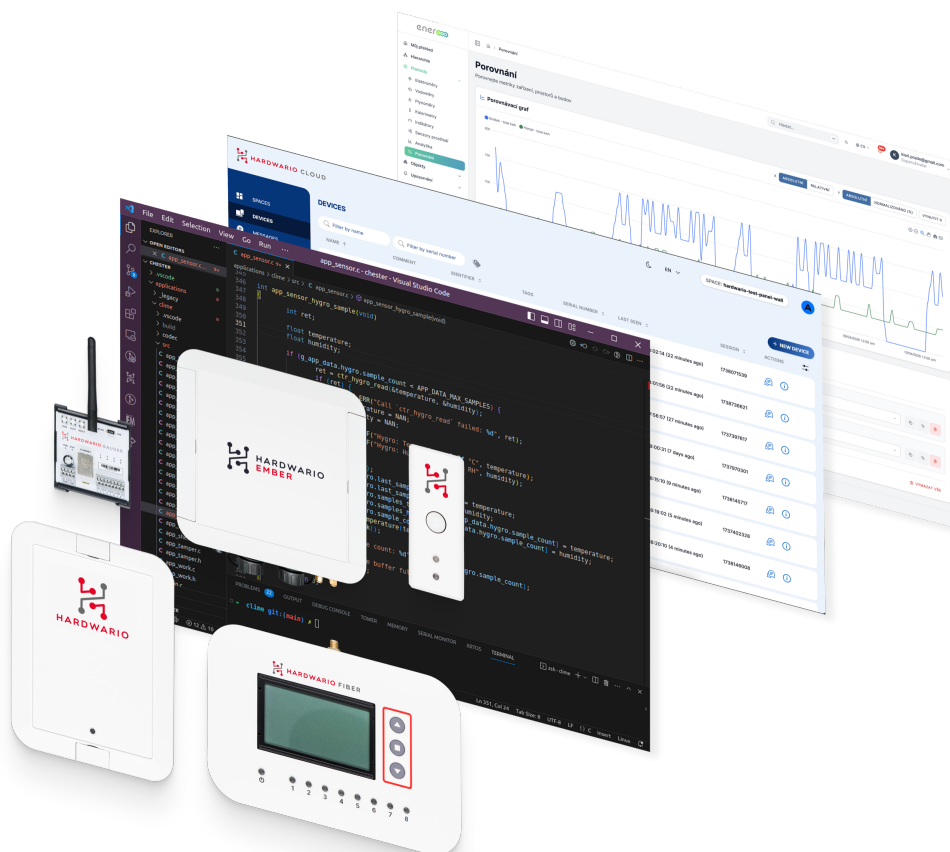


The Integrator's Guide: from PoC to 1,000 Devices

One deployment, followed from ten devices to a thousand — and every decision along the way



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1. How to read this guide

Every large monitoring fleet started as a proof of concept: a handful of sensors installed to answer one question. Very few proofs of concept were built so they could grow. That gap is what this guide closes.

The format is a story. We follow one deployment from ten devices to a thousand, and each chapter is simply the next thing that happens: the pilot, the hardware, the network, the roll-out routine, the operations, the data. You are the integrator building it. Your customer owns the site.

No prior IoT experience is assumed. Every technical term gets a plain-words introduction before it does any work, starting with the panel below.

TERMS YOU'LL MEET

Eight terms carry most of this guide. Everything else is explained where it first appears.

Proof of concept (PoC)

A small first installation that exists to prove the idea works before anyone commits to a rollout.

NB-IoT / LTE-M

Cellular flavors of LPWAN. The device uses the mobile network, like a phone does, but sips power.

Gateway

The box that receives radio messages from nearby sensors and passes them on over the internet.

Provisioning

Giving a new device its identity and settings before it goes to work.

LPWAN

Low-power wide-area network: radio designed to carry small messages over long distances, for years on a battery.

LoRaWAN

An LPWAN you can run yourself, on your own receivers, with no mobile operator involved.

Network server

The software that runs a LoRaWAN network: it knows which devices belong and hands their data onward.

FOTA

Firmware over the air: updating a device's built-in software remotely, with no site visit.

