OpenEdge

The General Framework of Edge Computing

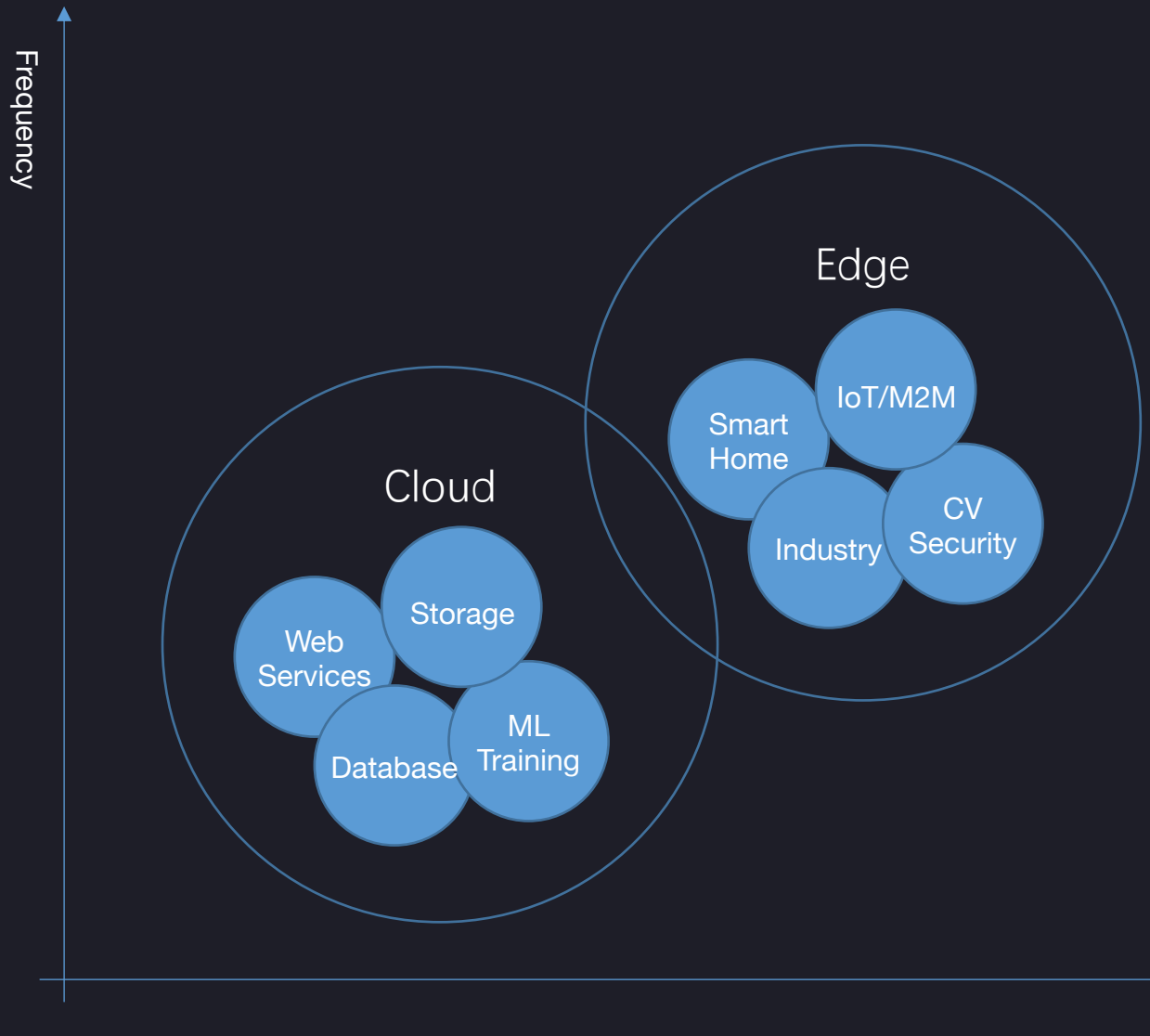
Leding LI

Chief architect of Baidu Cloud IoT

Member of LFEdge Technical Advisory Council

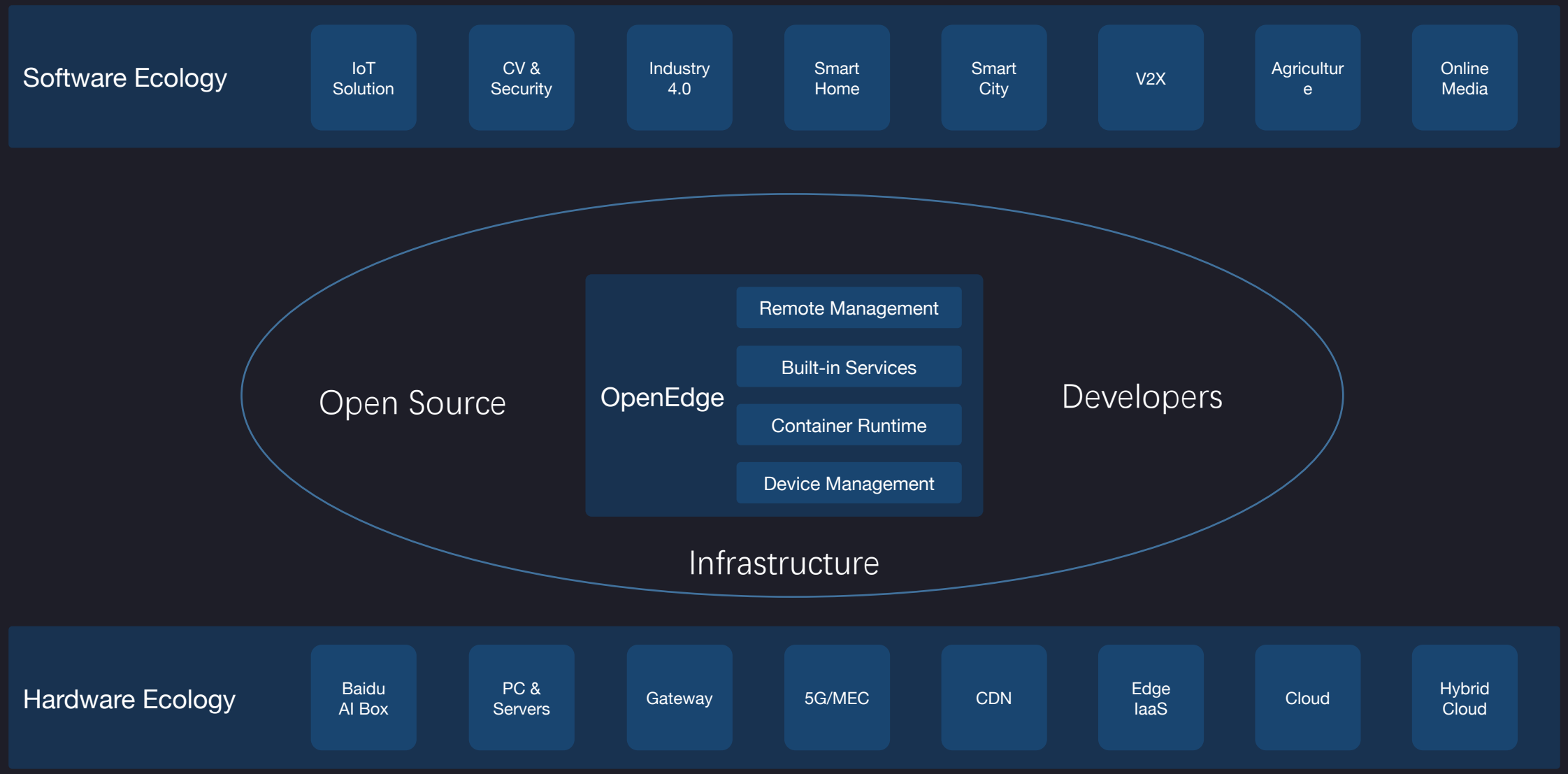
Overview

Cloud computing and Edge computing

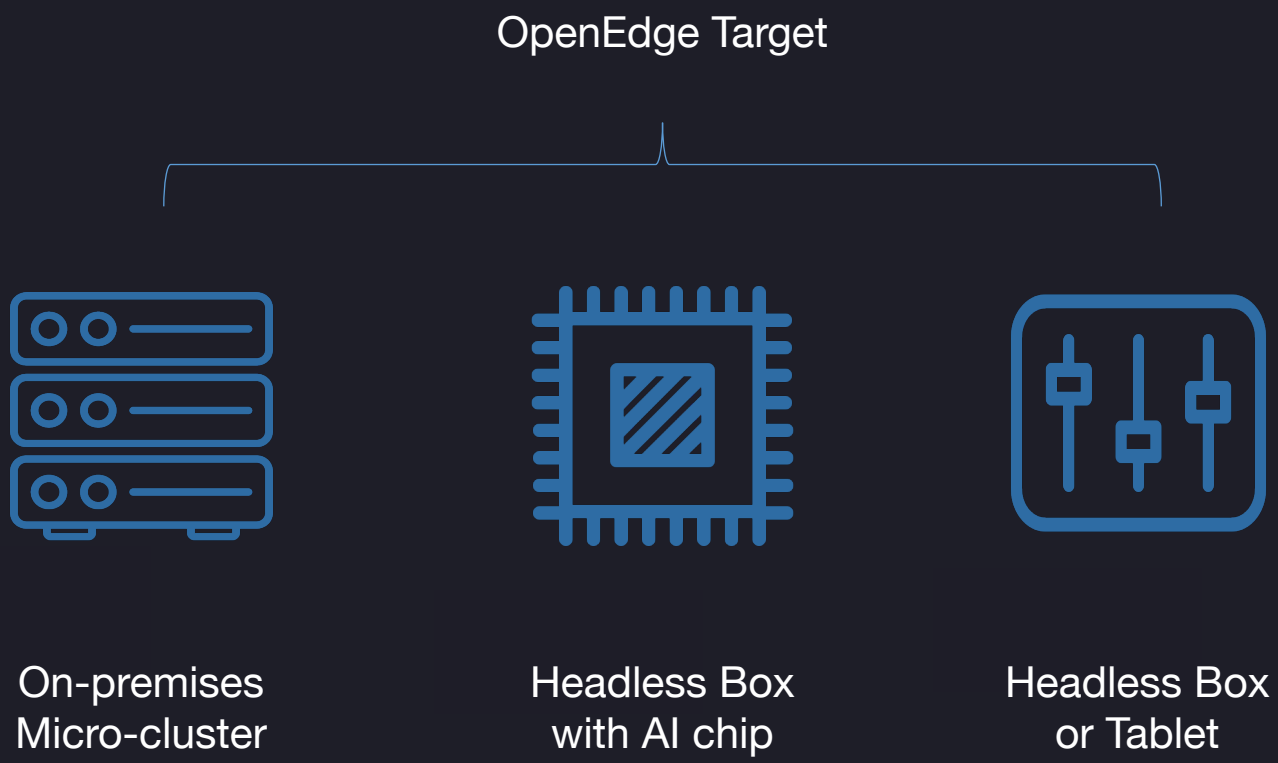


- Delay-sensitive
- High bandwidth consumption
- Power and connection limited
- Privacy and Policy requirements

Position


Software Ecology
IoT Solution
CV & Security
Industry 4.0
Smart Home
