



astarte

PUSHING YOUR INDUSTRY INTO THE CLOUD.

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Document Summary

- Talking about IoT/Industry 4.0
- Introducing Astarte: product description
- Industries & Business Cases
- Technical Slides
 - Connecting embedded systems: not so trivial

General Information

- The content of this presentation is confidential
- Last update: 17 Nov 2015
- Version: 1.0 Rev A

Talking about IoT/Industry 4.0

Welcome, Industry 4.0

- **OPEX reduction**
 - less maintenance, less plant shutdowns, predictive maintenance
- **Birth of new and more profitable business models**
 - value added services
- **More services delivered to customers**
 - switch from fixed to recurrent costs, (think new economy)
- **Process and product innovation**
 - think Big Data on IoT data



Industry 4.0: Everyone is involved

Industry 4.0 is a challenge for both management (new business models) and technical departments.

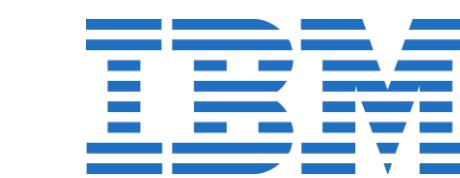
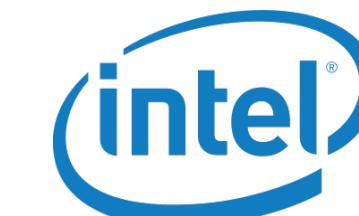


Industry 4.0: It's here to stay

Everyone is adopting it
Everyone is benefiting from it



BOSCH



ARM



BASF
We create chemistry

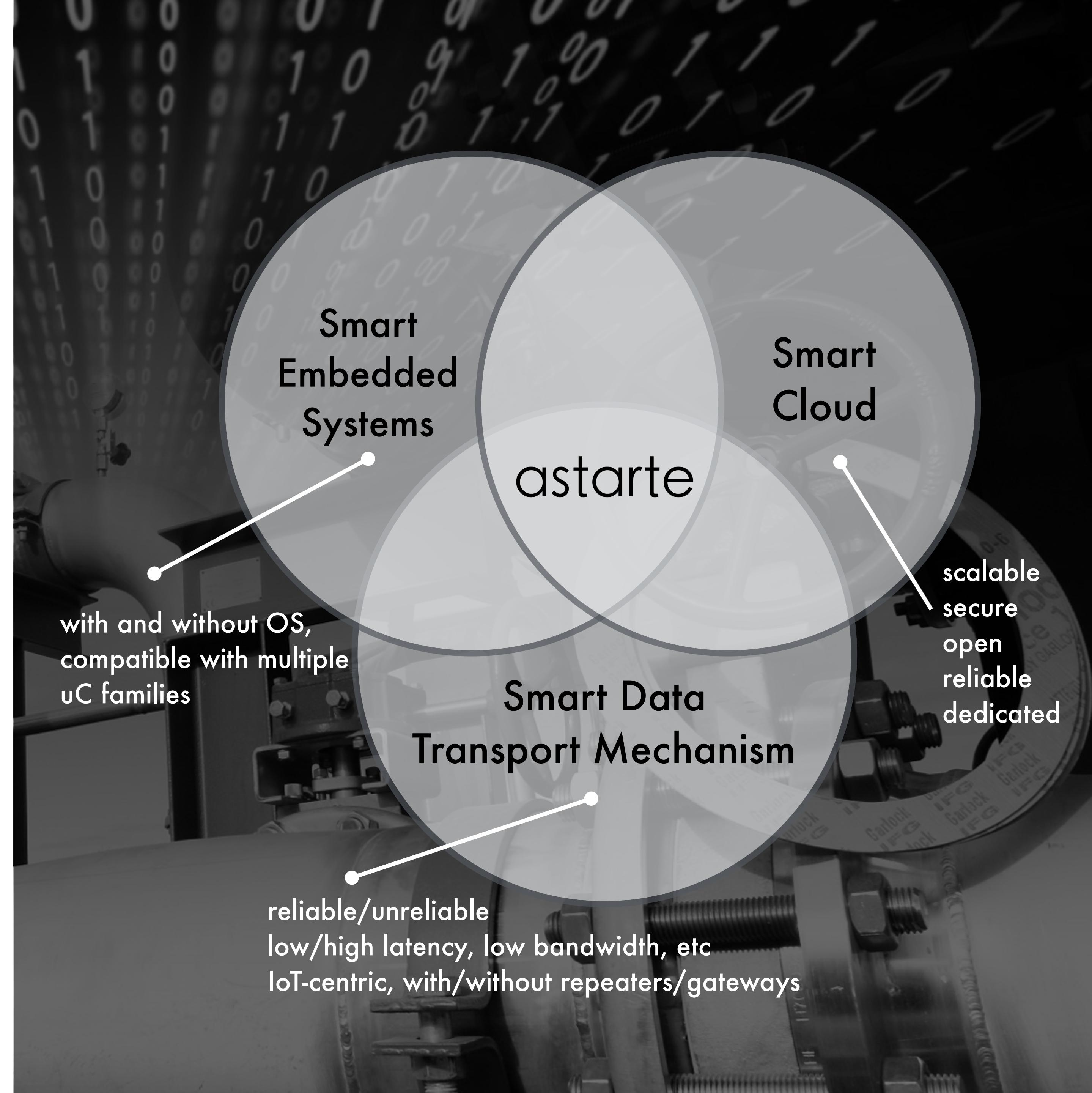


Industry 4.0 Key Success Factors

Yes. This is complex. You will probably need multiple partners.

Or, simply go Astarte.

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Introducing Astarte: product description.

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Product Description

What is Astarte

Astarte is our full-stack Industry 4.0 solution.

What you get

Our core competencies span embedded systems design & development, cloud systems engineering, IT security and compliance, frontend engineering. We take care of everything, from the embedded device to the cloud.

Customisations

Each customer is different, and we value this diversity. We're always ready to develop new interfaces as per customers' needs.