2. Meet the building blocks

The HARDWARIO catalog is deliberately small. Five devices cover the roles a monitoring solution needs, and they share one design philosophy: industrial enclosures, years on batteries where it matters, and open firmware you can read and modify.

Here they are, one at a time. The rest of the guide uses their names freely.



BUILDING BLOCK 1

CHESTER

The all-rounder. A modular monitoring platform in a rugged box: choose the inputs your job needs, and it reports over the mobile network or LoRaWAN.

- 3+ years on one primary lithium battery; solar, 24 V DC, and 230 V AC options
- IP67 enclosure, rated -20 to +60 °C
- 15+ ready-made applications — no firmware development needed

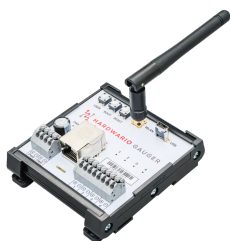


BUILDING BLOCK 2

STICKER

The volume sensor. A palm-sized LoRaWAN device that watches temperature and humidity wherever you put it — plus external probes, voltage inputs, and a motion option.

- 2+ years on two standard AA cells
- Configured by tapping a phone against it (NFC), even with the batteries out
- Mounts with two screws or double-sided tape



BUILDING BLOCK 3

GAUGER

The production counter. It sits on the DIN rail, counts electrical pulses from machines, and lets the factory's own systems read the totals straight from it.

- 4 galvanically separated pulse inputs for 24 V industrial signals (PNP)
- Built-in Modbus TCP server and REST API, over WiFi or Ethernet
- Powered from 9–28 V DC; no changes to existing PLC programs


BUILDING BLOCK 4

EMBER

The network builder. A LoRaWAN gateway: one unit receives from hundreds of nearby sensors and forwards everything over LTE or Ethernet.

- 8-channel LoRaWAN concentrator (EU868 / US915)
- IP67 enclosure, mounts indoors or outdoors; 11–28 V DC
- Builds a network the customer owns — no per-device network fees

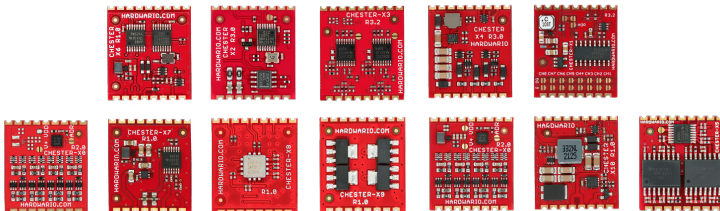

BUILDING BLOCK 5

FIBER

The edge computer. An embedded Linux device with eight wired temperature inputs and an on-site display. It runs your own software, right where the measurement happens.

- 8× 1-Wire inputs, backlit LCD with per-channel LEDs
- PoE powered (IEEE 802.3af) with Li-Ion battery backup
- Delivers data over MQTT with TLS; open platform with root access

The catalog stays small because CHESTER stretches. Two slots on its mainboard accept X-modules, small expansion boards that change what the device can measure.


X-MODULES

Plug-in expansion boards for CHESTER. One enclosure covers temperature, current, weather, structural sensing, and more — the module decides.

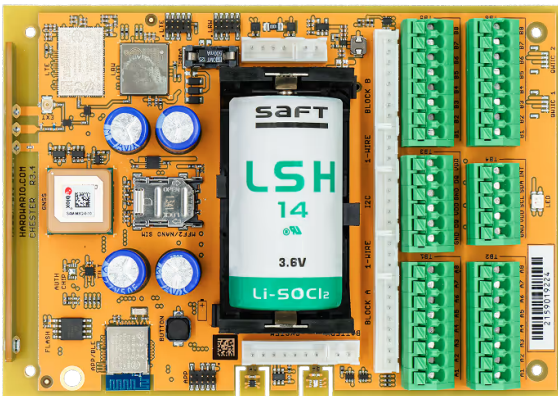
3. Ten devices: a pilot that counts

FLEET SIZE: 10 DEVICES

The most expensive mistake in industrial IoT is invisible at the start: a pilot built as a science experiment. It proves data can flow. It proves nothing about the fleet, because every choice in it was made for convenience.

