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G3 Alliance General Assembly

Enhance your industrial application combining
Power Line Communication & Metrology

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Agenda



Feel free to send us
your questions on



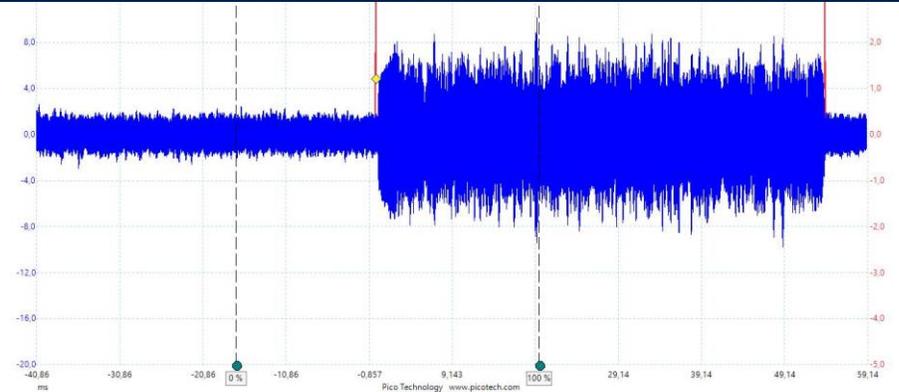
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|----------|---|
| 1 | General appraisal of Power Line Communication technologies |
| 2 | Target applications |
| 3 | Focus on PLC for Street lighting and Solar panels |
| 4 | Block diagram for PLC & metrology platform |
| 5 | ST ecosystem |
| 6 | Q&A Session |

Power Line Communication

PLC is applicable almost everywhere

The basic idea is to use the electrical power lines as a transmission medium for data signals.

Data is transmitted over the power lines by modulating the electrical signal at a **higher frequency** than the power signal.

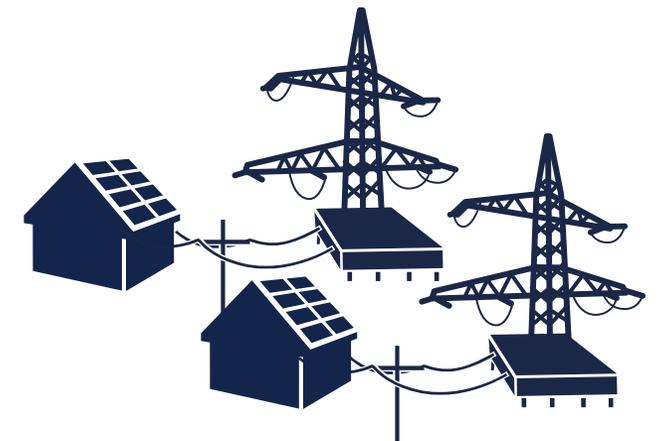


Example of a frame based on PRIME modulation

Reliable communication over long distances

Uses existing infrastructure

Cost-effective solution for many applications, including home automation, smart metering, internet access, and industrial control systems.



