Using VisNet® Hubs to identify and locate large unusual loads on LV networks

Background

Most people don't give low voltage (LV) networks a second thought until they lose supply. There are even some schools of thought that believe nothing really happens on LV networks, and as such they are deemed to be boring. This is not the case. The introduction of monitoring devices provides a window into the world of LV networks. We have observed a myriad of network events and phenomena occurring on a day-to-day basis that we can now detect and visualise. This ultimately provides us with a much better understanding of these networks, which is crucial moving forward as LV networks take on more responsibility in the form of:

- Embedded generation (domestic photovoltaics)
- Electric vehicle charging
- Heat pumps
- Energy storage

EA Technology have developed the VisNet Hub monitoring platform, which provides measurements and insights into LV distribution systems. The VisNet hardware is complemented by a software package, enabling network operators to manage their LV networks in real-time. Alarms, historical data, and the dynamic status of equipment for the entire LV network can be managed from one web application. In this case study, we show how the VisNet Hub can be used to provide visibility of electrical networks by detecting unusual loads at substations.

Our Approach

During a routine substation inspection, it was noticed that regular fluctuations were occurring on the transformer load ammeters. In fact, the needles of these ammeters were described as "bouncing every 10 seconds or so", which piqued the interest of the substation inspector. As a result, a VisNet Hub was installed to ascertain which feeder was experiencing the load fluctuations and to hopefully discover the route cause.

There were a number of concerns expressed, not least that there were vulnerable customers fed from this substation. In addition, there was also concern about tired LV fuses leading to reduced network resilience and ultimately loss of supply to customers. There were a range of different customers connected to this substation, including a small industrial estate, a large scrapyard with heavy machinery and a domestic housing estate.

Once installed, the VisNet Hub was able to continually monitor network data, and by configuring the waveform capture settings, we were able to automatically measure the number of irregular current events; this is graphed in Figure 1.

Within 48 hours, several hundred abnormal waveforms had been captured linked to phases L1 & L2 on network feeder No.4. Phase L3 represents nominal current values for that network for comparison. From analysis, the waveforms were being captured every 10 seconds (on average) and the peak load drawn was in excess 900 A, but only for very short durations (less than 1 second). These events occurred exclusively during the working week, with no activity over the weekend. With these insights at hand, we could deduce that the source of disturbance was either the scrapyard, or one of the companies on the small industrial estate which were fed of the same circuit.

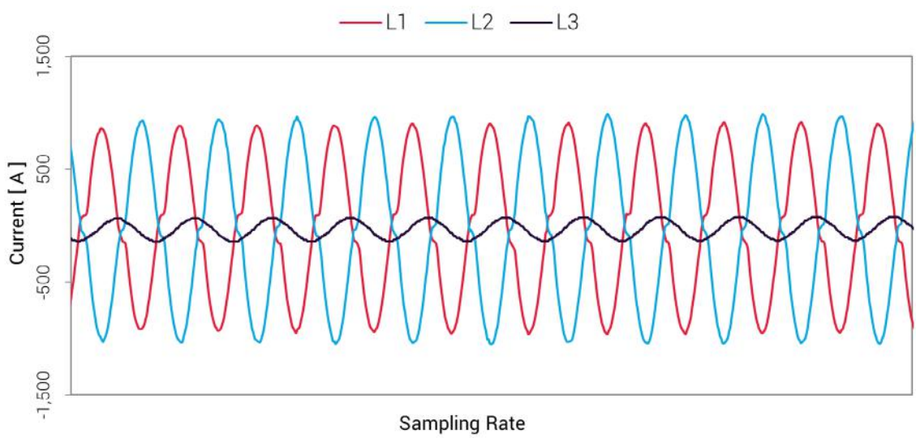


Figure 1: The current waveform of feeder 4 captured by VisNet. The "L" labels denote the feeder phase measured.

By a process of elimination and discussion with the relevant parties, we discovered that a small metal container manufacturer was the cause of the 2-phase unusual load on the network. The manufacturer was using a spot welding machine for attaching the metal handles onto the metal container lids, as shown in Figure 2.