Treat the pilot as unit one of the rollout instead. Four rules get you there:

1. **Pick one measurable problem.** Not “monitor the site” but “detect grain hotspots before spoilage” or “report true machine availability per shift.” The number you agree on here converts the pilot into a purchase order later.
2. **Keep it small: 3 to 10 monitoring points.** Small enough to fund from an operating budget, large enough to exercise the whole chain from sensor to dashboard.
3. **Make the scale decisions now.** Who owns the network, how devices get provisioned, who operates the fleet, where the data lands. The next chapters take these one at a time.
4. **Bench first, site second.** The CHESTER DevKit puts the base board and three common X-modules on your desk, so your engineers validate inputs and payloads in the lab before anyone drives to the customer's site.



ON THE BENCH

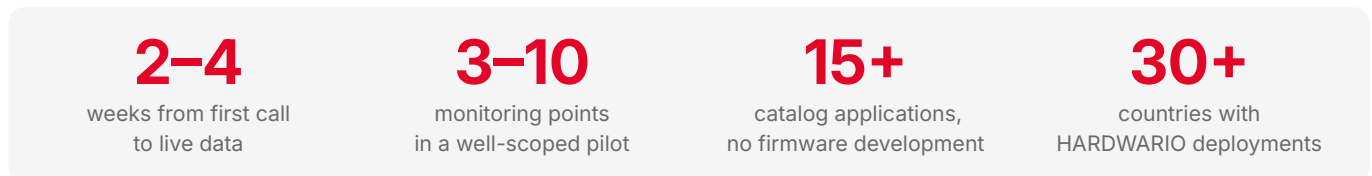
CHESTER's mainboard, as your engineers will meet it: the lithium battery that lasts 3+ years, the cellular modem, and the terminal blocks where your signals arrive.

For the pilot itself, the simplest path online is cellular. Each CHESTER carries its own NB-IoT or LTE-M connection, so there is nothing to install on site: no gateway, no server, no IT ticket with the customer. The signal reaches basements and metering rooms, and the battery lasts years.



Figure 1 — The pilot's data path. The devices carry their own connectivity; HARDWARIO Cloud passes the data to your application.

Run this way, pilots move fast. The customer sees their own machines or cold rooms in a dashboard while a competing proposal is still a slide deck.



4. One hundred devices: who owns the network?

FLEET SIZE: 100 DEVICES

The pilot worked. The customer wants every building, every line, every silo. Before you order hardware, settle the one decision that is expensive to reverse: who owns the network.

Cellular got the pilot live quickly, and for dispersed assets it stays the right answer. Each device pays its way with a data service, and no site infrastructure exists to maintain.

Dense sites change the math. Where dozens of sensors cluster in one building, plant, or farm, a private LoRaWAN network is the better deal: one EMBER gateway receives from hundreds of devices, and no per-device network fees scale against you. The network server — ChirpStack or The Things Stack — runs on infrastructure you control, or HARDWARIO operates it for you as a service.

INSIDE EMBER

An industrial MikroTik router board carrying the LoRaWAN concentrator card and LTE modem, sealed in an IP67 enclosure. One unit receives from hundreds of nearby sensors.

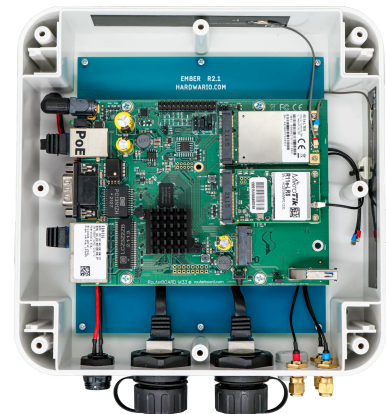


Figure 2 — The private-network path. The customer owns the radio layer; the network server hands data to your systems.

Question	Cellular via HARDWARIO Cloud	Private LoRaWAN via EMBER
Best for	Dispersed assets; fast pilots; deep-indoor single points	Dense sensor clusters on one site: buildings, plants, farms
On-site infrastructure	None — each device carries its own connection	One or more EMBER gateways plus a network server
Recurring cost model	Cellular data service per device	No per-device fees; optional managed server, SIM, and remote-access services
How data reaches you	REST API and webhooks from HARDWARIO Cloud	MQTT and webhooks from the network server

Table 1 — Choosing the connectivity path. Decide per site, not per fleet: the platform runs both at once.