Smart City
V2X
Agriculture
Online Media
Open Source
OpenEdge
Remote Management
Built-in Services
Container Runtime
Device Management
Developers
Infrastructure
Hardware Ecology
Baidu AI Box
PC & Servers
Gateway
5G/MEC
CDN
Edge IaaS
Cloud
Hybrid Cloud

Edge Targets



OpenEdge Project

OpenEdge Project

https://github.com/baidu/openedge

https://openedge.tech/

First release in Dec. 2018

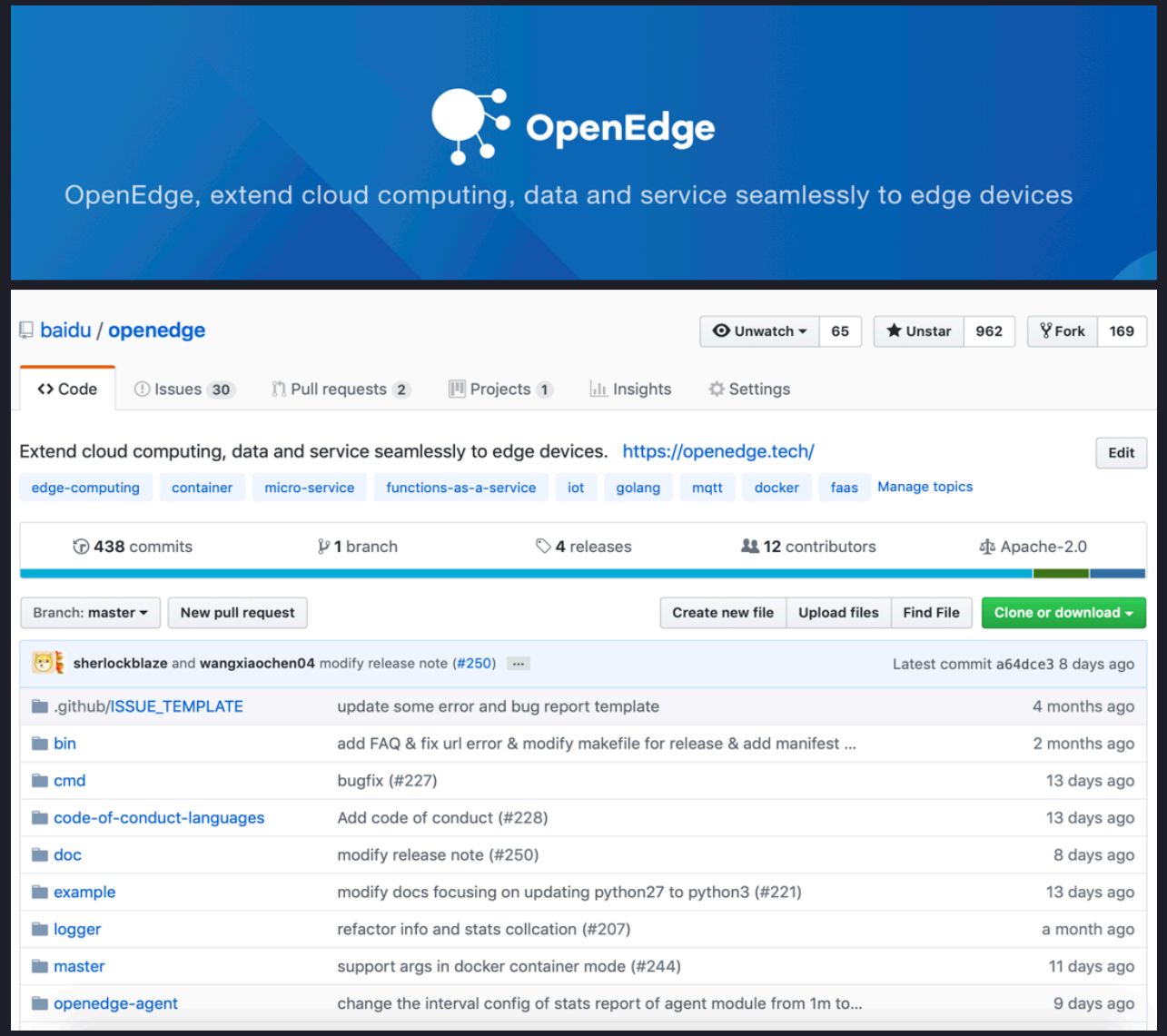
- Agile, monthly release
- 4 Releases
- 12 Contributors
- 900+ stars on github.com

