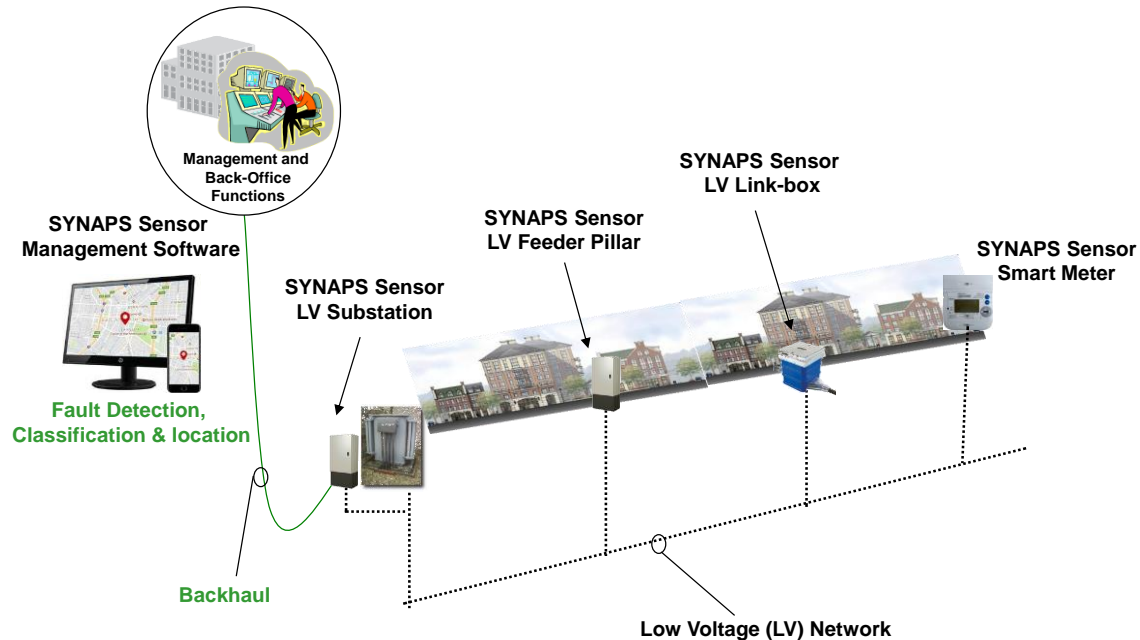# SYNAPS – LV Monitoring, Fault Detection & Cable Health

FUNDAMENTALS

SYNAPS is a cost effective compact solution for monitoring Low Voltage (LV) underground networks to provide real time **accurate detection, classification and location to 3m** of LV cable faults.

The solution consists of sensors placed in the LV substation and link boxes, or feeder pillars.

Sophisticated management software analyses the information from the sensor network, which continually monitors the LV feeder cables, providing cable health information on load parameters, faults and power quality.

SYNAPS will facilitate rapid early detection and accurate location of faults and network anomalies, including incipient and transient faults, and will enable preventative maintenance to detect faults before a hard permanent failure. Faults can be accurately detected and located on main feeder, spurs and in joints.

In radial networks SYNAPS will enable individual link and feeder cable status and flows to be monitored, whilst in fully interconnected mesh networks real time power flows will be monitored and 'hidden' open circuits detected.

It has been estimated that 40% of Distribution Network Operator (DNO) network costs and 50% of Customer Minutes Lost (CML) are due to faults on LV cables.

Accurate detection, classification and location of underground LV cable faults by SYNAPS will have a significant impact on reducing costs.

SYNAPS will enable faults to be detected more quickly and will also enable preventative maintenance to detect faults before a hard failure leading to lower costs for DNOs and more reliable networks for consumers.

SYNAPS – LV Monitoring, Fault Detection & Cable Health

FUNDAMENTALS

RATING
- Voltage Line Rating: 415V rms 3 phase
- Current Line Rating: 400A-600A
- Fault Current: Up to 8kA
- Basic Insulation Level (BIL): 8kV
- System Frequency: 50Hz

MOUNTING METHOD
- Mounted in substation

DIMENSIONS (HXWXL)
- Case: 125 mm x 173 mm x 300 mm)

WEIGHT
- Sensor: 3 kg

OPERATING TEMPERATURE
- -20ºC to +70ºC

STORAGE TEMPERATURE
- -40ºC to +85ºC

INGRESS PROTECTION
- IP65

DEVICE POWERING
- Line powered
- 24V DC Auxiliary

CONFIGURATION MANAGEMENT
- SYNAPS Sensor Management software for configuration, monitoring, and remote firmware upgrade

COMMUNICATIONS OPTIONS
- Ethernet 100BaseT
- External 3G/4G modem

GPS
- Location, time-stamp reference

OSCILLOGRAPHY & WAVEFORM CAPTURE
- Current and voltage 100kHz sampling
- Export via SYNAPS Sensor Management software
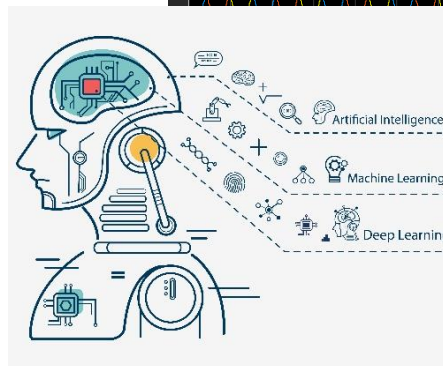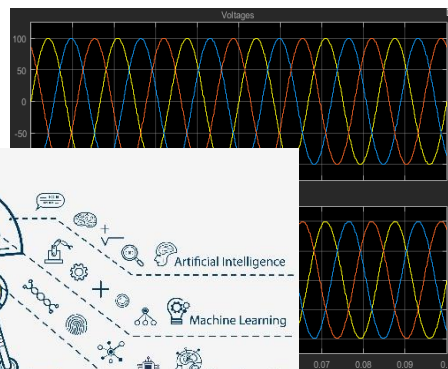
CERTIFICATION
- EMC Council Directive: 2014/30/EU
- Low Voltage Directive: 2014/35/EU
- Radio Equipment Directive (RED): 2014/53/EU

MEASUREMENT & DATA LOGGING
- Load Current   }
- Neutral Current   } via Rogowski Coil
- Fault Current   }
- Voltage
- Power (W, VA, VAr)
- Power Factor
- Phase Angle
- Sags, Surges
- Voltage Harmonics (THD and harmonics up to 1,000th order due to 100kHz sampling)
- Configurable logging intervals down to 1 min

ALARMS
- Voltage Threshold
- Fault
- Outage / Power Off / Power On
- Loss of Voltage
- Sags/Surges
- Substation Transformer Overload

Waveform Analysis & Machine Learning Algorithms