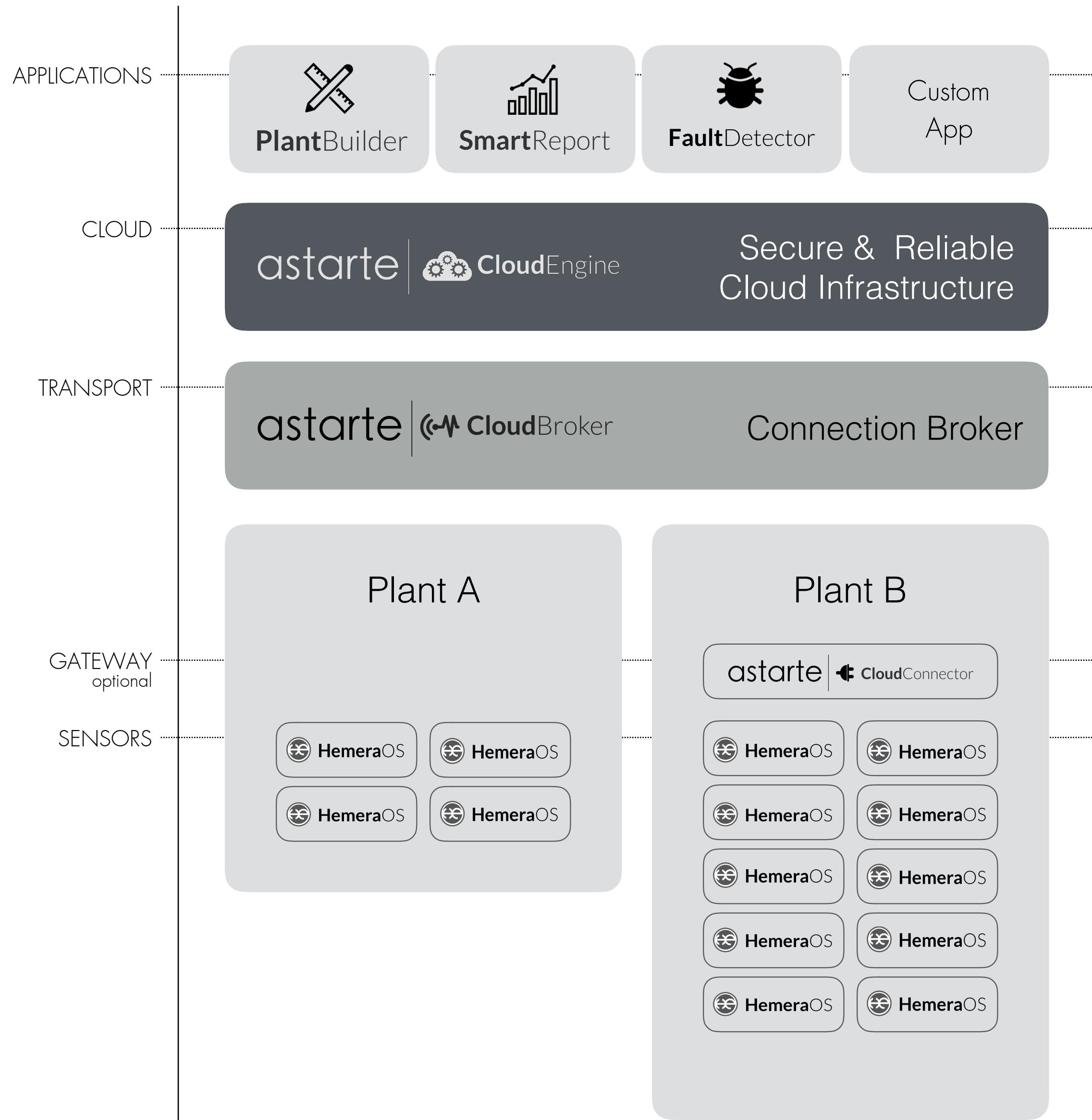


A full stack cloud solution

From embedded devices to a
secure and reliable cloud.

One solution. One partner. Astarte.

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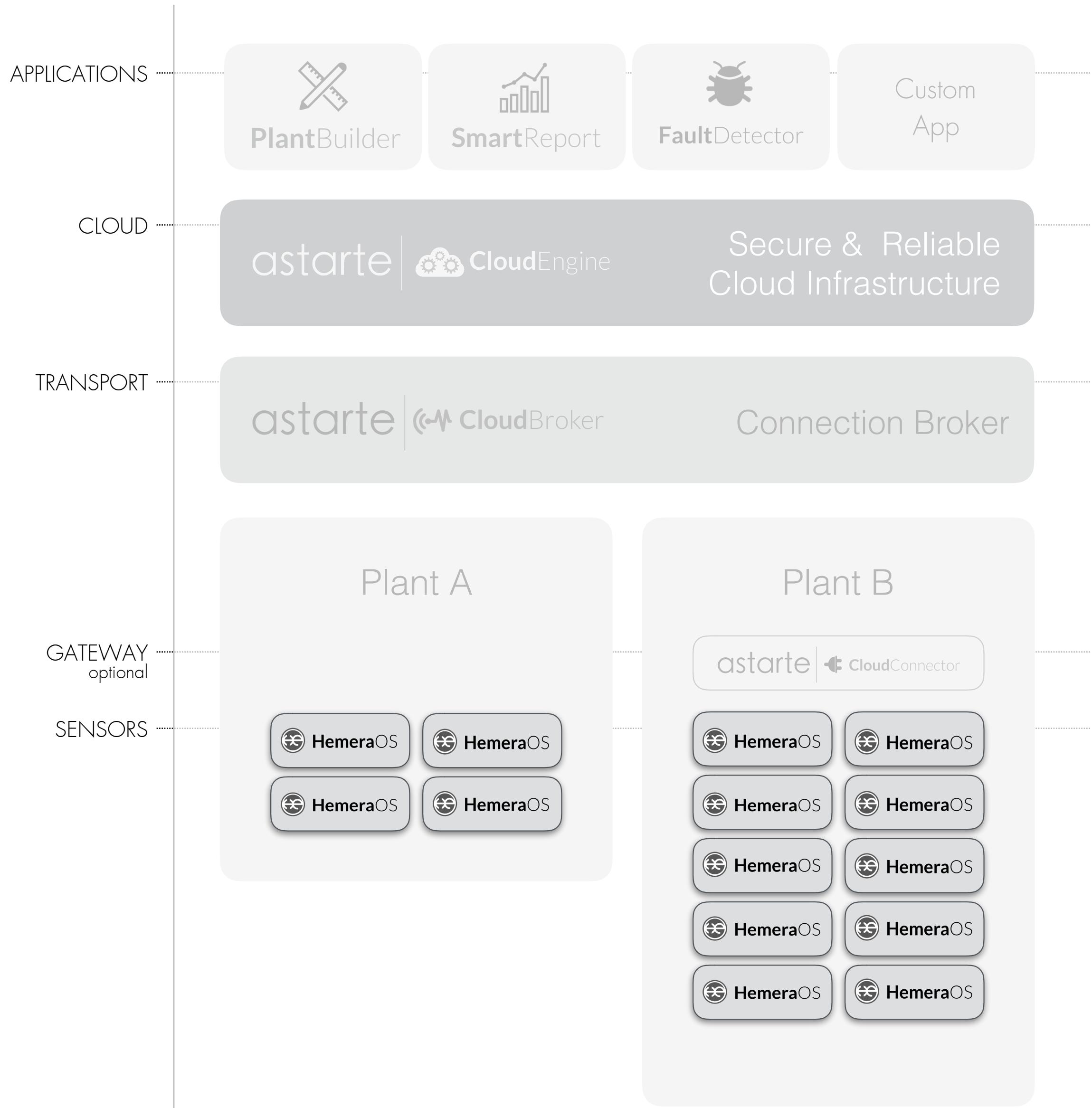


HemeraOS

Thanks to HemeraOS we support a variety of industrial hardware processors, micro-controllers, sensors and communication protocols. Astarte is compatible with any Cortex M, ARM9, Cortex A.

We are compatible with most peripherals out of the box. And we are constantly adding support to more.

