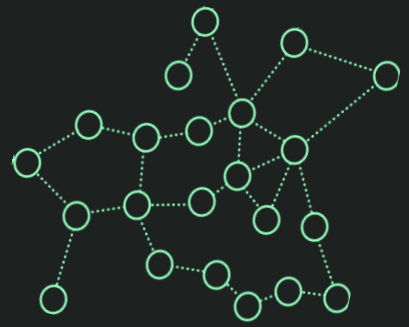
HOW TO SIMPLY MANAGE MASSIVE IOT DEPLOYMENTS

WIRELESS IOT CONNECTIVITY AT MASSIVE SCALE

YOUSSEF KAMEL

SVP Ecosystem Partners

OUR STRATEGIC FOCUS



100x
1 000x
10 000x
100 000x
1 000 000x

CONNECTIVITY

Reliable, optimized, scalable and simple to use wireless mesh **connectivity**.

SOFTWARE

The **software** core for de-centralized device connectivity, and open source reference software from node to cloud.

ROBUST PERFORMANCE

Industrial grade **massive IoT applications** and solution for our customers.

ECOSYSTEM

Building partnerships so that together we can offer turnkey solutions to end customers.

WIREPAS

WIREPAS VALUE

DESIGNED FOR MASSIVE IOT

HIGH PERFORMANCE

EASY TO INSTALL AND PROVISION

SCALE AND DENSITY

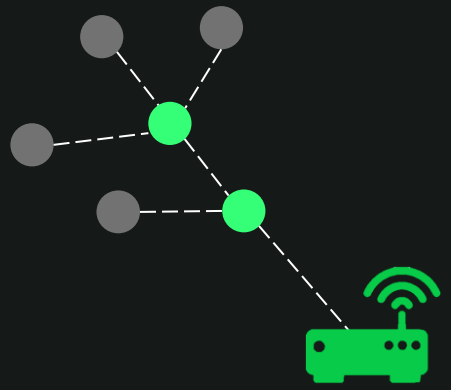
HIGH RELIABILITY

LOW POWER POSITIONING

WIREPAS MESH: DESIGNED FOR MASSIVE IOT

Local

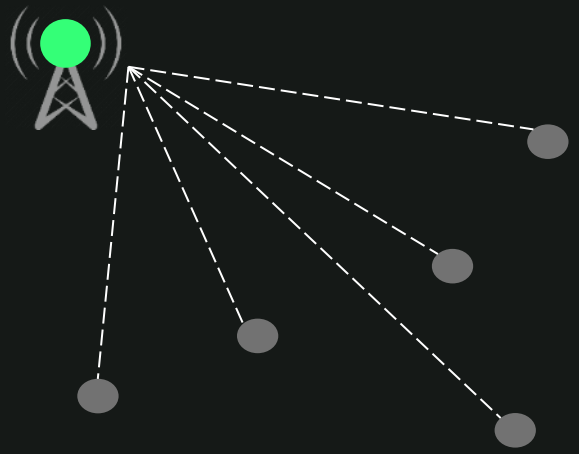
Local area and small installations



Zigbee, Thread, BLE Mesh, Z-wave

Wide Area

Wide area and sparse installions with limited bandwidth

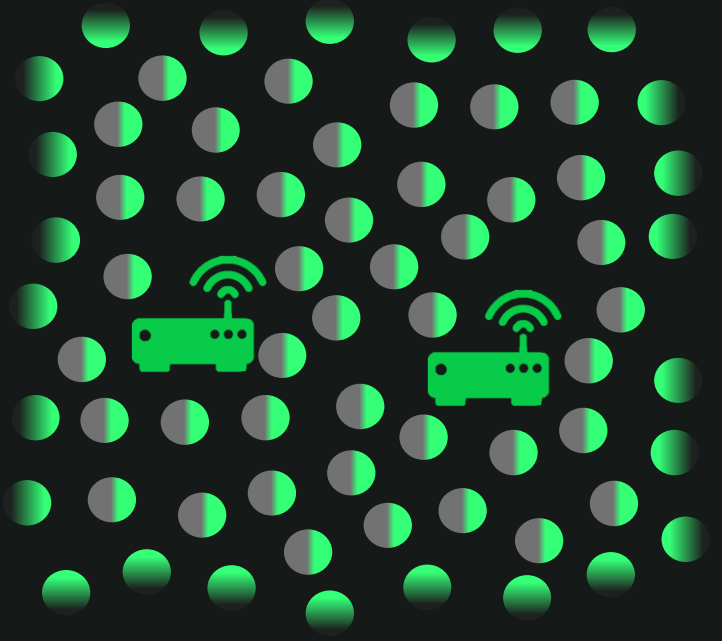


SigFox, LoRA, Ingenu, NB-IoT

Centralized

Massive IoT

Any scale, any density, any location with positioning



De-centralized

WIREPAS

FOCUS APPLICATIONS

LOGISTICS AND ASSET TRACKING

SMART LIGHTING

INDUSTRIAL AND GENERAL IOT

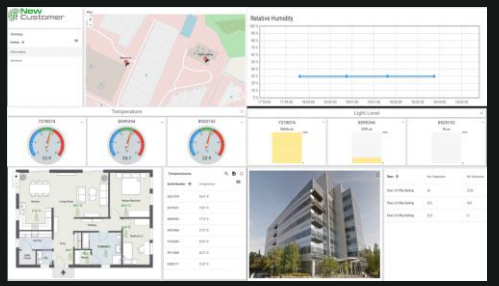
SMART METERING

WIREPAS

WIREPAS MESH OVERVIEW

Customer Hardware

Customer Dashboard



WIRELESS MESH NETWORK

ANY APPLICATIONS

License from Wirepas

WIREPAS MESH SOFTWARE

DEVICE HARDWARE

GATEWAY[1]

GATEWAY[N]

