



G3-Hybrid: Two powerful communication technologies in one single solution!

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G3 provides proven technologies offering lowest total cost of ownership and independency on telco operators



Cost effective, reliable and secure communication...


Cost-effective		Long range communication	Real-time communication
ITU standard	Supports IPv6	Secure	
	High robustness	High data rate	Future proof
Routing		Plug and play	



... in a wide range of applications

E-Mobility & Renewables

Smart Metering 

 Grid control / Monitoring 

Smart Cities & Street Lighting 

 Building & Industrial Automation 

Railway Applications

G3-Alliance provides standards-based technologies, designed for harsh network conditions and offering lowest total cost of ownership

Five Best Benefits of G3-PLC

1 Cost effective

- Uses existing powerlines for communication minimizing infrastructure and maintenance costs

2 Secure

- Supports MAC-level security using AES-128 cryptographic engine

3 Robust

- The 'robust' mode improves communication under noisy conditions, operates at very low SNR
- Self healing and high indoor penetration

4 Interoperable

- International ITU standard
- Certification program enabling multi-vendor implementations



5 Future proof

- End to end IP communication and IPv6 compliant
- Designed to accept diverse application layers



G3-Alliance: international standards, certified for interoperability



G3-Alliance

G3-Hybrid

G3-Alliance

Deployment

Next Generation

Creation of the consortium to standardize and promote the G3-PLC communication protocol globally

Start of the Linky roll out in France with now 36 million devices in operation

Introduction of the G3-Hybrid protocol combining existing PLC profiles and RF capabilities



2011

2014

2015

2018

2020

2022

Certification

Growth

Hybrid certification

Opening of the certification program

- Around 90 members
- > 400 certified devices
- Protocol enhancements

Certification of G3-Hybrid platforms and products



G3-Alliance

G3 is a mature technology with over 80 million products in operation in more than 30 countries worldwide

Known pilots and roll-outs of worldwide



In France over 35 million G3-PLC meters have been successfully installed by Enedis (part of EDF group)



An industrial program for a massive roll-out

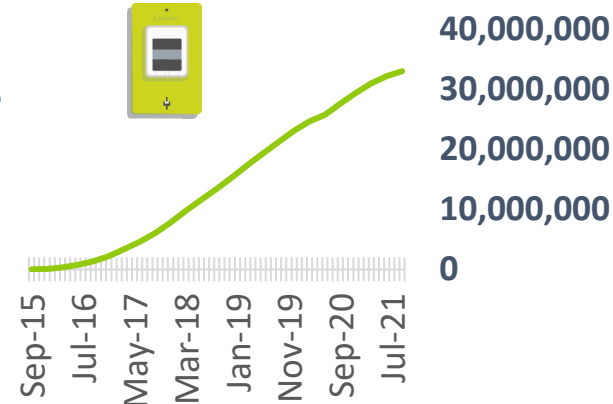


- **2 million** remote operations per month
- **99%** of successful remote operations

6 years



2015 → 2021



1 billion remote readings of consumption data per month
98% of successful remote readings