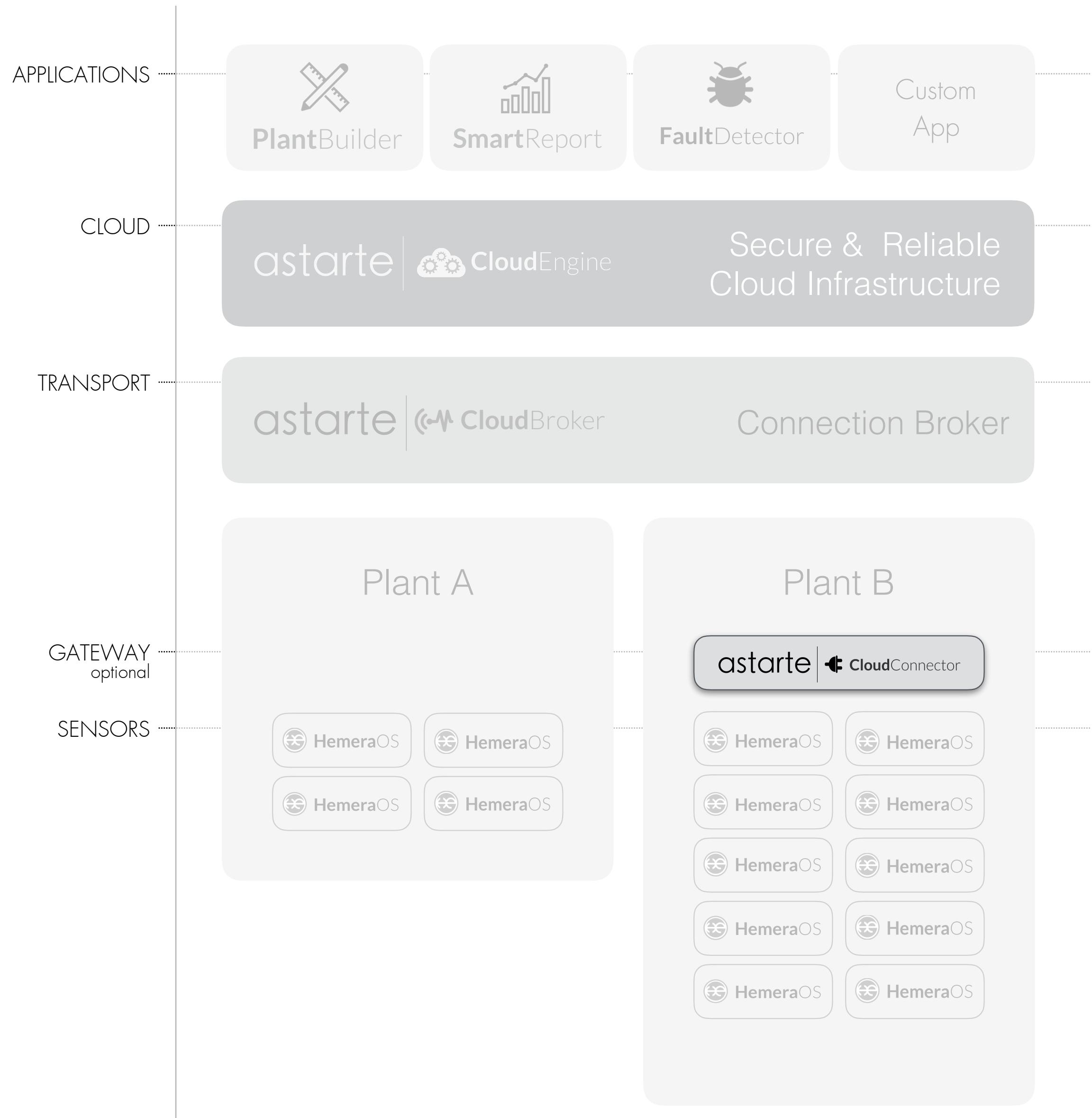
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Whether you plant and your devices are connected or not, we've got you covered: CloudConnector is Astarte's gateway for connected and unconnected IoT devices.

We support any meaningful local (like ethernet) and geographic (like LTE) network interface for maximum compatibility with any embedded device.

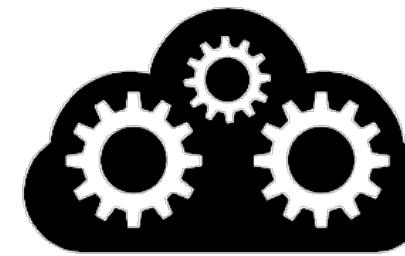


CloudBroker

Astarte CloudBroker is our entry point to the Astarte Cloud Engine.

We welcome any industrial grade communication protocol like HTTP/s, MQTT, COAP and others.

