ThunderSoft Industrial Solutions

EdgeX help ThunderSoft build solution efficiently

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World Leading OS Technology Provider

Smart Industry

Intelligent Vision

Smart IoT

Smart Vehicle

Smart Phone

Mission
Enriching an Intelligent World

Vision
Empowering Every Device with Our Technology

Values
Customer Focus, Dedication Essential, Technology Driven

Global Carrier

Start-up	Fast Growing	Expanding	Core Technology

2008	2009	2010	2011-2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Founded	Japan Branch	Strategic cooperation with Qualcomm	Strategic cooperation with Spreadtrum	**Joint Lab with Intel**	**Joint Venture with Intel**	Joint Venture with arm	Joint Venture with Qualcomm	MM Solutions Acquisition	Malaysia Branch	Germany Branch	Strategic cooperation with NVIDIA\GAC\SAIC\DiDi	ThunderX
		Investment from Qualcomm, arm&Spreadtrum	Joint Lab With Qualcomm	Joint Lab with Microsoft		IPO 300496	Rightware Acquisition		India Branch	Canada Branch	Non-public offering Raising RMB 1.7 billion	Forvision Acquisition

What We Do

Business Units

Intelligent Vision | Smart IoT | Smart Vehicle | Smart Phone

Core Technology

Cloud
| FOTA | MDM | Cloud Phone | IoT-Habour | ModelFarm | Big Data |

Middleware
| Intelligent Vision | Intelligent Voice | Intelligent Multimedia | UI Engine | Security | Connectivity |

OS
RTOS

System on Module
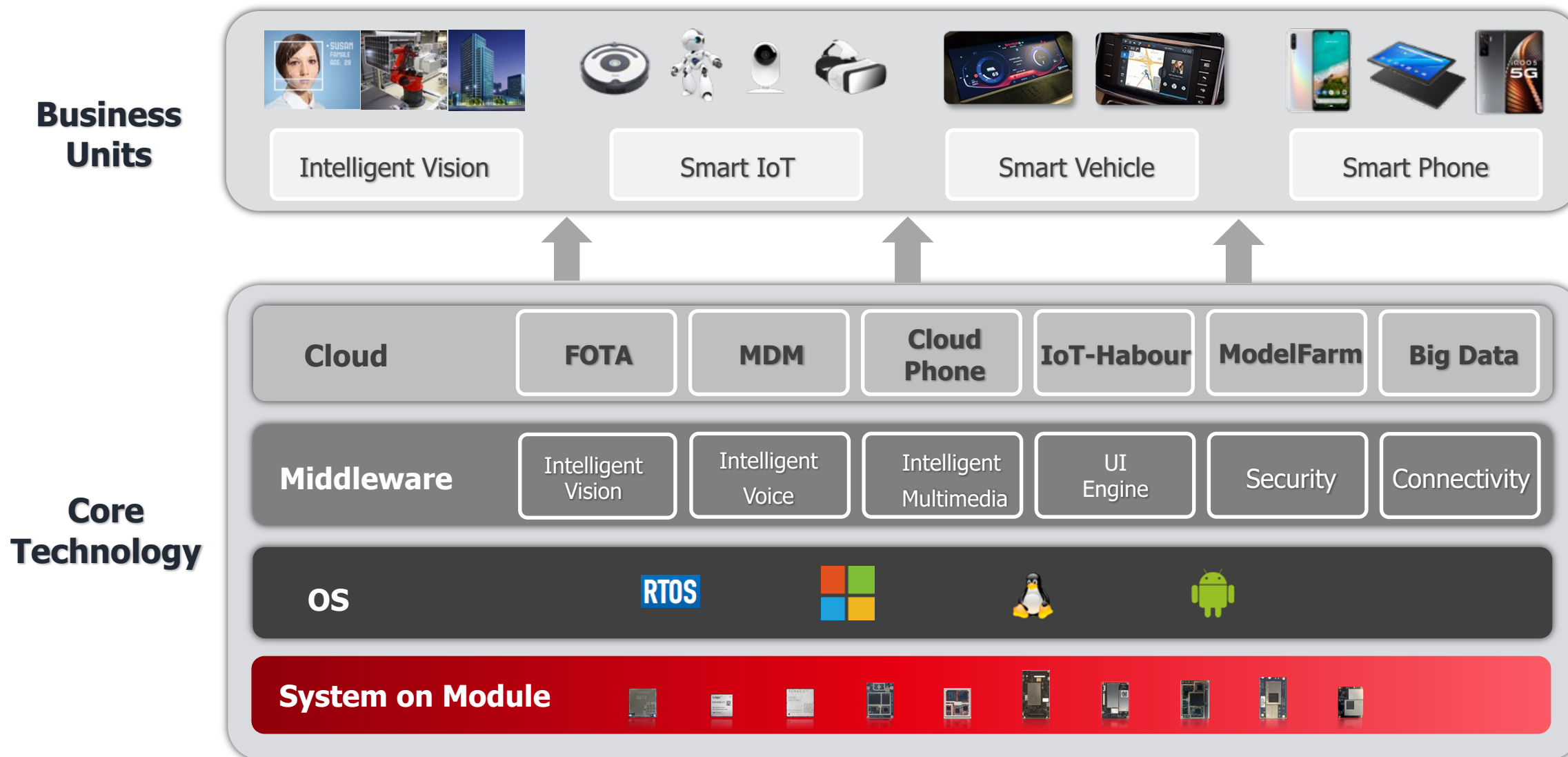
Build Customer Value via EdgeXFoundry