Focus

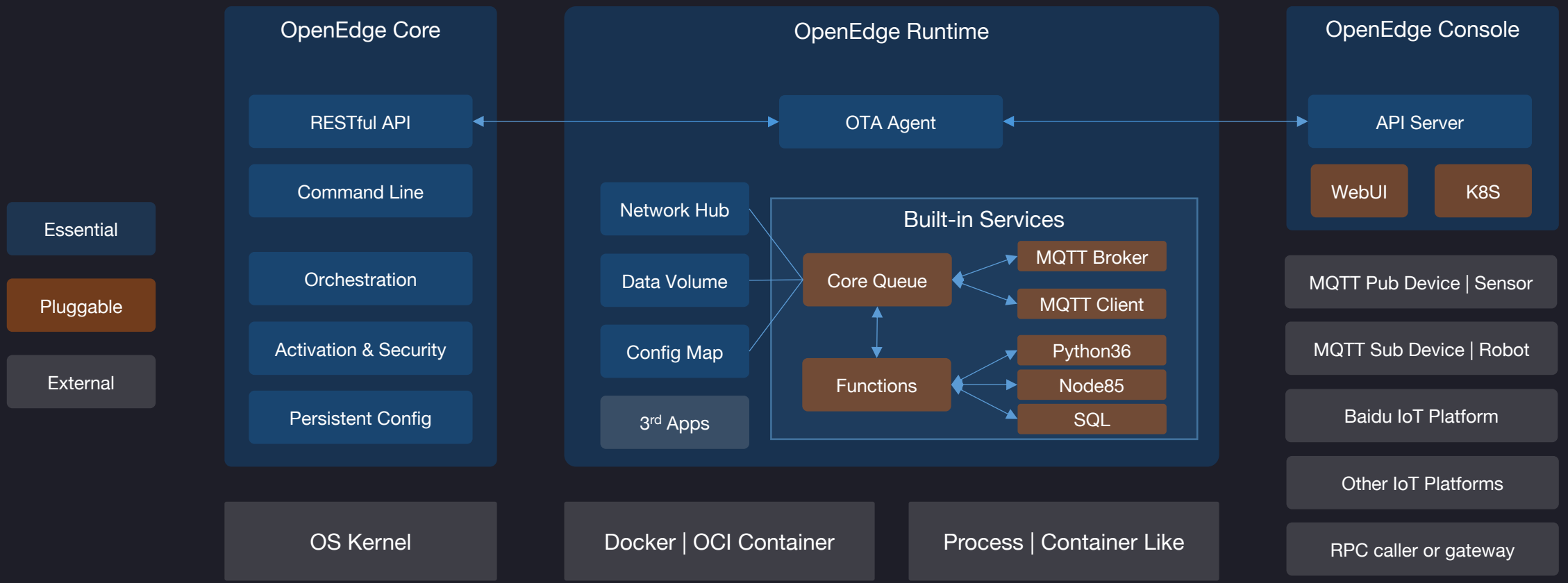
- Cloud Native infrastructure on Edge
- Large-scale deployment of unattended equipment
- Toolkits & services for creating applications

Vision

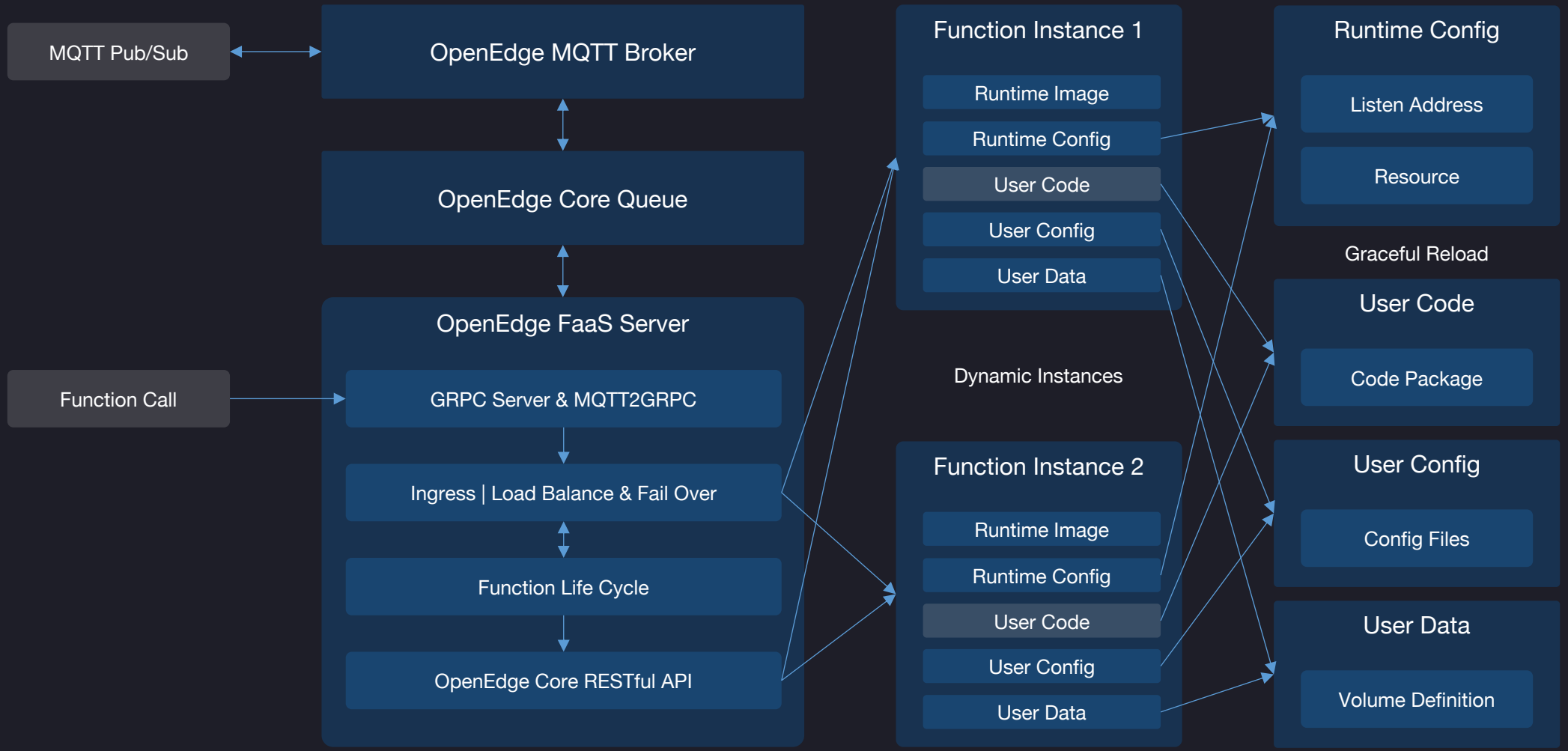
- Edge Operating System
- Edge Toolchain for Developers
- Cloud, Edge and IoT data collaboration