7 million people follow their consumption online

G3-PLC 100% G3-PLC communication



6 MANUFACTURERS WITH FACTORIES BASED IN FRANCE



45 ELECTRICAL INSTALLATION COMPANIES AND RECYCLING COMPANIES

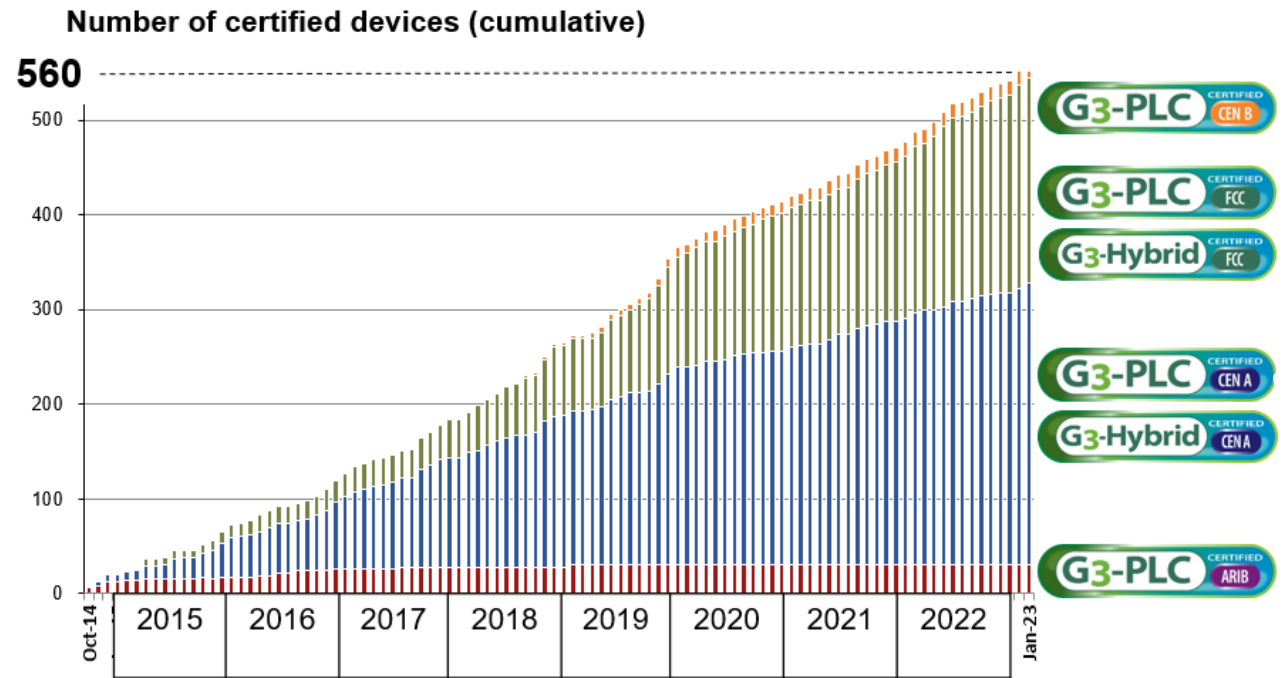
- Linky mass roll-out in France is completed
- Linky roll-out started or is in preparation in French foreign territories such as French Guyana, Martinique, Mayotte, etc. and in Haiti
- Experimentation started in France with the hybrid solution

G3-Alliance is supported by a international group of 100 utilities and industrial players from over 30 countries



G3-Alliance operates a successful certification program enabling multi-vendor implementations

- Two certification labs in France and Japan
- Certification covers conformance, interoperability and performance
- Certification for platforms as well as products
- Over 500 devices certified since opening of certification



For list of all certified devices: <https://g3-plc.com/g3-plc-certification/certified-products/>

RF or PLC Communication?

PLC Advantages

- Built on existing infrastructure which lowers deployment costs
- Able to communicate with hard-to-reach nodes without attenuation
- No line-of-sight limitation (Underground, through walls)
- Not affected by weather

RF Advantages

- Immune to noise on the lines
- Able to connected isolated meters to the main network
- Mesh RF network can help extend the effective range of the network

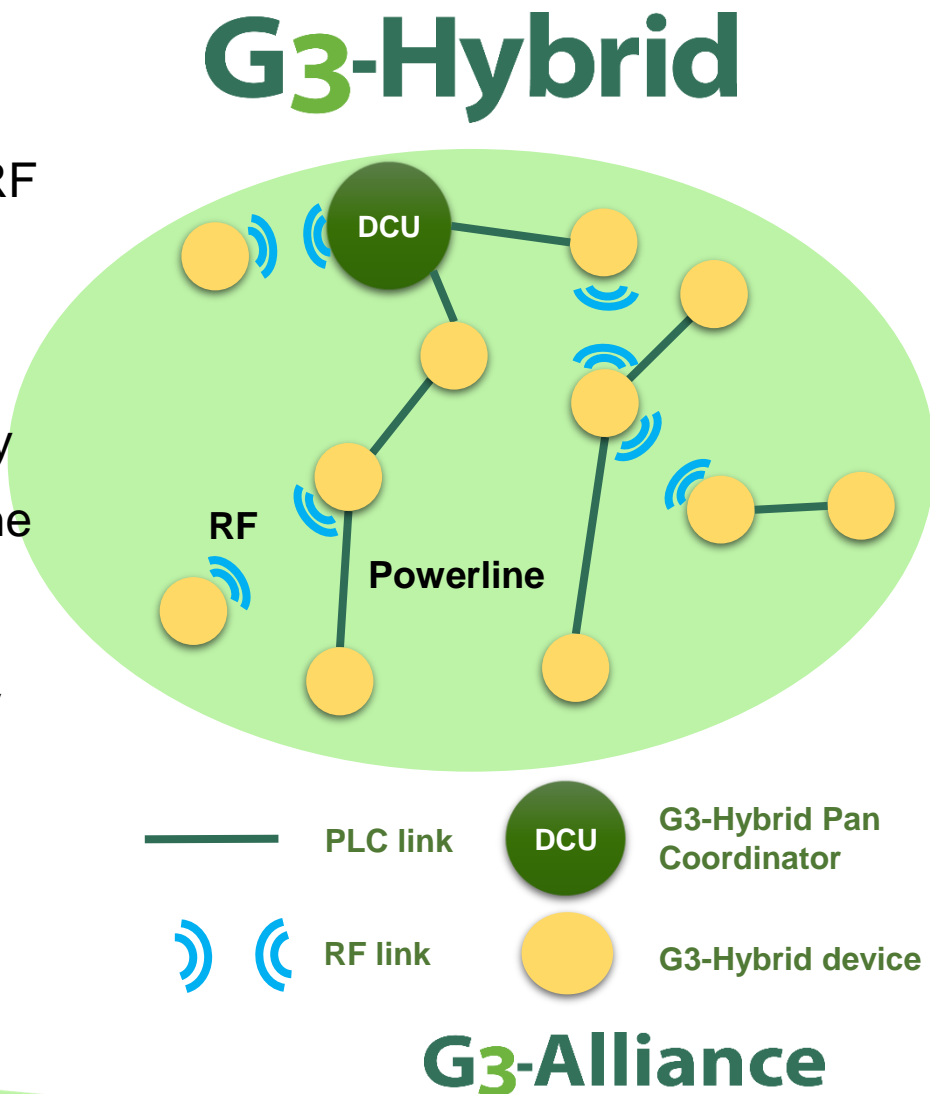
What if you can have both in one?!