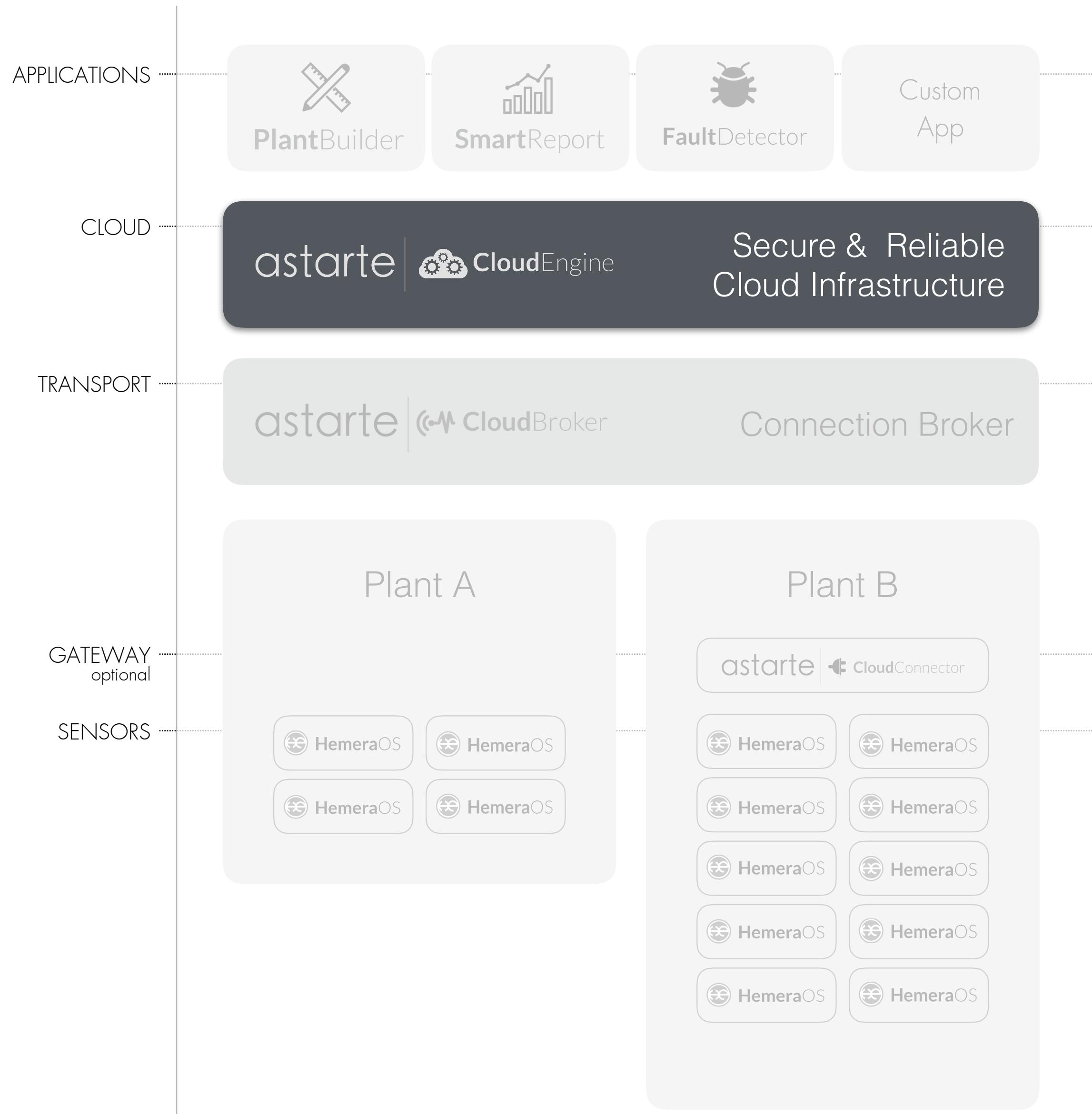


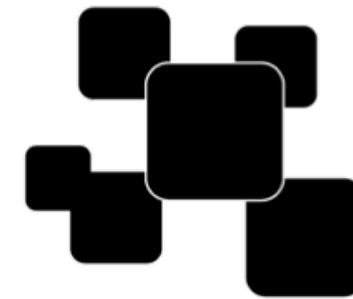


CloudEngine

CloudEngine is the heart of Astarte. Data are collected, maintained, secured, organised in views and, eventually, analysed in a secure and reliable cloud infrastructure.

CloudEngine can be deployed on multiple server in various geographical regions. Alternatively, it can be deployed on-premise, depending on customer's needs.

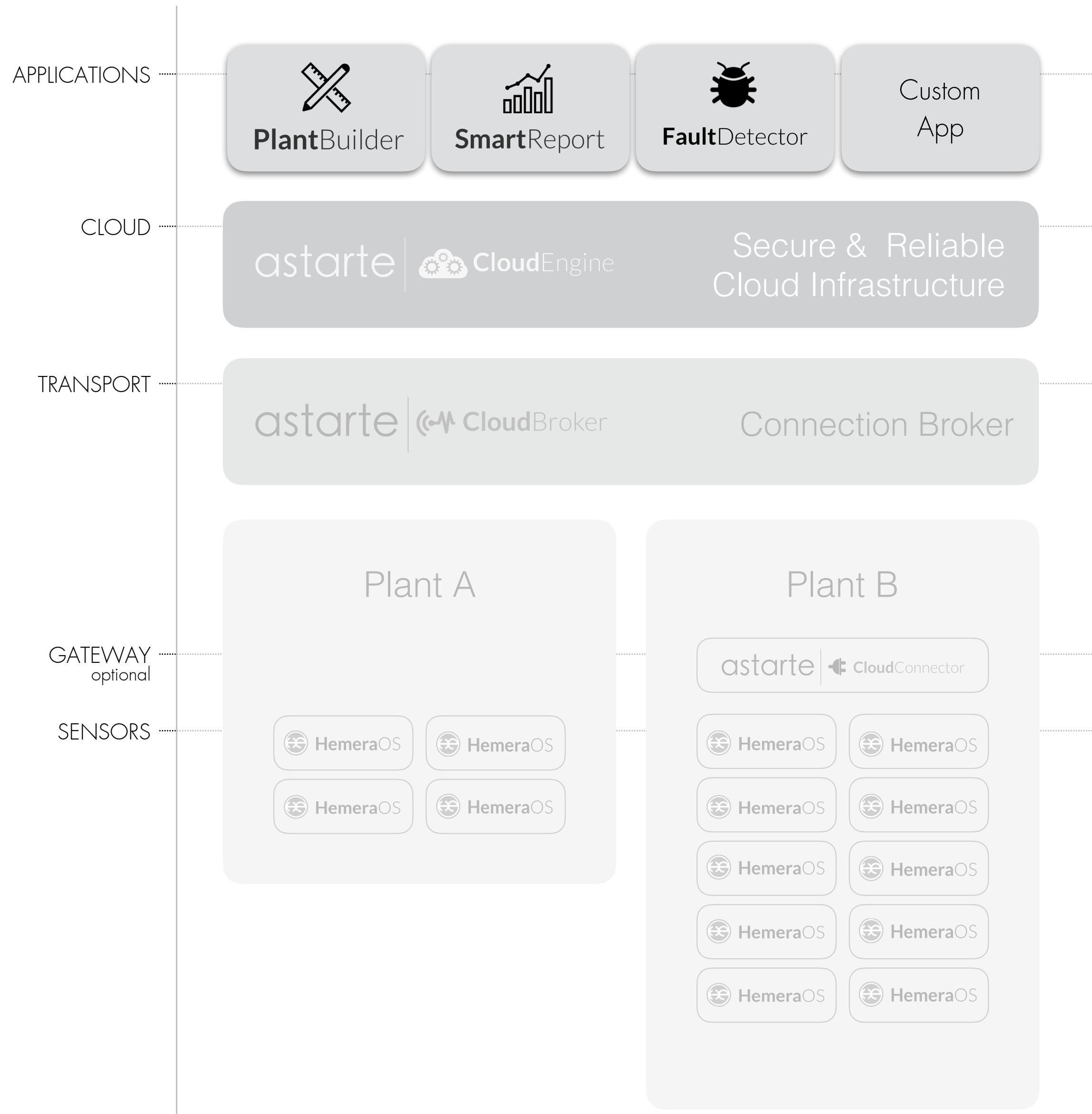




CloudApps

Astarte supports a variety of third party applications that can be developed on top of the CloudEngine. CloudApps use standard HTTP RestFul interfaces to create innovative & profitable services.

Here are some of our apps:
PlantBuilder, SmartReport, FaultDetector.





PlantBuilder

Astarte

Plant EX19 Panoramica Generale | Sinottico | Report

Notifications

- Notifica malfunzionamento EX19 / Edificio 3 / Piano 2 / Area A
- Report giornaliero Disponibile report del 22/04/2015

