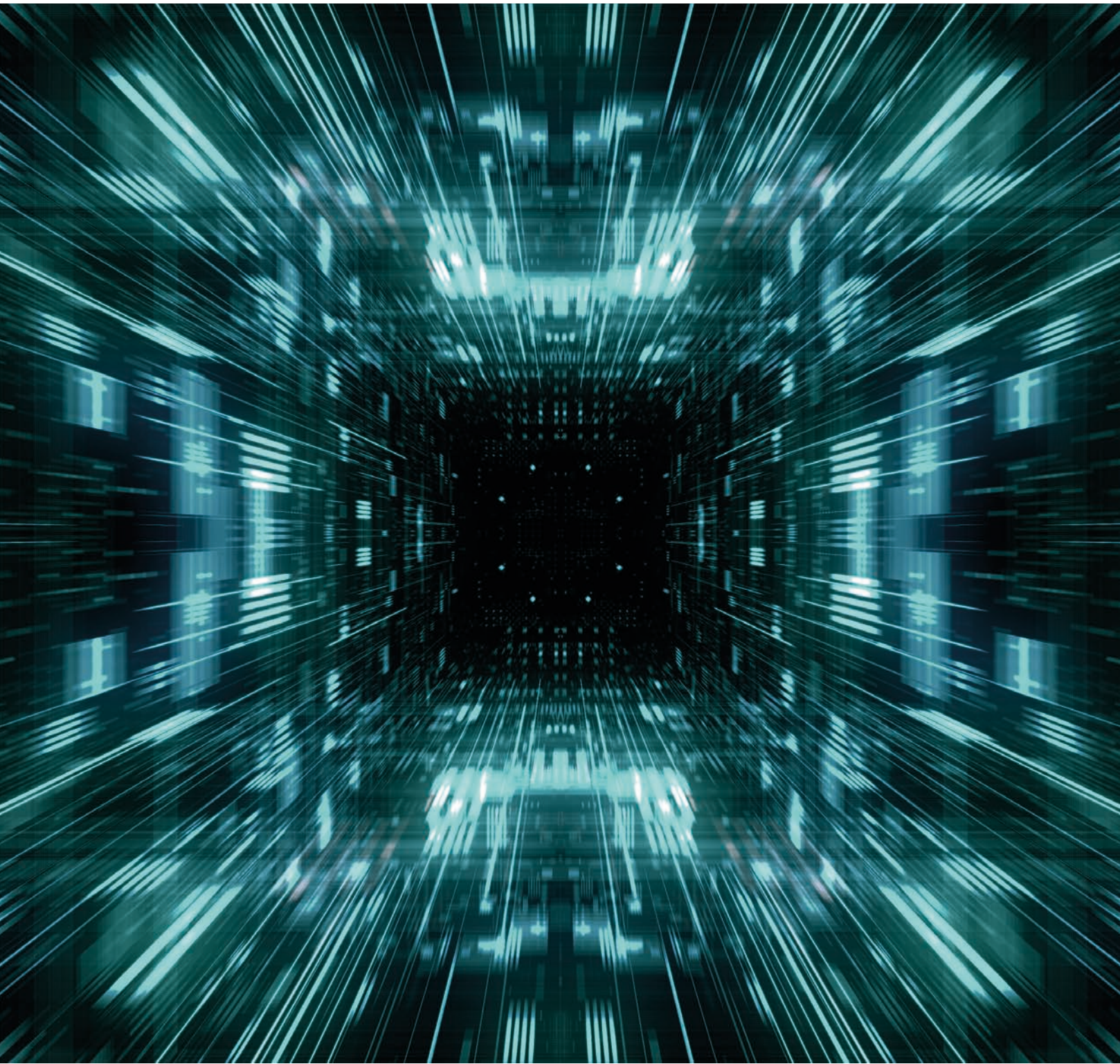




EDGE DEVICE

Your gateway to the future



What is the EDGE Device?

