture





## Features description



NEARBY  
COMPUTING

The solution can be deployed with **Red Hat** or any other **Container Platform Management**.

- Manage the infrastructure, the network functions, and services applications from **a single-pane of glass**.
- Rich marketplace with a pre-existing catalogue of integrated applications and **Druid's solutions available** out of the box.
- **Service Applications intent driven orchestration:** such to automatize overall solution deployment independently from the specific service applications KPIs and needs.
- Distributed telemetry, log, and tracing collection from multiple sites.
- Vendor agnostic and integrated support for **hyperscalers, VMware vSphere and vCD, Red Hat Advanced Cluster Management for Kubernetes, SUSE Rancher, Sylva, Wind River Studio Cloud Platform and more**
- **RBAC:** Unified **RBAC** framework delivers full multi-tenancy.

**Druid**

**Druid's Raemis™ 5G core network platform:**

- Intuitive Management Interface which makes installing and maintaining a private cellular network as easy as setting up Wifi. **The Raemis™ GUI uses the Raemis™ RestAPI** to access the core software and 3GPP components of the network, hiding the complexity of the 3GPP network, enabling an IT manager to perform complex tasks in a few clicks.
- **REST API integration** enables a myriad of value added applications to enhance the private cellular network.
- **The Raemis™ platform** supports & enhances the slicing concept directly **to Enterprise and Edge Private Networks**. It enables management of these "enterprise slices" with an intuitive web interface that can be operated by any qualified **IT technician**.
- **The Raemis platform** can scale up and down to a **single eNodeB** device and a handful of users all in a single VM that has a small computing and memory footprint.
- **Raemis supports** distributed architectures which can be deployed in cloud native environments with central management of multiple edge sites. This enables your network to benefit from **the Raemis™ MEC** and redundancy capabilities.

## Benefits

The convergence of **5G private networks and edge computing as enablers of video analytics, and drone surveillance use cases, transforms digital substations into intelligent, secure, and efficient hubs** for managing our evolving energy landscape.

### 01. Enhanced Surveillance and Security

- 01.1. Video analytics processes live camera feeds, detecting anomalies, intrusions, or equipment malfunctions.
- 01.2. 5G ensures low-latency communication, allowing real-time video analysis.
- 01.3. Drones equipped with cameras provide visual surveillance, covering large areas efficiently.

### 02. Predictive Maintenance

- 02.1. Edge computing processes data from sensors and cameras within the substation.
- 02.2. 5G facilitates rapid transmission of maintenance alerts.
- 02.3. Drones perform visual inspections, identifying potential issues before they escalate.

### 03. Emergency Response and Situational Awareness

- 03.1. During emergencies, video analytics can identify critical situations (e.g., fires, leaks, unauthorized access).
- 03.2. 5G enables real-time communication between drones, control centers, and field personnel.
- 03.3. Drones equipped with thermal cameras and LIDAR (light detection and ranging) provide situational awareness.

### 04. Reduced Downtime and Improved Efficiency

- 04.1. Video analytics helps identify failing components early, reducing downtime.
- 04.2. 5G private networks ensure seamless communication for remote diagnostics and maintenance, as well as central visibility.
- 04.3. Drones perform routine inspections, optimizing asset management.

### 05. Scalability and Flexibility

- 05.1. Edge computing allows for flexible deployment of video analytics applications.
- 05.2. 5G networks can scale to accommodate additional devices and surveillance cameras.

### 06. Integration with Smart Grids

- 06.1. Digital substations, powered by 5G and edge computing, seamlessly integrate renewable energy sources.
- 06.2. Drones monitor solar panels, wind turbines, and other distributed energy resources.

### 07. Single Pane-of-Glass Management

- 07.1. View the entire operation via a single dashboard, allowing the ability to manage all operations centrally and at a granular level.
- 07.2. Manage all operations per site, combining infrastructure, communications via 5G private networks as well as the applications required per substation.





NEARBY  
COMPUTING

## About NearbyComputing

The company was founded in 2018 and operates globally from its headquarters in Barcelona, Spain as **global leader in Edge Orchestration**.

Nearby Computing has been Named a **2023 Gartner Cool Vendor in Edge Computing** and helps Telcos & Enterprise customers unleash the potential of Edge Computing through Orchestration and Automation of MEC and 5G.

NearbyOne is an orchestration platform that goes beyond market standards to manage all tiers of the network, from Cloud and Data Centre to Edge, from a single pane of glass. Using a cross-domain approach that is fully agnostic, NearbyOne manages hybrid networks at scale through domain-specific as well as comprehensive end-to-end orchestration. The solution covers all critical elements of deployment automation - from the initial Edge node provisioning to application on-boarding, to lifecycle management and LA monitoring.



C/Tuset 32, 2ª planta  
08006 Barcelona  
+34 936 550 050

[info@nearbycomputing.com](mailto:info@nearbycomputing.com)

Gartner

COOL  
VENDOR  
2023

Copyright © 2024 Nearby Computing, S.L

Druid

## About Druid

**Druid Software**, founded in 2000 and headquartered in Ireland, is the industry-leader in private cellular network technology, and provides enterprise-focused core network platform to advance connectivity and enable simplified private network management.

For almost 25 years, customers and partners worldwide have chosen **the Raemis™ platform to connect applications, devices and radios benefiting from enhanced security, performance, and cost efficiency**. The Raemis™ platform is in use today by ISPs and Enterprises for mission-critical environments all over the world.

**Druid's technology** enables solutions in different areas including **Enterprise Communications, IoT, Mobile Edge Computing, Neutral Host and Public Safety**.