License from Wirepas

WIREPAS POSITIONING ENGINE

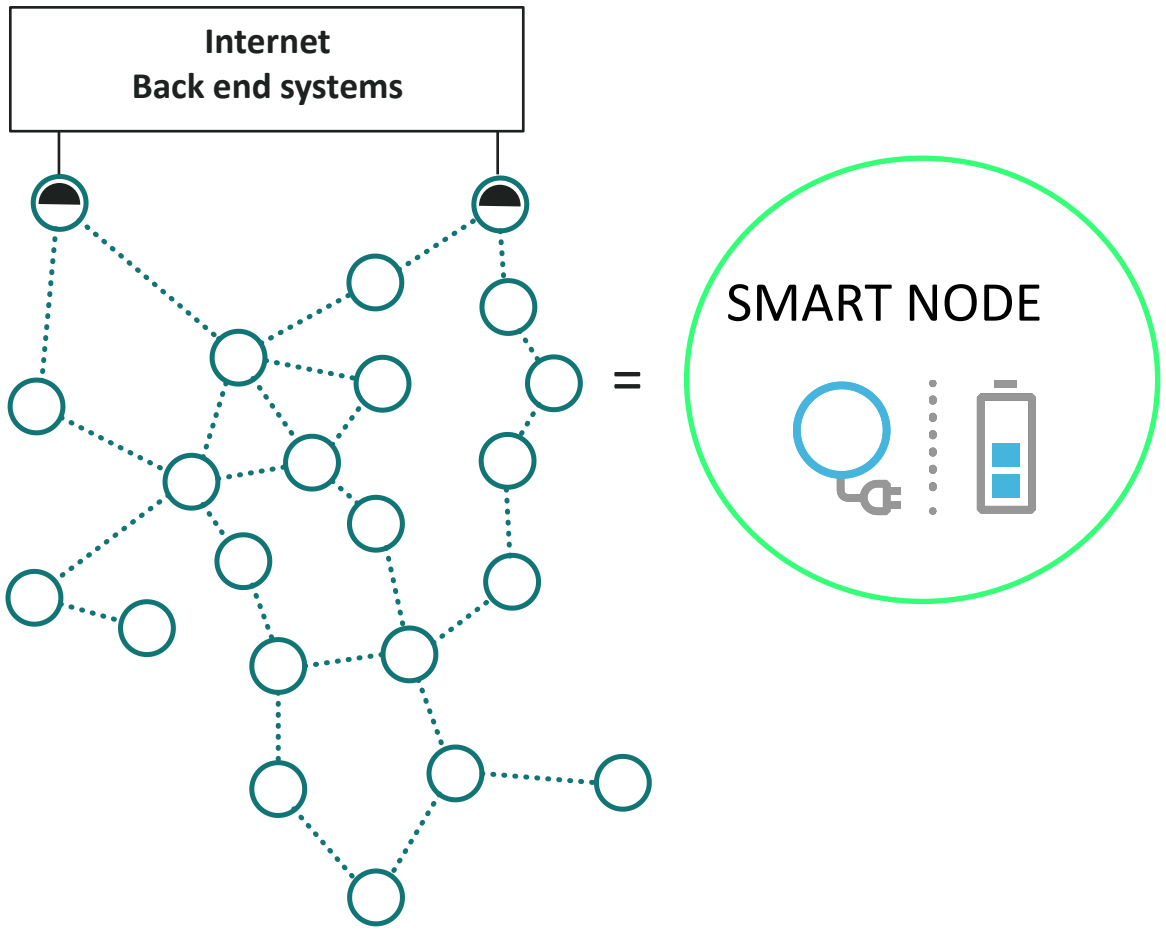
WIREPAS NETWORK TOOL

CLOUD TOOLS

Open source reference

WIREPAS

Wirepas Mesh – De-centralized operation

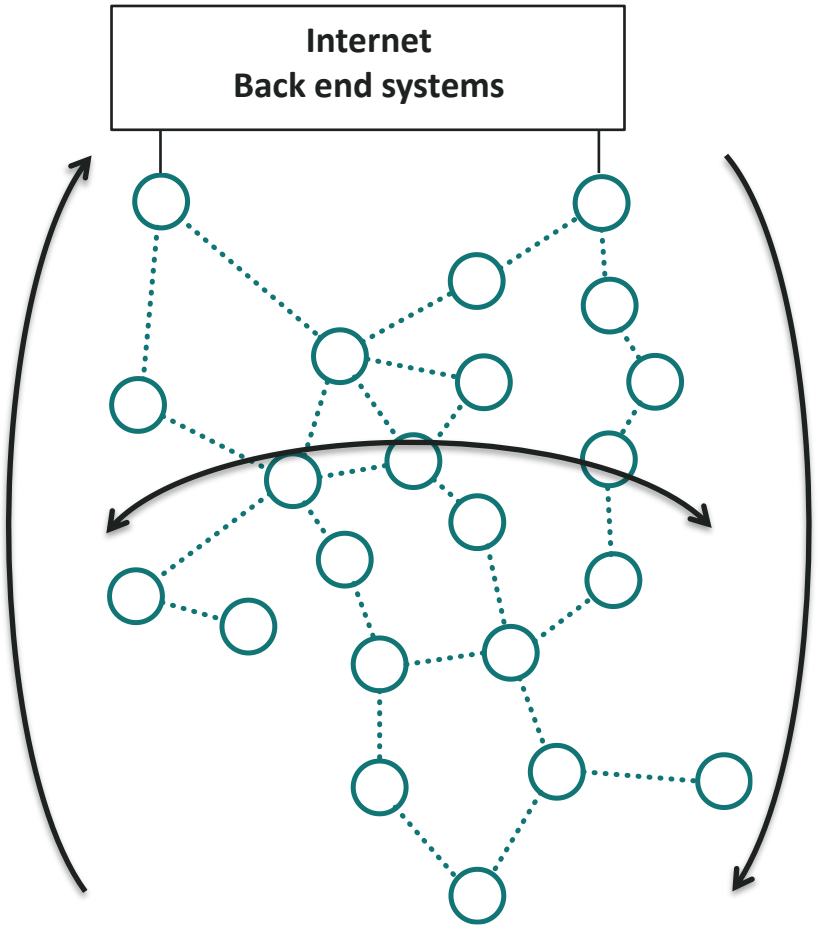


- A node automatically scans its neighborhood, chooses the router which has the best path to the gateway.
- It becomes a router and extends the network coverage
- Each device decides its role locally, all devices are capable to route at low power

- No network manager, no coordinator
- No network tables
- All decisions are done locally