Key figures of power line networks

Free physical layer

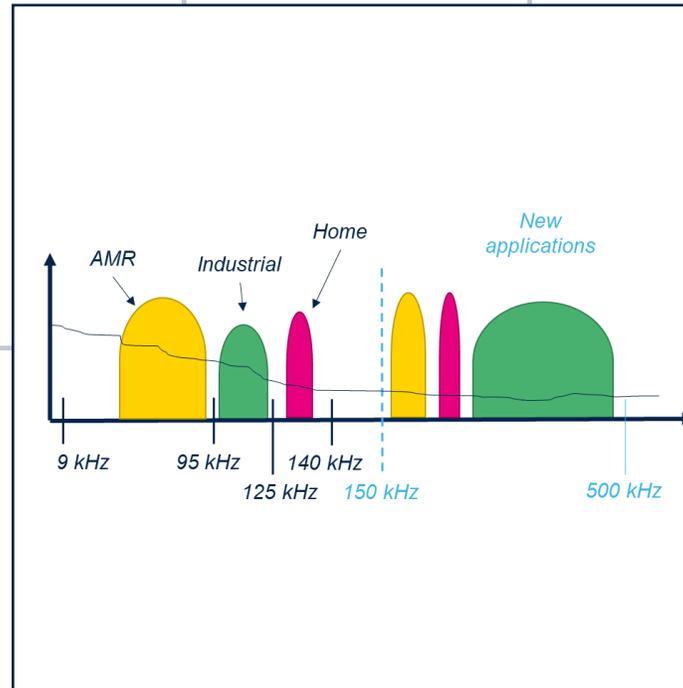
Worldwide deployments

Multiple network topologies (mesh & tree)

Integration of battery powered devices

Integration of RF

Standards

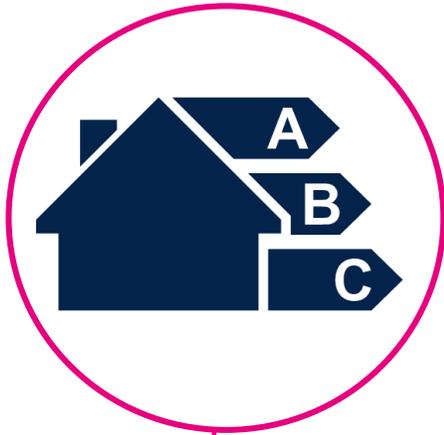


Target Applications

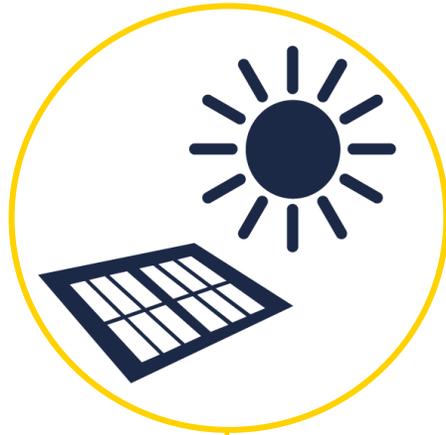


Applications that use Power Line Communication

Energy management



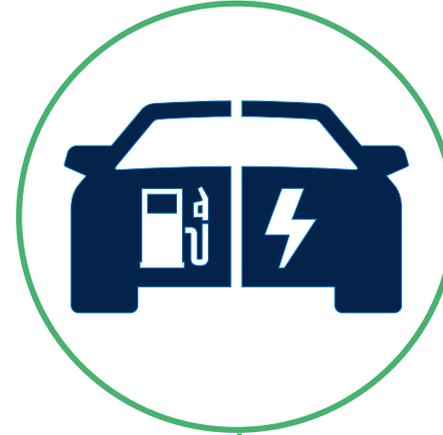
Smart Grid /
Electricity metering



Solar panel



Street lighting



Charging station
for EV



Industrial
automation



PLC can work over **AC** and **DC** power lines

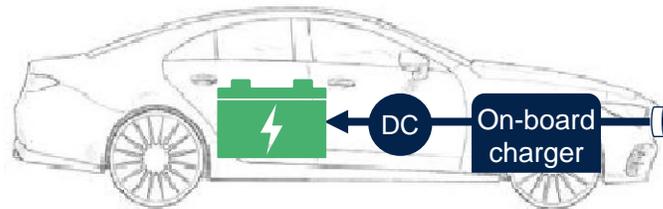
Electrical vehicle charging station

Several charging models on the market



Residential and commercial

AC power supplies the on-board charger, which supplies DC power to the battery.