Although no fuses had blown, the network is being continuously monitored and has been put on a watch list to check for tired fuses. In addition, a fuse-blow application has also been deployed to detect and notify of any fuse operation.

Client Benefits

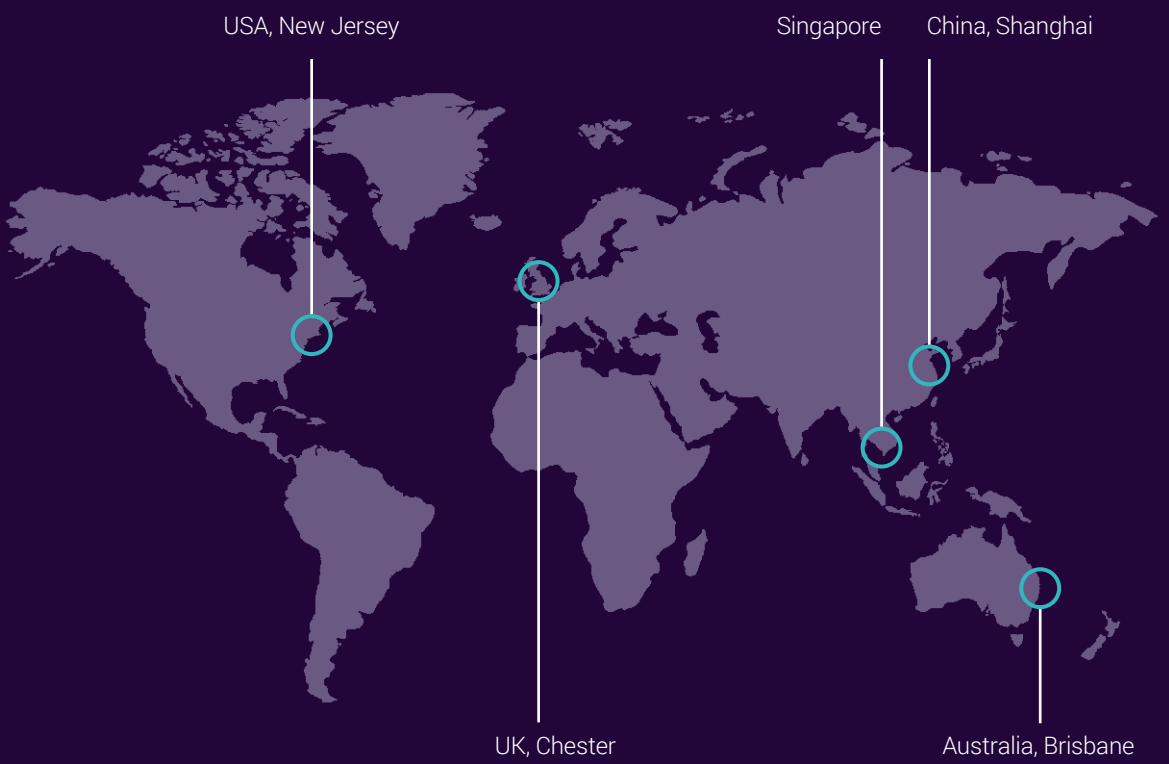
Drilling down into the data provided by the VisNet Hub can bring important insights with valuable benefits, as outlined in this case study. Visibility of the LV network, coupled with the expertise of industry experts, provides actionable insights that enable network operators to respond appropriately and promptly to network issues.

The VisNet Hub will provide LV network operators the visibility required to manage and understand situations like these. If you would like to know more about the VisNet Hub and its many capabilities, please click here.

Figure 2: A spot welding machine used to weld handles on to metal lids

Global Footprint

At EA Technology we specialise in asset management solutions for owners and operators of power network assets.



Founded in 1966 we have over 50 years' experience in the industry and 5 regional offices around the world to support our global customer base.

We work with a lot of our clients on a long-term basis to help them safeguard their power networks.

We advise our clients on strategy and implementation of a range of technology solutions to manage power assets, delivering maximum life and minimise cost.

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Safer, Stronger, Smarter Networks

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