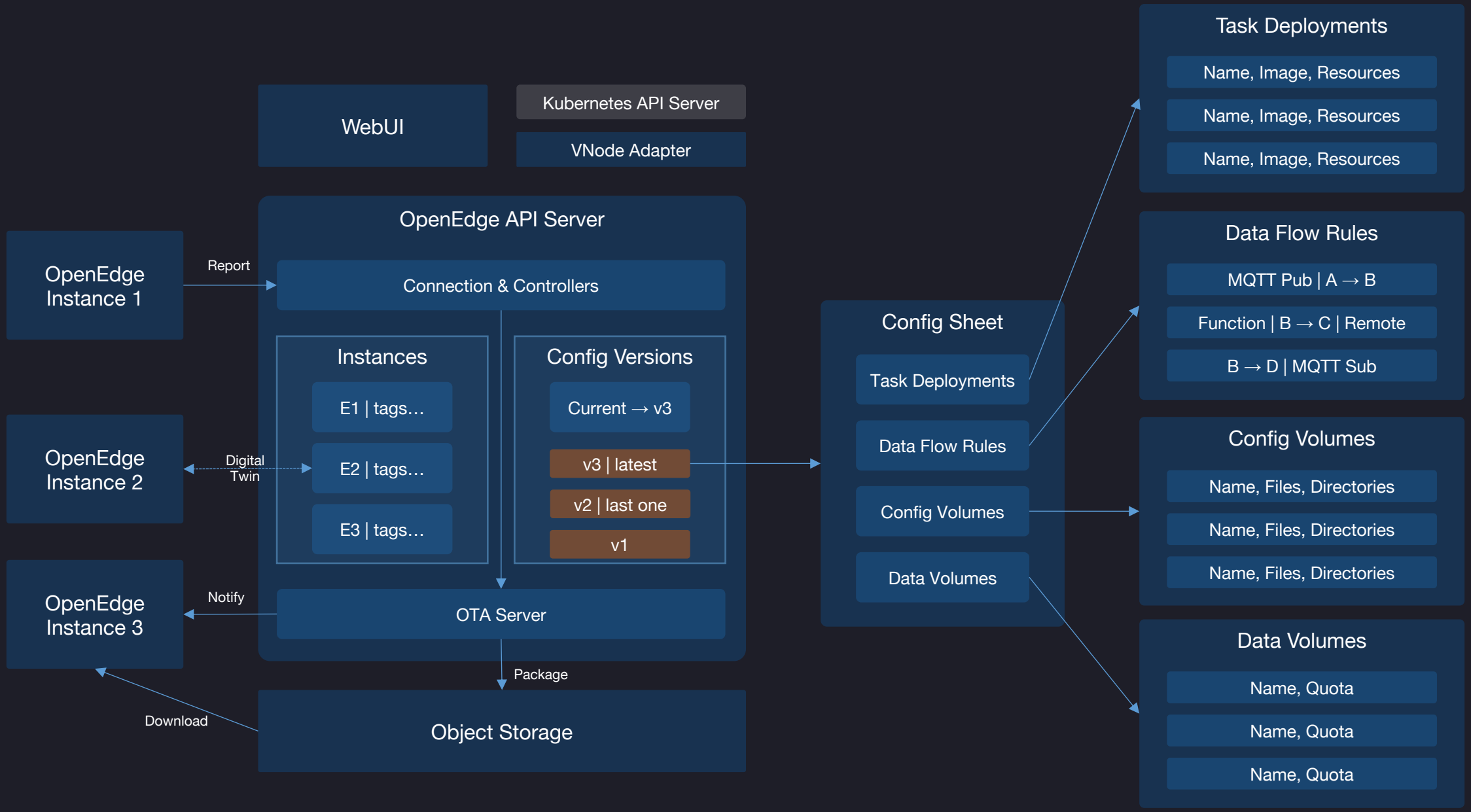
Cloud Native Architecture



Function as a Service



Remote Management



Optimization for Edge

Adaptive

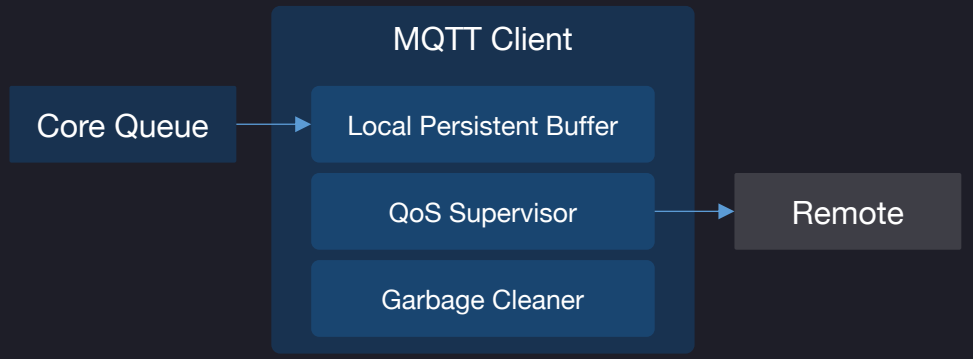
Raspberry Pi

Linux, macOS, Windows 10, Legacy Windows

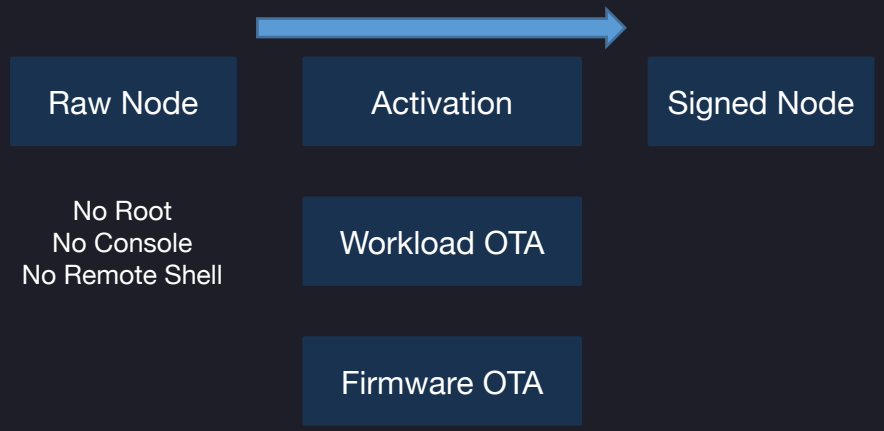
x86, x86_64, armv7, aarch64, mips, mips64

