

PLS-DC1

Data Concentrator



Applications

Upgrade of existing street lights for control, dimming, and energy monitoring from a remote SCADA terminal using existing power lines without the need for any new wired or wireless infrastructure.

Control of architectural lighting from a remote SCADA terminal using the built-in DALI controller.

Micro grid/distributed energy resource control and monitoring using the built-in RS232/RS485 interfaces along with the patent-pending transparent communications pipeline allowing existing infrastructure to be upgraded to remote monitoring and control without any field upgrades to equipment or the installation of new wired or wireless networks.

Weather and environmental sensor network without having to resort to cellular data for every single sensor node.

Safety and emergency lighting network using a combination of existing power lines and built-in Bluetooth low energy radio to send public service announcements to Bluetooth enabled cell phones or emergency beacons in the area.

Traffic and pedestrian monitoring using add-on millimeter wave sensors to monitor traffic intersections and pedestrian traffic without having to install cameras that need extensive wireless or wired infrastructure and introduce privacy concerns.

Remote motion and intrusion monitoring using add-on microwave motion detection units combined with a local camera to monitor and photograph any intrusion into a secure perimeter without having to install extensive wireless or wired infrastructure.

Remote load control using the built-in relay control channel for control of large loads using external relays/contactors.

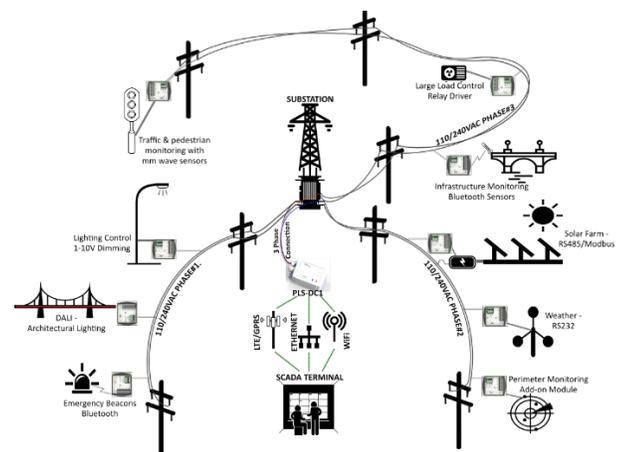
Remote infrastructure monitoring using commercial off-the-shelf sensors and the built-in RS232/RS485 or Bluetooth channels to monitor bridges and roadways without having to equip each sensor with a cellular data connection.

Key Features

- Used to connect and control all neighborhood NC1 nodes distributed on all three phases of the local power grid
- Flexible communication channels: Ethernet, WiFi, and Cellular
- A highly secure, transparent, patent-pending, multi-protocol communications pipeline to remote devices using existing power lines
- Open source API – allowing end users to write their own front-end SCADA or to modify existing ones
- Server independent – allowing users to connect directly to a terminal using local Ethernet, independent of external networks
- Secure industry standard communications on all channels of communications

Architecture

- Power Line Systems network based on G3-PLC (ITU-T G.9903) architecture, consists of multiple NC1 network nodes and a single network data concentrator - DC1
- The network nodes can exist on any of the three phases of the low voltage (80 – 305VAC) side of the power grid
- The network automatically installs and is self-healing; there is no field installation necessary other than mounting and wiring of the NC1 node
- Each NC1 can be as far as 3 miles out from the nearest DC1 and still maintain network connectivity
- The data concentrator, DC1, connects to all three phases of the power grid – again on the low voltage side, at a suitable location; this is typically either the substation for the neighborhood or a pole mount medium voltage to low voltage transformer
- The data communications can jump medium voltage to low voltage transformers allowing communications to take place between nodes that are not all on the same side of the low voltage transformer
- Each DC1 can support up to 255 network nodes
- Each DC1 has the capability to communicate with the central SCADA terminal via secure ethernet, WiFi, or LTE/CDMA/GSM cellular network.



Technical

Power Line Network	<ul style="list-style-type: none">▪ G3-PLC (ITU-T G.9903) standards based and certified▪ OFDM based IPv6 Auto Connect / Auto Healing Mesh network▪ 98.4 - 121.9KHz CENELEC Band▪ 40Kbps minimum data rate▪ 3-mile range between nodes▪ 255 nodes per cluster with one DC1 data concentrator▪ PLS-DC1 can connect directly to the SCADA system via local Ethernet▪ Alternative cellular or WiFi connection supported by PLS-DC1
Security	<ul style="list-style-type: none">▪ 256-bit Elliptic Curve Cryptographic security between nodes and data concentrator▪ Secure TLS/SSL based connection between data concentrator and operator terminal (SCADA)▪ Biometric and two-factor authentications at the operator terminal
Power	<ul style="list-style-type: none">▪ 80 – 305VAC, 50-60Hz, three-phase via screw terminal block▪ ANSI C136.37 surge requirements compliant▪ Fully protected against transients and brownouts with EN55022 Class B isolation▪ Screw terminal block for Line in and Load out connections
Cellular	<ul style="list-style-type: none">▪ LTE/4G – QPSK, 16QAM with Verizon carrier certification for use in the USA▪ Global 3G HSPA/GSM quad band with 2G fall back and multiple carrier certifications for international use▪ 24dBm class 3 transmit power with two internal antennae▪ 44FF (nano sized) SIM card slot
WiFi	<ul style="list-style-type: none">▪ 802.11 b/g/n support▪ WPA-PSK, WPA2-PSK, and WEP security▪ Built-in internal antenna with up to 16dBm transmit power
Ethernet	<ul style="list-style-type: none">▪ IP68 panel mount connector▪ 10/100LAN with built-in surge suppression
Software	<ul style="list-style-type: none">▪ Open API for building front-end SCADA▪ Windows based admin software for commissioning and control of nodes▪ Automatic logging of network and node statistics▪ Automatic powerline network intrusion detection using a patented cipher stream encryption technique
Power	<ul style="list-style-type: none">▪ 1 to 3 phase 80 – 305VAC universal input, 15VA peak power consumption▪ 3.75KVAC isolation to EN55022 Class B on all three input phases▪ ANSI C136.37 surge requirements compliant - fully protected against brownouts and transients
Mechanical	<ul style="list-style-type: none">▪ 6.65 x 4.68 x 2.4 in [169 x 119 x 61 mm]▪ IP66 protection level▪ -40°C to 65°C operating temperature