WIREPAS

Any communication direction



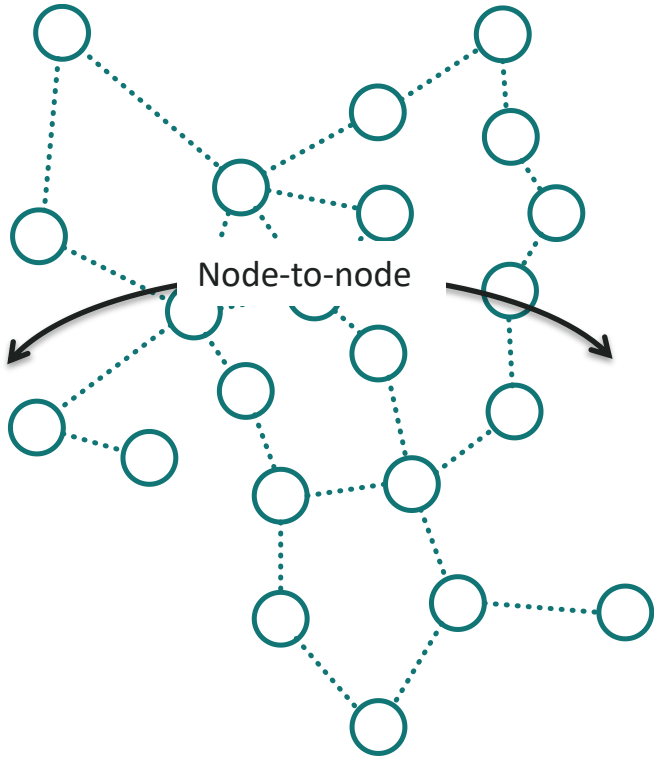
Data gathering uplink

Control and updates downlink

Direct node-to-node communication

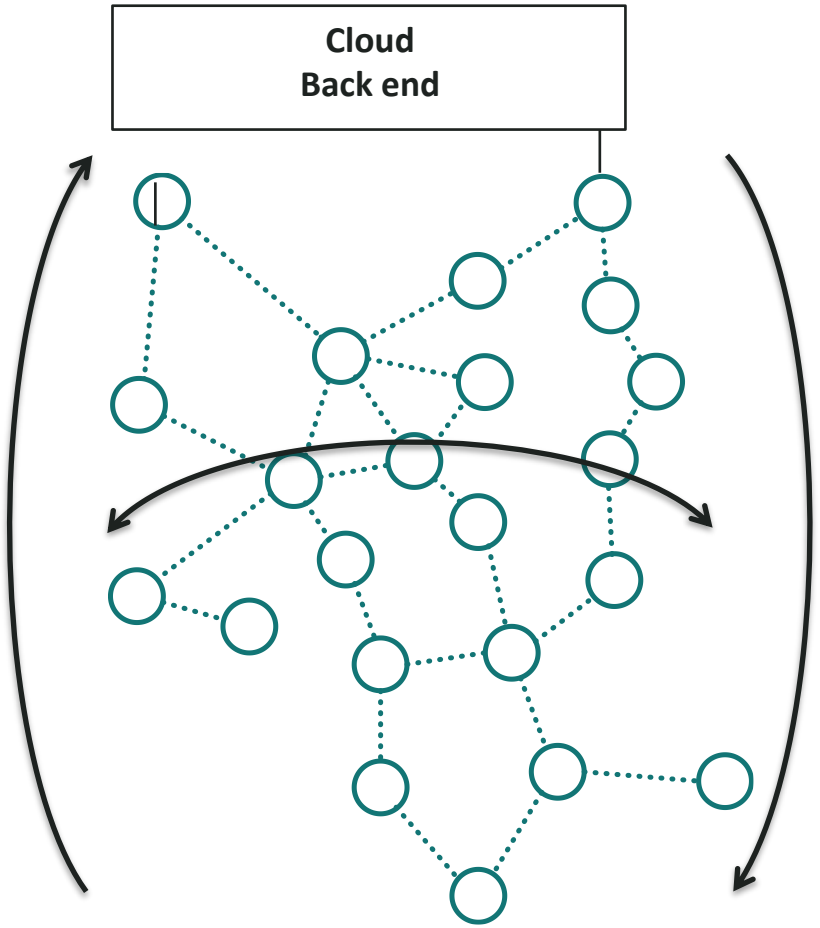
WIREPAS

Topologies



Gateway-less network

Gateway(s) can be added at any stage to connect the local network to the cloud



Single or multi-Gateway network

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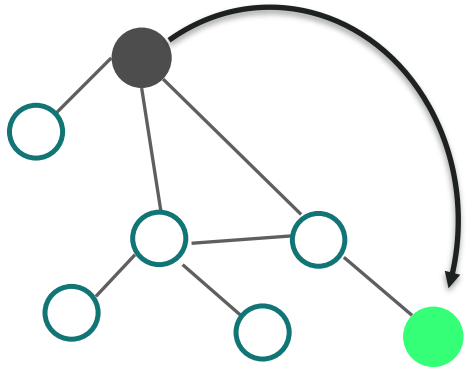
Messaging: Unicast, Broadcast and Multicast

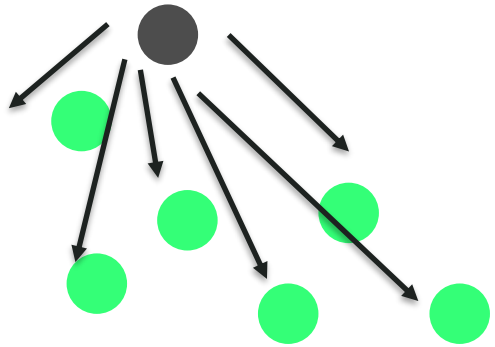
UNICAST : Send to a specific device

BROADCAST: Send to all devices

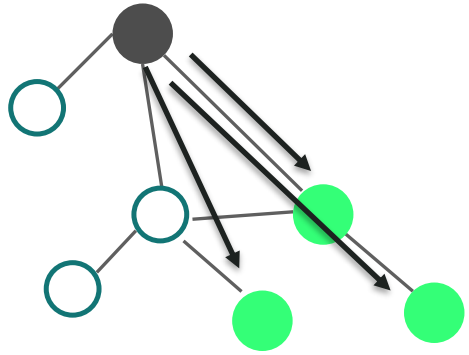
MULTICAST: Send to a group of devices



Unicast



Broadcast



Multicast

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INTERFERENCE TOLERANCE

Dynamic local channel selection

WIREPAS

Dynamic *local* channel selection out of **40 channels**

THREAD GROUP

One channel selected at provisioning

Bluetooth®

Mesh

3 channels
Used by all BLE beacons

Wi Fi

Channel selected at provisioning

1 2 3 4 5 6 7 8 9 10 11 12 13 14

2.4GHz Channel	37	0	1	2	3	4	5	6	7	8	9	10	38	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	39
2.4GHz Frequency	2400 MHz	2402 MHz	2404 MHz	2406 MHz	2408 MHz	2410 MHz	2412 MHz	2414 MHz	2416 MHz	2418 MHz	2420 MHz	2422 MHz	2424 MHz	2426 MHz	2428 MHz	2430 MHz	2432 MHz	2434 MHz	2436 MHz	2438 MHz	2440 MHz	2442 MHz	2444 MHz	2446 MHz	2448 MHz	2450 MHz	2452 MHz	2454 MHz	2456 MHz	2458 MHz	2460 MHz	2462 MHz	2464 MHz	2466 MHz	2468 MHz	2470 MHz	2472 MHz	2474 MHz	2476 MHz	2478 MHz	2480 MHz