Cluster with HA

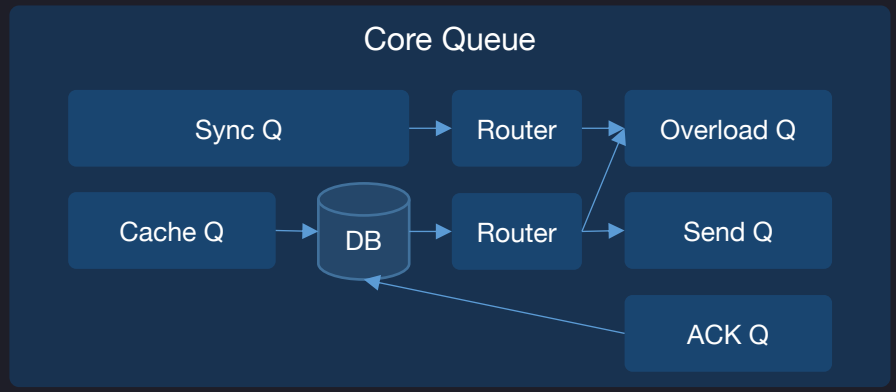
Unstable Network



Automation



IO Limited

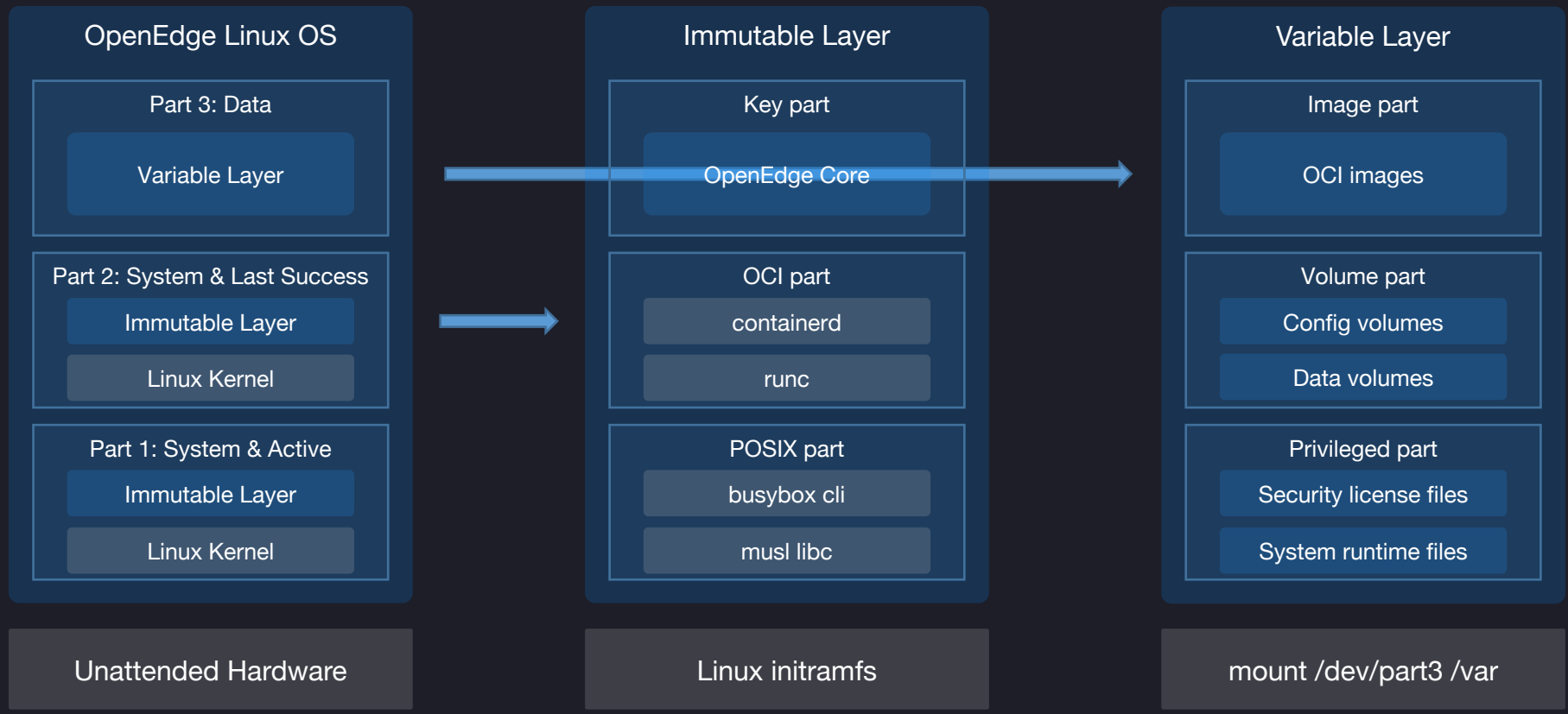


Roadmap, Edge Operating System

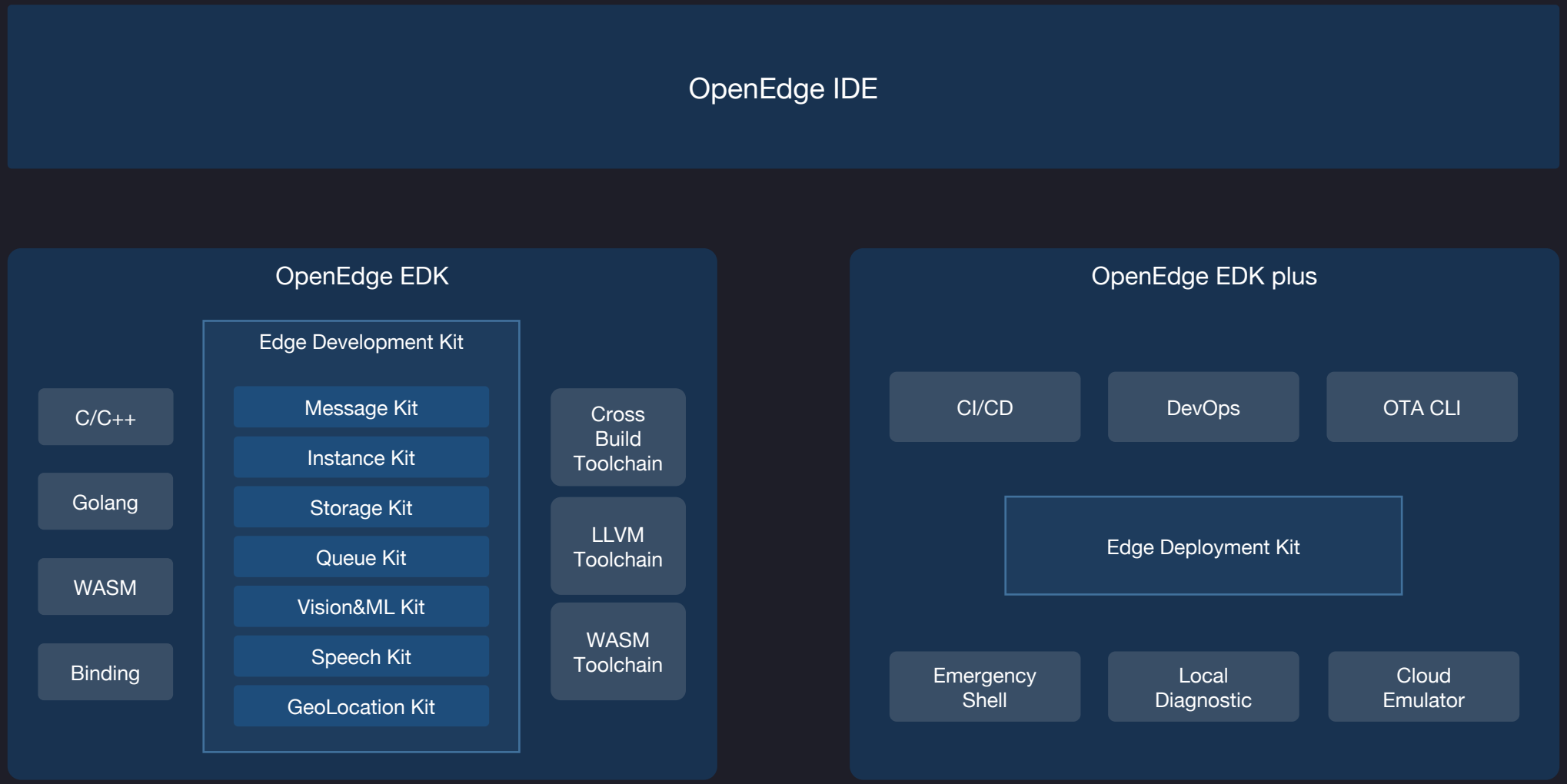
Lightweight

Fast Boot

Headless



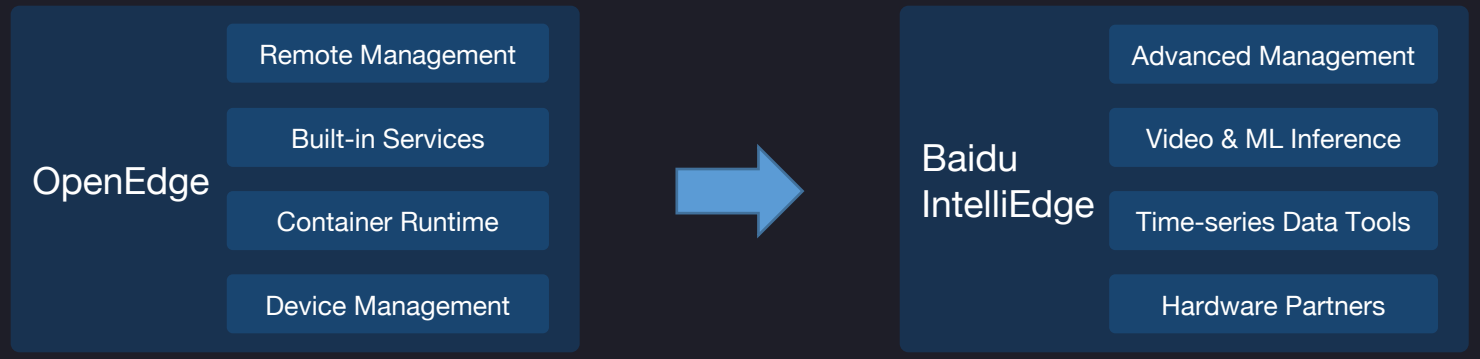
Roadmap, Edge Toolchain for Developers



Baidu IntelliEdge

An OpenEdge Solution for Enterprise

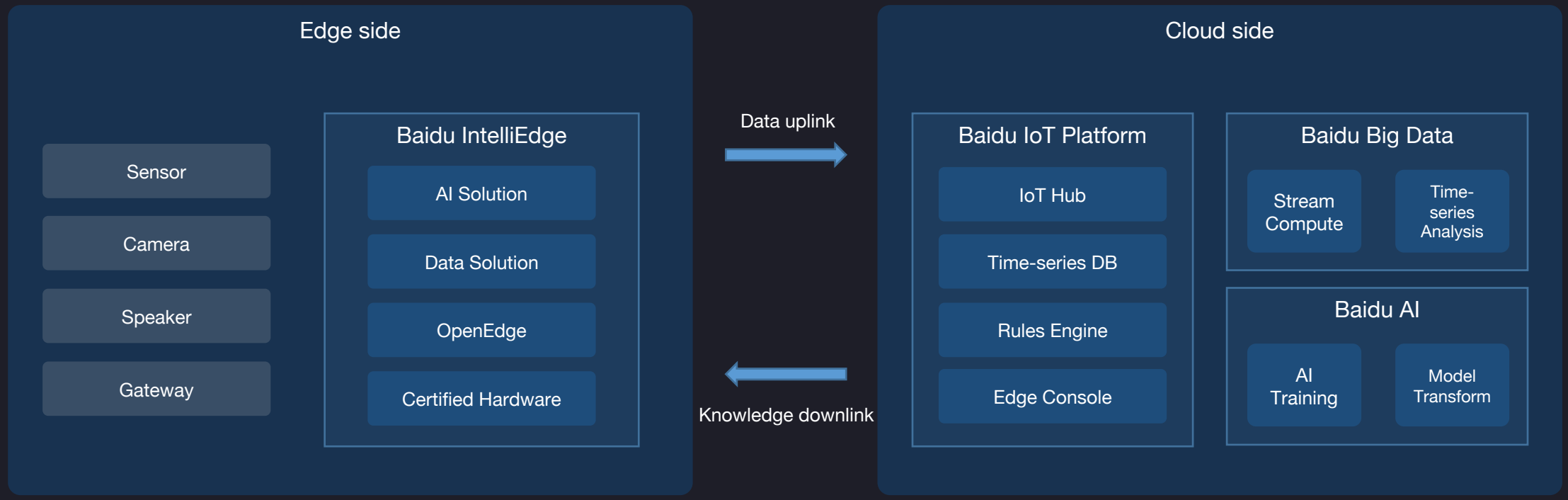
Relation



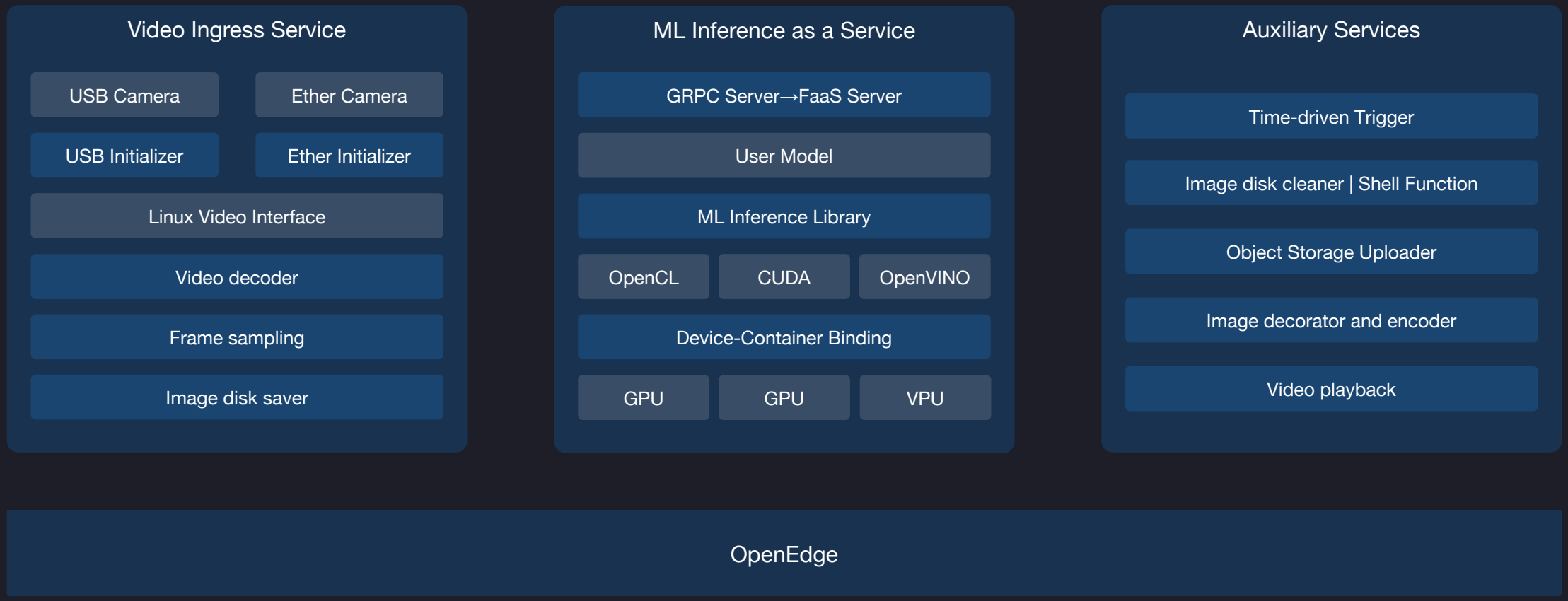
Infrastructure
Open Source
for Developers

Solutions