Unique Selling Proposition

Differentiating Functionality

ThunderSoft Build

Getting things done

Platform Functionality

Provider Solution Approach

Integration, Application, Engineering

Open Source & Standardization

Base Operating System, DevOps platform & Collaboration

Leverage Open Source Communities & Talent

Reuse with EdgeXFoundry
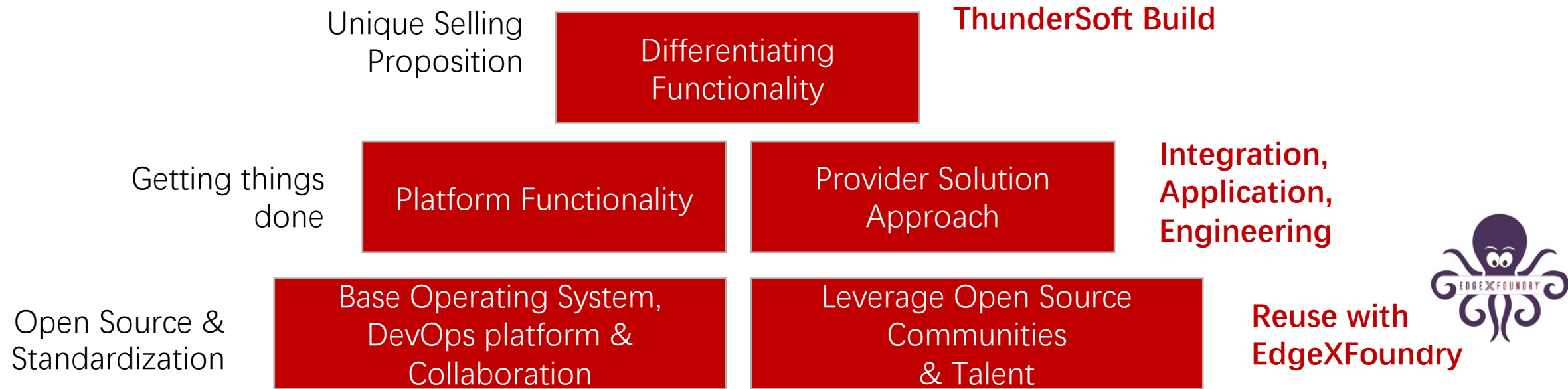
- Avoid vendor lock-in & dependencies