WIREPAS

FIT FOR PURPOSE PERFORMANCE*

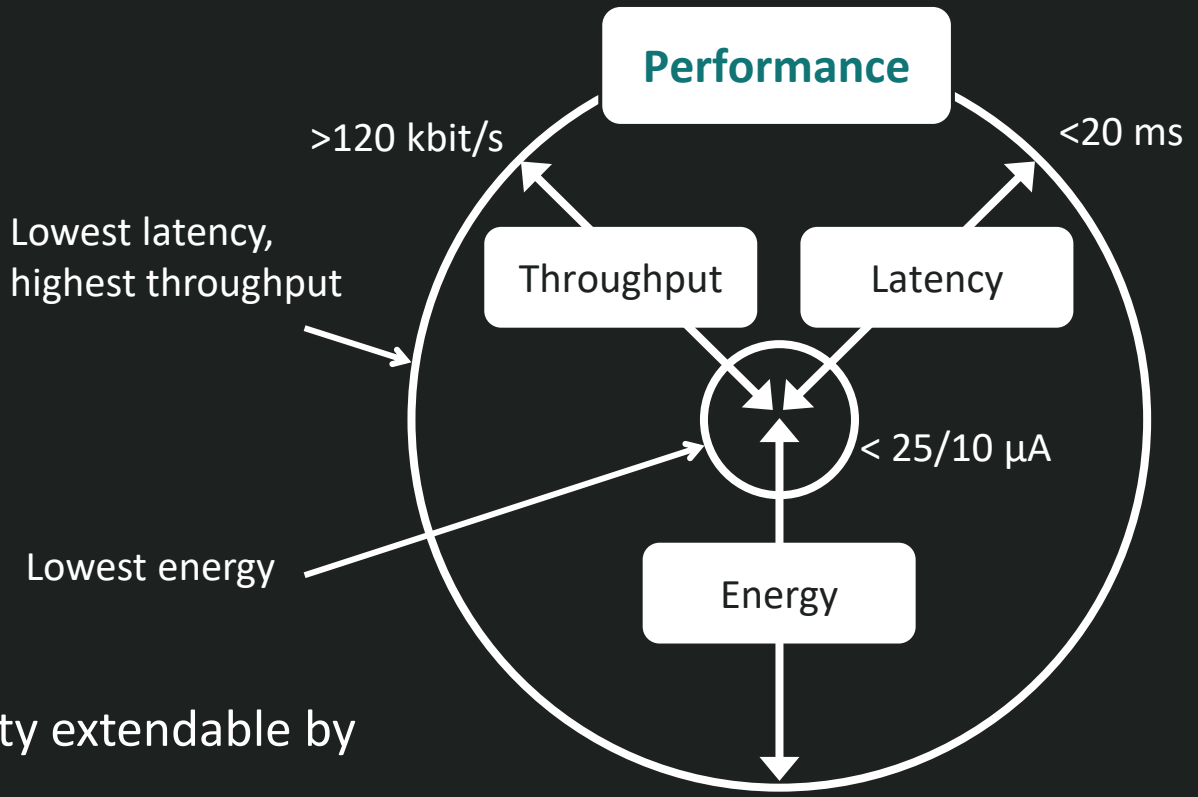
< 25 µA router current (in low power mode)

< 10 µA non-router current

< 20 ms per hop latency

> 120 kbit/s application data throughput

- Network throughput via 1 Gateway, network capacity extendable by adding gateways



* Examples on 2.4 GHz PHY

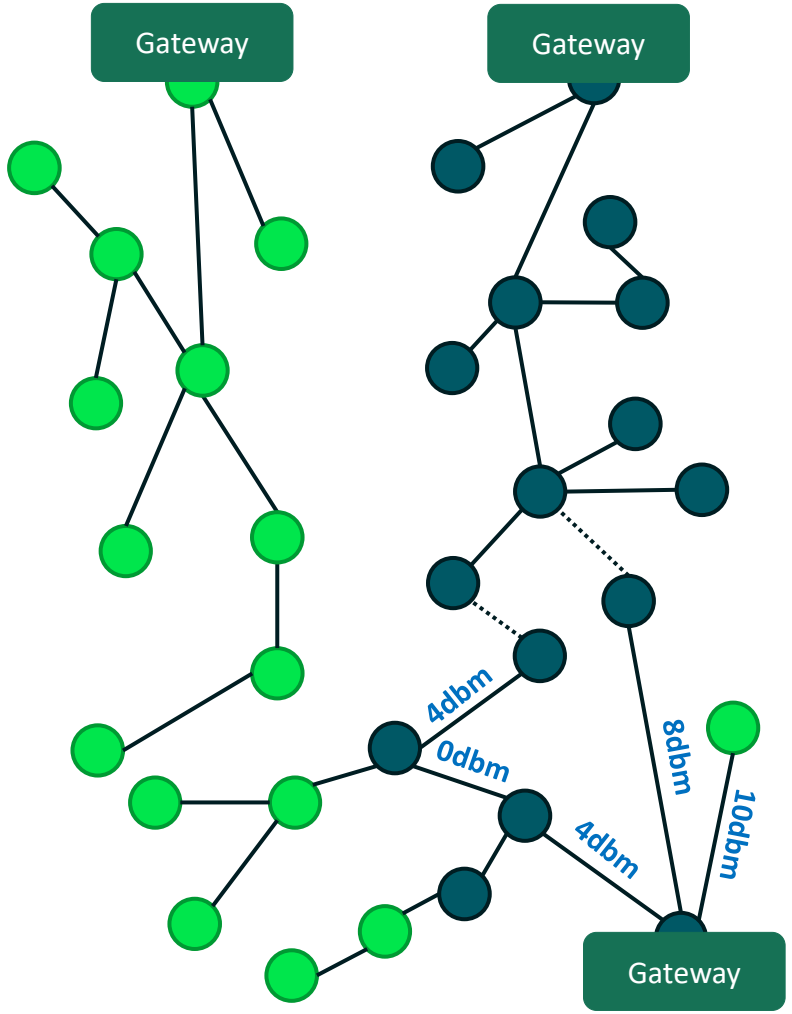
LARGE SCALE AND HIGH DENSITY

Decentralized operation

- All network decisions are done locally
- Any device can be a router at any time