Commercial
for Enterprise

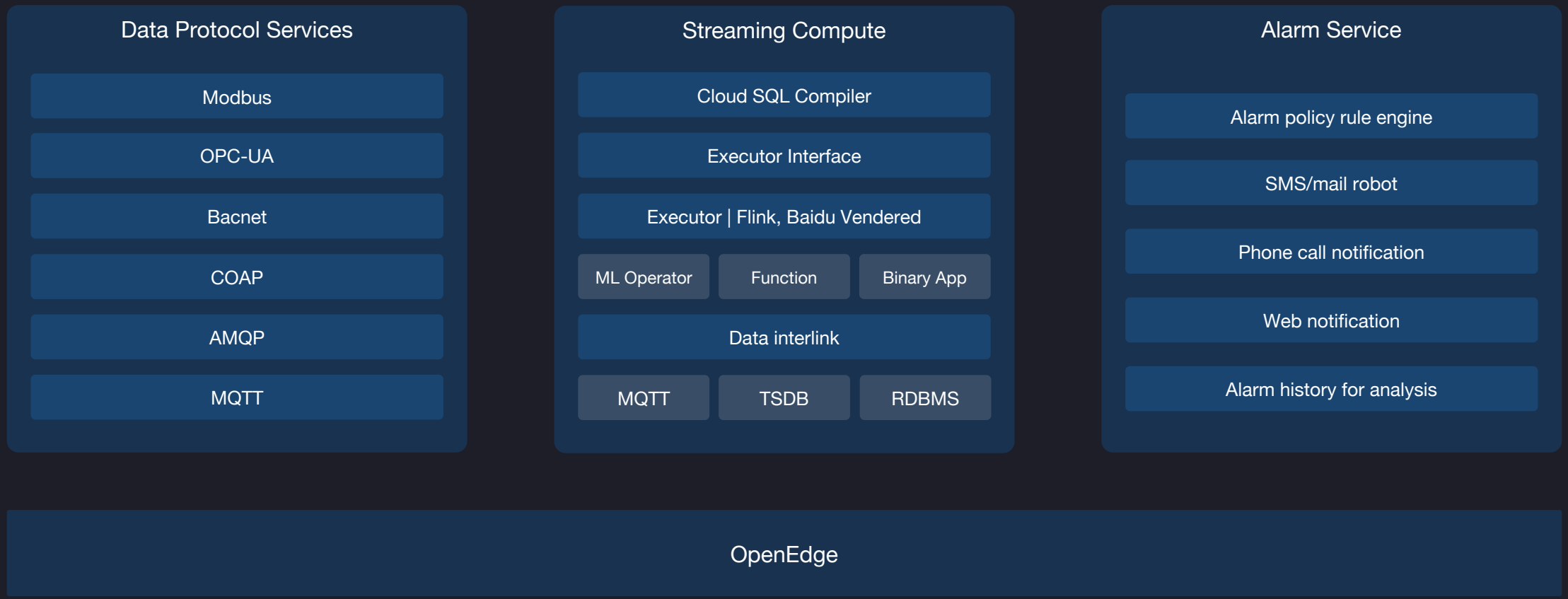
Edge & Cloud Fusion



AI Solution


Video Ingress Service
USB Camera
Ether Camera
USB Initializer
Ether Initializer
Linux Video Interface
Video decoder
Frame sampling
Image disk saver
ML Inference as a Service
GRPC Server→FaaS Server
User Model
ML Inference Library
OpenCL
CUDA
OpenVINO
Device-Container Binding
GPU
GPU
VPU
Auxiliary Services
Time-driven Trigger
Image disk cleaner | Shell Function
Object Storage Uploader
Image decorator and encoder
Video playback
OpenEdge