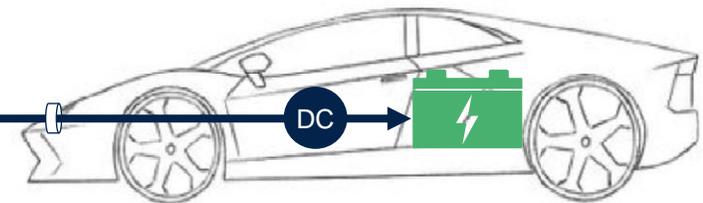


IEC15118



DC Fast Charging stations

The station converts AC power to DC voltage, then it directly charges the battery pack



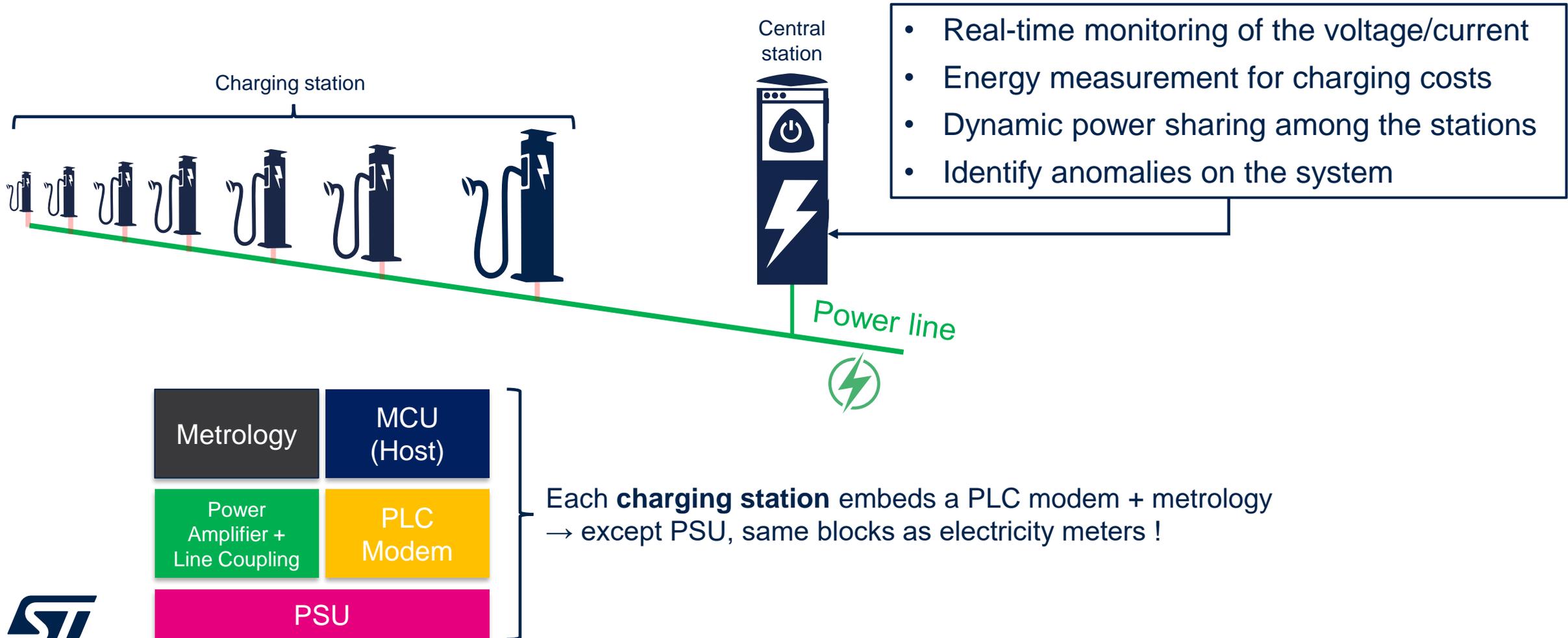
IEC15118



When the station is part of a charging network, Narrow Band Power Line Communication allow to monitor and balance the power between the charging stations.