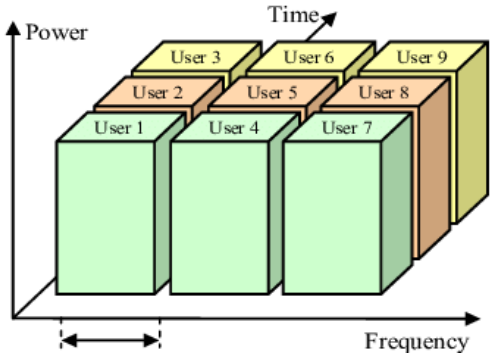
Short time on Air

- High data-rate to minimize time on air
  → Less collisions for high density



Locally synchronized and frequency agile

- Combination of FDMA and TDMA



Adaptive Transmit Power

- Nodes adjust Tx power depending on neighbor proximity

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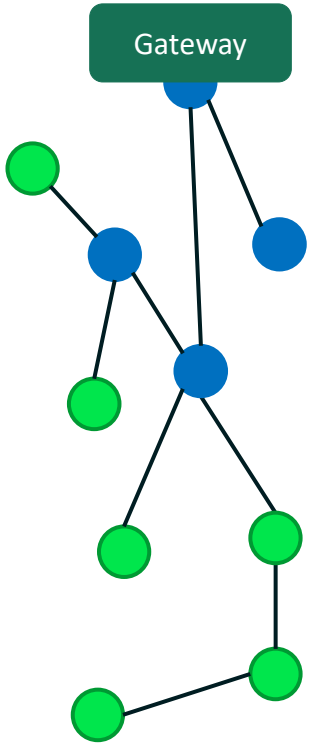
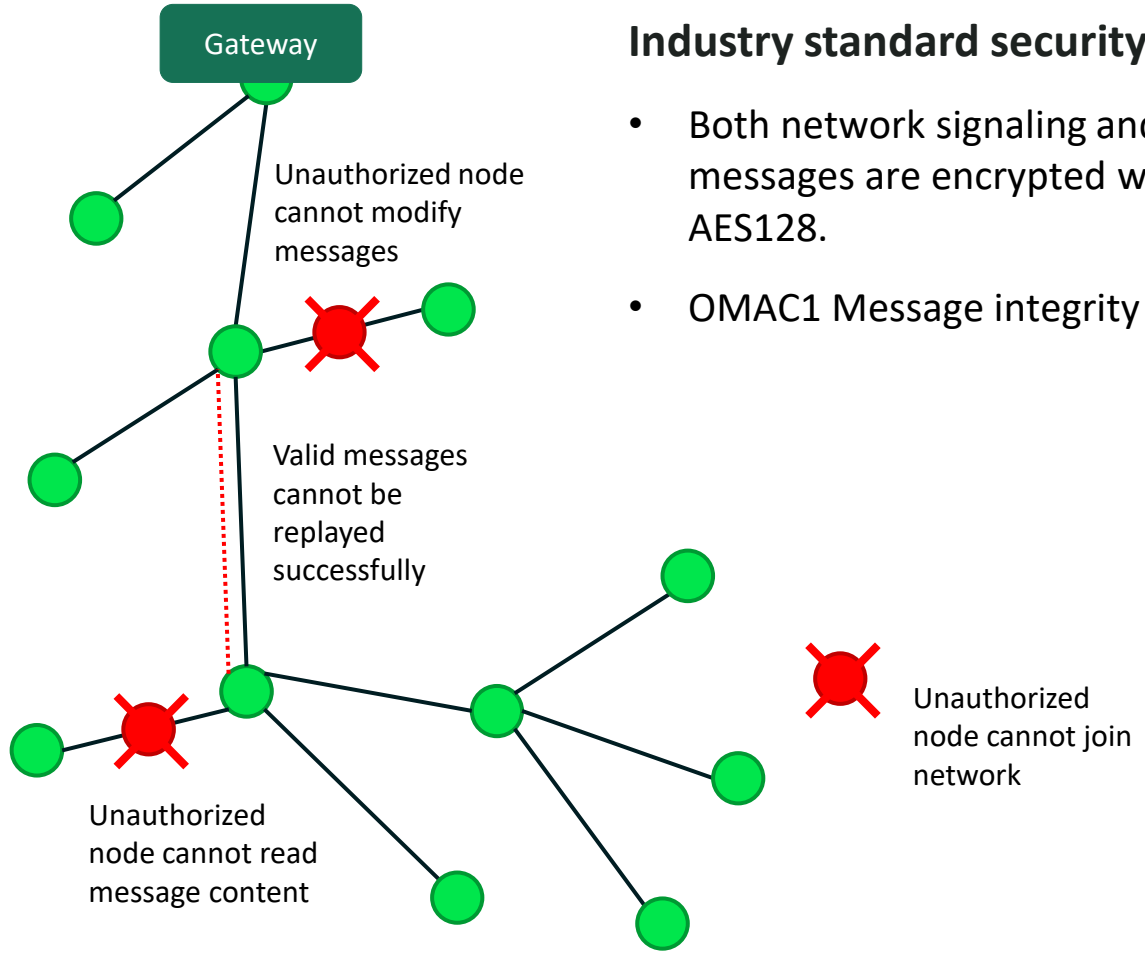
SECURE AND FUTURE PROOF

Native OTA can be used to securely update :

- Wirepas Mesh firmware
- Application software

Firmware images are encrypted





Industry standard security

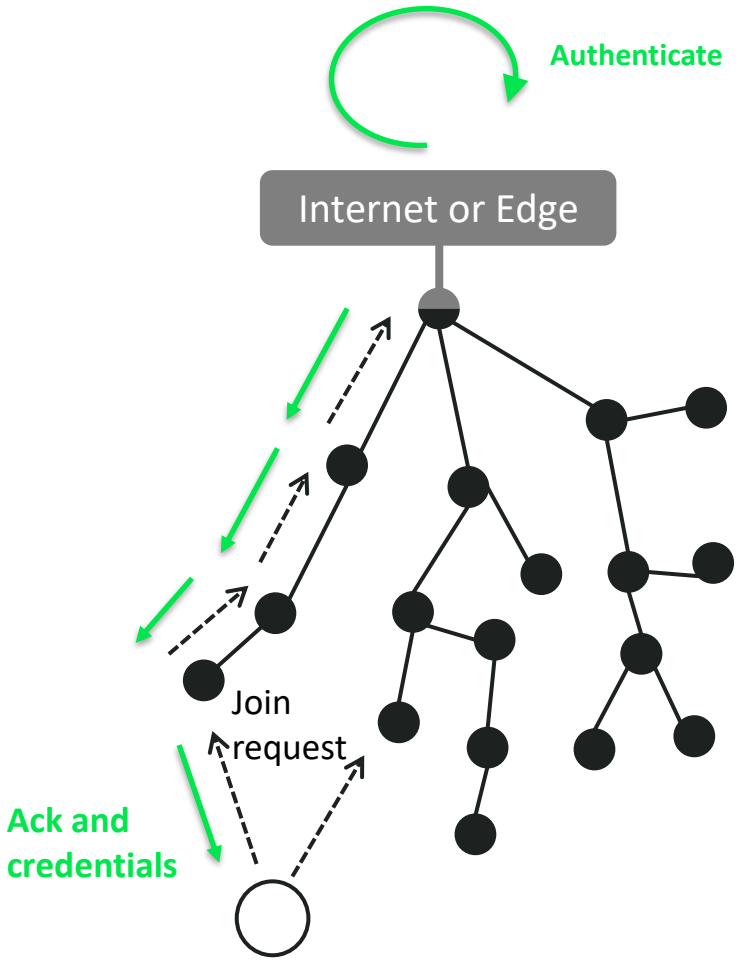
- Both network signaling and messages are encrypted with AES128.
- OMAC1 Message integrity check

WIREPAS

AUTOMATIC PROVISIONING

- A new device declares itself to the network
- Gets authenticated
- Receives its network credentials securely and joins the network

- Authentication can be local or cloud-based
- Provisioning does not disrupt network operation while new devices are added



*BLE, NFC and other out of band provisioning also supported

WIREPAS

SELF- INSTALLATION

EASY TO INSTALL AND PROVISION

Installation requires zero configuration by the user

Mesh routers can be battery operated

Secure self-joining : the installer does not get access to network keys

No infrastructure required

WIREPAS

RESILIENT COVERAGE & RELIABILITY

PROVEN RELIABLE CONNECTIVITY

99.99% availability in large-scale installations with over 700 000 devices per network thanks to patented routing algorithm which allows millions of decisions in parallel.

DEMANDING IOT

Designed to work in environments with thousands of other wireless devices producing interference, metal and harsh environmental conditions.

WIREPAS

SCALE AND DENSITY

COLLISION-FREE COMMUNICATION

Up to 1,500 devices in one cubic meter can have 2-way communication with no collisions

ACCURATE INVENTORY

Wirepas Mesh can detect & identify up to 5,000 devices in one minute

WIREPAS

LONG BATTERY LIFE

BATTERY POWERED ROUTERS

More than 4-year lifetime with two AAA battery, with continuous bi-directional connection and device routing data.

Bi-directional low power switch enabling 5-year lifetime with a coin cell battery.

