



Agenda:

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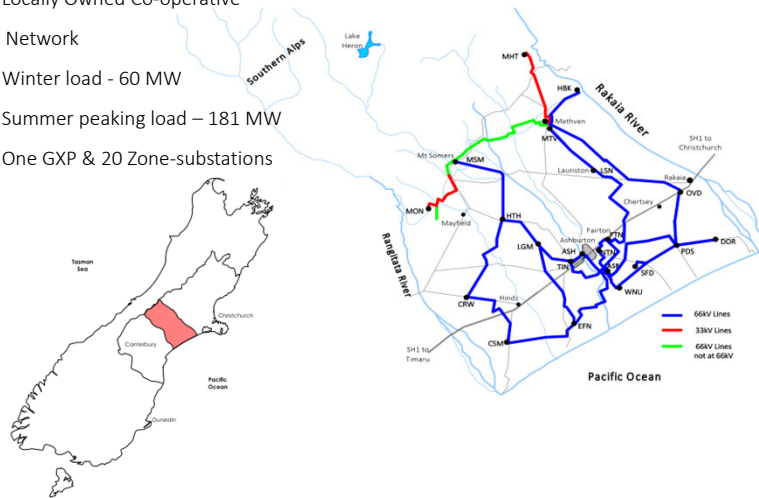
- EA networks Overview
- Use Cases for LV monitoring and control
- PowerPilot
 - Infrastructure
 - Devices
 - Trials
- Monitoring devices data
- Ripple control replacement
- Future Focus



EA Networks Overview

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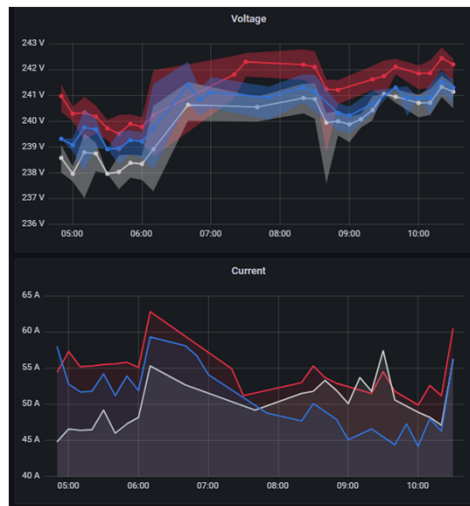
- Established in 1921
- Locally Owned Co-operative Network
- Winter load - 60 MW
- Summer peaking load – 181 MW
- One GXP & 20 Zone-substations



Use Cases for LV Monitoring and Control

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- LV Network Visibility
- Transformer Loading
- Improve Phase balancing
- Voltage Monitoring
- ADMD per ICP
- Active response instead of reactive response
- Explore ripple control replacement



PowerPilot Infrastructure

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1. Infrastructure

- Could be cloud or server based
- Gateways
- Easy to install and deploy

2. Software

There are three main areas:

- Admin webpage – set up and monitor all devices
- Installer webpage – for device installation
- Data analysis webpage (Grafana dashboards)

GATEWAYS



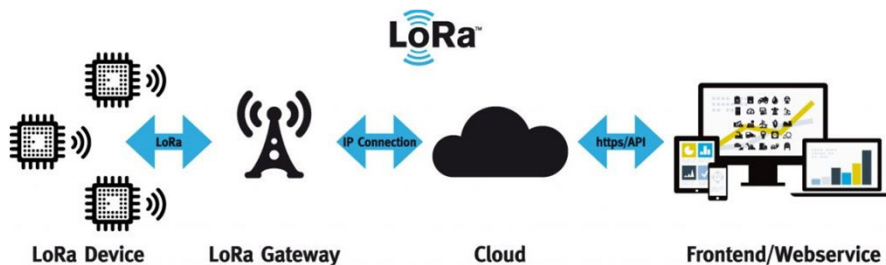
Last 5 days Gateway statistics

NAME	DESCRIPTION	Devices	N. Messages	Average of RSSI	Average
Kerlink-06FC	Pendarves substation	29	33170	-109.82	
Multitech-098F	Northtown substation	36	17883	-112.69	
Multitech-33CF	Kermode Street	38	22853	-104.52	
Tektelik-8472	Lauriston	1	900	-115.18	