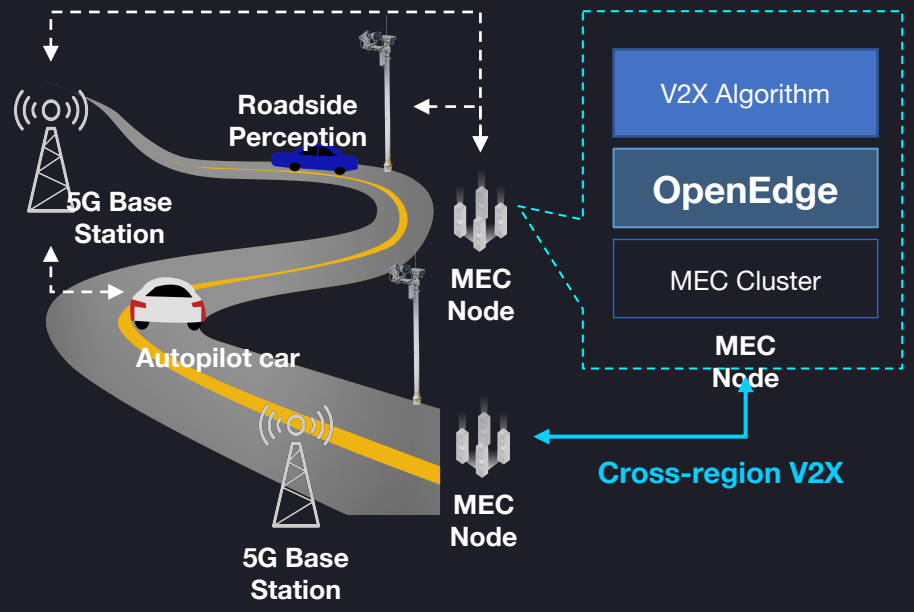
Roadmap, Data Solution

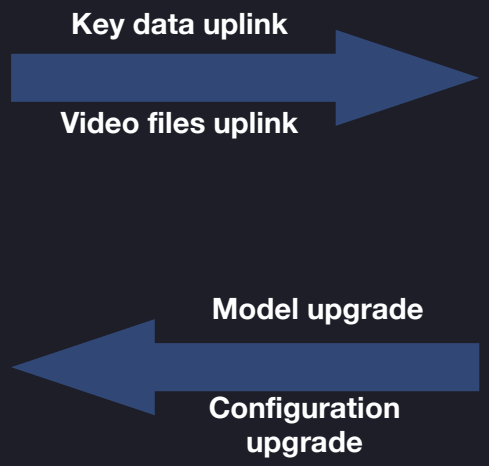


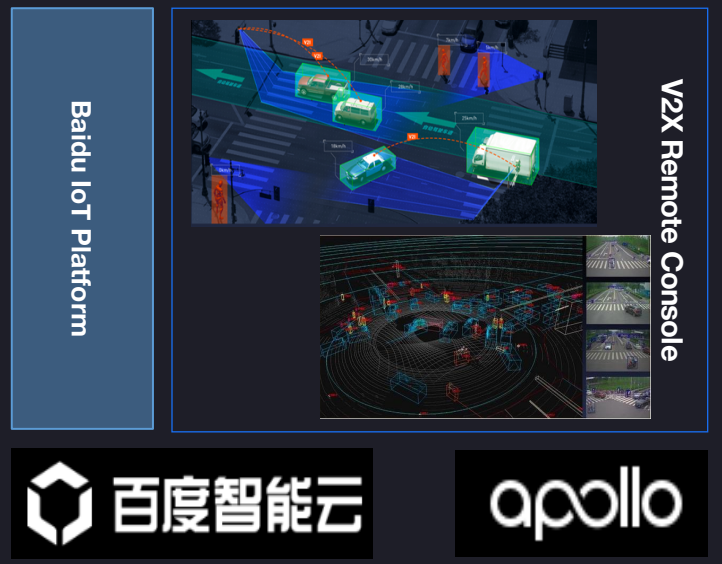
Long Term Goals

Applications

Autopilot by V2X







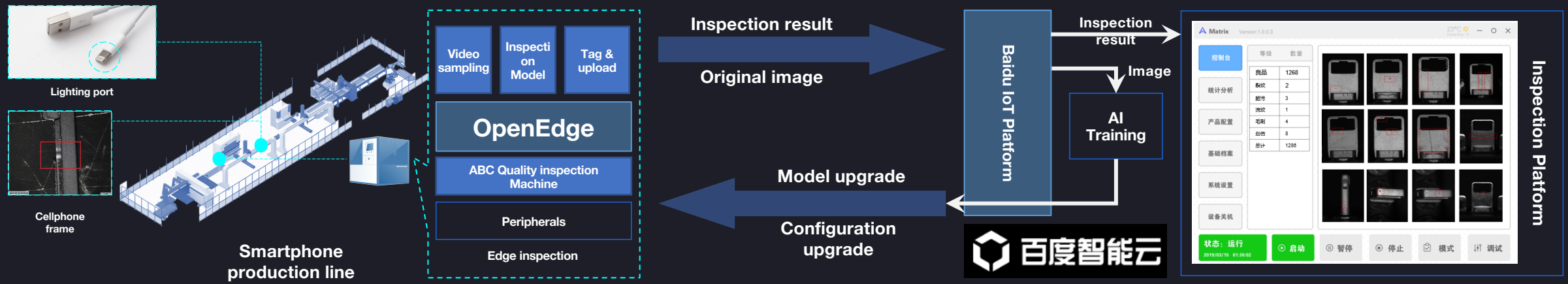
百度智能云

apollo

Over 60% reduction in automatic driving costs to help solve cross-regional road synergy challenges

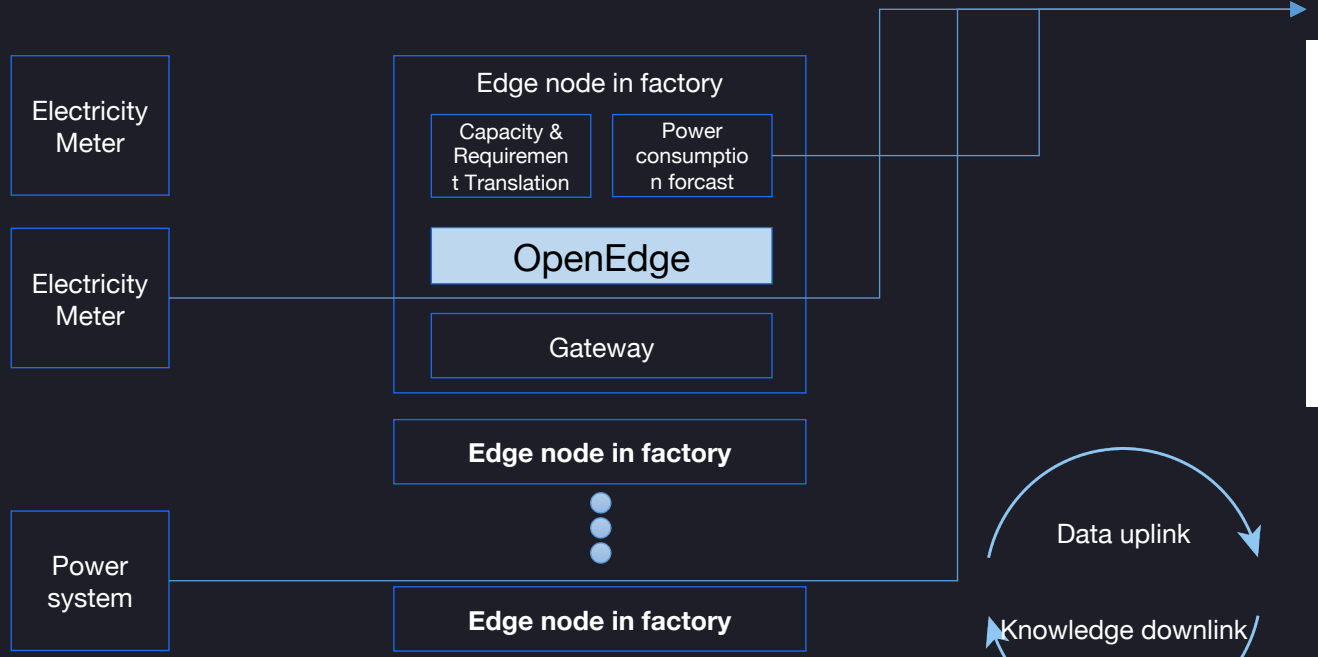
Global optimization of a wide range of multi-base station nodes