- Reduce bottlenecks in resources

- Support cooperation and handle antitrust law

- Support digital transformation by open source

➢ Increase flexibility & scalability

➢ Increase availability & attractiveness of talent

➢ Increase standardization, reuse & efficiency

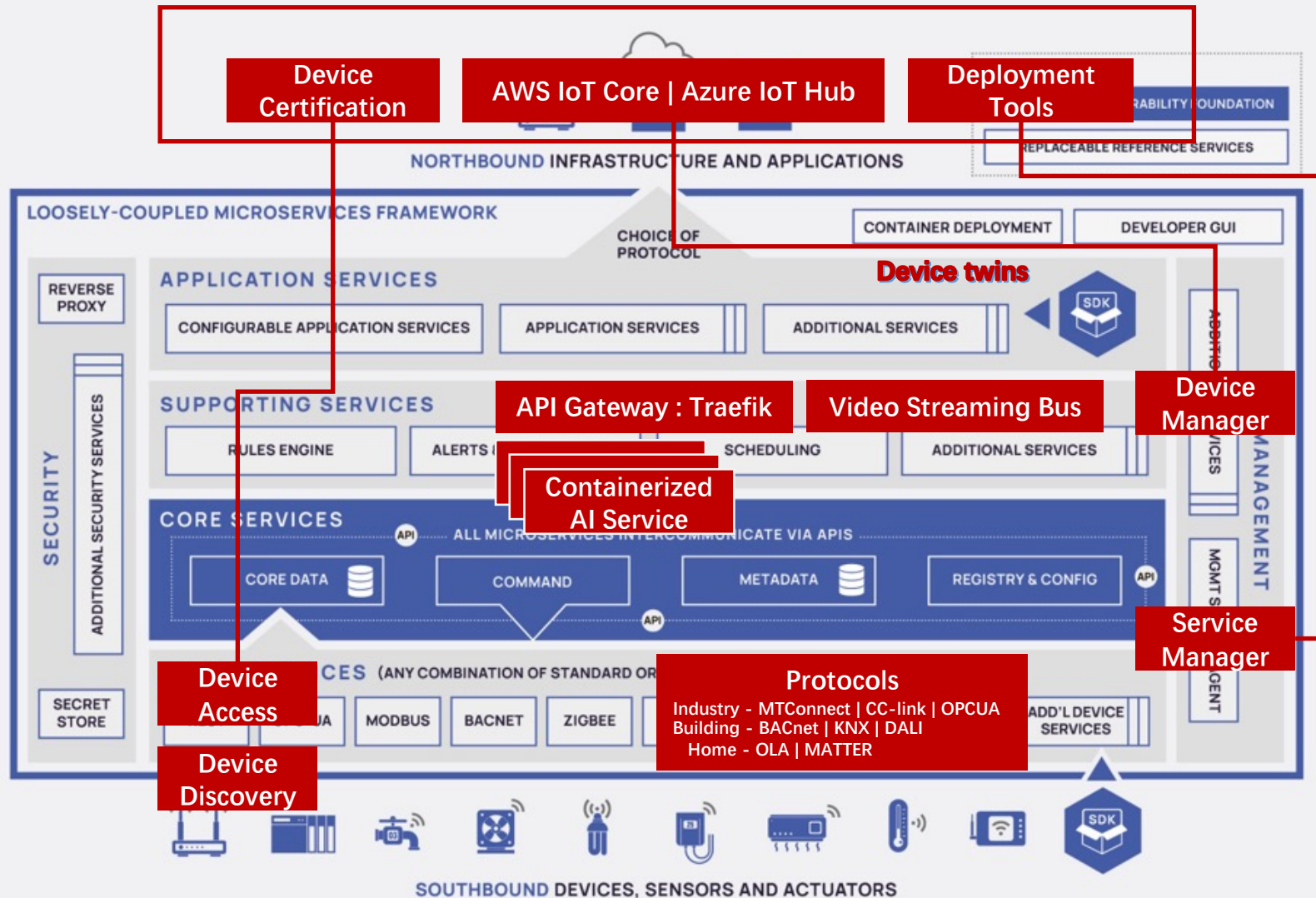➢ Increase innovation speed by maintaining legacy integration