A third, quieter option exists for small self-contained sites: STICKER can link directly to a FIBER edge device over a proprietary LoRa point-to-point radio, 3+ km line of sight. No gateway, no network server — FIBER delivers the data over MQTT with TLS.

5. Provisioning becomes a production line

At ten devices, provisioning was a task. At a hundred, going on a thousand, it is a production line, and it deserves the same discipline.

STICKER makes the point vividly. Its NFC interface works even with the batteries out, so an office team can configure an entire batch while the devices are still in the box. The site visit shrinks to mount-and-verify: two screws or a strip of tape per sensor. A hundred sensors in a day is a realistic plan.



UNDER STICKER'S LID

The circular NFC antenna. Tap a phone against the closed device to write its configuration — settings, alarm limits, radio keys — even before the batteries go in.

CHESTER follows the same logic over Bluetooth: the HARDWARIO Manager phone app handles settings, diagnostics, and firmware in the field. No laptop, no opening the enclosure. LoRaWAN devices get registered in the network server as part of the same batch step.

The repeatable run looks like this:

1. **Define the identity scheme.** Device names, tags, and groups that encode customer, site, and function — agreed before the first batch ships.
2. **Pre-provision on the bench.** Configuration written over NFC or Bluetooth, radio registrations done, everything labeled.
3. **Stage kits per site.** Devices, mounts, batteries, and a one-page install procedure packed together.
4. **Install and verify.** Mount, power, then confirm live data for every point before leaving the site.
5. **Record as-built.** Where each device physically is. At device 900, this list is your support desk's most valuable asset.

The pilot is the dress rehearsal. Provision your ten pilot devices exactly the way you intend to provision a thousand. The wasted ceremony costs an hour; the validated process saves weeks.

6. Run the fleet from a desk

Day two is where monitoring solutions earn or lose their margin. A fleet you must drive to is a cost center. A fleet you operate remotely is recurring revenue.

On the cellular path, HARDWARIO Cloud is the operations room:

- **Fleet visibility** — every device organized by tags and groups, with health monitoring and a message viewer for raw payloads when something looks wrong.
- **FOTA firmware updates** — push new firmware to one device, a group, or the whole fleet. Roll out in waves: a pilot group first, everyone else after the soak period.
- **Remote shell** — a diagnostic console into the device from your desk. Most “please drive out and check it” tickets end here.
- **Enterprise footing** — 99.9 % availability SLA, EU data centers (Germany), GDPR compliance, TLS 1.2+ encryption in transit on every hop, AES-128 on LoRaWAN device links, role-based access, audit logging.
- **Multi-tenant, under your brand** — separate customers and teams with their own permissions. Your operations center, your logo, your contract.

On the private-network path, the network server plays the same role for the radio layer. GAUGER carries its own web interface and REST API on the factory network, including over-the-air updates. FIBER is open Linux: your images, your containers, your monitoring agents.

One habit matters more than any feature: put battery life on the calendar.



BATTERIES ON THE CALENDAR

Two AA lithium cells keep a STICKER reporting for 2+ years; CHESTER runs 3+ years on its primary cell. Plan replacement rounds by install cohort — don't wait for the first silent device.

7. Send the data where decisions happen

HARDWARIO's integration stance is deliberately modest: the platform is middleware, not the destination. The data belongs in the system your solution runs on, and the customer relationship belongs to you.

From HARDWARIO Cloud, data reaches your systems through the REST API and webhooks. The two proven destinations are ThingsBoard, an open dashboard and alarm platform, and purpose-built applications where the webhook feed lands in your own backend.

From a private LoRaWAN network, the network server routes decoded payloads over MQTT or webhooks. And GAUGER's production counts never need to leave the factory: the plant's PLC, SCADA, or MES reads them directly from the device's built-in Modbus TCP server.

SoftLi — machine counts straight into the MES

SoftLi's manufacturing execution system reads real-time machine data from GAUGER units on the line, giving manufacturers accurate availability and downtime figures with no changes to existing PLCs. The integration surface is GAUGER's own Modbus TCP server and REST API: data lands directly in software the plant already runs.