Hybrid PLC&RF Advantages

- Maximises coverage and connectivity
- Strongly reduces the complexity of the roll-out and with that the cost
- Increases performance (communication success rate and data rate)

G3-Hybrid: Two powerful communication technologies in one single solution!

- RF mesh and power line communication in one *single* solution
- Each node can use PLC as well as RF for communication
- The route is built with a hop-by-hop selection of the 'best' channel
- Maximises coverage and connectivity
- Strongly reduces the complexity of the roll-out and the cost
- Open standard adopted by ITU enabling multi-vendor interoperability
- Complies to FCC and regulatory requirements globally
- Fully backwards compatible with G3-PLC



G3-Hybrid benefits: Maximises coverage and connectivity and strongly reduces the complexity of the roll-out



Cost of Ownership

- Avoids high cost of last 1% connectivity
- Reduces complexity of the roll-out
- No OPEX for using the network



Flexibility

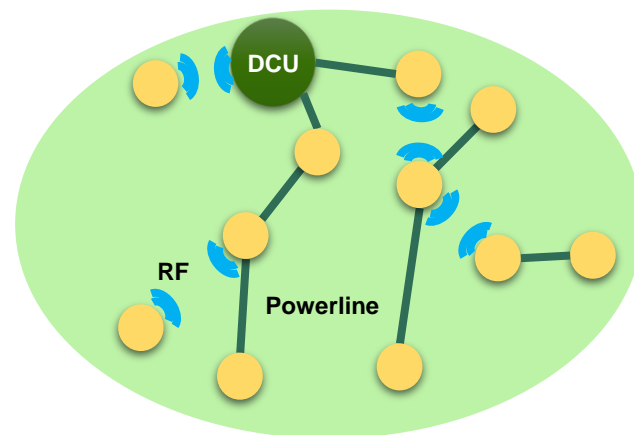
PLC and RF work hand-in-hand and complement each other, maximising coverage and connectivity



Performance

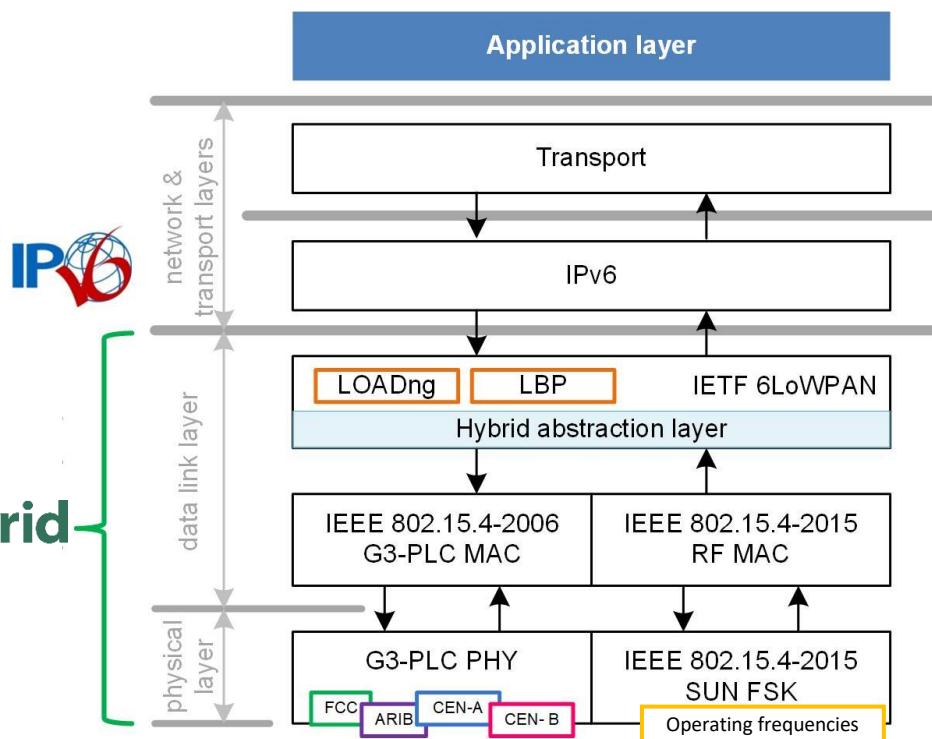
- Higher communication success rate
- Higher data rate as more nodes use best available channel
- Opens other IoT applications such as sensors, gas and water meters

