Standards Based Data Integration at Scottish & Southern Electricity Networks

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Scottish & Southern
Electricity Networks

Open Grid Systems

Scottish & Southern Electricity Networks (SSEN) owns:

- Two electricity **distribution** networks

- One electricity **transmission** network

- +100,000 **substations**

- +130,000 km of **overhead lines** and **underground cables**

- +100 **submarine cable** links

- SSEN serves **3.5 million customers** across one third of the UK's landmass.

- Consultancy and software company based in **Glasgow**, UK

- Provide service and software including consultancy, applied research, and commercial software development

- Work with a number of **utilities** and **vendors**

- A lot of our work has been **international**, primarily **North America** and **Europe.**

- **25+** different clients in **12** countries

- Involved in IEC standards work regarding software and data modelling including IEC TC57 Working Groups 13, 14, 16 & 19

- Work focussed on **Model Driven Architectures**, **Open Standards** and cutting-edge technologies

Combining Datasets

- SSEN want to improve the **management** of their networks through using **modern**, but proven technology.

- Emphasis is on **mobility**, and **analysis** of collected data

- A **single** dataset has a **limited** use

- **Combined datasets** can provide useful information

- **Field Team Support Tool** – Staff only

- **Lightning Strike Visualisation** – Control Room and Field

- **Network Damage Reporter** – Customer and Staff

Customer Reports

Lightning strikes

Network Model (CIM)