- the Edge Device is the recommended IoT device for the **DAIM Edge Computing Platform**
- the Edge Device enables
 - **IoT connectivity** and collection of data
 - **data processing and analytics** capabilities close to the data source
 - flexible **data logistics** - data filtering and routing to a variety of systems (on premise and cloud)
- **easy** to set up and simple to operate
- **highest security standards** for protecting data and intellectual property
- batteries included: preinstalled with **ready-to-go IoT software**
- extensible: **run your own applications and algorithms** as Docker containers



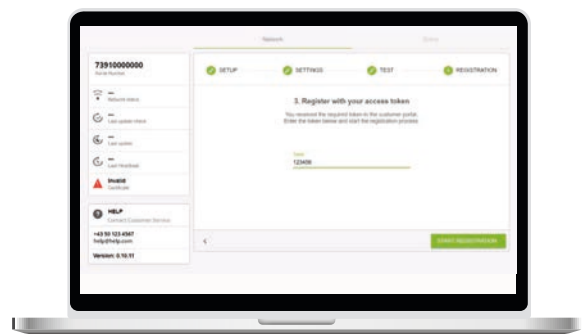
Edge Device Use Cases



- **simple connectivity and data logistics solution:**
 - collect data and route it to different systems, based on data attributes or content
 - aggregate or compress data before sending it to the cloud
- **condition monitoring:** detect wear of components and alert customer service
- **process stability:** monitor process stability of production machines, control production process through algorithm
- **machine learning:** train model in cloud system, apply model on the edge
- collect and store **data important for warranty or legal** reasons
- basis for **remote maintenance** of production machines (third-party software required)

Easy Set Up

- simple and secure configuration and registration process
- easy network configuration via setup wizard, similar to home routers
- network setup with or without network separation between production and external networks



Edge Device Technical Data:

- Intel Kaby Lake, Core i3-7100U (Dual Core, 3M Cache, up to 2.4GHz) ULT
- 1 x 8 GB DDR4 RAM (expandable to 16 GB)
- Industrial Grade 128 GB SSD incl. Power Shield Function
- TPM 2.0 Chip
- 3 x GbE LAN
- 4 x USB 3.0
- 1 x HDMI/1 DP

What is Edge Computing?

In industrial IoT solutions, data often cannot be sent from production sites to the cloud or a data center for processing due to:

- limited network bandwidth and cost
- legal, compliance and security reasons to keep data on production sites
- reliability of the production process (e.g., production must not depend on internet access)

Edge Computing moves computation and data storage to “the edge” where data is produced, to improve response times, save bandwidth and to keep data “on site”.

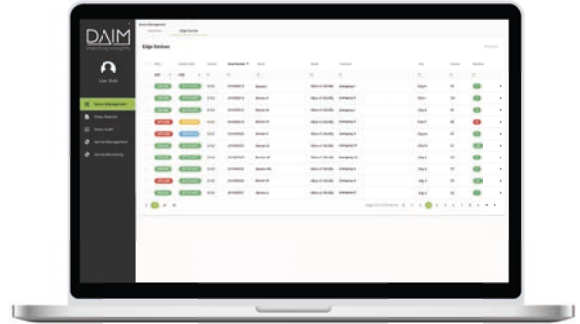
DAIM Edge Computing Platform

The DAIM Edge Computing Platform is a central management solution for your Edge Devices:

- **manage devices:** automatic and secure software updates and security patches, monitor health and online status of your devices
- **manage applications:** orchestrate applications running on your devices, manage application updates
- **manage data flow:** orchestrate data flow across devices: which data gets sent where?

Goal:

- platform user can **focus on delivering value to his customers:** connectivity solutions, condition monitoring, digital services, machine learning, remote maintenance, etc.
- DAIM Edge Computing Platform **takes care of managing necessary software and infrastructure:** manage devices, algorithms, security patches, upgrades, data distribution, etc.