Monitoring a park of Electrical Vehicle Charging Stations

Fast growing market



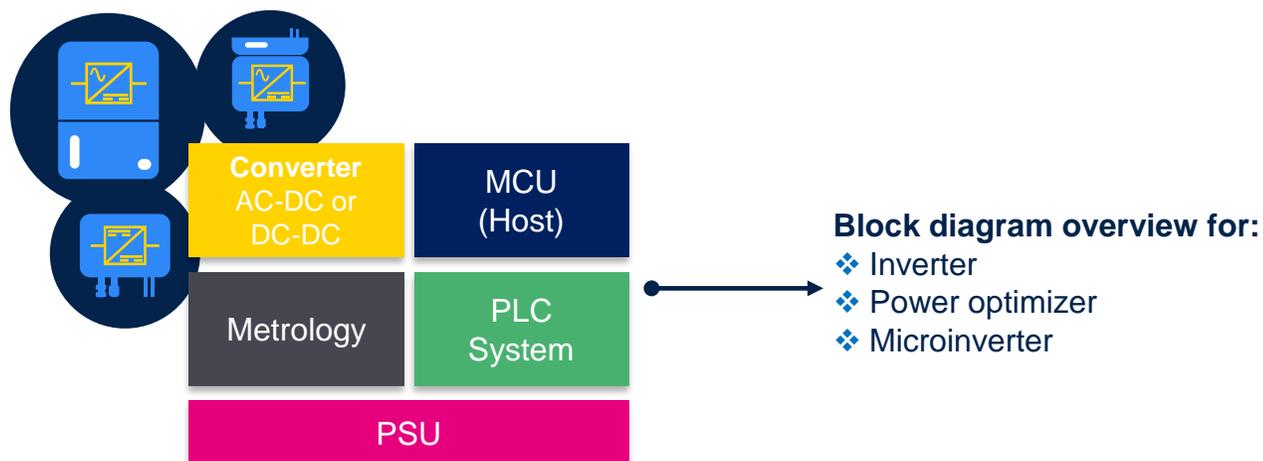


Monitoring of energy production of solar panel

Smart solar market, part of the renewable energy programs for carbon neutrality

Communication with the PV panels / strings can enable several applications

- Basic PV functions
 - Simple Rapid ShutDown (RSD) for PV safety (NEC 2020)
 - LEDs, I/O signaling
- Advanced PV functions
 - Monitoring applications using metrology where the devices would receive commands / requests and then reply to the inverter with data on its operating state
 - Maximum Power Point Tracking (MPPT) where bi-directional PLC communication would be used for higher volume of data exchange required by the application



The advantages of PLC technology for smart solar applications

- Plug & Play
- Reduces cost installation
- Increases the safety of PV systems
- It works over AC and DC
- It allows advanced features
- Robust and reliable 2-way communication
- Cost-effective solution