How EdgeX help ThunderSoft

- ◆ **Standard Device Definition File（Device profile，YAML）**
  - ◇ Diverse southbound hardware ecosystem.
  - ◇ Readable device profiles can easily be converted from other systems.
- ◆ **Defines standard service interfaces between modules（API Gateway）**
  - ◇ Allow services to scale up and down based on device capability and use case.
  - ◇ Easy integrated plug-and-play software applications and value added services.

- ◆ **Flexible deployments**
  - ◇ Device‐to‐Edge
  - ◇ Edge Native
  - ◇ Edge‐to‐Cloud

Device Service

Core Service
Support Service
Application Service

Device Service
Core Service
Support Service
Application Service

Device Service
Core Service

Support Service
Application Service

Sensors　　**Device Edge**　　**Infrastructure Edge**　　**Cloud**
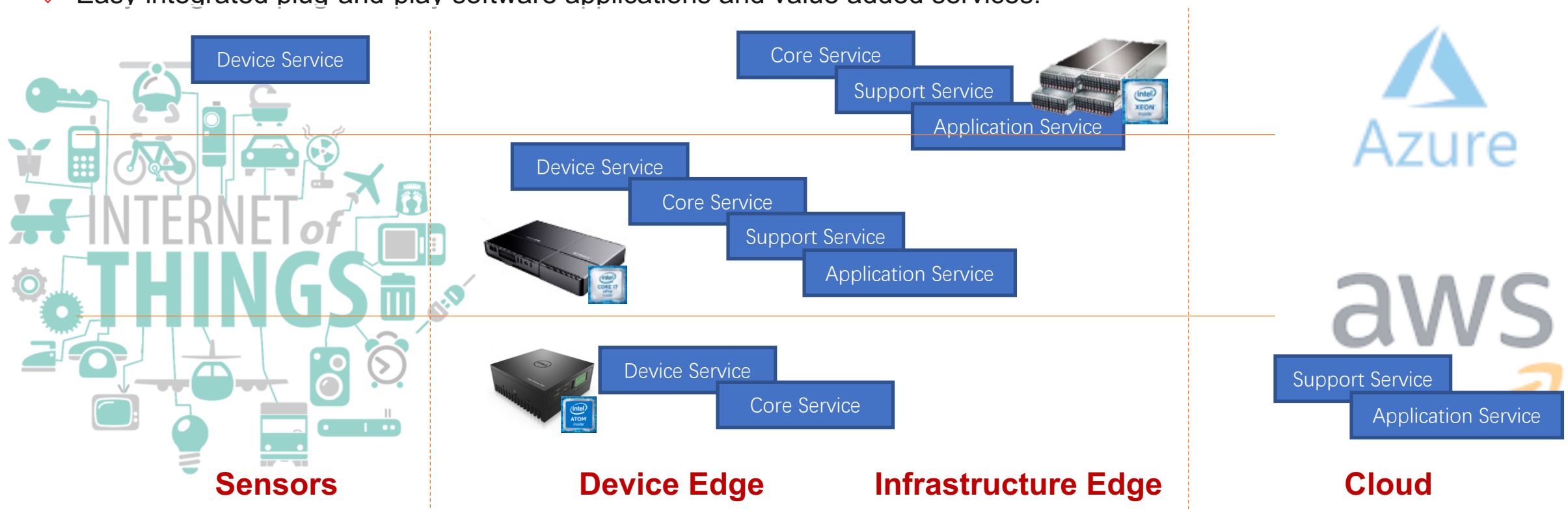
ThunderSoft enhanced EdgeX

- Device discovery via COAP\mDNS;

- Device access authentication through cloud device certificate;

- Support industrial, building, home protocols;

- Video Streaming Bus;

- Containerized AI data processing services;

