



K^eLVN IoT Wireless Sensing & GSM Hub

Electrical Substation Condition Monitoring

Captec developed its KeLVN low-power wireless monitoring platform for retrofit deployment across more than 520 substations and approximately 11,000 sensor points. Following the three-year programme, work is being prepared for an initial phase of approximately 2,000 units, subject to Ofgem approval, with a potential further phase of around 4,000 units being developed for future submission.

The Customer

A UK electricity distribution network operator (DNO) serving approximately five million people across North West England.

Responsible for thousands of substations and network assets, the organisation invests in smarter infrastructure to improve network visibility, reliability, safety and long-term asset management while supporting the UK's ongoing transition to net zero.



The Challenge

- Legacy substations pre-dated remote monitoring, providing limited visibility of operating conditions without periodic inspection
- Electrification, EV adoption and rising temperatures increased loading and the need for equipment monitoring
- With no suitable commercial platform, existing assets required a non-intrusive retrofit enabling rapid, all-weather operation and simple sensor mounting
- The system had to withstand -20°C to $+85^{\circ}\text{C}$, operate for 5 years on battery power and communicate wirelessly through a local hub

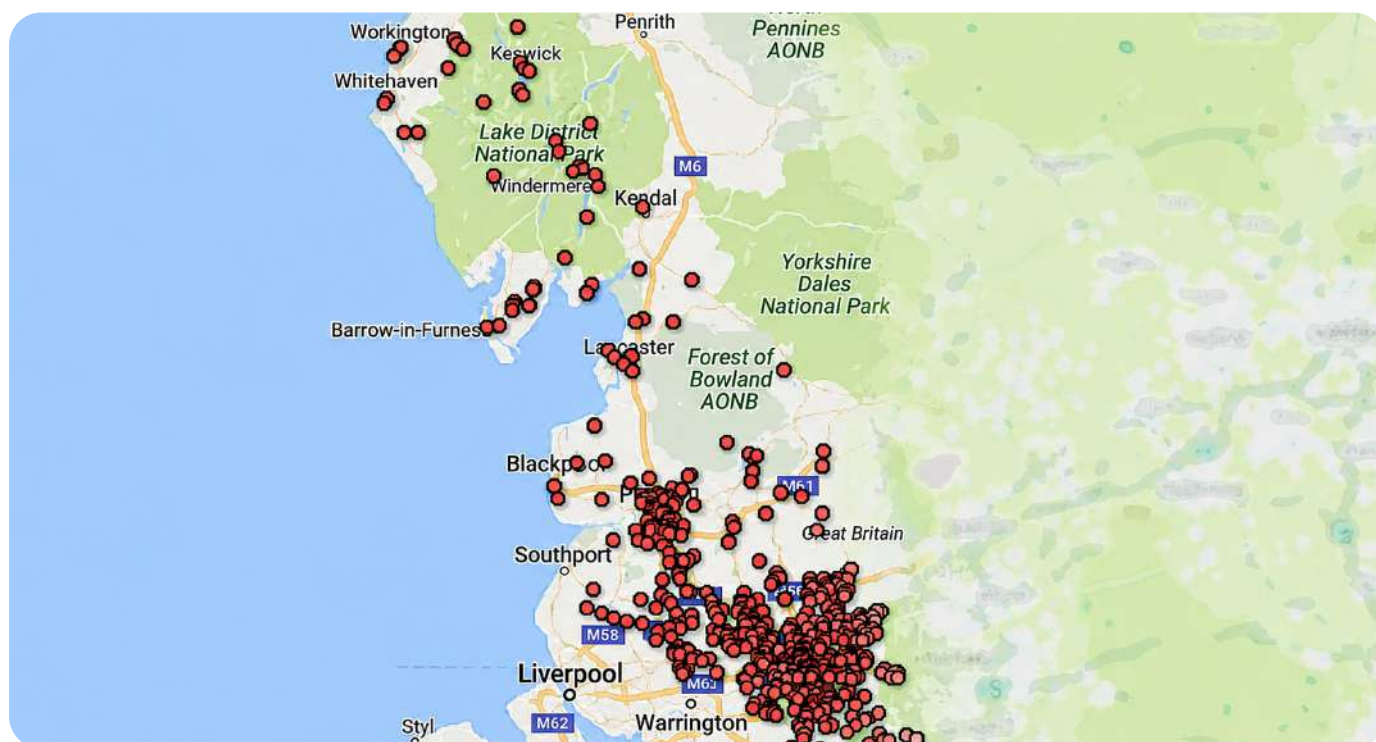
The Solution

- Captec's K°LVN platform utilises a highly efficient hardware and software stack, minimising power consumption, enabling low-power sensors and a local wireless hub to achieve a minimum 5-year battery life
- Wire-free sensors provide accurate, non-intrusive measurement of transformer and ambient temperatures, voltages and currents, with support for additional sensor types
- Magnetically mounted, IP67-rated sensors measure transformer surface temperature through the mounting interface, enabling rapid, non-intrusive installation, with cable-tie mounting available for other sensor locations
- The hub incorporates optimised mobile cell-site selection to transmit collected data to the customer's central monitoring platform



The Outcome

- ▶ A measurement testing programme over 3 years demonstrated remote monitoring across more than 520 existing substations without replacing legacy infrastructure
- ▶ Approximately 11,000 sensor points provided daily substation parametric data, supporting the modelling and characterisation of substation performance to help identify early indicators of potential failure
- ▶ Following the testing programme's success, the platform architecture will be rolled out to replace obsolete components and support continued deployment
- ▶ Work is being prepared for an initial phase of approximately 2,000 units, subject to Ofgem approval, with a potential further phase of around 4,000 units being developed for future submission
- ▶ Custom training was developed to help onsite teams deploy and commission the system efficiently as the rollout expands



The customer manages multiple substations across a diverse range of environments throughout the North West of England.

CAPTEC

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