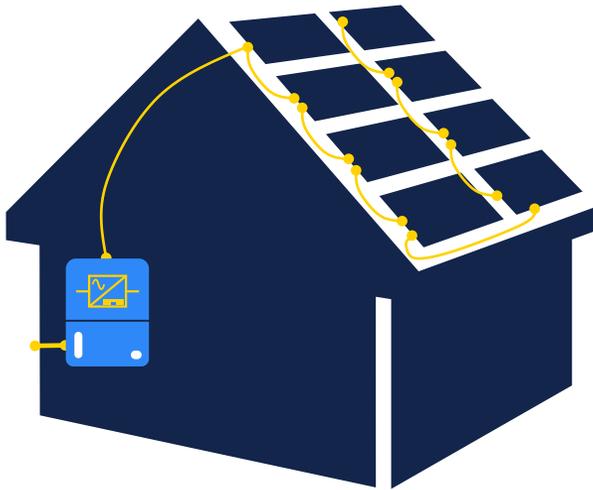
Solar application description

Smart solar market, part of the renewable energy programs for carbon neutrality

String inverter



Several panels connected to one DC-AC converter

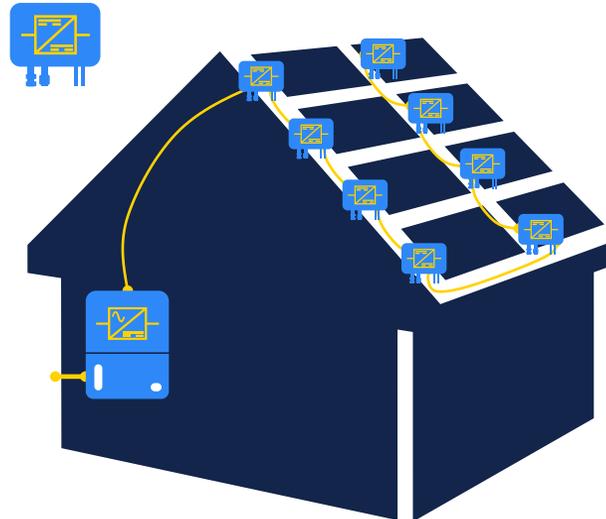


VS.

Inverter + Power optimizers



Each panel connected to a DC-DC converter, all connected to one DC-AC converter

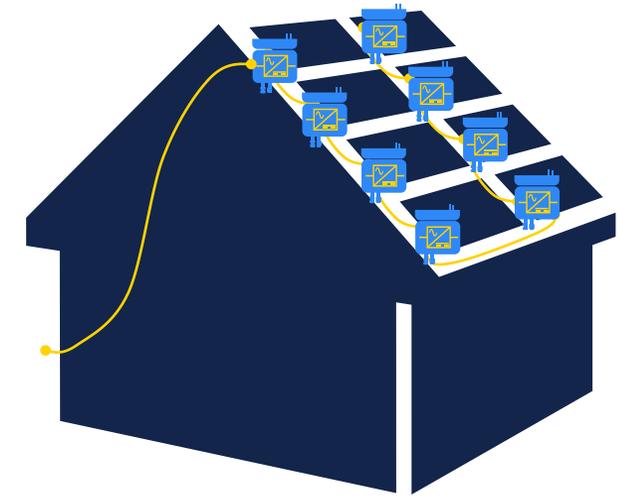


VS.

Microinverters



Each panel connected to an individual DC-AC converter



Semiconductors are key to reducing power consumption



30% of inner-city traffic congestion is the result of drivers searching for somewhere to park

With smart technologies, drivers will **know in advance** where an **available parking spot** is located and will not have to drive around at random looking for one.

Source : IBM



Municipal lighting accounts for **20%** of the planet's entire energy consumption

The **city of Milan, Italy**, has converted all of its street lighting to **LEDs**, as of August 2015, and reports energy savings to be **greater than 50%**. Moreover, they've avoided the emission of 23.650 tons of CO₂ into the atmosphere.

Source : City of Milan



Lighting & dimming
From on-off light control to PWM dimming

25%
saving



Washing machine
From Class D to Class A++

40%
saving



Refrigerator
From on-off control to PWM

40%
saving



Electronic lighting
From bulb lamps to tube lamps & LED

80%
saving



Air conditioning
From analog to digital
From AC to BLDC control

30%
saving



Digital power supply
Efficiency > 98% in run mode
Stand-by power to < 1mW

77%
saving

Source : ST

Why is G3 an ideal technology for street lighting?

WIFI effect “plug the light and it works without network investment”