- Device Manager at Edge and Digital twinning with mainstream cloud services;

- Service Manager at Edge;

- Remote deployment tools;

Case Study

Medical diagnosis assist
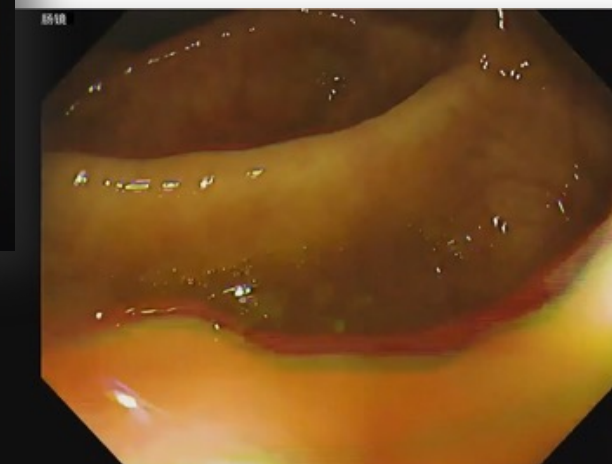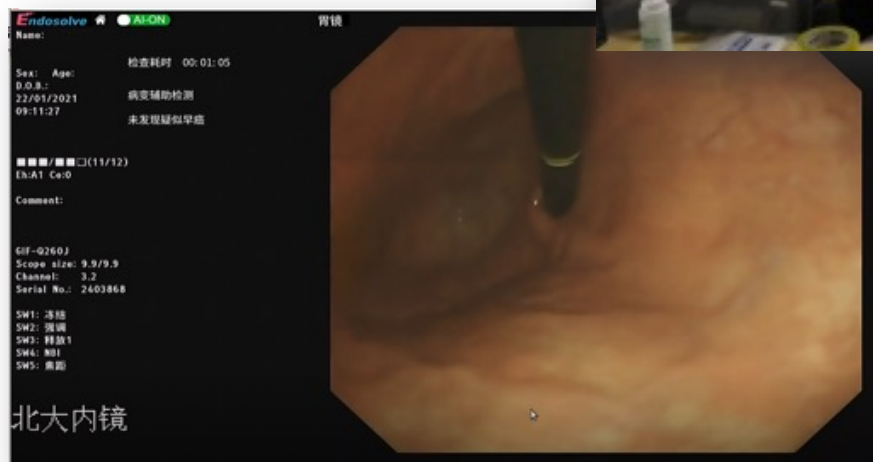
Problems and Solutions

Problems

- Lack of professional imaging doctors. Now the imaging data has increased by more than 30%, but the growth rate of radiologists is only 4%.

- High misdiagnosis and missed diagnosis rate. The total clinical misdiagnosis rate in China is 27.8%.

- Low diagnosis speed. The traditional method for doctors to outline and label each picture takes 3 to 5 hours on average.

- Lack of expert and the uneven distribution of medical resources. High-quality resources are concentrated in first-tier cities such as Beijing, Shanghai, Guangzhou, and Shenzhen.

