

Power Line Systems—Key Features

Installation simplicity

End-to-End Security

Network Reliability

SIMPLE



- Simple two wire connection (line & neutral) between the power lines and nodes
- Auto connecting, auto healing mesh network
- Transparent data pipeline between the operator interface (SCADA) and end devices
- Multiple communication protocols—RS232, RS485, CAN, DALI—all available in parallel

SECURE



- No need for the internet, cloud service or any third party servers
- Completely restricted remote access by default— the system is not connected to the wider internet
- Multiple layers of encryption—patented cypher stream encryption on top of a 256-bit ECC

RELIABLE

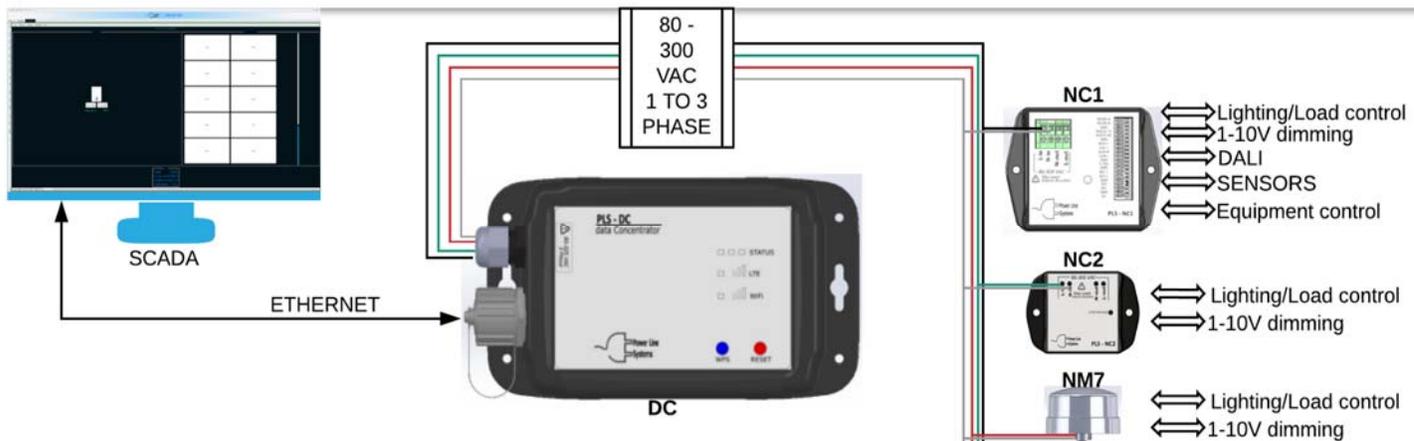


- Installed user base of over 50 million G3-PLC nodes across the world
- Extensive field testing conducted by G3-PLC alliance and multiple G3-PLC chip vendors
- Standards based with multi-vendor interoperability



Power Line Systems—Technology

Designed from the ground up for long range, secure, reliable communications based on IEEE G3-PLC protocols



FEATURES

- ◆ Power Line Systems networks, based on G3-PLC (ITU-T G.9903) architecture, consist of multiple network nodes (NC1/NC2/NM7) and a single network data concentrator - DC
- ◆ The network nodes can exist on *any of the three phases* of the low voltage (80 – 300VAC) 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 to the power lines
- ◆ Each NC1 can be as far as *3 miles out from the nearest NC1* and still maintain network connectivity
- ◆ The data concentrator, DC, connects to all three phases of the power grid on the low voltage side, at a suitable location; this is typically either the substation for the neighborhood or a pole mount medium 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 DC can *support up to 255 network nodes*
- ◆ Each DC has the capability to communicate with the central SCADA terminal via secure ethernet, WiFi, or LTE/CDMA/GSM cellular network with secure ethernet being the preferred option to prevent any network intrusion