Faults from OMS

Field staff reports
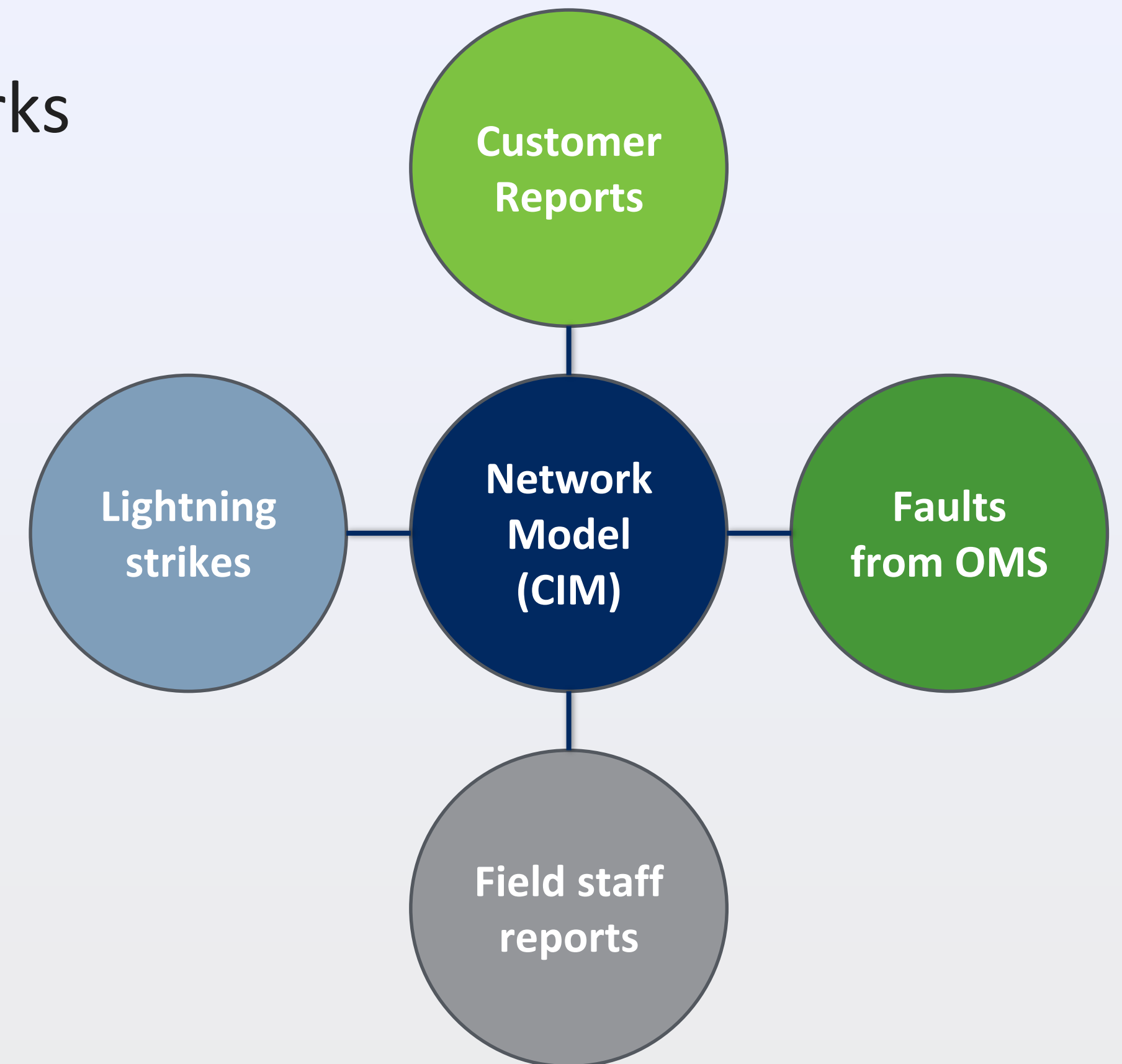
Field Team Support

- Need for crews to **access** data and submit **configurable structured reports** to support a variety of field work

- The application had to be **scalable** and capable of dealing with the **full**, **detailed** electrical network models **including LV**, scaling with device storage

- Had to be **secure**, both for **online** and **offline** access with remotely **revokable** user access and **encrypted** communications

- It had to work **offline** including:

  - Full access to **network data**

  - Create and store **reports**

 - Ability to securely log-in even without a network connection
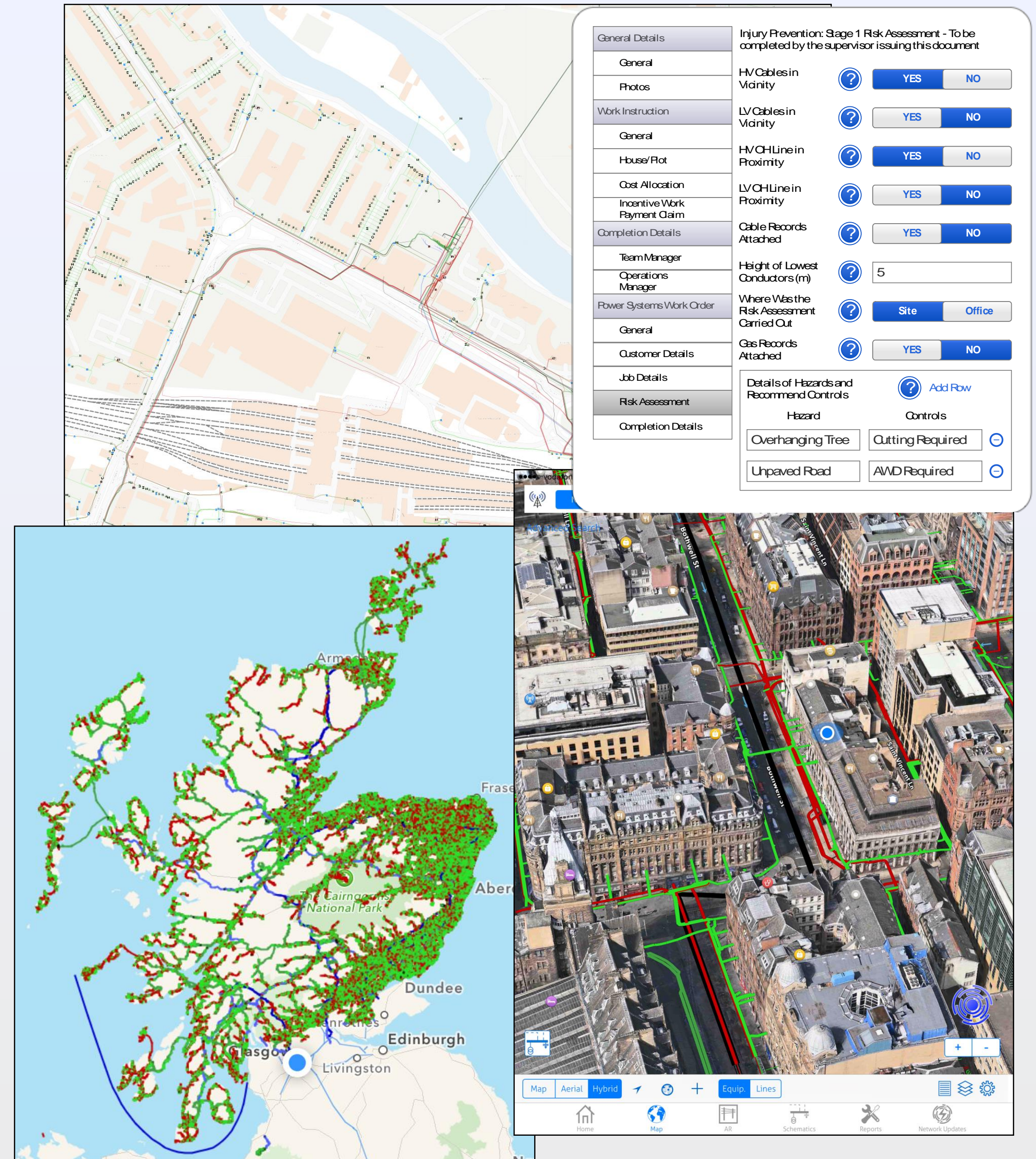
Integrated Data Entry