Types of Switching and Monitoring Devices

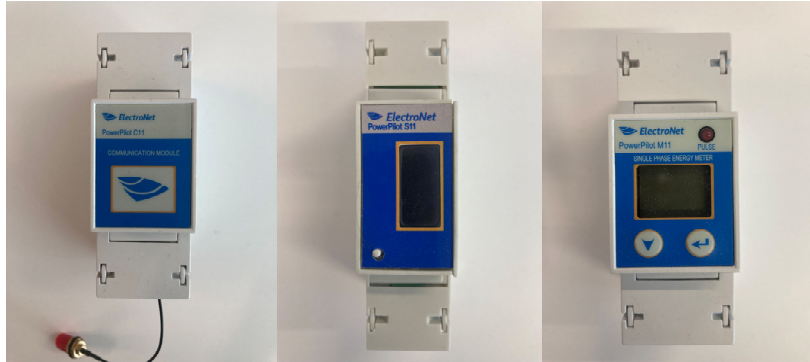
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- S11 – single phase switching
- M11 – Single phase monitoring
- SPM32 – 3 phase monitoring
- M31 – 3 phase monitoring and switching
- SPM20 – multi circuit monitoring

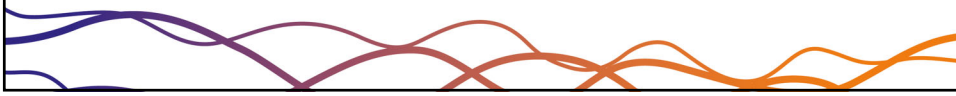


Power Pilot Devices

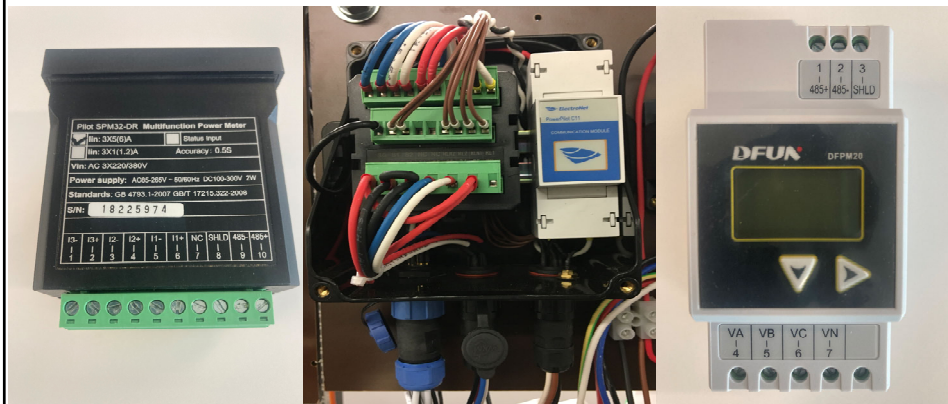
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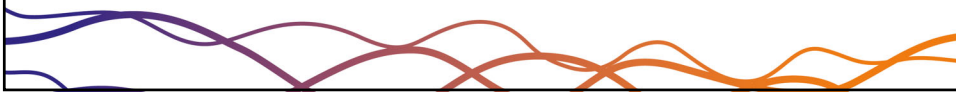
C11 – Communication Meter S11 – Switching Meter M11 – Single Phase Power Quality Device



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SPM32 – Three Phase Power Quality Device M31S – Three Phase Power Quality Device with switching (up to 5A) and a comms meter DFPM20 – Multi-circuit Power Quality