Support for energy harvesting switches

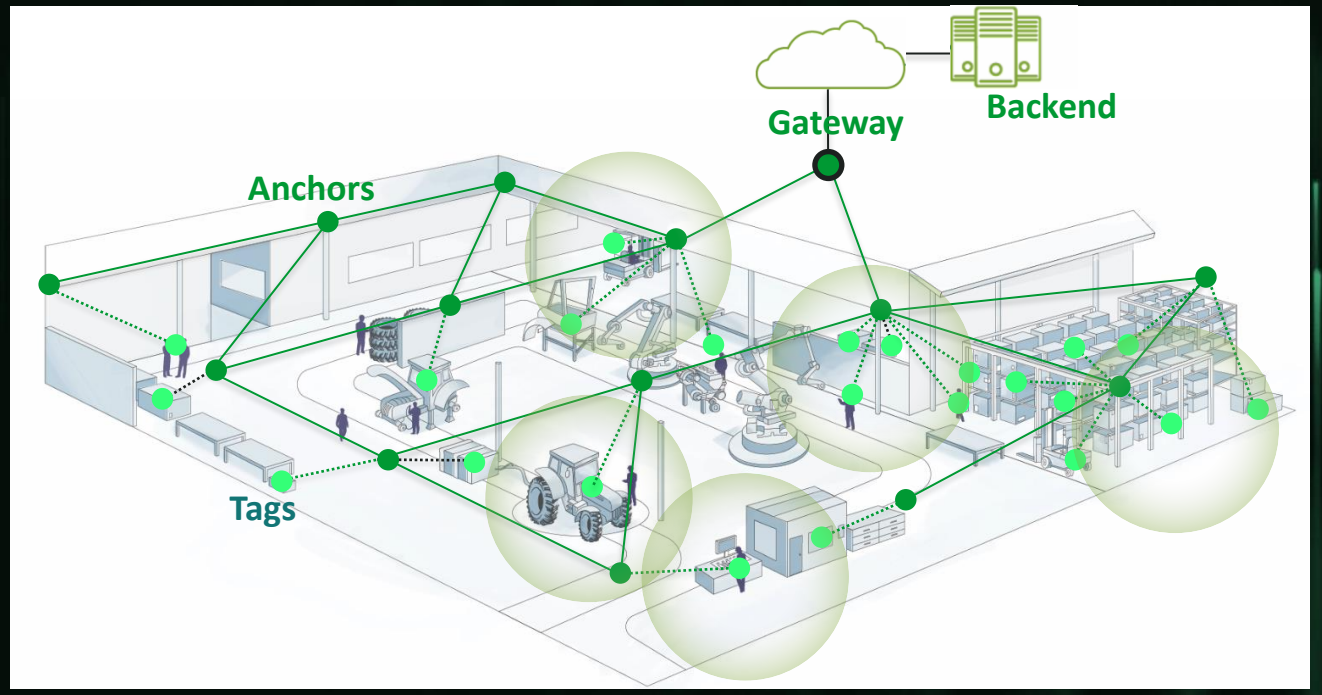
WIREPAS

BUILT-IN POSITIONING

Wirepas Positioning Engine works with battery operated anchors

- Each fixed device operates as a position anchor
- RSSI measurements are done by the moving assets, minimizing traffic
- Simple install and low cost retrofit
- Works for **any** size of installation
- < 5m accuracy for most indoor deployments

- Lightweight & simple asset application code



Confidential

WIREPAS

USE CASES AND PARTNER SOLUTIONS

WIREPAS

MONITORING AND CONTROL

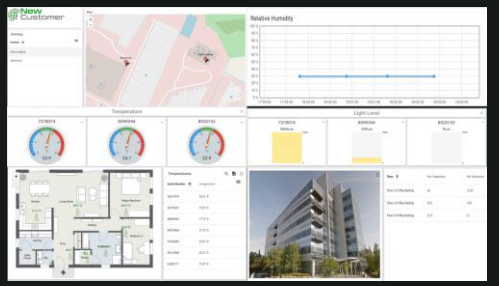
DEVICE TO CLOUD SOLUTION

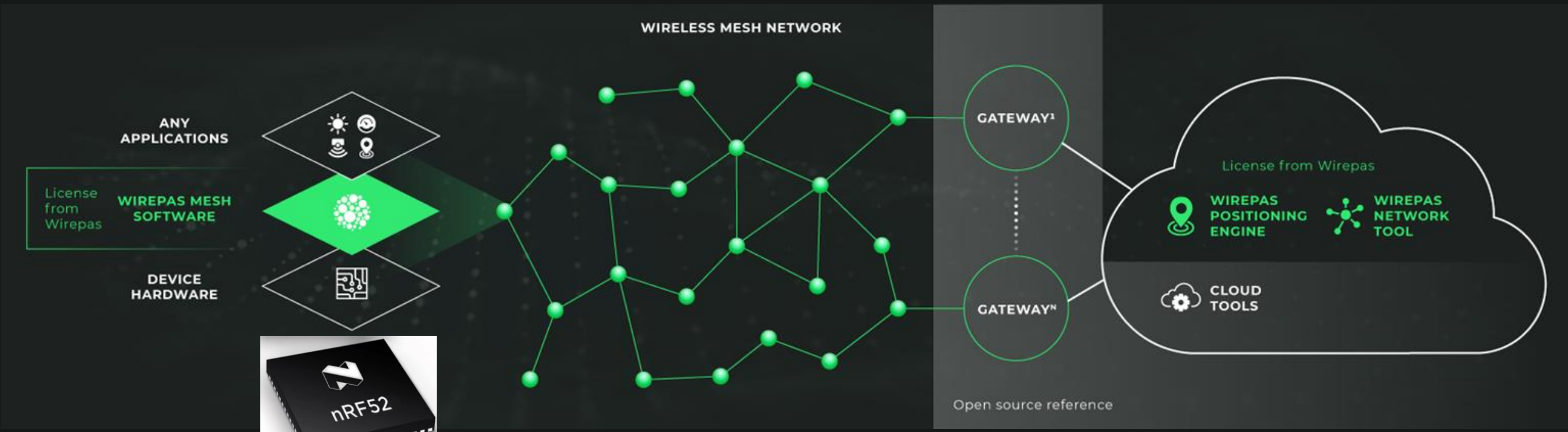
WIREPAS

SEAMLESS SENSOR TO CLOUD INTEGRATION

Customer Hardware

Customer Dashboard





WIREPAS

WIRELESS CONDITION MONITORING SYSTEM

CASE SULZER

SOLUTION AND BENEFITS

- Sulzer uses Wirepas Mesh to manage predictive maintenance of their pumps.
- Thanks to easy installation and long battery autonomy, the system is retrofitted to existing pumps.
- TREON provide the industrial sensors and deploy the end-to-end monitoring system.

WIREPAS

SMART LOCKER SOLUTION

CASE POSTI GROUP

SOLUTION AND BENEFITS

Finland's main postal service, deploys Wirepas Mesh in their smart locker solution and get:

- reliable wireless control of the lockers
- real-time status of the lockers,
- Improved security allowing wide self-service network.
- Centralized control of the lockers from Posti’s system.
- Faster customer service and operation.