- The client supports multiple **form-based** data entries to create **reports**

- Schema-driven forms allow the server to **dynamically** push new forms to clients

- Different forms can be added for different purposes or to **meet new requirements**

- These **reports** are then **tied** to the **CIM network model element**

- This links any reports (e.g. maintenance, inspection) to a **unique, persistent element** with useful structured data

- **Real-time communication** with control room leads to **faster diagnosis** and **restoration**

- **Improved data quality** of asset health assessment leading to **pro-active maintenance** for even better **network resilience**

- Can be integrated with a customer application so updates in the field are **automatically reflected** in **status updates** to the customer **improving** the **customer experience**

Real-Time Lightning Strikes

- **Control room operators** and **field crews** needed to see **real-time lightning** data

- For control room engineers this lets them identify **potential lightning strikes** on **network equipment**

- For field crews it highlights **potential safety issues** where lightning strikes are occurring **nearby**

- A **study-mode** for **historical** access supports **post-fault analysis** and asset health diagnosis

- A **real-time feed** of lightning strike data comes from **a third-party provider** within a **few seconds** of a strike being detected

- The strike is defined as being somewhere within a **specific area** with a margin of error

- The server then uses the **CIM network model data** to find any **equipment** within the strike area

- Control room operators and field crews see the **alert less than 10 seconds** after the **strike occurs**
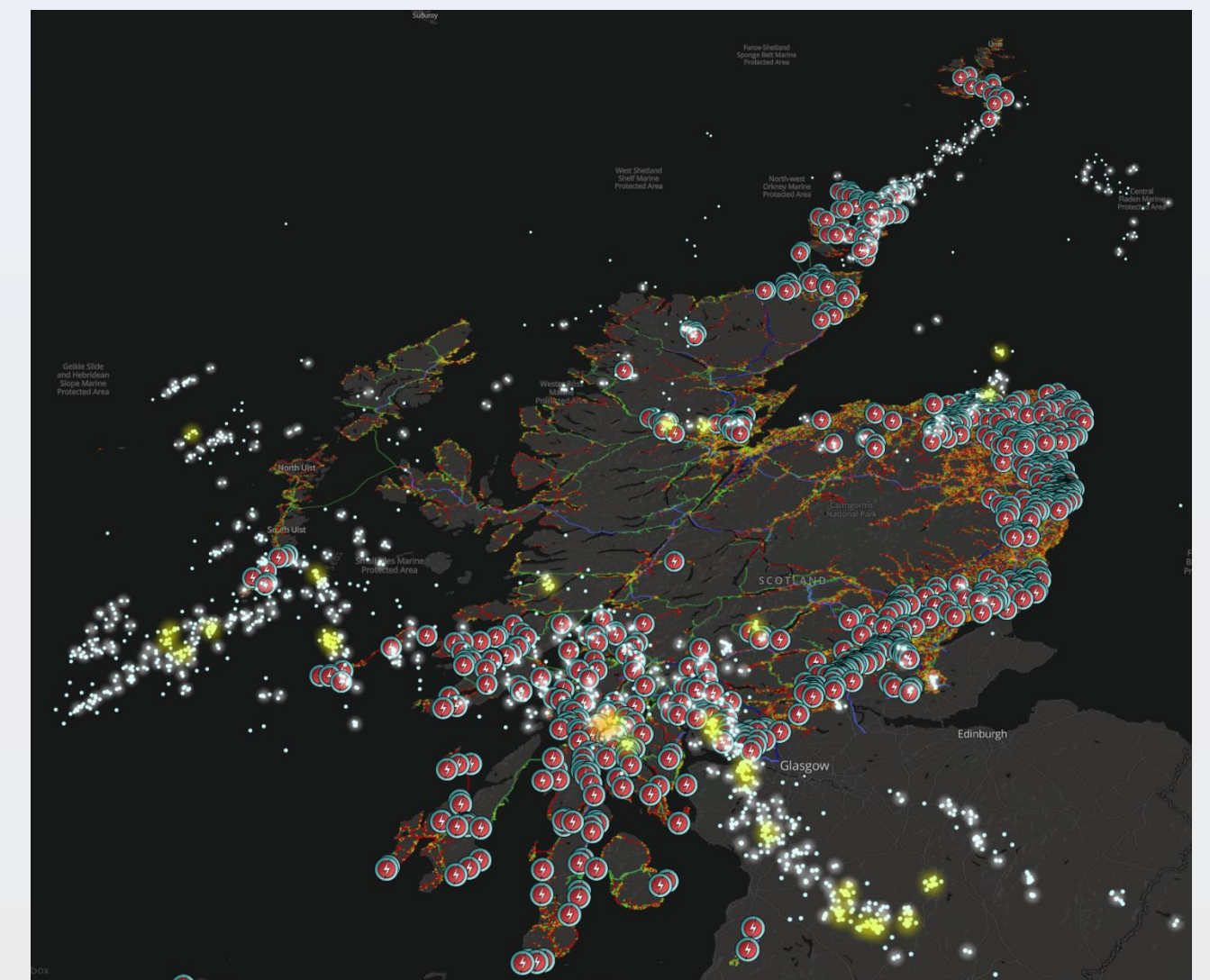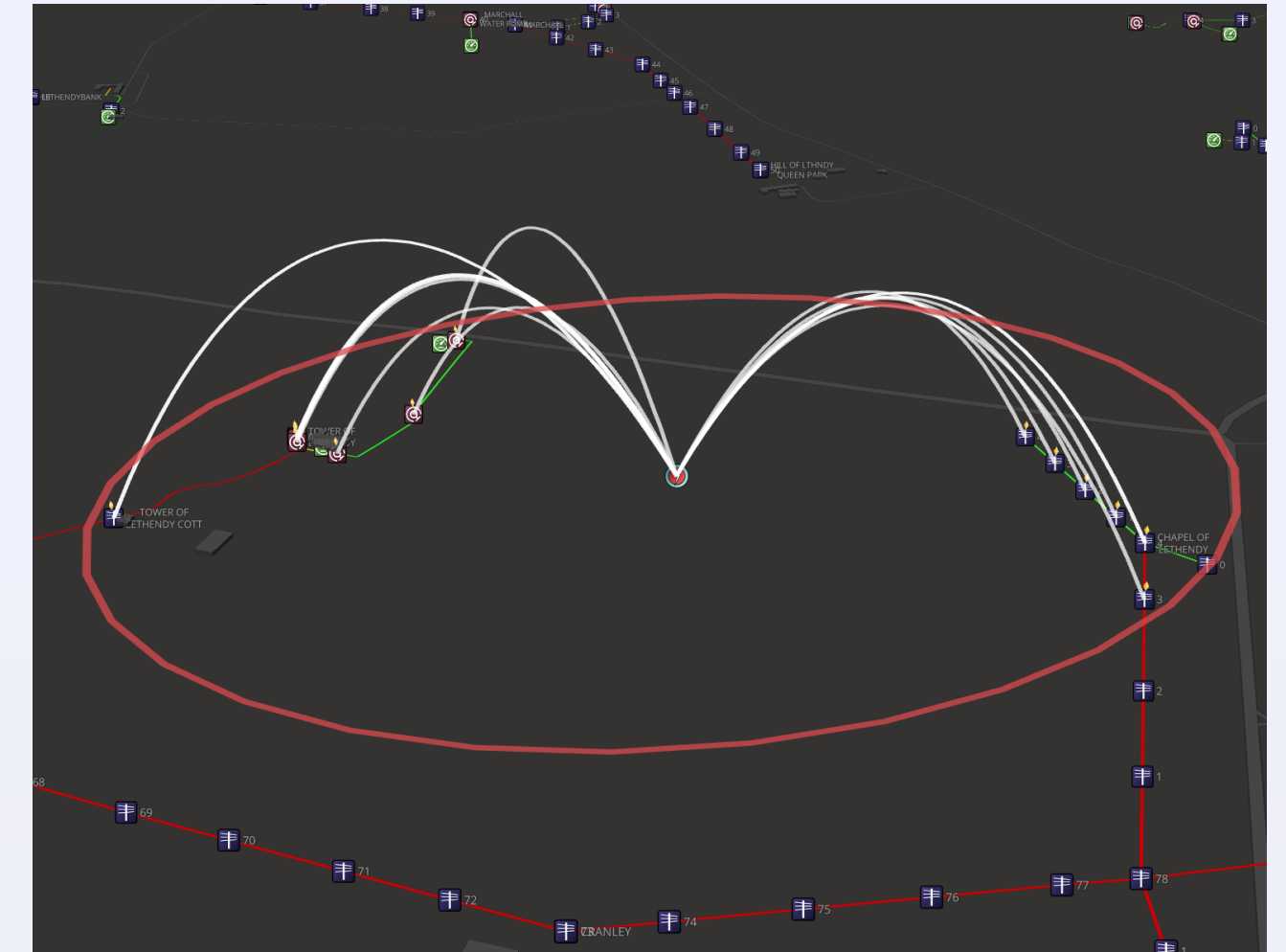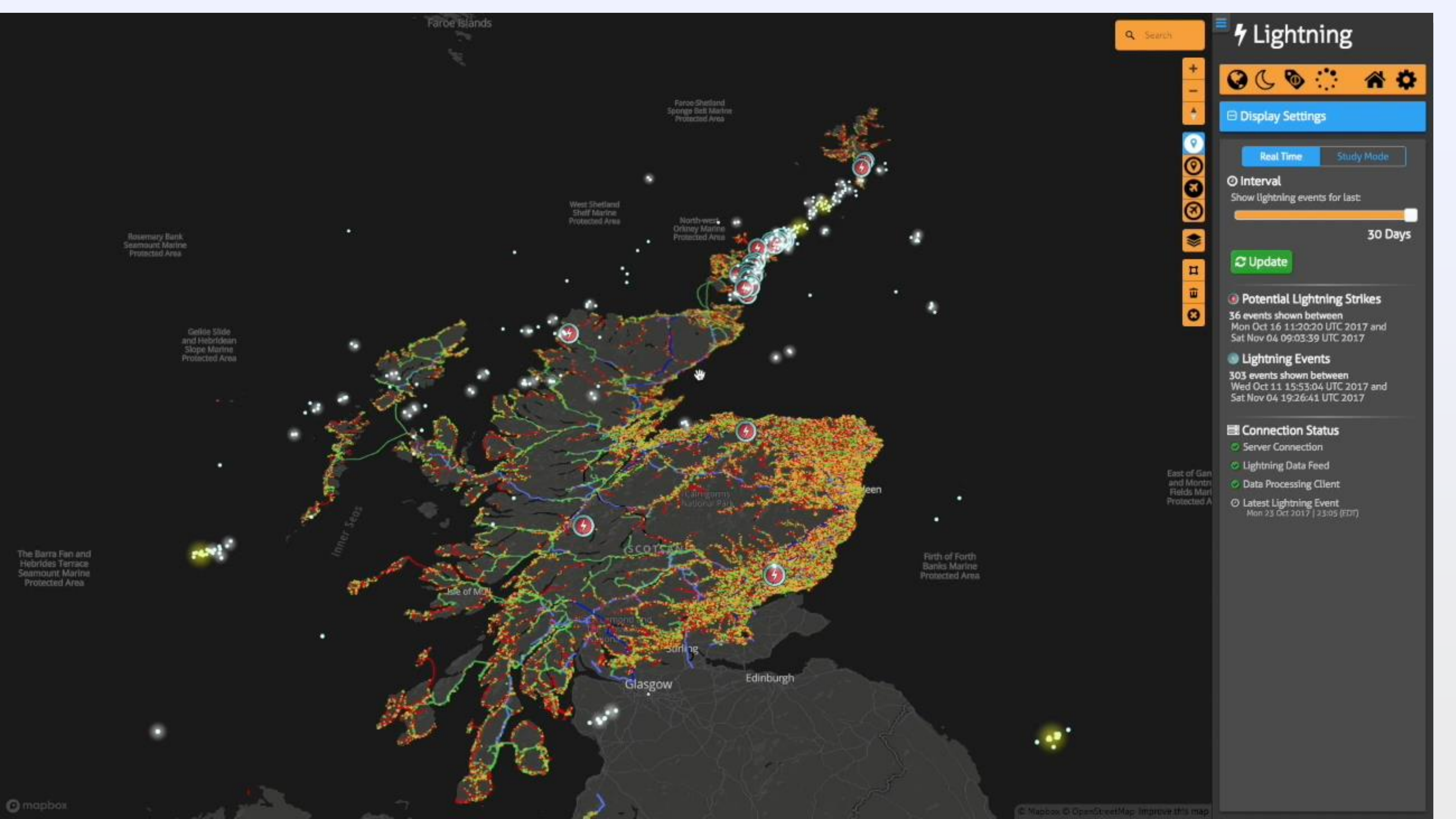
☐ Display Settings

