Using VisNet® Hubs to investigate power quality issues

Background

Our everyday lives are dominated by a broad range of electronic devices, each of which requires a steady source of power to reliably operate. Power quality refers to the characteristics of this electrical power. Modern day electricity distribution systems, that directly supply homes and industries, are run with currents/voltages at a nominal magnitude, frequency and in a clean sinusoidal waveform. Any unwanted irregularity of these three characteristics is considered a power quality issue.

Poor power quality can affect and damage commercial and domestic electronics, leading to frustrations for customers and penalties for network operators. Such issues have many causes, from brutal acts of nature, to faulty network, to simply switching large loads on and off.

This case study shares an example of how VisNet Hubs can be used to investigate power quality issues. The VisNet Hub monitoring platform provides measurements and insights into low voltage (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.

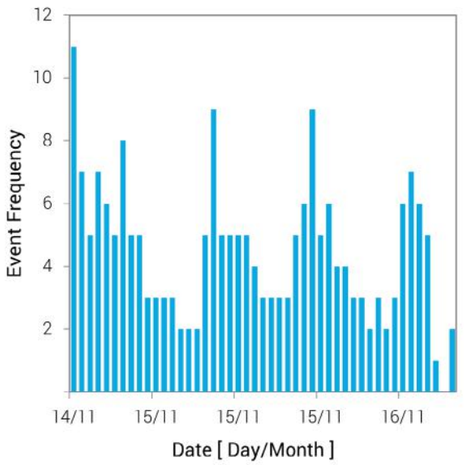


Figure 1: The frequency of irregular current events captured by the VisNet Hub.

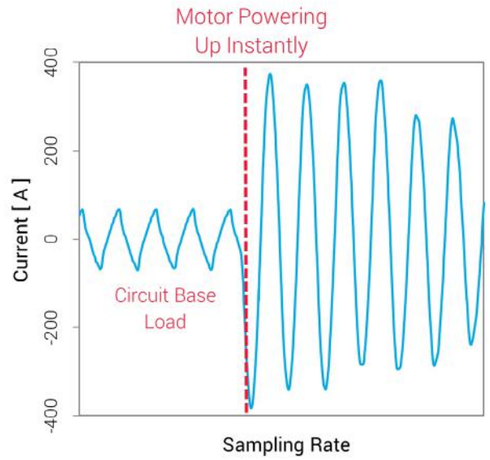


Figure 2: The network current before and after the motor powered up with a direct on-line setting (instantly). This waveform coincided with the events shown in Figure 1.

Our Approach

In this example, a major network operator was contacted with a complaint by one of their vulnerable customers. Over several weeks they experienced dimming lights on a regular basis. This was affecting the wellbeing of the customer, as they spent most of their day at home due to illness.

Traditional power quality monitoring equipment was installed but discovered no evidence that power quality standards had been breached. Further to this, the network was reconfigured to remove a large local commercial plant off supply; this again failed to resolve the issue. VisNets were then installed to assess the situation.

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.

By examining the data, we were able to determine that the incident affecting the network occurred routinely (approximately 5 times an hour on average). We also learned that this was a three-phase issue. By inspecting the current waveform (shown in figure 2), we found that the events coincided with an inrush of current (typically five times nominal values), which is commonly associated with the start-up of large machines. From Figure 1, we can also see that the peak current values steadily decrease with time. This is characteristic of a motor powering-up and then reaching steady state.

With these insights at hand, the team took a closer look at the cable records and identified a previously overlooked water pumping station connect to the LV network. The network operator, with help from EA Technology, was then able to identify and locate the water utility to carry out repairs within 24 hours. We found that the issue originated from a pump motor powering up. The "soft start" mechanism designed to limit the start-up current had failed to operate correctly and instead reverted to direct on-line starting; this was causing a large start-up current to be drawn leading to the dimming of lights.

With the VisNet installed, we can continuously monitor the pumping station to ensure that current bursts are within tolerable limits. Figure 3 shows the current waveform after repairs had taken place. As you can see, the peak currents reached are less than previously recorded with no detrimental effects on domestic lighting.

