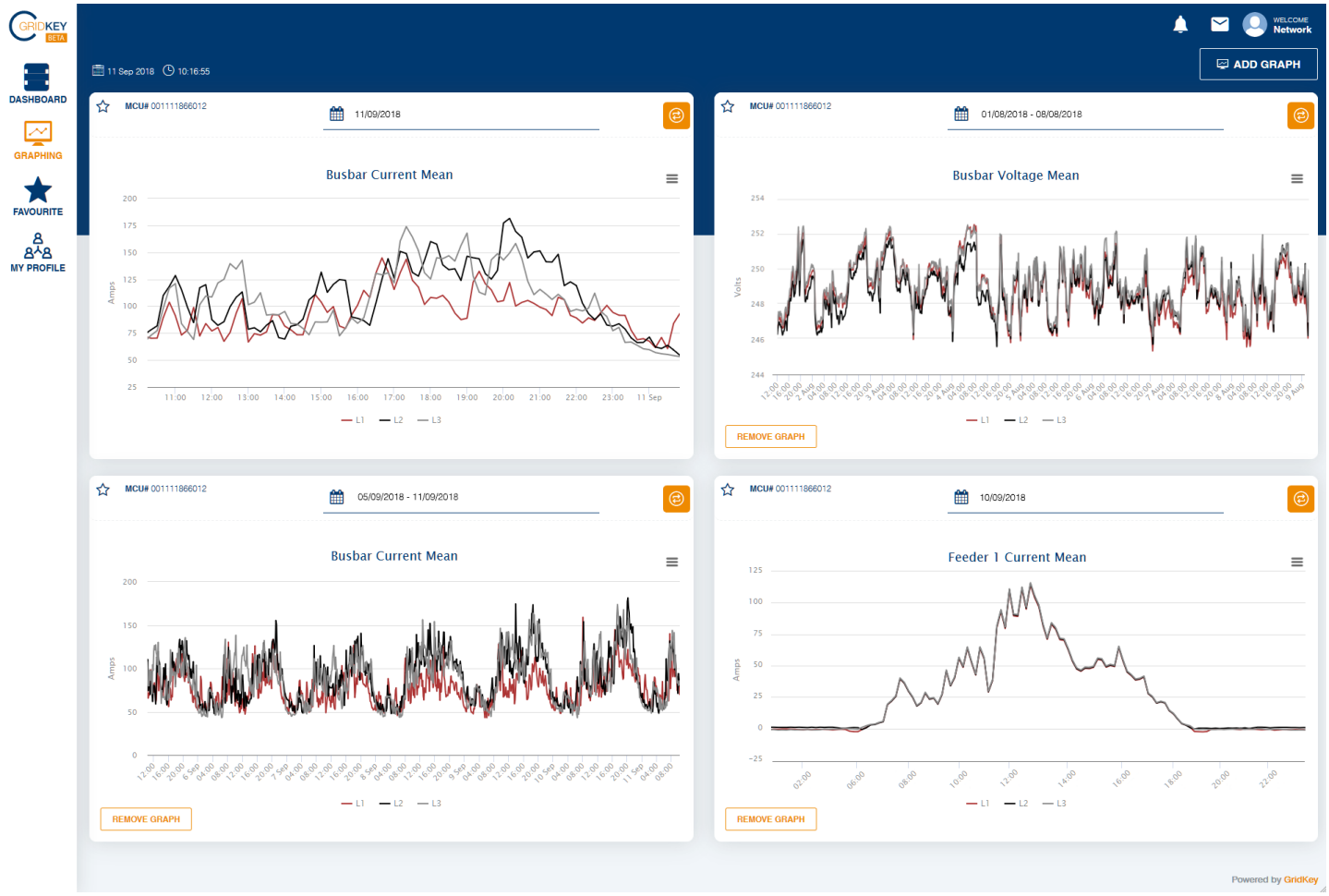
GridKey Data Centre



Unlocking the smartgrid

A collaboration between Lucy Electric and Sentec

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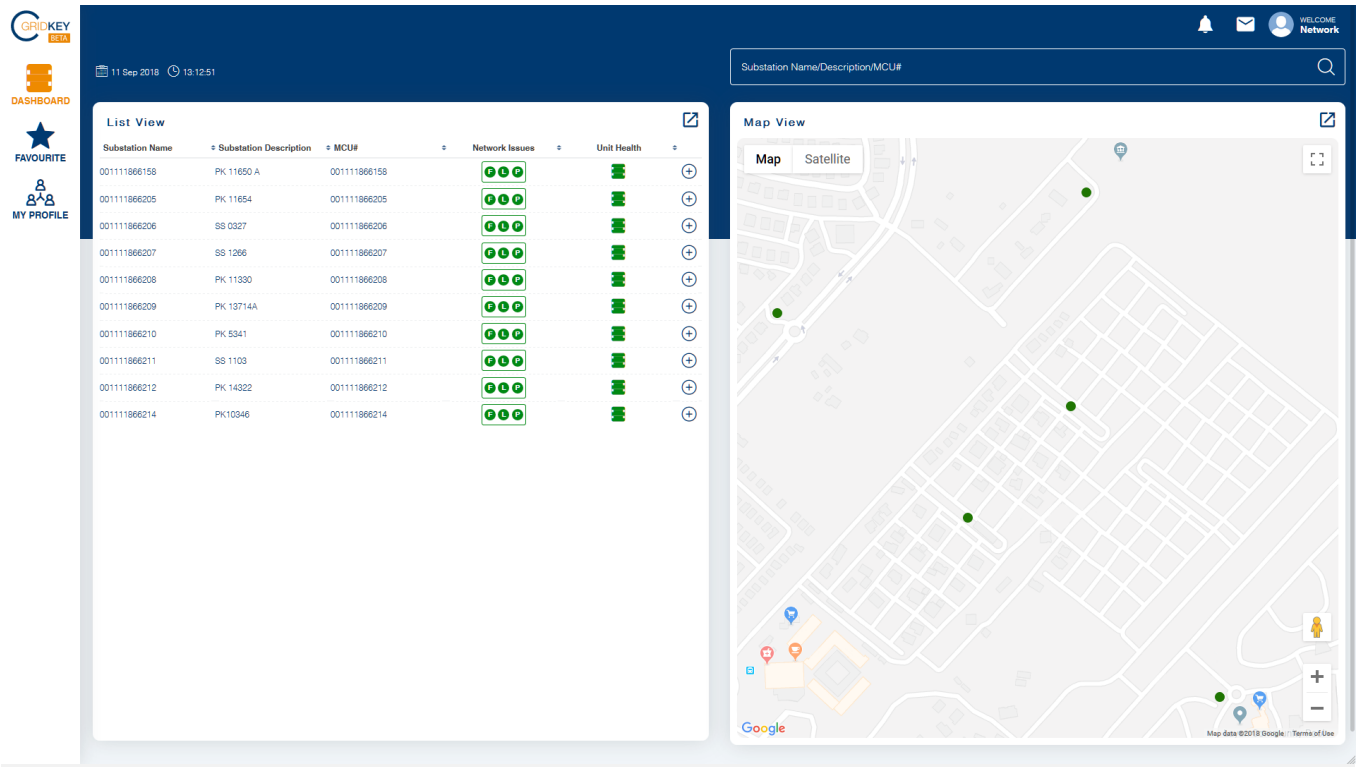
1 Introduction

Increasingly Network Operators are adding automation and monitoring systems to their networks to increase efficiency, manage distributed energy sources and to restore faults more quickly. As a result the amount of data being generated and collected by companies is increasing exponentially.

One example of this is Low Voltage monitoring which allows companies visibility of what is happening on the last mile of their network. Lucy Electric's LV monitoring system, GridKey, has alone generated over 100 billion data points to date. To be meaningful and valuable this data needs to be stored, analysed and presented in a way that is actionable and easy to understand.

Data analytics is a very specialised area and many companies do not have the capabilities or capacity to manage this activity. To address this challenge the GridKey team has developed its own Data Centre which delivers a high integrity solution for effective data management.



2 Data storage and management

To manage and safely store the volume of data collected we use a NoSQL database technology similar to that used by Amazon, Google and e-Bay. The design of the database balances data 'read and write' – ensuring that no data is lost when the units report and balancing this with the ability to read the data to allow the analytics to operate.

The GridKey Data Centre uses a variety of techniques to ensure this balance is maintained, including pre-processing to store the data in different forms as well as the raw data. It can manage in excess of 10,000 systems, reporting simultaneously without losing any data.

3 Analytics and alarms

A powerful analytics engine has been included in the Data Centre, carefully integrated with the NoSQL data storage. A series of analytics are in development – using both the data collected as well as monitoring the health of the GridKey units. Further packages are planned around the four themes of actionable information:

- Faults – detection of faults, assistance in determining the cause and potentially predicting faults before they happen
- Losses – calculation of losses caused by phase imbalance and harmonic content, with the ability to identify energy theft when combined with data from domestic and commercial meters