G3-Hybrid



The G3-Hybrid unifies powerline and radio frequency technology creating one, seamlessly managed network using both media

Unified G3-Hybrid PLC+RF protocol stack



- Unifies wireless RF and wired power line communication
- One, seamlessly managed network over both media
- The hybrid protocol stack is built using open standards IEEE 802.15.4-2015 in addition to the existing G3-PLC protocol
- Switching between PLC and RF is decided above the hybrid abstraction layer

G3-Hybrid is a full-fledged RF solution with all mechanisms in place to meet regulatory requirements in any part of the world



- Based on open standard IEEE 802.15.4-2020
- Supports a wide range of RF frequencies bands
- Supported mechanisms include:
 - Frequency Hopping
 - Adaptive power control (APC)
 - Duty-cycle handling
- Last gasp mechanism supported
- Certification program includes conformance, interoperability and performance testing
- Interoperable solution enabling multi-vendor implementations

Band designation MHz	Region (informative)	Local requirements met by G3-Hybrid
863	Europe	✓
866	India	✓
870	Europe	✓
915	North America	✓
915-a	North America & Mexico	✓
915-b	Brazil	✓
915-c	Australia & NZ	✓
919	Malaysia	✓
920	Japan	✓
920-b	HK, S'ore, Thail., Vietn.	✓
915-d	Europe	Under investigation in WS4
915-e	Philippines	
917	Korea	
867	Singapore	
920-a	China	

G3-Hybrid platforms from 6 international chip manufacturers have already been certified

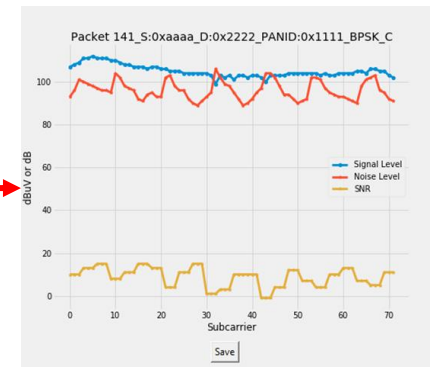
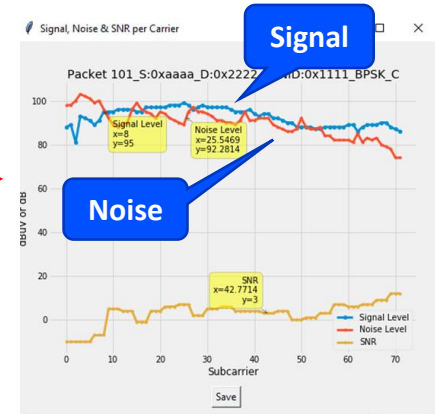
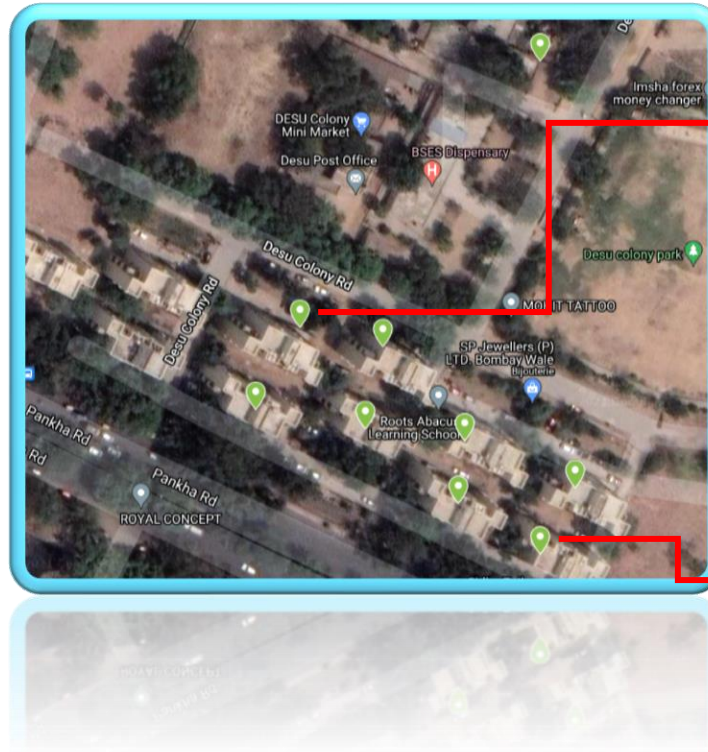
The Renesas logo consists of the word "RENESAS" in a bold, blue, sans-serif font. The letter "R" is stylized with a long, sweeping tail that extends to the left.The Microchip logo features a red circular icon on the left, containing a white stylized "M" shape. To the right of the icon, the word "MICROCHIP" is written in a bold, black, sans-serif font.The STMicroelectronics logo features a stylized blue "ST" monogram on the left. To the right of the monogram, the text "life.augmented" is written in a smaller, blue, sans-serif font.The Semitech Semiconductor logo features a stylized "S" icon on the left, composed of a black and green shape. To the right of the icon, the word "semitech" is written in a green, sans-serif font, and "semiconductor" is written in a smaller, black, sans-serif font below it.The HiTrendtech logo features a stylized blue and white circular icon on the left, resembling a target or a spiral. To the right of the icon, the word "HiTrendtech" is written in a green, sans-serif font, with a red underline beneath the text.The Eastsoft logo consists of the word "EASTSOFT" in a bold, red, sans-serif font, followed by a registered trademark symbol (®) on the right.