Real Time | Study Mode

⊙ Interval
Show lightning events for last:

30 Days

🔁 Update

🔴 Potential Lightning Strikes
36 events shown between
Mon Oct 16 11:20:20 UTC 2017 and
Sat Nov 04 09:03:39 UTC 2017

🔵 Lightning Events
303 events shown between
Wed Oct 11 15:53:04 UTC 2017 and
Sat Nov 04 19:26:41 UTC 2017

☰ Connection Status
✅ Server Connection
✅ Lightning Data Feed
✅ Data Processing Client
⊙ Latest Lightning Event
   Mon 23 Oct 2017 | 23:05 (EDT)

Faroe Islands

Faroe-Shetland
Sponge Belt Marine
Protected Area

West Shetland
Shelf Marine
Protected Area

North-west
Orkney Marine
Protected Area

Rosemary Bank
Seamount Marine
Protected Area

Geikie Slide
and Hebridean
Slope Marine
Protected Area

The Barra Fan and
Hebrides Terrace
Seamount Marine
Protected Area

Inner Seas

Isle of Mull

Cairngorms
National Park

East of Gan
and Montr
Fields Mari
Protected A

SCOTLA

Firth of Forth
Banks Marine
Protected Area

Stirling

Glasgow

Edinburgh

🔍 Search

mapbox

Network Damage Reporter

- Network Damage Reporter is a smartphone application to allow customers to submit **reports** relating to:
  - Power outages
  - Damage to Network Equipment
- The users is asked to take a **photo** (for downed lines or damaged equipment) and then verify the **location** of the incident
- Network Matching is based on the user's position (and for photos, heading) and **intelligent** server-side processing
- This matches the damage or outage report to the **CIM network element**