Solutions

Cloud

AI box   Monitor

Medical equipment

Mobile APP
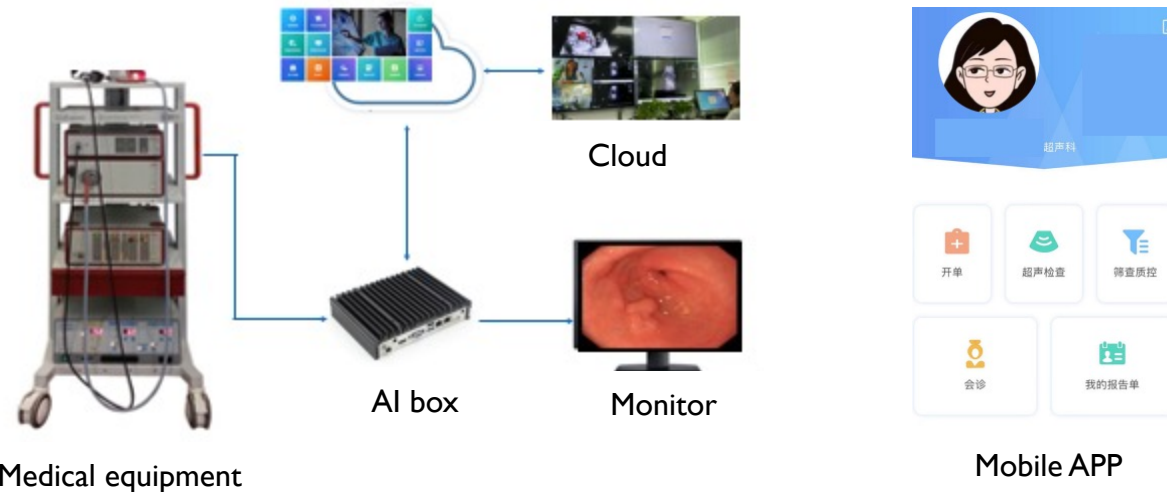
- We provide professional hardware(Edge AI box) and AI analysis software, relying on medical experts and ThunderSoft algorithm training platform, with high algorithm accuracy and low missed detection rate.

- The end-to-end complete solution provides one-stop services such as local AI-assisted diagnosis, remote expert consultation, patient data submission, quality control review, result feedback, and patient inquiry.

Software Architecture

Microservices
Based on containerized technology to be more manageable, extensible, and portable.

Real-time Processing
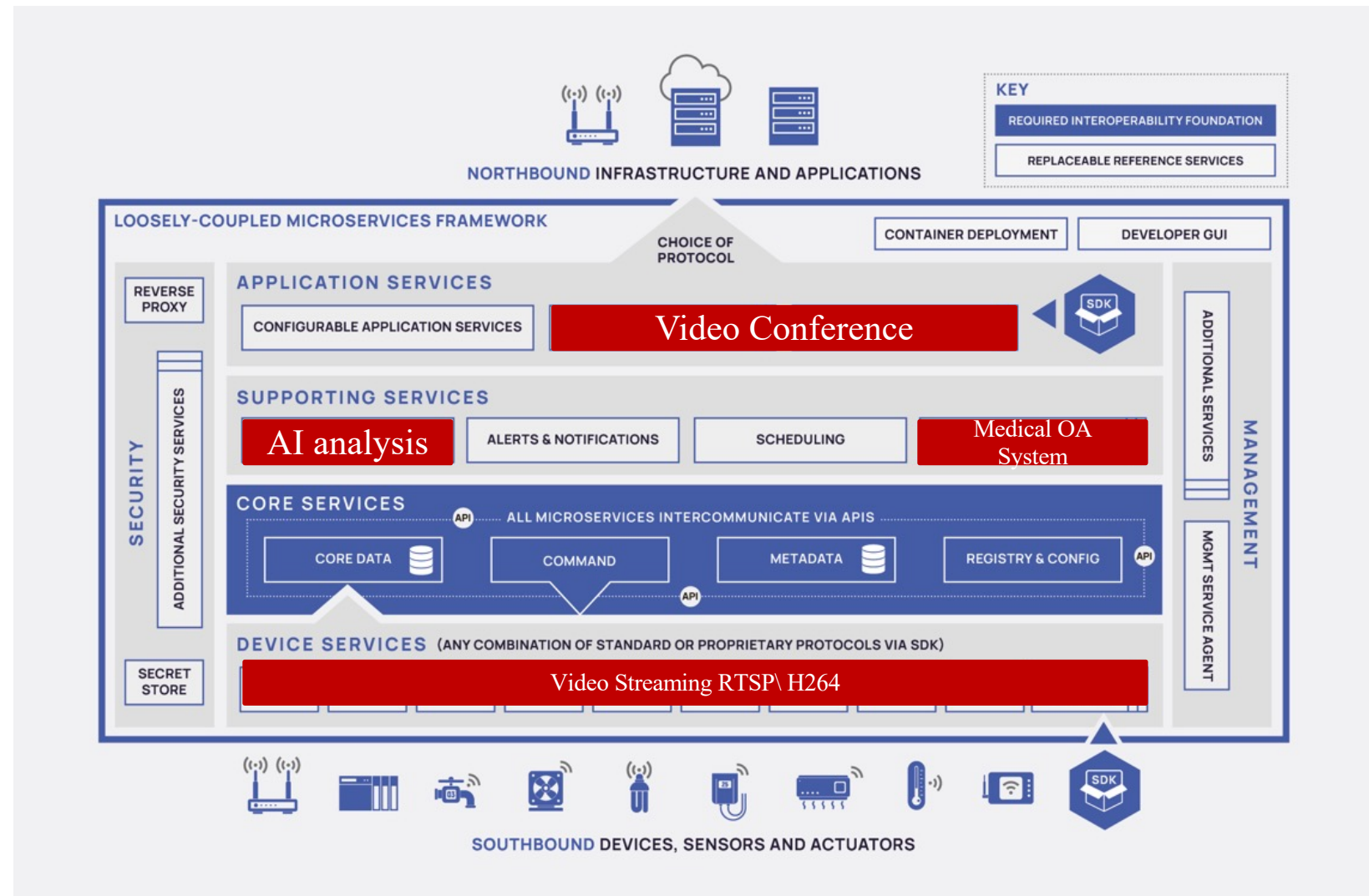Optimization for multi-camera real-time video processing.