Cable networks exists and are maintained



G3 technology is already deployed in more than 100 million meters worldwide

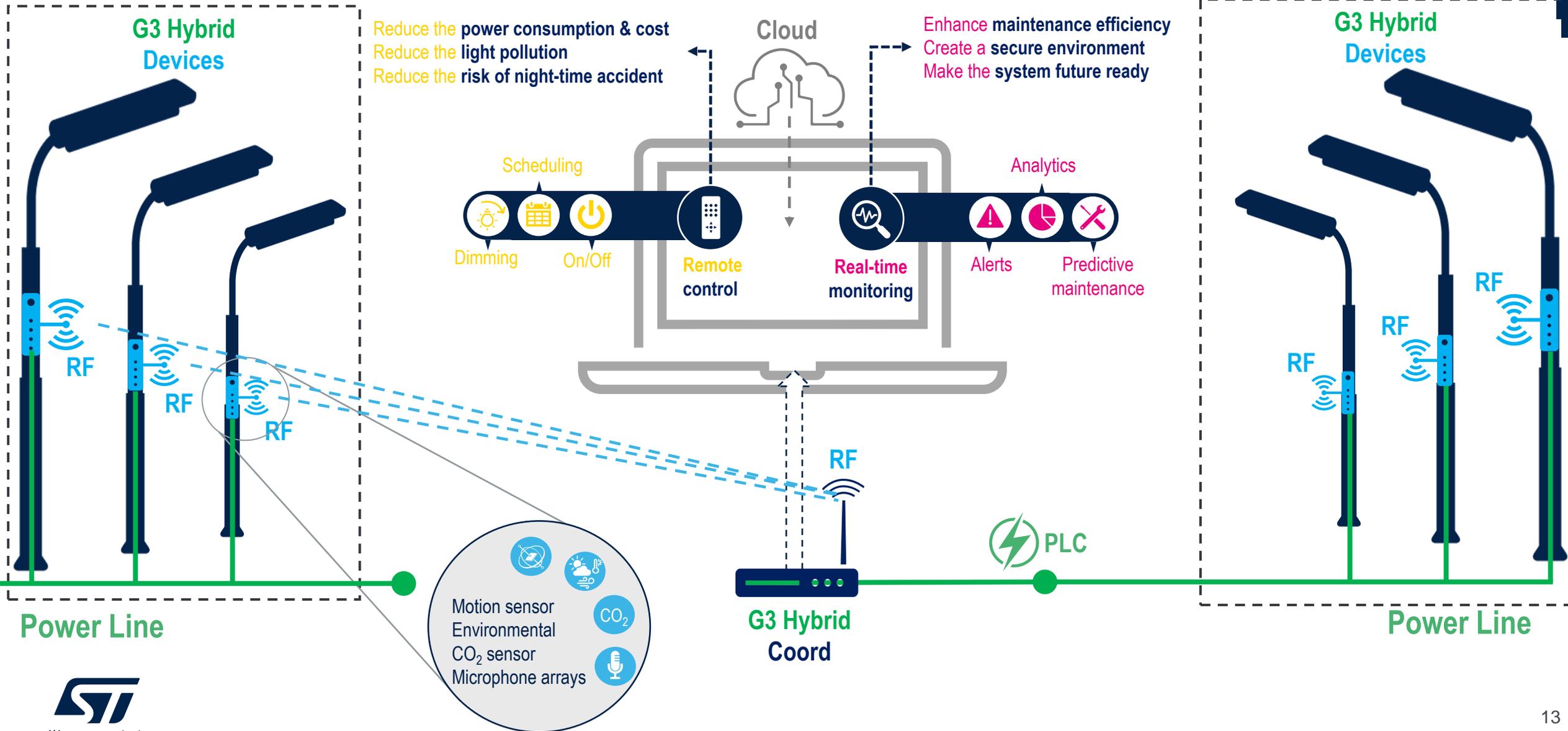


Network installation with lowest CAPEX/OPEX if relying on the infrastructure deployed



Compatibility with battery power sensors (RF) and line powered lights (PLC)