Quality inspection by AI

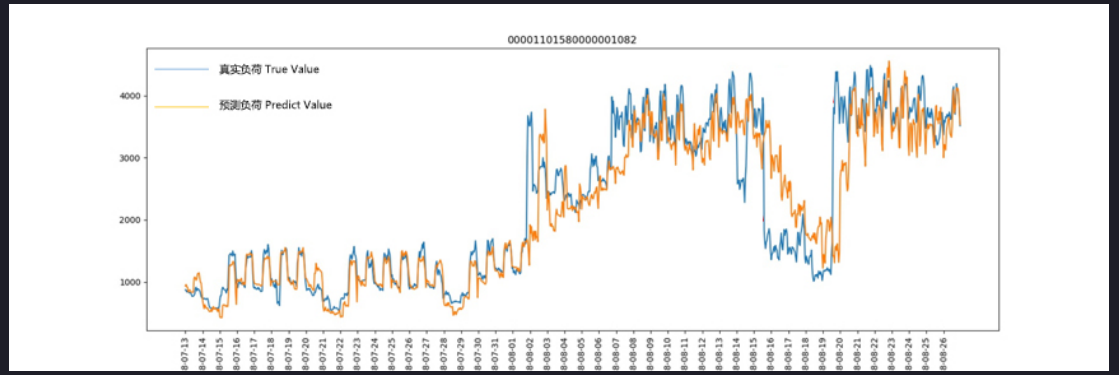


Fusion Manufacturing line &AI model production line
Model deployment efficiency: 1 days → 1 minutes
Solve the problem of flexible production quality inspection

Integrated Energy Management



AI algorithm avoids the risk of power deviation assessment for more than 3,000 enterprises

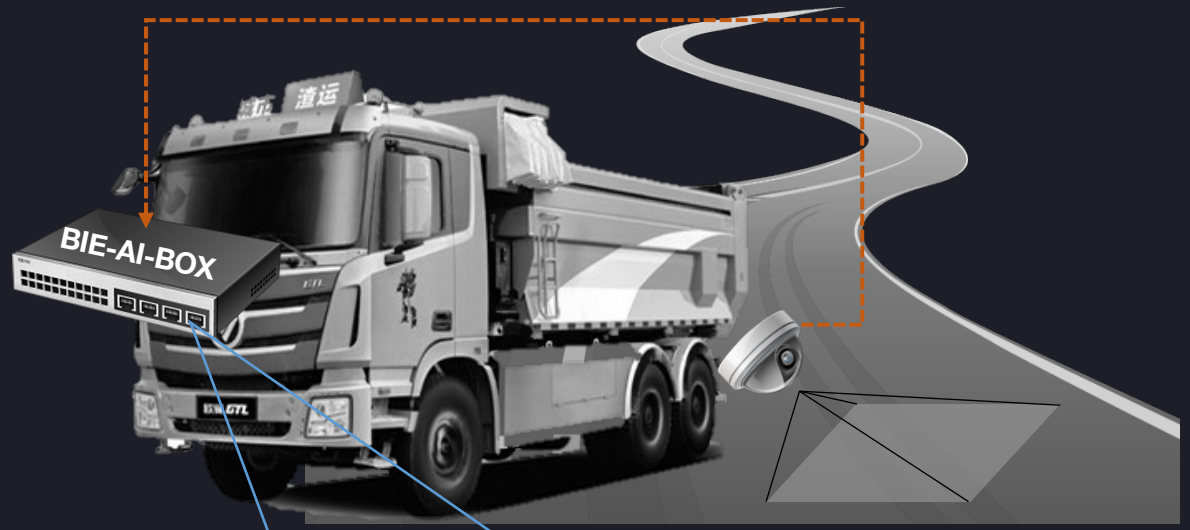


Daily power load forecast for a factory within 45 days

Predictive average accuracy 91%
5% Increase in plant productivity

http://pop.litiandata.com/

Edge CV in Vehicle



EcoCloud

Dept. Sanitation	Dregs Office	City admin
Occurrence is cleaning	Regulatory optimization	Tracing & Processing

IoT Platform

AI Training Platform

Baidu ABC Cloud

Algorithm Iteration

Inference result Upload

OpenEdge & Baidu IntelliEdge

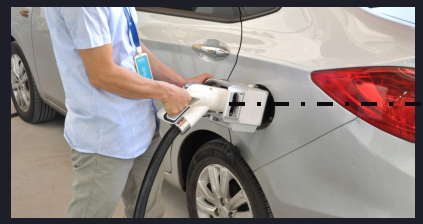
Video capture

Single frame identification

Multi-frame identification

Identify the spilled situation through machine vision, Deploy the algorithm on the local smart edge to infer, instantly identify problems, and reduce bandwidth costs.

Charging pile Digital twin



Charging detection

BIE-AI-Board

OpenEdge &
Baidu IntelliEdge

Algorithm iteration

Result upload

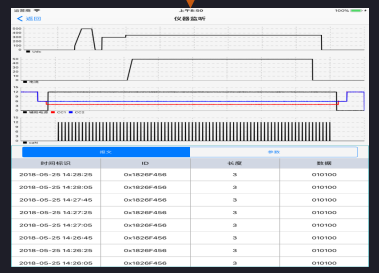
Energy Cloud

IoT Platform

AI Training Platform

Baidu ABC Cloud

Data acquisition of charging operation Process

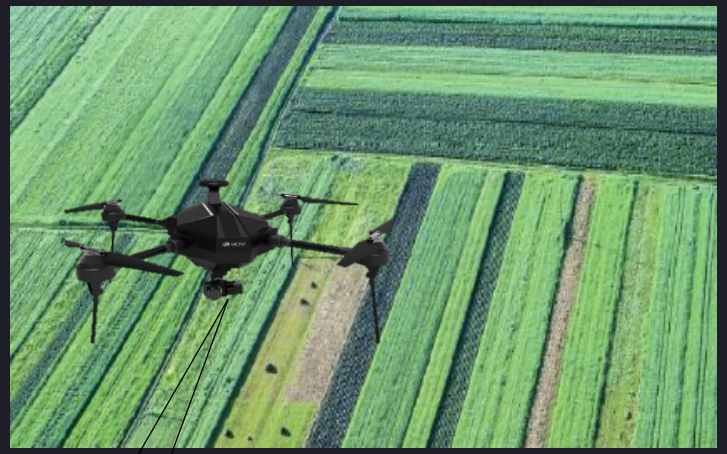


Effect analysis algorithm of charging job

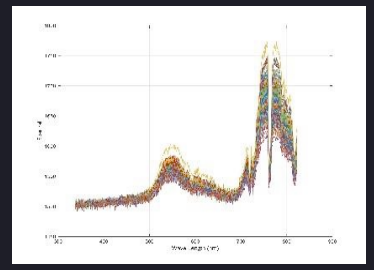
Multidimensional Analysis function

Through big data Model training, the algorithm is deployed on the local intelligent edge, forming the local charging pile digital twin, providing the hand manipulator mode and the embedded mode of charging job quality detection service, real-time output operation effect.

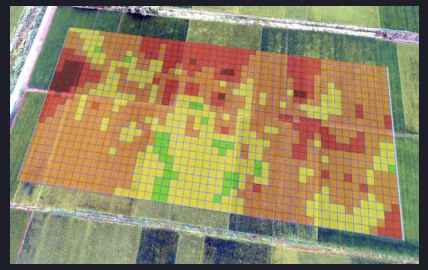
Accurate fertilization of UAV



Agriculture Cloud

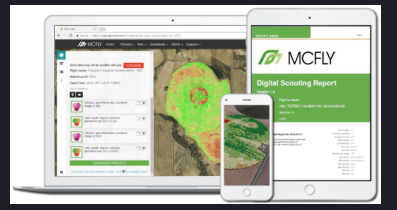


Spectral Analysis Display-graph



Spectral analysis display-distribution map

Pest Database



Task System

IoT Platform

AI Training Platform

Baidu ABC Cloud

Precision Plant Protection Operations

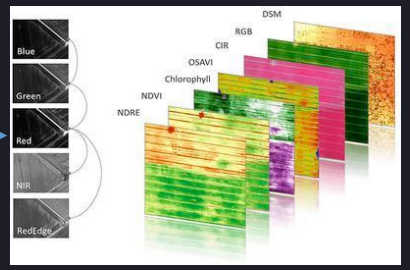
BIE-AI-Board

Algorithm iteration

Result upload

OpenEdge &
Baidu IntelliEdge

Spectroscopy & Video Acquisition preprocessing



Single Frame result analysis algorithm

Multi-Frame recognition results

Through spectral analysis and machine vision to identify farmland pests and diseases, the algorithm is deployed on the local intelligent edge, for detection, plant protection UAV into one (discovery or elimination) to lay a solid foundation.

THANK YOU

OPENEDGE.TECH