WIREPAS

REMOTE MONITORING FOR MANUAL VALVES

CASE HALTIAN

SOLUTION AND BENEFITS

- Quick and easy to install on any valve – no cabling
- The valve position data is reported to the control system in real-time.
- Major reduction of accidents rates and increase of safety at the plant

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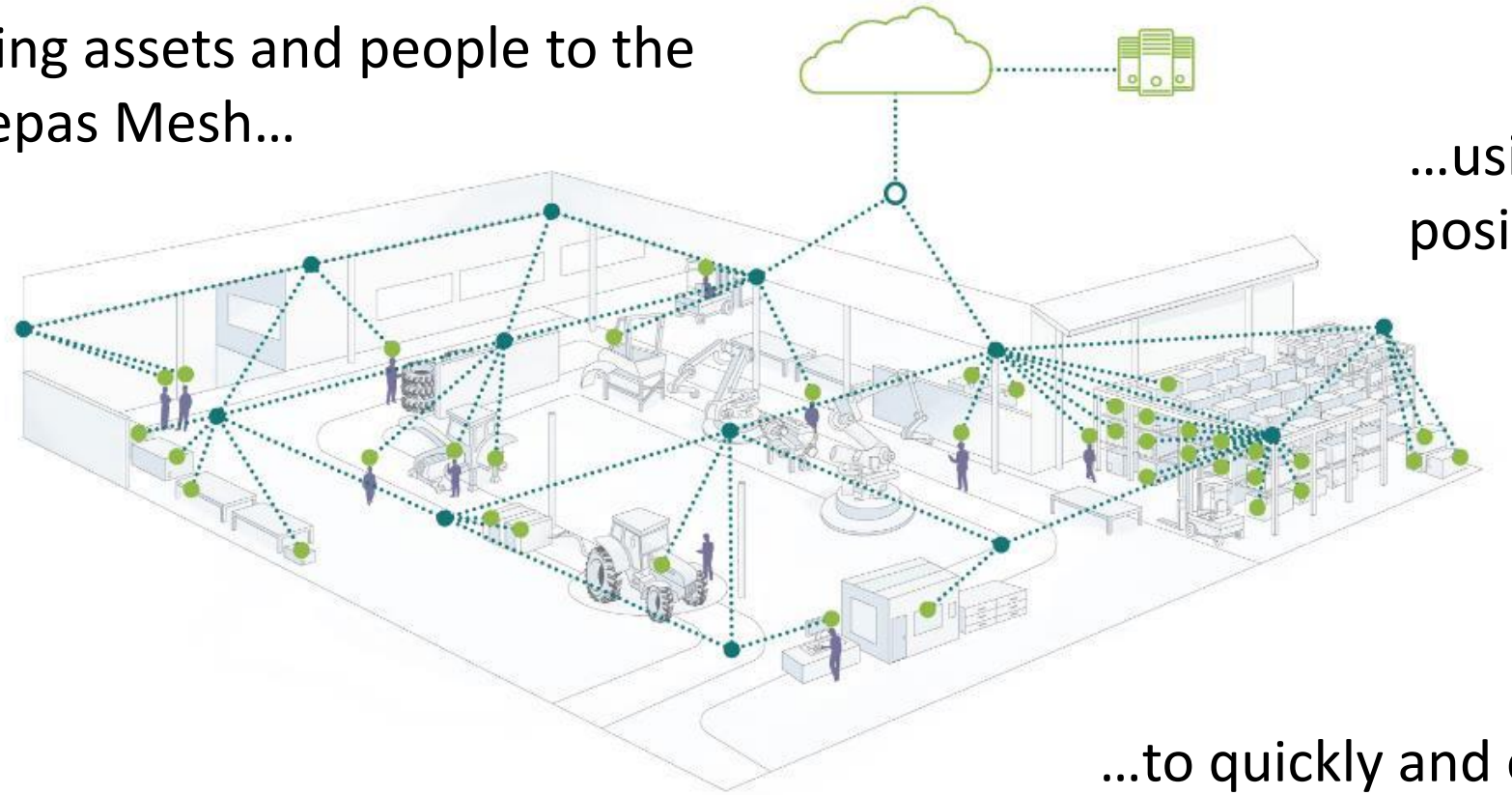
ASSET TRACKING

END TO END SUPPLY CHAIN VISIBILITY

WIREPAS

LOCATING PEOPLE AND THINGS

Linking assets and people to the Wirepas Mesh…

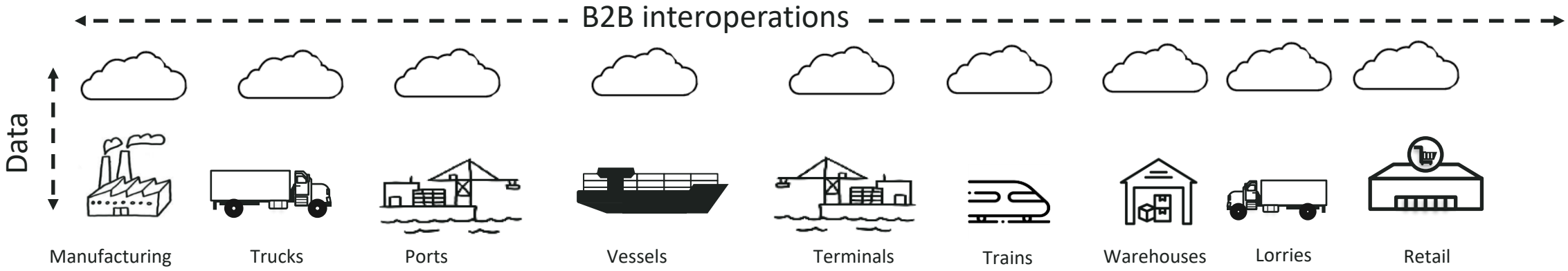


…using anchor nodes as positioning infrastructure…

…to quickly and easily locate people and assets

WIREPAS

END TO END LOGISTICS



- Wirepas provide wireless technology supporting:
  - Self-provisioning
  - Seamless Roaming from location to location
  - Fast inventory for secure business to business handover

WIREPAS

PALLET TRACKING

WORLD LEADER IN TRACEABLE PALLETS:

- End-to-end pallet tracking as a service.
- Real-time inventory of pallets at service centers and gates
- Real time condition monitoring of goods
- Dimensioned for individual goods tracking

- Goods in, goods out identification

WIREPAS

WAREHOUSES

CASE PROLOGIS

Prologis is the world biggest logistic warehouse owner

Their IoT platform, powered by Wirepas Mesh connectivity, has tens of use cases.

- Real estate condition monitoring
- Lighting control and energy saving
- Asset tracking
- Goods in, goods out identification

WIREPAS

SAFE CONSTRUCTION

CASE WAKECAP

SOLUTION AND BENEFITS

- WakeCap is an enterprise solution to improve construction safety & productivity
- By using Wirepas Mesh, Wakecap was able to cut their development time and come up with their solution in a record time.
- Affordable deployment, extremely easy on-site installation and long battery life.