Hybrid PLC & RF for smart street lighting

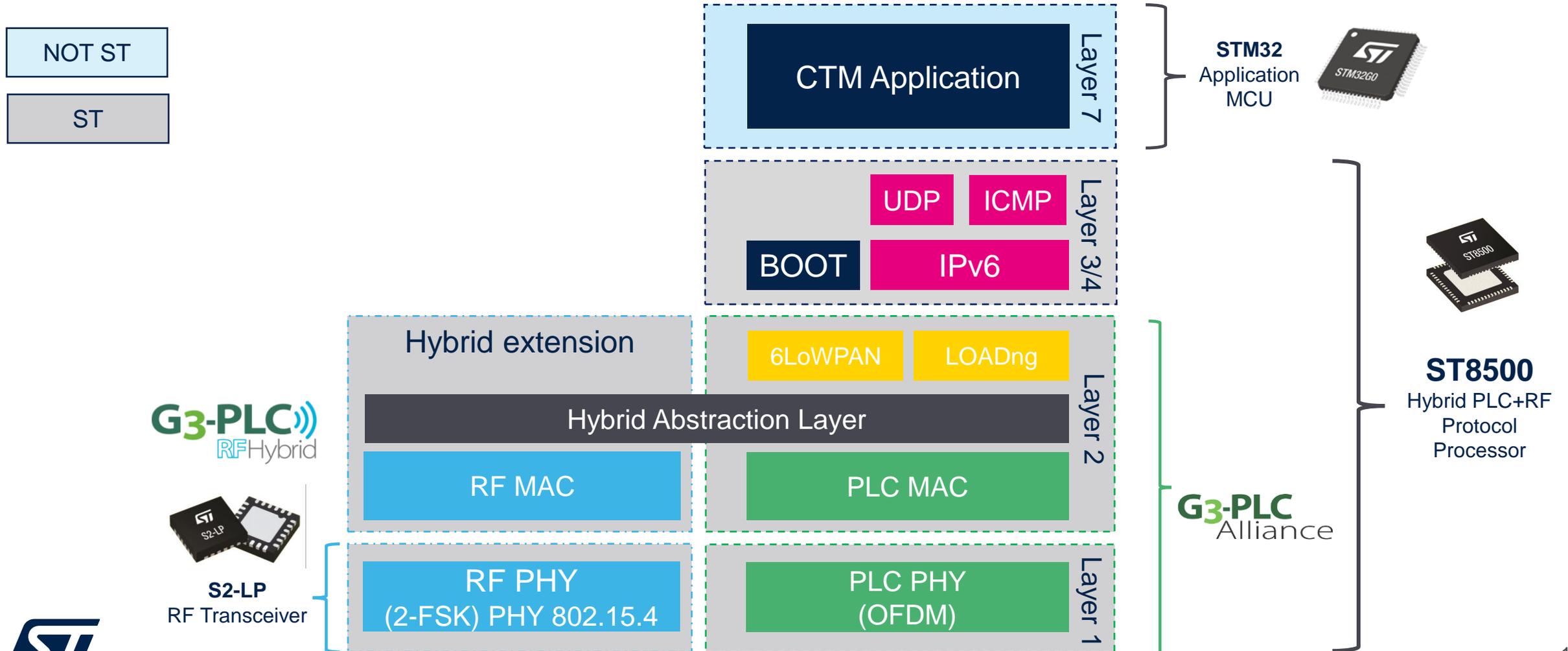


Block diagram for PLC & Metrology platform



Power Line Communication, FW partitioning

ST8500 based solution G3



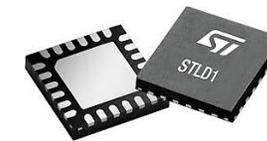
Power Line Communication, EVLKST8500GH Ecosystem

Evaluation kit

- ST8500 + STLD1 evaluation module
- NUCLEO-G070RB application controller module
- X-NUCLEO-S2868A2 or -S2915A1 RF

CAD Resources

- EVLKST8500GH kit Gerber
- EVLKST8500GH kit BoM
- EVLKST8500GH kit Schematic



Kit Documentations

- EVLKST8500GH kit data brief
- Application notes
- User manual

Tools & Software

- G3-PLC Hybrid binaries (Coordinator & Device)
- G3-PLC Hybrid GUI
- STSW-ST8500GH Software package data brief
- STM32 Application firmware example



Q&A