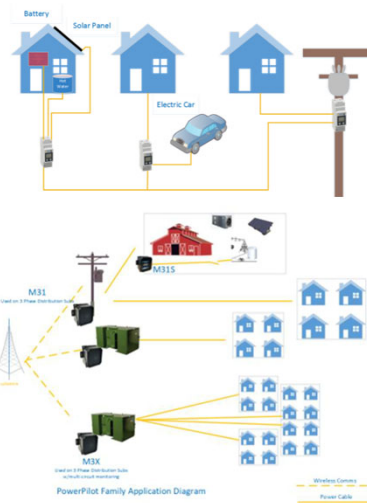
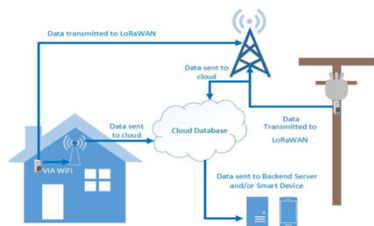


Possible Configurations

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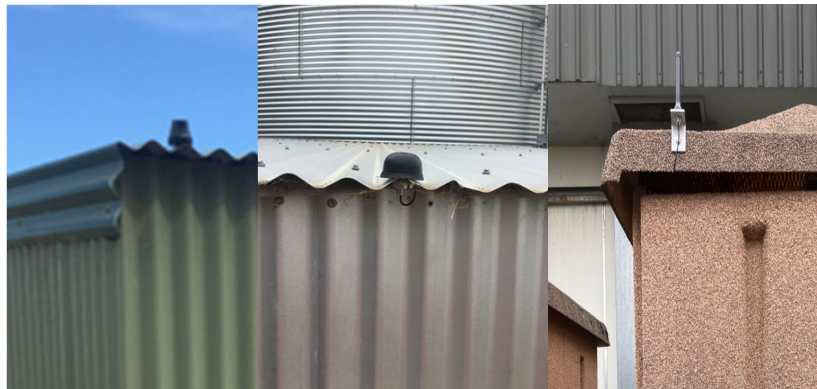
Device Functionality

- V, I, P, Q, f
- Class 1 Metering capable
- LoRaWAN comms
- PQ monitoring (including LI)
- LoS Alarming (Last Gasp)
- Small and self-contained



Antenna Types

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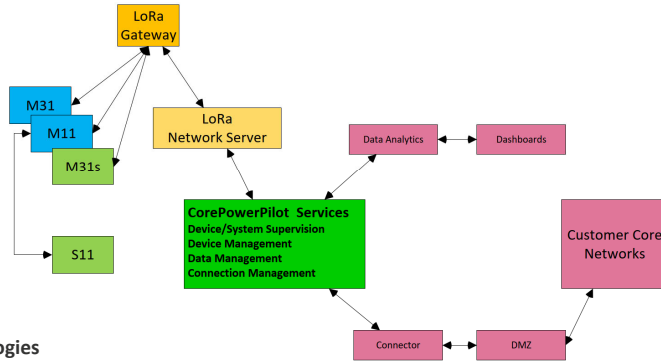
Salt & Pepper Shaker Type

Dome Type

Dipole Type

EA Basic System Architecture

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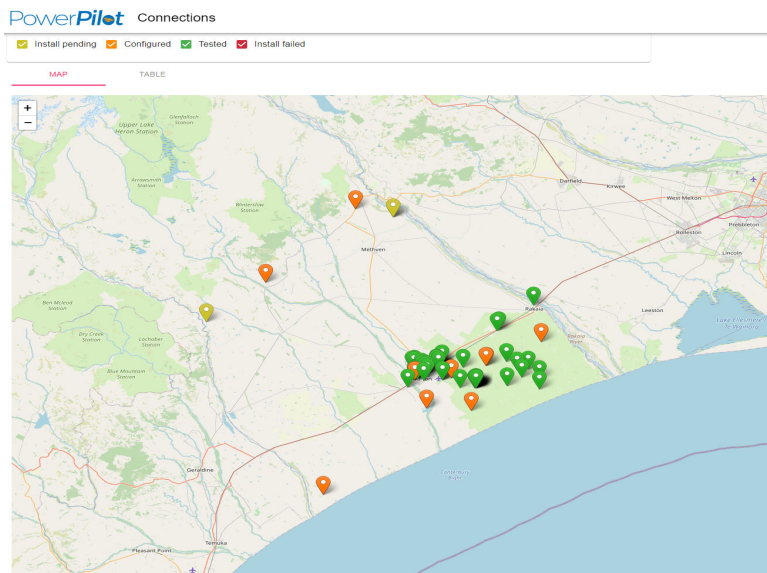