Industrial Security by Design

Device Encryption

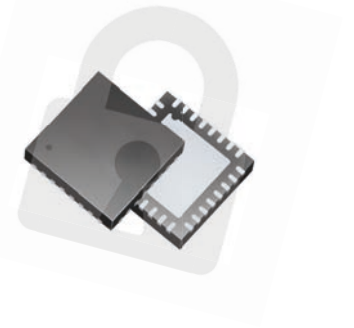
- full Device Encryption with Linux Unified Key Setup (LUKS) and AES256
- boot process secured against manipulation by TPM 2.0 chip

Device Identity & Communication

- devices identified by x509 certificates
- device registration secured by hardware key in TPM 2.0 chip
- all communication TLS encrypted

Secure Software Distribution

- device only runs signed Docker containers
- device only installs signed OS packages
- device only accepts signed configurations



Designed from ground up with strong IoT security in mind

- protect Edge Devices, platform backend and customers **against manipulation and malicious code**
- secure communication, certificate based authentication/authorisation and software signing

- **protect intellectual property** located on the Edge Device (e.g., your Edge Applications)
- device encryption, protection against manipulation through TPM 2.0 chip

Regular security audits by independent security advisers and university researchers.

Manage Devices

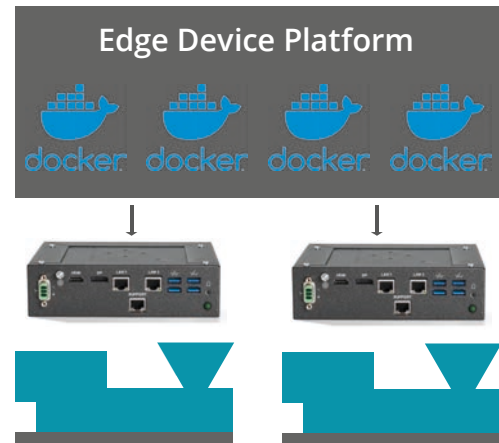
Central Management of Edge Devices

- security & OS updates/upgrades
- monitoring of upgrade status, online status, telemetry
- management & monitoring of deployed containers (health status, versions)

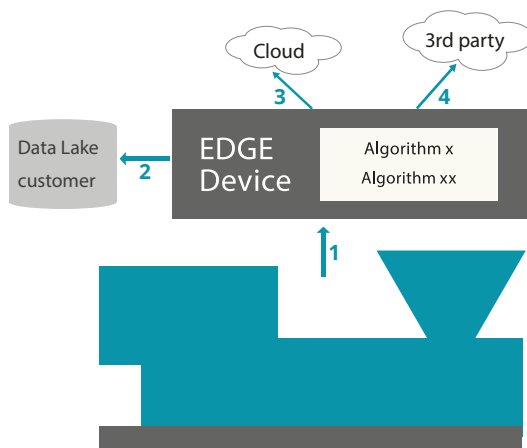


Manage Applications

- Edge Applications are deployed on Edge Devices as Docker containers
- use included applications such as Apache NiFi (data logistics) or databases (e.g., postgres)
- create your own applications as Docker containers, using tools and programming languages you are already familiar with - if it runs in a Docker container, it runs on the Edge Device
- create value for your customers by offering digital services in your business domain: connectivity solutions, condition monitoring, digital services, machine learning, remote maintenance, etc.



Manage Data Flow



...by configuration of endpoints

1. data storage/processing at Edge Device
2. data storage at customers' Data Lake
3. forwarding of data to cloud
4. forwarding of data to 3rd party

NiFi for Data Flow Management

Use Apache NiFi for data flow management:

- highly configurable
 - loss tolerant vs guaranteed delivery
 - low latency vs high throughput
 - dynamic prioritization
- back pressure (even between sites)

Data Provenance: track data lineage

- secure: all connections TLS, multi-tenant authorization
- supports different protocols (MQTT, OPC-UA, REST, Avro, ...)