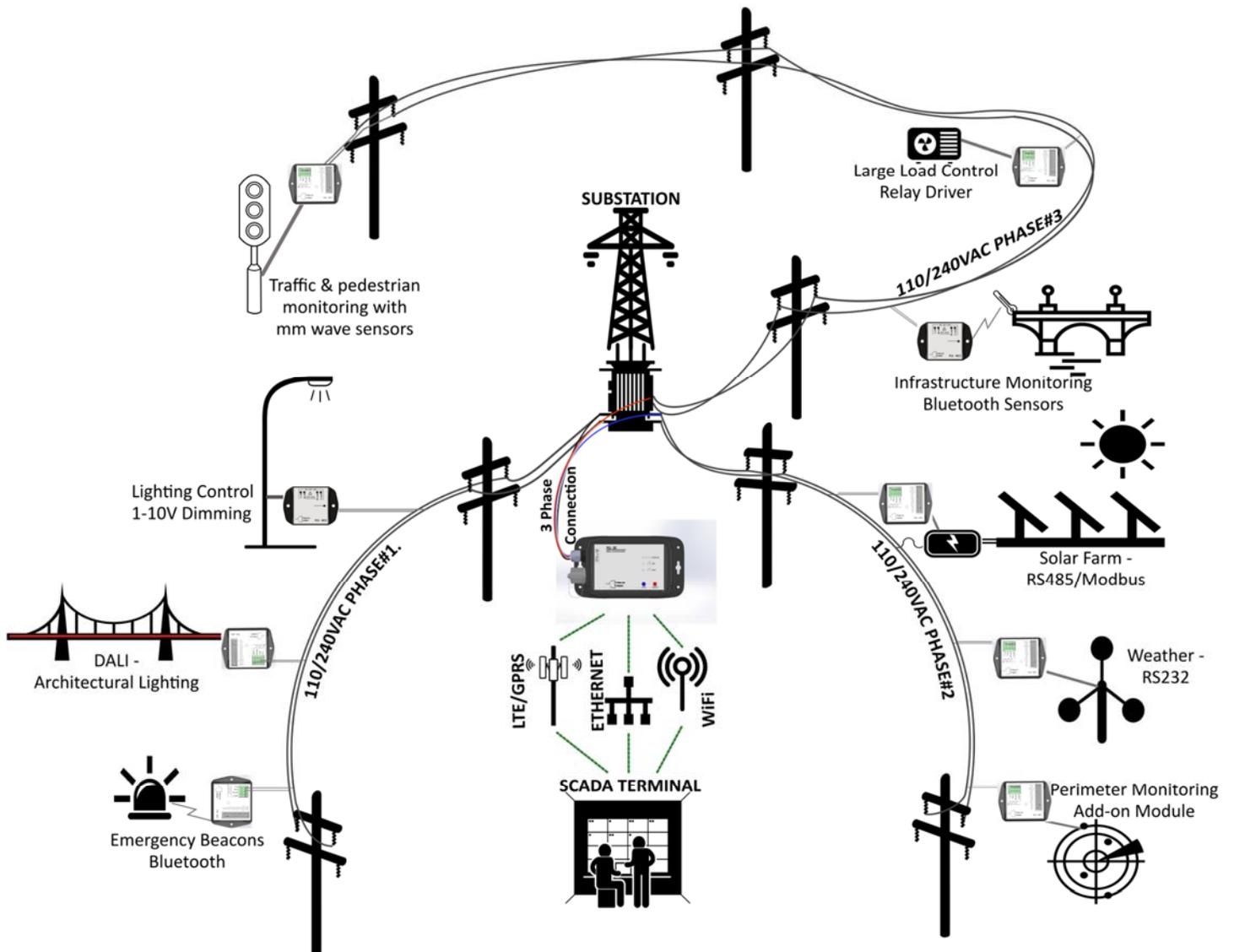
About G3-PLC:

- ◆ G3-PLC was developed to facilitate long range communications over harsh power line conditions
- ◆ G3-PLC alliance was created in 2011 to support the adoption of this technology worldwide
- ◆ The standard has now been ratified by ITU (G.9903) and IEEE (1901.2)
- ◆ This technology is being used widely for smart metering and utility side communications
- ◆ G3-PLC is a OFDM based physical layer and is compliant with worldwide regulatory bodies such as CENELEC, ARIB and FCC
- ◆ The standard supports IPV6 which enables the implementation of Internet-of-things protocols over power lines

Power Line Systems—Architecture

Monitoring and control of critical infrastructure over a wide area

No new wires. No wireless infrastructure. No need for the internet or cloud connectivity.



Power Line Systems—Applications

Lighting

Load control

Environmental monitoring

Perimeter security ...

Street lighting control



- Scheduled dimming
- Energy monitoring
- Lamp burn out notifications
- Geo location tagged data

Architectural lighting control



- DALI control via power line
- Transparent data pipeline enables large area lighting control using the DALI bus

Environmental monitoring



- Weather, Air quality, water level detection...
- Interface to off-the-shelf sensors via RS232, RS485 or CAN bus
- Patent pending transparent pipeline to interact directly with sensors

Safety and Security



- Pedestrian and traffic monitoring with mm Wave sensor (add on accessory)
- RGB light beacons for remote signaling (add on accessory)
- Perimeter monitoring with mm Wave sensor with automatic local control loop for activating floodlights or gates

Structural monitoring



- Monitoring of bridges, roadways, water and gas pipelines using the nearest NC nodes mounted on light poles
- Off-the-shelf sensor via RS232, RS485 or CAN channels
- Data is transmitted automatically over the power lines to the nearest DC

Traffic and parking management



- Traffic and pedestrian counting using mm Wave sensors
- RGB dual sided light beacons for remote traffic flow management in emergencies
- Air quality and traffic density monitoring using a combination of mm Wave and Off-the-shelf air quality sensors