IOT Technologies

- LoRaWAN – (Long Range Wireless)
 - Range
 - Up to 50 km rural
 - Around 3 km urban
 - Operates 20 dB below the noise floor
 - Point to Multi-Point
 - Multicast downlinks

PowerPilot in Ashburton District

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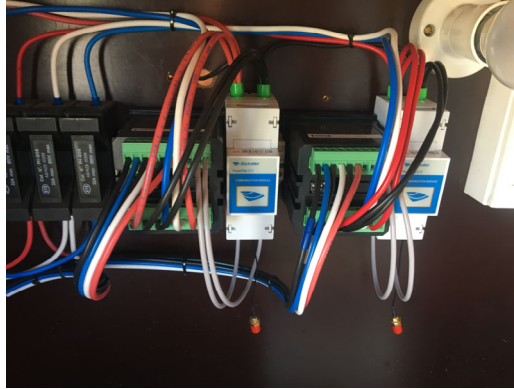


Use Cases 1

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Single and Three Phase Power Quality Metering

- 14 x M11 single phase power quality devices
- 24 x SPM32 three phase power quality devices



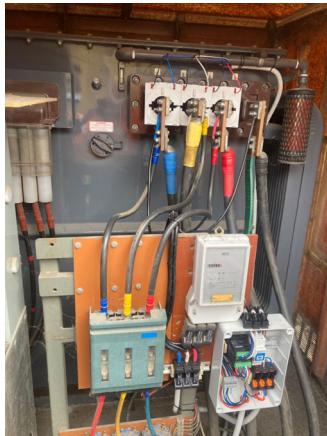
Use Case 2

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Distribution Transformer Monitoring

Site 1 – ANZCO

- 17 x M31 installed



Site 2 – Talley's

- 2 x M31 installed



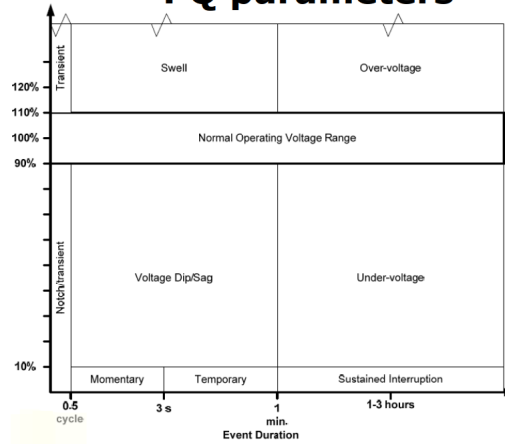
Parameters monitored

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Violations

- SAG (Very Low voltage)
- SWELL (Very High voltage)
- Undervoltage
- Overvoltage
- Harmonics
- Overloading

PQ parameters



Definition of Voltage Magnitude Events according to IEEE Std. 1159-1995.

Visual Representation of Data

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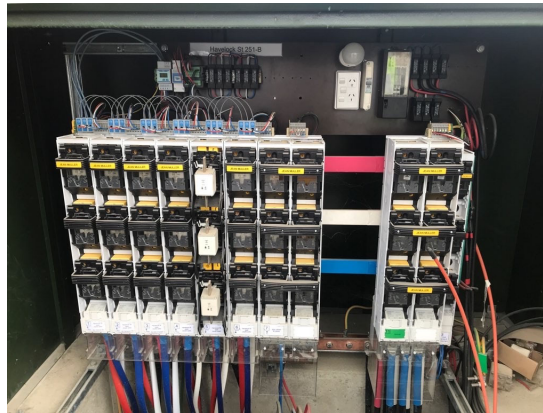