WIREPAS

LIGHTING

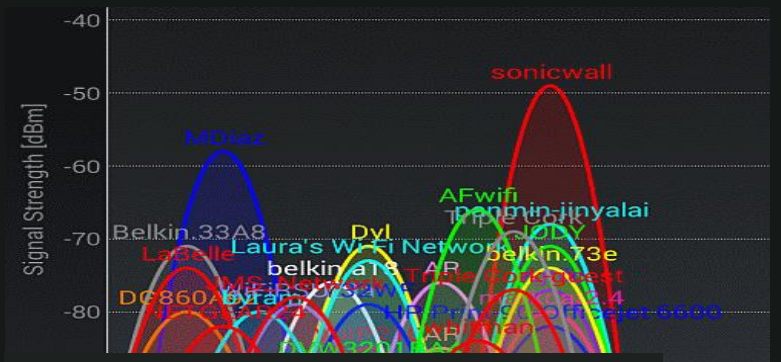
SEAMLESS INSTALL AND CONTROL

FUTURE PROOF DATA COLLECTION

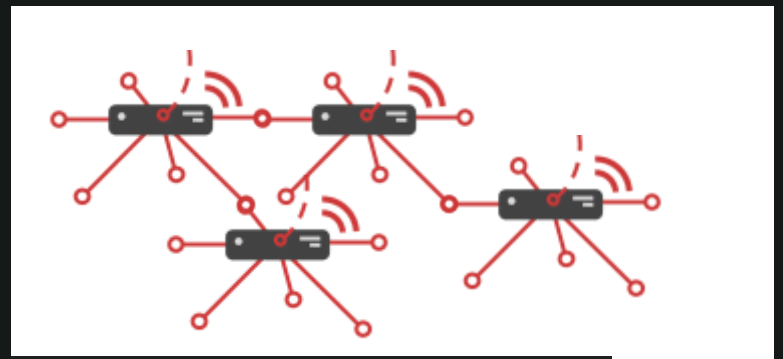
WIREPAS

CHALLENGES WITH SMART LIGHTING DEPLOYMENTS

Complex and costly installation



Multiple radios interfering

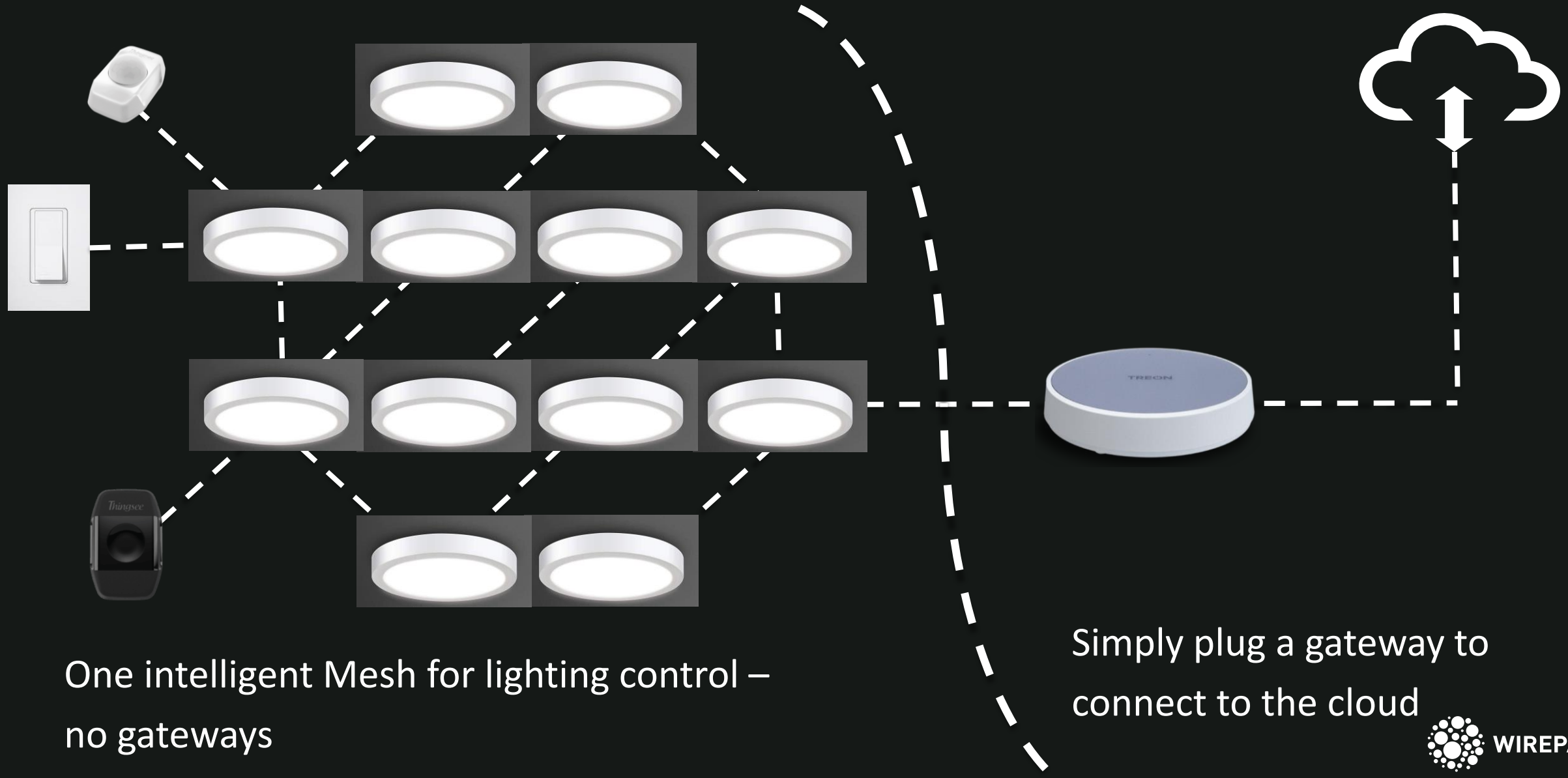


Heavy infrastructure

Too slow traffic for IoT

WIREPAS

THE SOLUTION: ONE MESH – UPGRADEABLE TO FULL IOT



One intelligent Mesh for lighting control – no gateways

Simply plug a gateway to connect to the cloud

WIREPAS

LIGHTING CONTROLS

CASE MOUNT KELVIN

SOLUTION AND BENEFITS

Wirepas Mesh is the backbone of the lighting controls system with BLE beaconing to communicate with EnOcean switches, mobile app and Alexa.

- 100’s per building
- Lighting control
- Heat mapping

WIREPAS

EMERGENCY LIGHTING

CASE EXILIGHT

SOLUTION AND BENEFITS

- Every fitting self-discovers other fittings around to form the network.
- Minimal commissioning and system management time.
- Easy installation
- No maintenance
- Over 1000 lights with one gateway

WIREPAS

QUESTIONS ?

- Downloads and use cases:
  www.wirepas.com/downloads
- Opensource software:
  https://github.com/wirepas
- Technical support questions:
  sebastien.pellorce@wirepas.com
- How to engage and partner with Wirepas:
  ben.corrado@wirepas.com

WIREPAS

THANK YOU