Components

WIFI	TEMPERATURE	BUS
MOTOR	HEATING ACTUATOR	
CLOCK	PLC Controller	
VALVE	ANALOG SENSOR	
COOLER	PRESSURE	

PLC - PLE608

Device

SYSTEM ID	EX19
DEVICE ID	7ABD-PLE608
DEVICE TYPE	PLC Master

Position

Impianto	UNIGE
Edificio	Centrale Termica
Piano	N/A
Locale	N/A
Zona	C

Description

Elettrica	Master PLC
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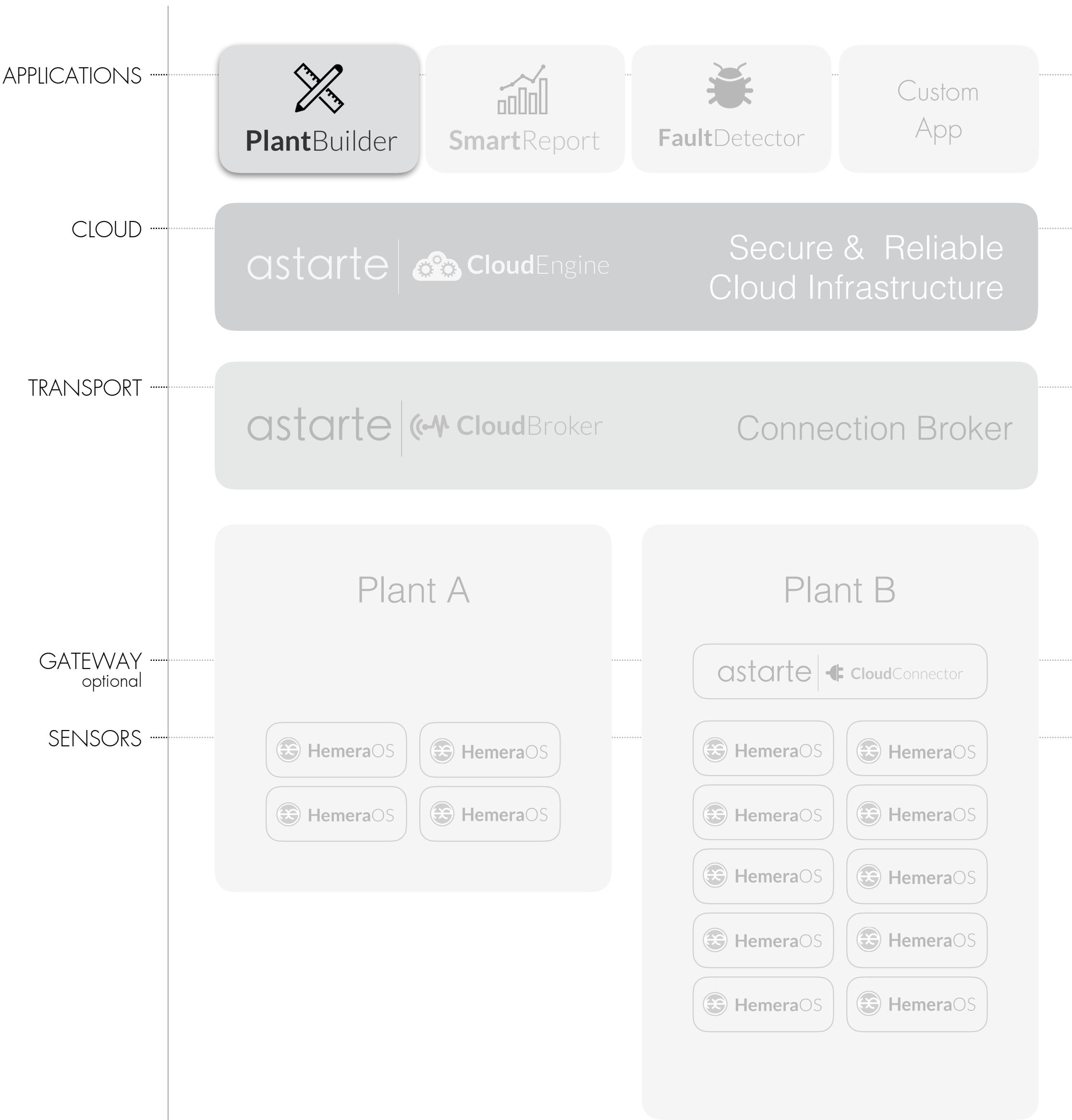
Data

Nome registro	Nome variabile	Unità di misura	Imposta
0430	Luminosità sentore	Lumen	Imposta
0758	Peso motori porta		Imposta
0759	Peso motori porta		Imposta
0758	Peso motori porta		Imposta
0759	Peso motori porta		Imposta
0758	Peso motori porta		Imposta
0759	Peso motori porta		Imposta

Argungi nuovo record

Web browser

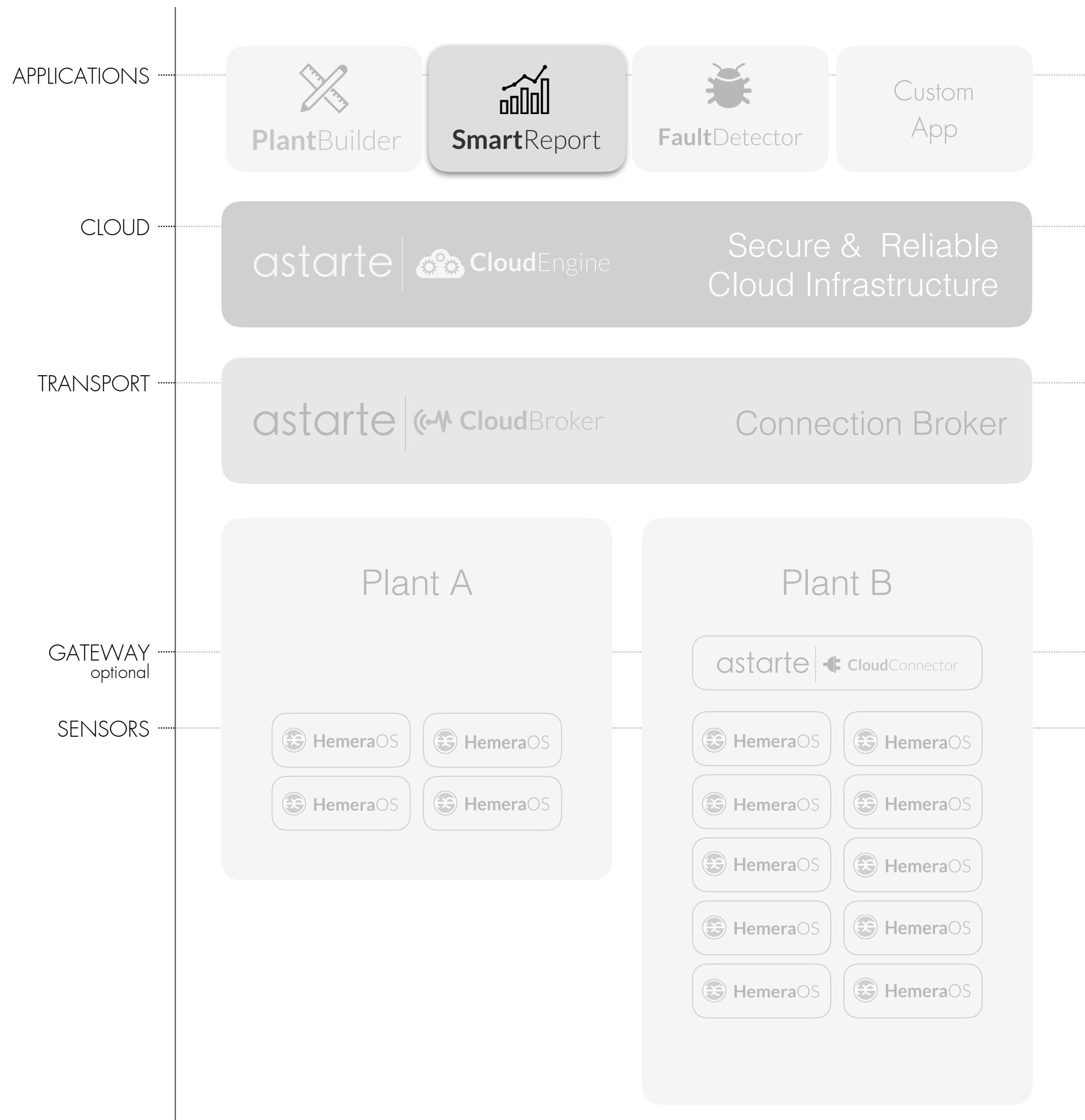
PlantBuilding is a CloudApp that lets you to draw your plant infrastructure to easily read data and send command remotely and using your internet browser.