- Power Quality – supporting compliance with statutory requirements for voltage control and harmonic content
- Planning – helping network operators safely maximise the use of their assets allowing for changing load profiles from low carbon technologies and to manage replacement or reinforcement of assets

4 Graphical User Interface (GUI)

Displaying information in an intuitive way is essential. Learning from best practice in other sectors such as web design, the team have developed a highly visual user interface that presents data in clear, simple and easy-to-read screens. This facilitates decision-making and allows users to quickly see business and safety critical information.

The GUI can be customised to business need and the user's role and personal preferences.

Key facts:

- The new GUI is currently in beta testing and scheduled to be released in Q4 2018.
- It is a web-based solution so runs on any computer/tablet/phone with a wide variety of browsers
- It displays information in a wider variety of ways – from a top down overview of all the monitoring systems reporting through to detailed analysis of the raw data of specific units.

5 Hosting

To improve resilience and protect against hardware failures we have created a four core system hosted on the cloud with a number of data protection features:

- A high integrity solution that ensures collected data is safe against a number of scenarios
- A safety back up regime – both locally and off-site to allow full disaster recovery
- Hosted on Amazon Web-Services based in Ireland.

6 Security

Security of both the complete system and the data has been designed in from the start. We use a number of methods to ensure that the system cannot be compromised by unauthorised personnel either through the GridKey unit communications or through the web interface. The Amazon cloud solution is verified to ISO270000 and our cyber security measures have also been independently verified.

Data from individual customers is managed into separate accounts and can only be accessed by verified users. Varying levels of administration rights ensure that data access levels, by user, can be controlled within the Data Centre.

7 Integration with other systems

The GridKey Data Centre has been designed to integrate with other systems – both accepting and passing data and information to third party systems. The system integrates with a wide range of sources including internet and real devices with outputs managed through an OpenAPI interface.

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