Overview of all certified G3-Hybrid platforms is available on our website:

<https://g3-plc.com/g3-plc-certification/certified-platforms/>

Trials for example in India by Sagemcom show G3-Hybrid is performing well under very harsh conditions (1/3)

- Location represents a challenging environment for both RF & PLC communications:
 - Very high level of PLC noise



Sagemcom

Trials for example in India by Sagemcom show G3-Hybrid is performing well under very harsh conditions (2/3)

- Location represents a challenging environment for both RF & PLC communications:
 - Very high level of PLC noise
 - Obstacles create a very harsh environment for back meters to communicate in RF with the front Meters

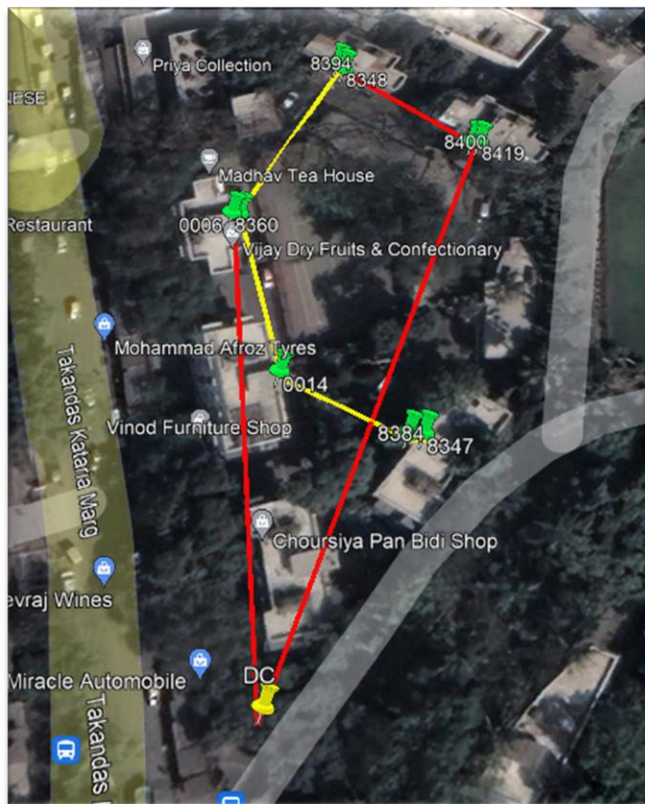


Sagemcom

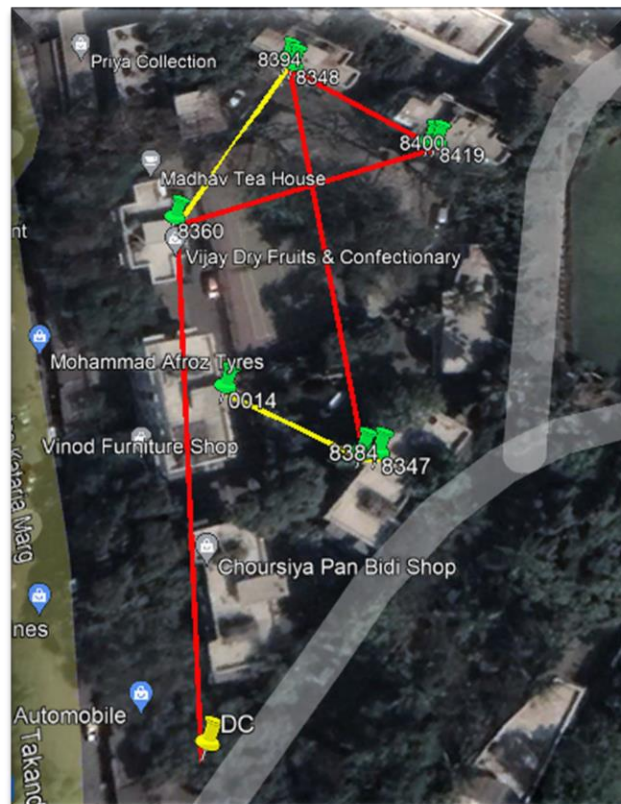
Trials for example in India by Sagemcom show G3-Hybrid is performing well under very harsh conditions (3/3)