SmartReport

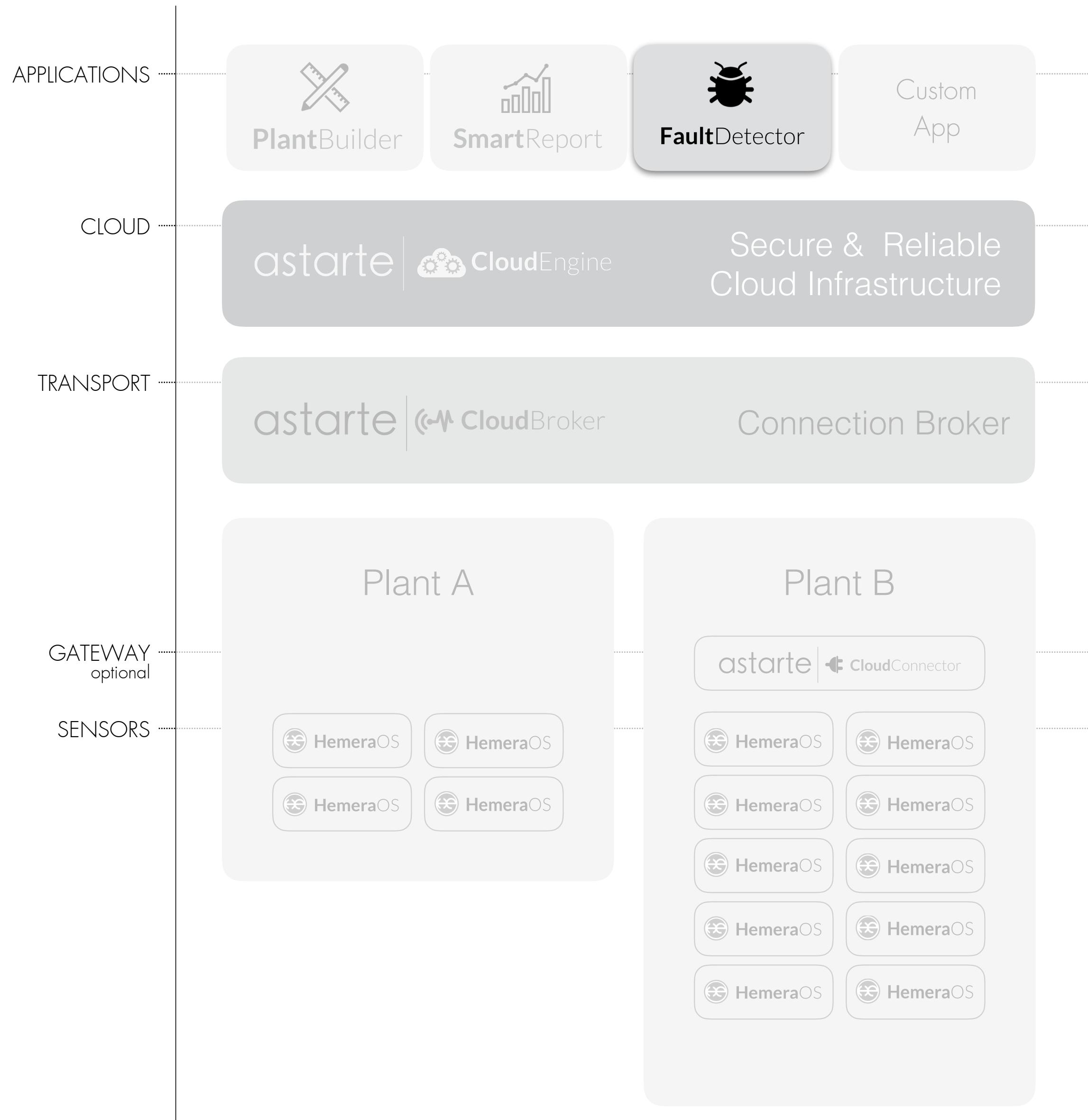
Get smart reports from your distributed devices. The Astarte CloudApp SmartReport collects them and shows them in an ergonomic fashion.