Use Cases 3

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Multi-Circuit Monitoring

- Installed at Civic Centre site monitoring 6 circuits.
- Used for multiple LV circuit distribution substations
- 3 phase 2 % accuracy sensor with LoRa and Wi-Fi
- Up to 10 three phase LV circuits can be simultaneously monitored

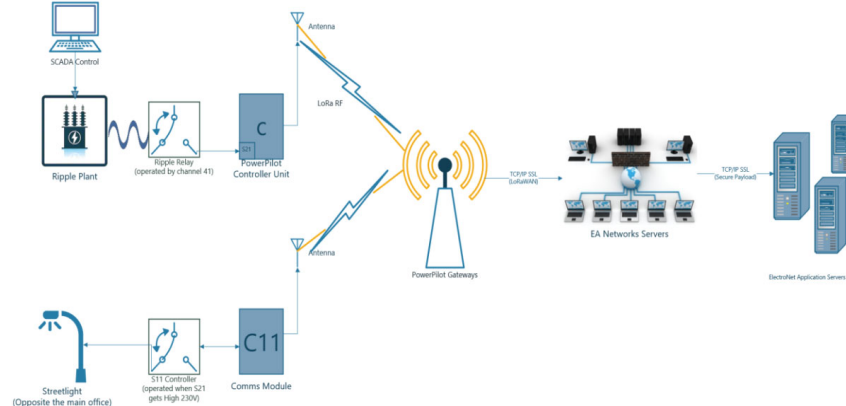


Use Cases 4

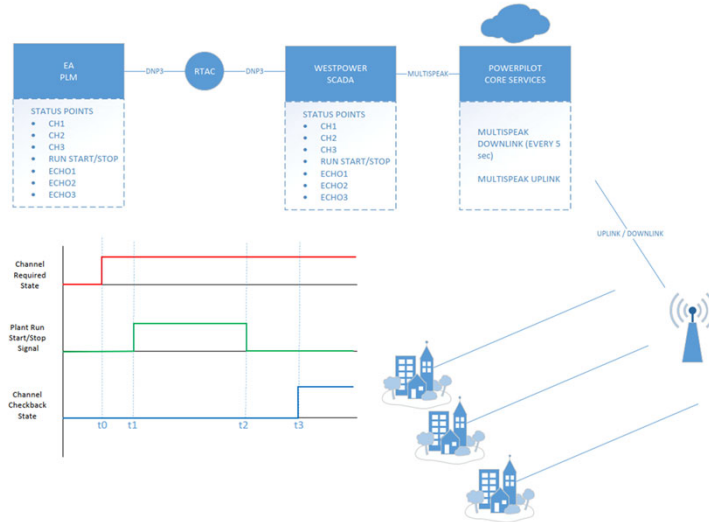
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Switching single and three phase loads

- Single phase load – Streetlights, Hot water
- Three phase loads - irrigation pumps
- Incorporated into existing SCADA and PLM applications.



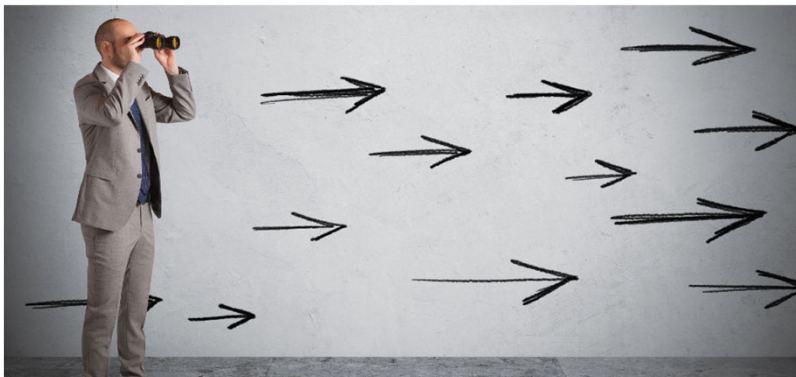
Peak Load Management Integration ¹⁹



Future Focus

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- Better utilisation of distribution transformers
- Impact of PV/EV on Network
- Identify and address voltage violations
- Commerce commission reporting
- Explore ripple plant replacement



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Any Questions??