- The server takes the **heading** and **location** of the user to identify **potential** associated equipment using the full **network model** covering MV and LV in **<1ms**
- Confirmation from the user regarding the **estimated location** of the equipment is sought
- This **intelligence** and **social information gathering** can lead to faster **identification** of damaged equipment without revealing sensitive data to the public
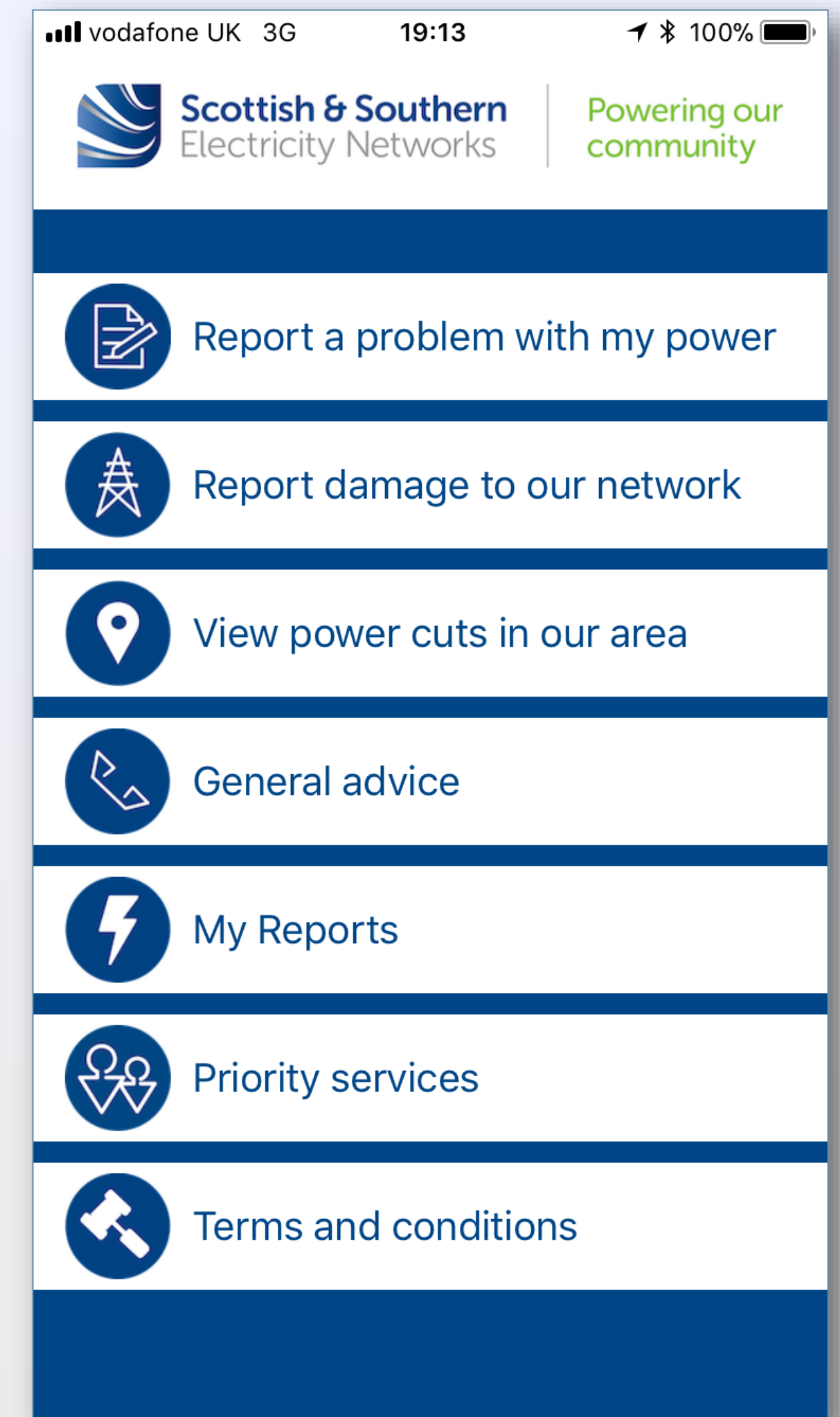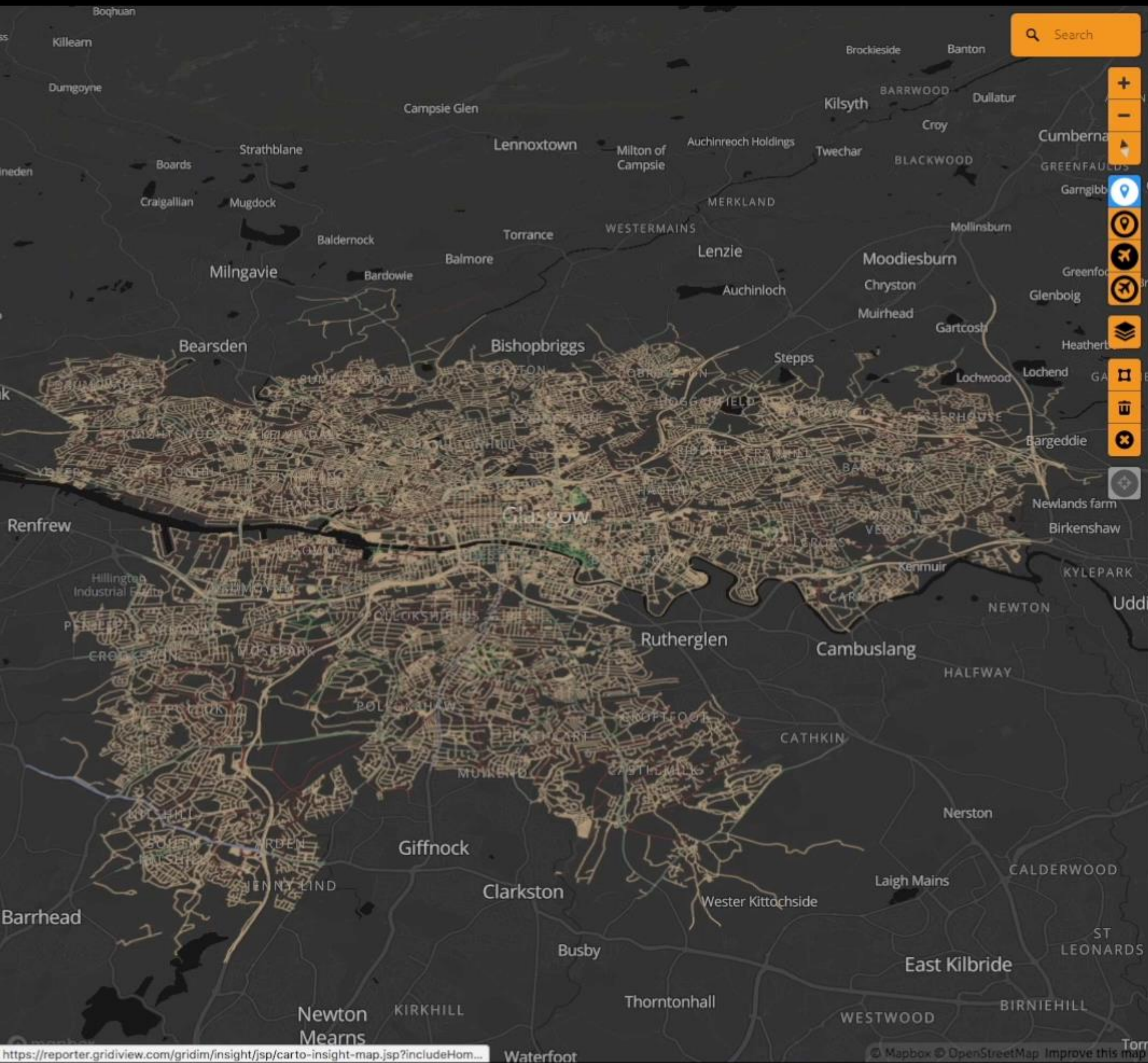
Grid Reporter

Display Settings

Summary

No Power		0
Equipment Damage		0
Line Down		0
Vulnerable		0
Flagged		0
No Messages		0
No OMS Ref.		0
Closed		0
No Fault Assoc.		0
Active Faults		0
Cleared Faults		0

Search

vodafone UK   02:06   100%

Grid Reporter

Report a problem with my power

Report damage to network

View current outages

My Reports (2 messages)

Terms and conditions

Settings

https://reporter.gridiview.com/gridim/insight/jsp/carto-insight-map.jsp?includeHom...

© Mapbox © OpenStreetMap Improve this map

Conclusion

- Data Integration has allowed SSEN to develop **mobile** and **web** based **apps** that will provide **business benefits** over the years to come

- No individual project **required** a common network model in **CIM**

- The use of this CIM data means SSEN will be able to **correlate** the data and analysis from multiple applications

- **Customer reports** can be **linked** to **outages** with **lightning strikes** on equipment and **field crew reports**

- The more applications use this data moving forward, the more **value** is **gained**