G3-Hybrid: The Ideal Technology - Automatically Adjusts Topology Based on Channel Condition

16/06 02:00



20/06 8:00 to 20:00



— RF Link
— PLC Link

G3-Hybrid is now a global solution and worldwide deployments have started!

Example projects include (see next slides):

- Sagemcom will start deployment of G3-Hybrid in Tunisia at STEG, which is also a member of the G3-Alliance
- Gridspertise started a smart meter pilot in India with G3-Hybrid
- Gridspertise started deployment of G3-Hybrid technology in Latin America in June 2023
- Eastsoft has certified G3-Hybrid chipsets for many RF bands and is successfully deploying G3-Hybrid globally: Middle East, Asia, LATAM, Africa
- G3-Hybrid deployment in mini-grids in Africa started in 2023
- Wasion, a leading meter manufacturer from China and promotor of G3-PLC, also included G3-Hybrid in their product portfolio in 2023
- Kaifa announced to start large scale deployment of G3-Hybrid in Pakistan in 2024

Sagemcom will start deployment of G3-Hybrid in Tunisia at STEG, which is also a member of the G3-Alliance

- Latest Sagemcom G3-Hybrid meters and Data Concentrators are now in the final stage of G3 certification



Gridspertise started a smart meter pilot in India with G3-Hybrid

- Gridspertise signed an MoU with Tata Power
- Tata Power Delhi Distribution Ltd. (TPDDL), serves 1.9 million customers in North Delhi
- Objective is to deploy smart metering and automation technologies in India's distribution network
- The smart meter pilot project will use G3-Hybrid technology

<https://www.smart-energy.com/industry-sectors/smart-meters/tata-power-and-enel-group-to-deploy-smart-meter-and-automation-tech-in-india/>



Gridspertise started deployment of G3-Hybrid technology in Latin America in June 2023



G3 Hybrid technology deployment Colombia

A new fully modular and interoperable Smart Meter that:

- allows different communication protocols (G3 Hybrid – PLC + RF Mesh, Cellular LTE and NBloT)
- is flexible allowing the distributors to change the communication technology over the time
- maximizes the reachability and availability of field devices in urban and rural areas thanks to G3 Hybrid technology



Eastsoft has certified G3-Hybrid chipsets for many RF bands and is successfully deploying G3-Hybrid globally (1/4)

Eastsoft. | Application of Eastsoft G3 Hybrid Solutions - Saudi Arabia



- 2 million G3 Hybrid communication module
- Meter reading across transformer areas
- The success rate is 1.5% higher than the NB solution in the same period.

Eastsoft has certified G3-Hybrid chipsets for many RF bands and is successfully deploying G3-Hybrid globally (2/4)

Eastsoft | Application of Eastsoft G3 Hybrid Solutions - Indonesia

- G3 Hybrid
- Success rate 98%

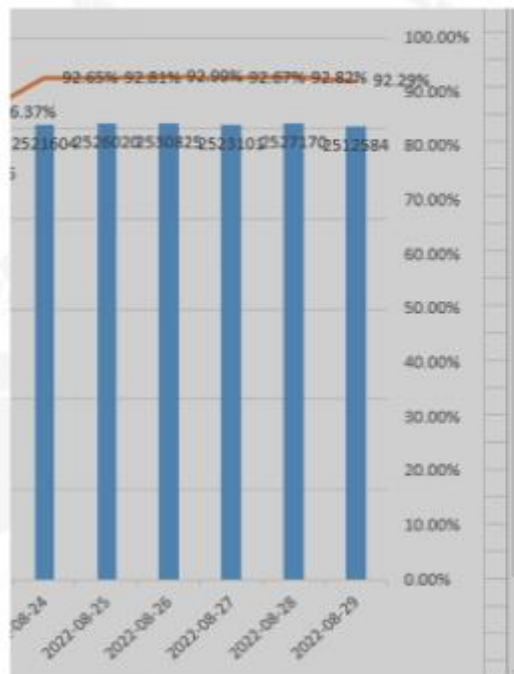


Eastsoft has certified G3-Hybrid chipsets for many RF bands and is successfully deploying G3-Hybrid globally (3/4)

Eastsoft | Application of Eastsoft G3 Hybrid Solutions - Uzbekistan



- More than 3.2 million G3-PLC modules;
- Always ranked first in all KPIs;
- Excellent on-site communication performance;
- Highly praised by local electricity company.