The white-label thread runs through the whole stack. OEM printing puts your logo on the enclosure, the multi-tenant dashboard carries your brand, and your backend sits behind the webhooks. The customer sees your product.

WHITE-LABEL IN PRACTICE

A CHESTER-based unit with an on-site display, its enclosure printed with the deploying partner's own brand — the hardware wears the logo of the company that deploys it.



8. One thousand devices

FLEET SIZE: 1,000 DEVICES

Somewhere past the first hundred devices, the project quietly changes species. It stops being a deployment and becomes an operation. The architecture holds — that was the point of every earlier chapter — but four habits change.

Radio coverage becomes a plan. Private networks grow by adding EMBER gateways placed by site survey, each receiving from hundreds of devices. Specialized roles have their own numbers: one CHESTER unit reading utility meters by radio collects from up to 128 of them, running 7+ years on battery at a daily readout.

Monitoring becomes statistics. Nobody watches a thousand devices one by one. Operations shift to exceptions: health dashboards, alert thresholds, cohort views by tag. HARDWARIO Cloud runs the same platform from a 10-device pilot to 10,000 devices in production, with no migration.

Firmware becomes governance. One baseline version per device type, rolled out in waves with a canary group, with a change log the support desk can read. The mechanics are one click; the discipline is yours.

Support becomes a model. A spares pool sized to the fleet, a defined repair loop, the as-built register from the provisioning chapter, and remote-first diagnostics so a truck roll is the last resort.

None of this is hypothetical. It is where the platform has already been:

GrainLink — 1,000+ systems across North America

GrainLink builds its grain-storage monitoring product on CHESTER, with private LoRaWAN networks at storage facilities. Over 1,000 systems track temperature and humidity in silos across Canada and the USA, through winters where units have proven themselves at -40°C and survived -48.8°C . The same technology is now expanding to Brazil, Europe, and Australia.

“ CHESTER has proven itself in Canada's most extreme conditions. Whether it's -40 degrees or $+40$ degrees, exposed to scorching heat or blanketed in ice, the device continues to operate without fail.

— Amir Fuhrmann, CTO of Axilera (GrainLink)

KSB — from pilot to certified series production

Global pump manufacturer KSB partnered with HARDWARIO to monitor industrial pump systems. The jointly developed second-generation system is certified — CE, RED, EMC, Safety, IP67, EN 18031 — and in series production. The platform that ran the pilot carried the product all the way through certification into manufacturing.

9. The business behind the build

The scaling story only matters if the business model scales with it. Three facts define what building on HARDWARIO means for an integrator.

The channel is the business. Over 80 % of HARDWARIO's business comes through partners, so the company grows when its integrators do. Partners get full access to firmware, documentation, and pricing. No gated datasheets, no NDA before the first technical answer.

The product is yours to brand. OEM enclosure printing, your brand on the dashboard, and open firmware whose behavior you define. On a private LoRaWAN network, the infrastructure is capital your customer owns rather than a subscription that grows with every sensor.

The platform will outlive the project. HARDWARIO has built IoT devices since 2016, ships to 30+ countries, is publicly traded on the Prague Stock Exchange, and commits to a 10+ year product longevity program. All electronics are manufactured in Europe from components sourced through authorized distributors. For an integrator signing a five-year service contract, that posture is the contract's foundation.

80 %+

of HARDWARIO business comes through partners

10+ yrs

product longevity program commitment

2016

building industrial IoT devices since

30+

countries with deployments

Scope the pilot. Scale the fleet.

The next step is deliberately small: one pilot, on one site, against one measurable problem — with the architecture of a thousand-device fleet already inside it. HARDWARIO's engineers will help you scope it, pick the building blocks, and get to live data in 2–4 weeks.

Start at www.hardwario.com or write to ask@hardwario.com.

- [Book a 30-minute call](#)
- [Read the documentation](#)
- [Explore the open SDK on GitHub](#)

ABOUT HARDWARIO

HARDWARIO a.s. designs and manufactures industrial IoT devices in Liberec, Czech Republic. Founded in 2016 and listed on the Prague Stock Exchange, the company does more than 80 % of its business through its partners.

HARDWARIO a.s.

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