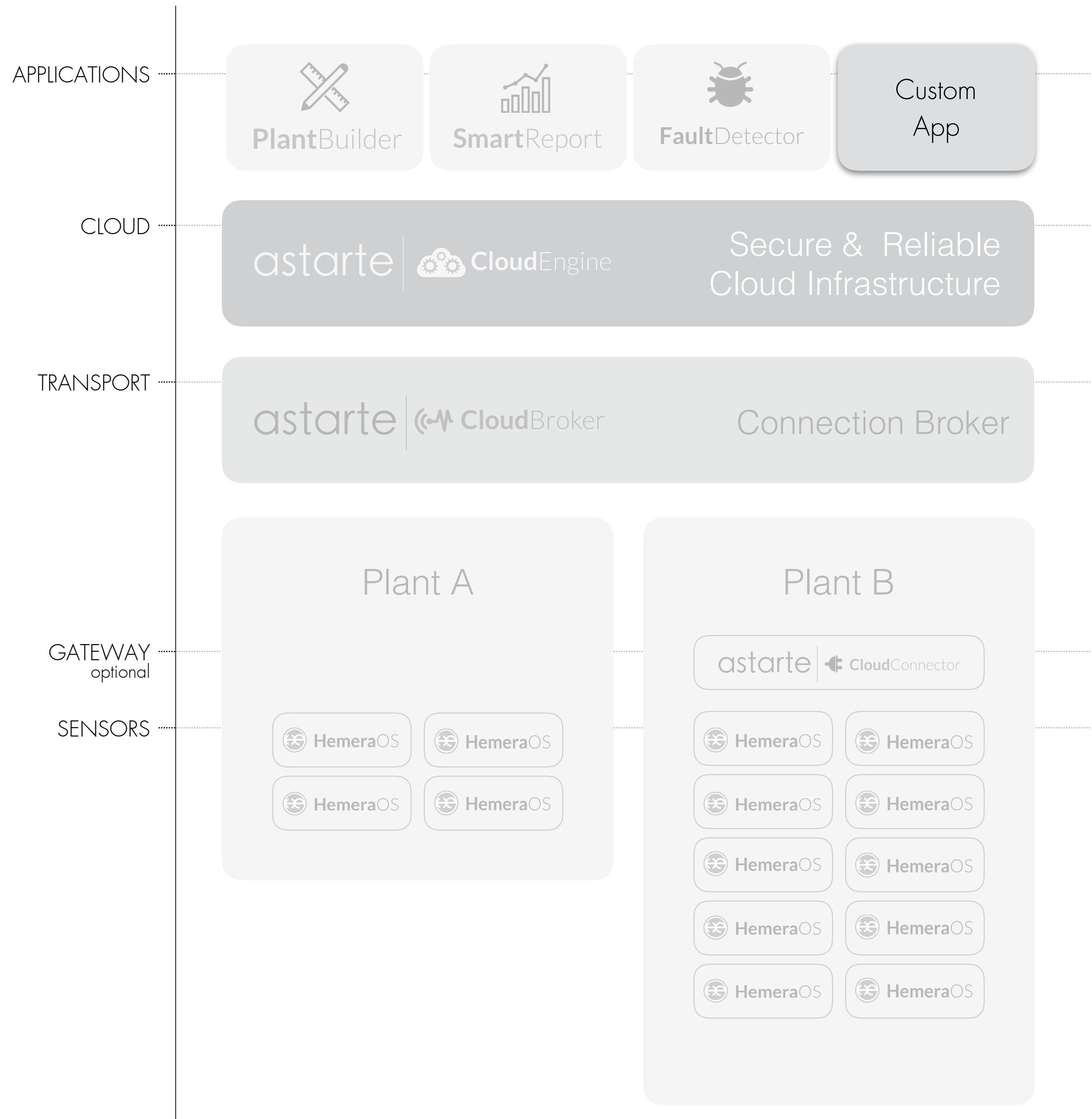
FaultDetector

Predictive maintenance is an essential factor to keep unnecessary costs under control. The FaultDetection CloudApp warns managers when something is happening, right before it happens. Less unplanned stops, less profit lost.



Custom Applications

Astarte is able to satisfy any customer's need. We can both develop custom interfaces and expose personalized APIs. It's your choice.





Cloud or On-Premise

Astarte can be deployed in private-cloud mode, or on premise. In both case, we are agnostic with respect to both the infrastructure provider and embedded device maker.



Read Data & Send Commands

Astarte can be used both for reading data from distributed devices and to send commands on a tiny and reliable communication protocol.

Industries & Business Cases

Deployments & Reference Industries

- Tracking of biomedical devices
- Building automation management
- Management fleets of panels, monitors, and screens
- Monitoring of remotized naval systems
- Remote monitoring of gas pipelines
- Remote management of wind turbines
- Track fleets realtime monitoring

Business Case #1: Cost Reduction

XYZ is a company with a fleet of 2000 deployed devices. On an yearly basis, on average, XYZ pays for 500 maintenance interventions. The average cost of each intervention is 400 Eur. Yearly expense is 200.000 Eur. XYZ data shows that 30% of these interventions are false negatives, 50% are events that could be remotely solved and 20% require manual intervention (e.g.: hardware failure).

Thanks to Astarte, XYZ optimises its maintenance process: now they spend 40.000 Eur in maintenance intervention and 80.000 Eur for Astarte services, a net 80.000 Eur yearly saving. Additionally, XYZ can now offer a new line of services to their customers built on top of Astarte.

Business Case Info

#DEVICE	2000
#INTERVENTION	500
INTERVENTION COST	400 Eur

Without Astarte

YEARLY EXPENSE	200.000 Eur
FALSE NEGATIVES	30 %
REMOTELY SOLVABLE	50 %
ON-SITE SOLVABLE	20 %

Using Astarte

YEARLY MAINT. EXPENSE	40.000 Eur
ASTARTE SERVICES	80.000 Eur
TOTAL	120.000 Eur

Savings

WITHOUT ASTARTE	200.000 Eur
WITH ASTARTE	120.000 Eur
NET SAVINGS	80.000 Eur

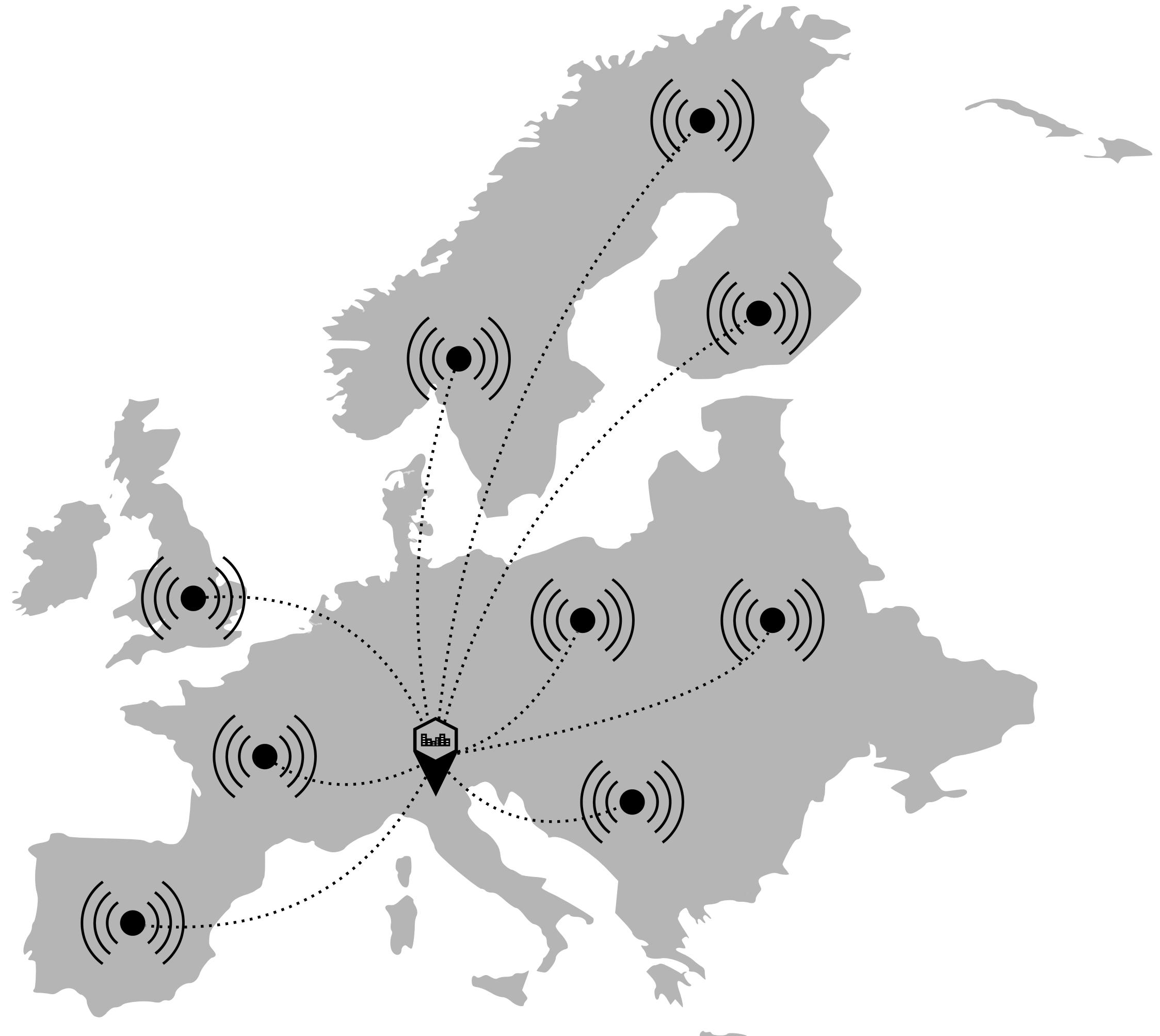
Business Case #2: Cost Reduction and Revamped Offer

XYZ requires to expand and revamp its product line to increase their offer towards their end customers. Internally, they can choose to either develop an entire cloud + middleware + embedded software stack and account for management, maintenance, IT security, infrastructure costs, development of customisations, development of the embedded software and firmware, or adopt Astarte.