Eastsoft has certified G3-Hybrid chipsets for many RF bands and is successfully deploying G3-Hybrid globally (4/4)

Eastsoft | Application of Eastsoft G3 Hybrid Solutions



Peru

- Success rate 97%;
- G3 Hybrid solution was adopted as a technical standard in the bidding process.



Bulgaria

- About 100,000 meters per year;
- Success rate 99%;

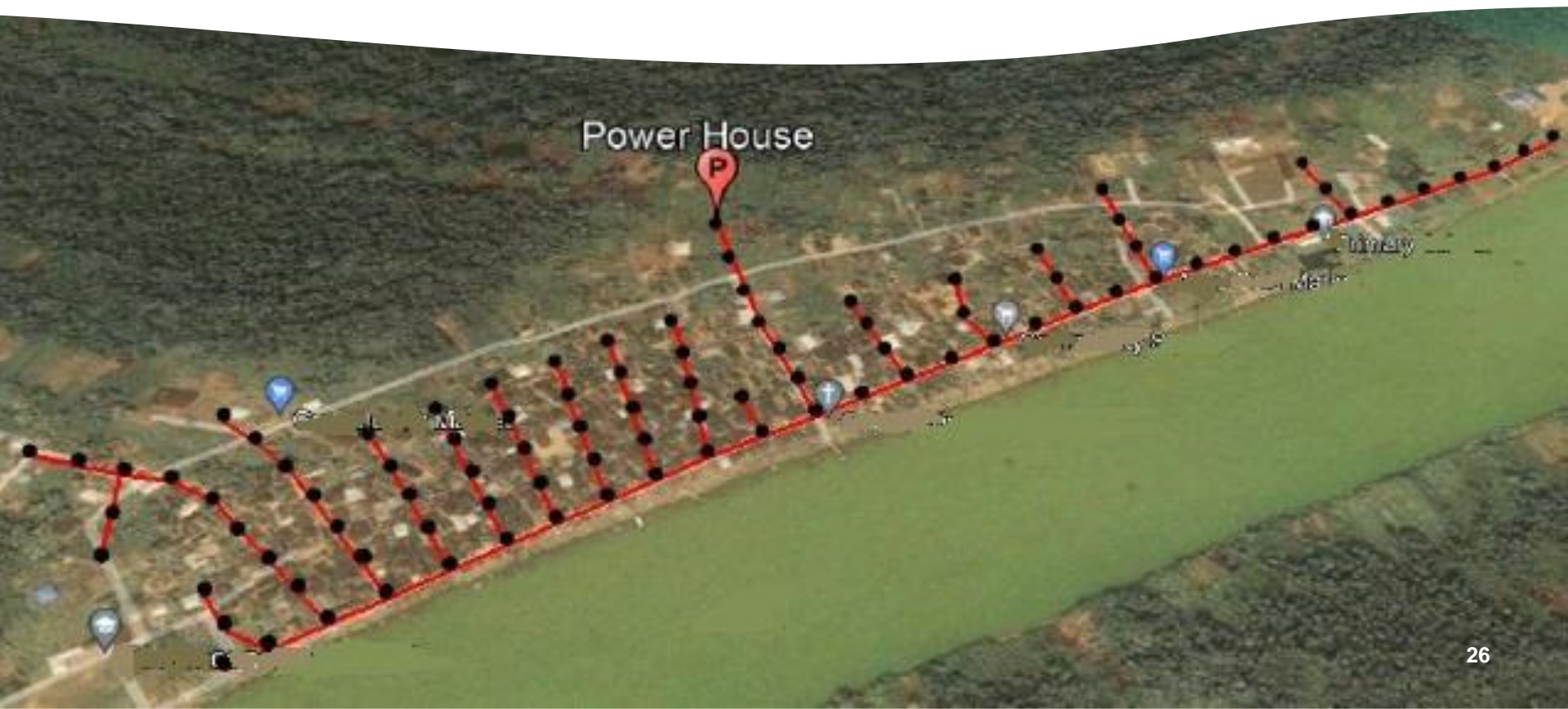


Africa

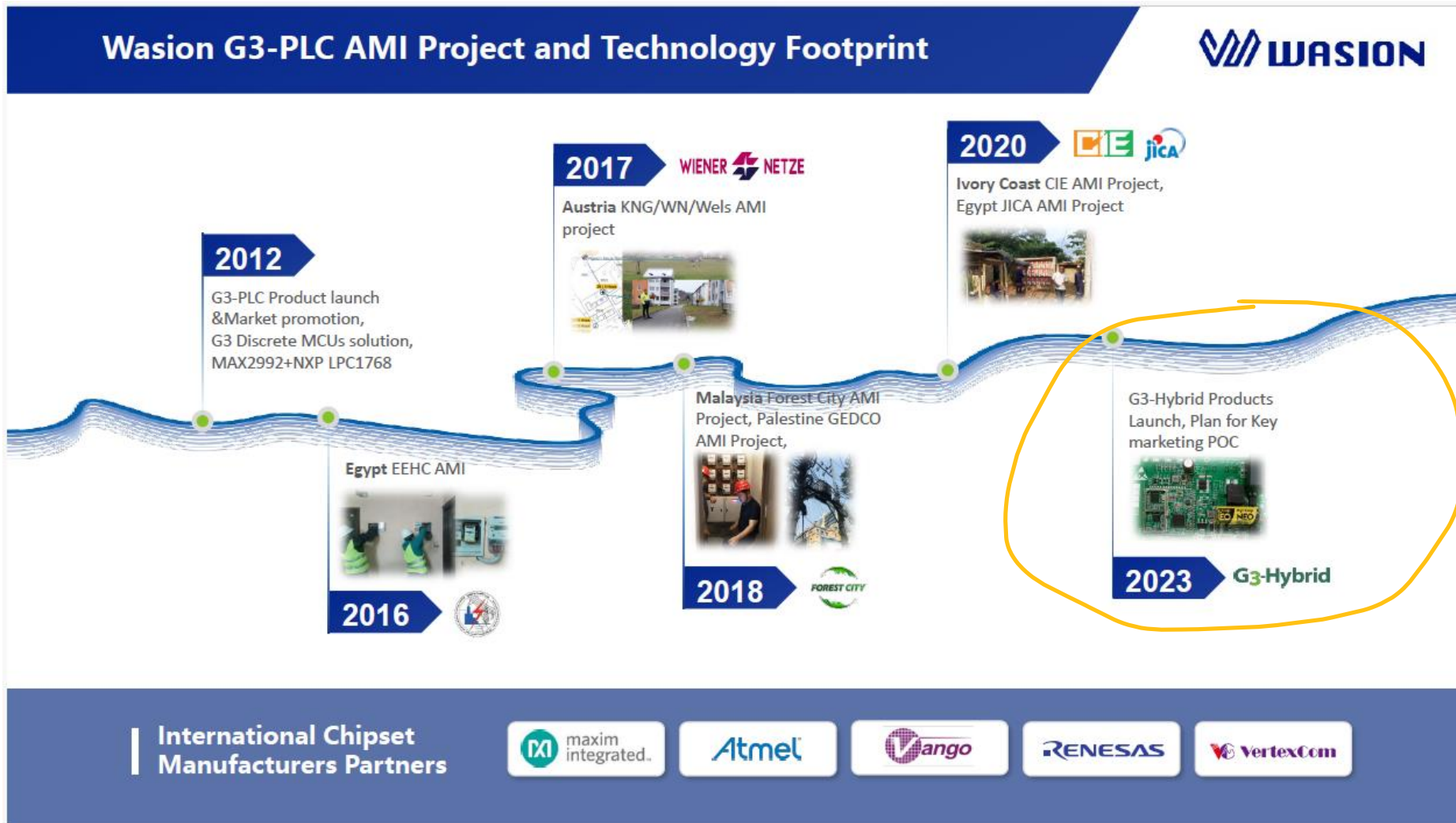
- 1.6 million modules for prepaid electricity meters and CIUs;
- Continuously supplying;

G3-Hybrid deployment in mini-grids in Africa started in 2023

- One of the mini-grids is in Nigeria
- The existing generation was removed, and solar arrays and batteries were installed
- In this village around 1700 G3-Hybrid meters are connected



Wasion, a leading meter manufacturer from China and promotor of G3-PLC, also included G3-Hybrid in their product portfolio in 2023



G3 technology provides a powerful communication backbone for the Smart Grid!

- ✓ Standards based and interoperable solution enabling multi vendor implementations
- ✓ Proven robustness in the 80+ million devices already deployed worldwide
- ✓ Designed for harsh network conditions thanks to its automatic adaptive modulation, mesh routing and by using different frequency bands
- ✓ G3-Hybrid unifies PLC and RF communication maximizing coverage and connectivity and reducing the complexity and cost of the roll-out
- ✓ Backed by an international group of DSOs and industrial players to ensure continuity and evolution over a long time

If you have any questions,
please visit www.g3-alliance.com or
contact generalsecretary@g3-alliance.com