Client Benefits

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 situations like these. If you would like to know more about the VisNet Hub and its many capabilities, please click here.

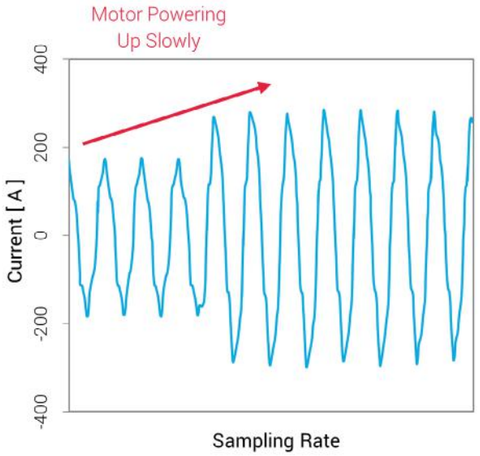
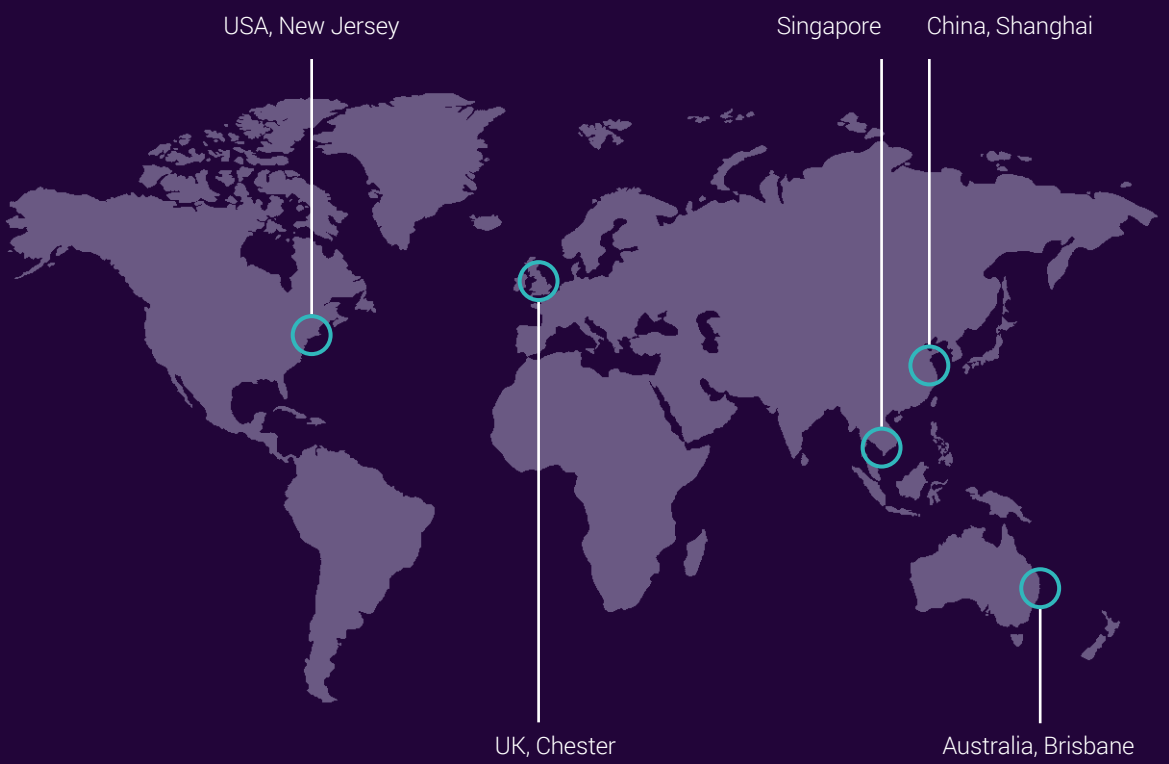


Figure 3: The network current before and after the motor powered up with a soft start setting (slowly).

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.

ea technology

Safer, Stronger, Smarter Networks

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