	CAPEX [in men/years]	OPEX [in '000 €]	OPEX [€/device]
Cloud Infrastructure	8	Infrastructure	15
Middleware	1	Infrastructure Maintenance	30
Embedded OS + Embedded Software	8	Security IT	120
Customizations	2	Embedded OS	80
Subscription Fee			40

To which additional loss of income must be added, due to not being on the market for months. XYZ opts for Astarte as Industry 4.0 provider, clearly a winning solution over in house development.

Connecting embedded systems: not so trivial.



Accessing your sensor network.

Your sensors are deployed on an arbitrarily dislocated geographical area.

You want to access the data they generate from within your headquarter.



Accessing your sensor network.

We could for example install a WebServer on each device, and then access from remote. Each sensor must have its own public IP ADDRESS.

In this way it is possible to access to each node using just a simple web call, right?

For example

<http://87.98.23.183/readPLCvariable/0x8271>

MAIN REASONS

1. Network issues
2. Security is a non-trivial task
3. Pull vs Push Systems



WRONG.
sensor network.
THIS IS NOT
GOING TO
WORK.

We can install a simple WebServer on each sensor node. Now each sensor has its own public IP address.

In this way it is possible to access to each node using a simple web call, right?

For example

<http://87.98.23.183/readValue/0x8271>

1. Network issues

PUBLIC IP

Fixed IP allocation (who maintains this?): costly

Reverse DNS: is not an option at all; only amateurish solution

PROTOCOL

Webserver/HTTP: not the right protocol
(compare HTTP vs MQTT)

High bandwidth means high OPEX

NETWORK TOPOLOGY

Behind a NAT?

Routed through unreliable hops?

A **sensor network**.
THIS IS NOT
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We can install a simple WebServer on each sensor node. Now each sensor has its own public IP address!

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For example

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2. Security is a non-trivial task

DEVICE INSTALLATION

Who manages the installation & authorization procedure?
How? Can you guarantee confidentiality of data sent & received?

PERIODIC MAINTENANCE (DEVICE)

Is the device ever going to be updated/maintained? What if new exploits are discovered for your stack installed on your device base?

PERIODIC MAINTENANCE (CLOUD)

How frequently are you auditing your system?
How frequently are you maintaining your cloud infrastructure IT? Are you mitigating security issues? How?

AWRONG.
sensor network.
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3. Pull vs Push Systems

PULL SYSTEM

You need to take care of maintaining an accurate list of web server device. You need to periodically poll devices — what if the device doesn't respond? Aggregation and analysis of data is a complex operation

PUSH SYSTEM

You only need a device to be authorised to collect data Devices send data when they know they need it Aggregation and analysis on aggregate are easy tasks to do

A sensor network.
WRONG.
THIS IS NOT
GOING TO WORK.

For example

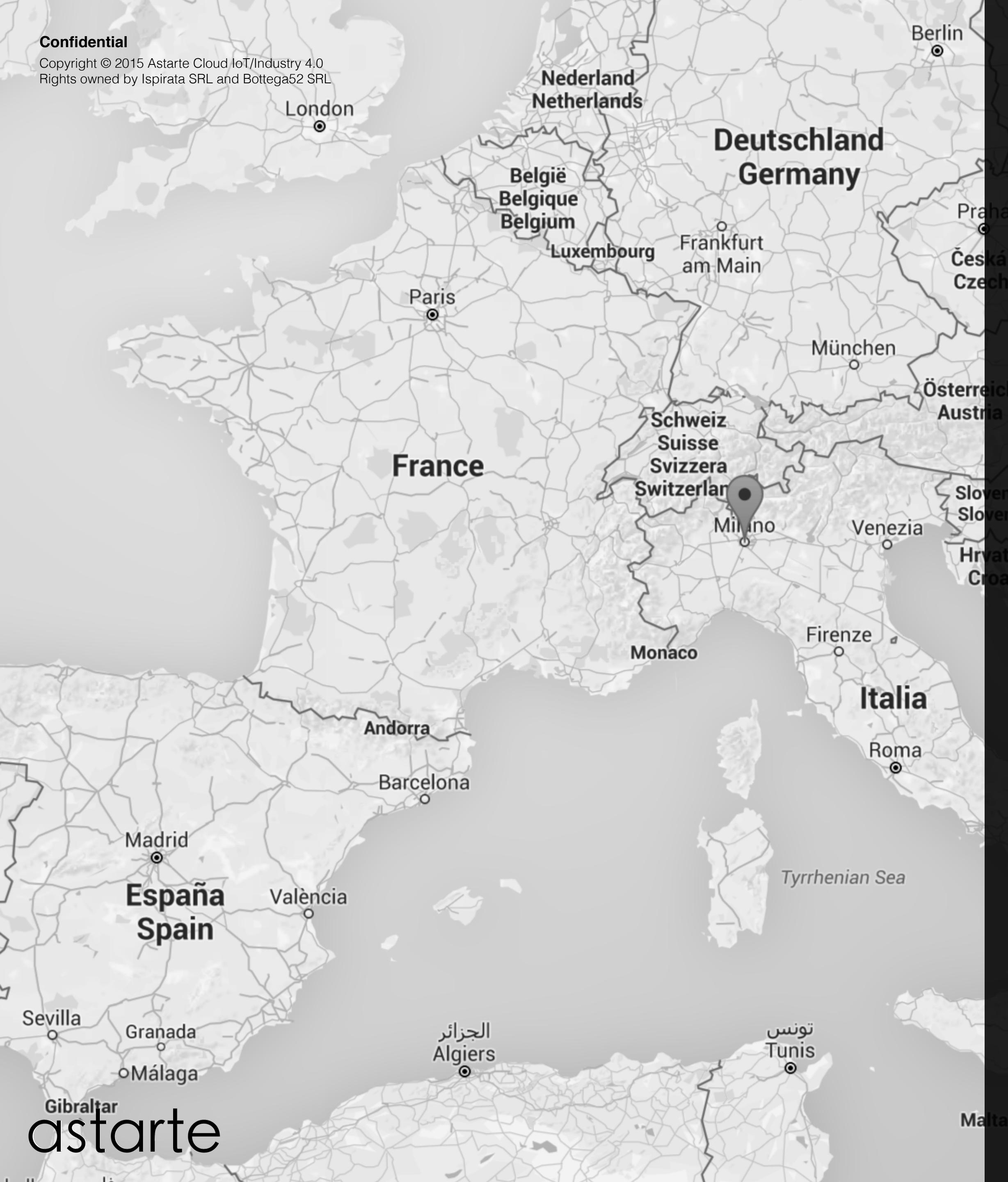
<http://87.98.23.183/readValue/0x8271>



Accessing your sensor network.

A true cloud infrastructure is the only credible option.

- Reliability
- Security
- Data aggregates
- Algorithms



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