Security
Provide system isolation, full -disk encryption, code protection functions.

Integrating Mainstream Cloud Services
AWS/Tencent Cloud

E2E Solution
Provide device management, FOTA, application management, etc.

NORTHBOUND INFRASTRUCTURE AND APPLICATIONS

KEY
REQUIRED INTEROPERABILITY FOUNDATION
REPLACEABLE REFERENCE SERVICES

LOOSELY-COUPLED MICROSERVICES FRAMEWORK
CHOICE OF PROTOCOL
CONTAINER DEPLOYMENT   DEVELOPER GUI

REVERSE PROXY

APPLICATION SERVICES
CONFIGURABLE APPLICATION SERVICES   Video Conference

SDK

ADDITIONAL SERVICES

SUPPORTING SERVICES
AI analysis   ALERTS & NOTIFICATIONS   SCHEDULING   Medical OA System

SECURITY
ADDITIONAL SECURITY SERVICES

CORE SERVICES
API   ALL MICROSERVICES INTERCOMMUNICATE VIA APIS
CORE DATA   COMMAND   METADATA   REGISTRY & CONFIG   API
API

MANAGEMENT
MGMT SERVICE AGENT

DEVICE SERVICES (ANY COMBINATION OF STANDARD OR PROPRIETARY PROTOCOLS VIA SDK)

SECRET STORE

Video Streaming RTSP\ H264

SDK

SOUTHBOUND DEVICES, SENSORS AND ACTUATORS

Product Application and Market Policy

Fetal Echocardiographic Diagnosis

The Product have been applied in 22 hospitals in Beijing, HeNan, JiangXi, SiChuan and GuangDong.

ThunderSoft Advantages

- More than 40 Top medical experts team support
- Mature Channel cooperation in medical
- More than 100,000 image files for fetal echocardiographic and Colon/ Gastric cancer
- Mature AI team and hardware team
- Mature Cloud platform, Edge platform and hardware device

And current progress is as follows:
- 6 channel partners
- Contact more than **180** hospital and **260** PCS EB-I have been applied in **28** hospital

Cancer Diagnosis （Endoscope）

The product have been applied in 5 hospitals in Beijing and JiangSu.

Market Policy

- Get class two equipment certification for Demeter in second half of 2021 and get class three equipment certification for EAB-I in first half of 2022.
- More that 20 medical SI and 10 channel partner, applied more than 1000 hospital before 2023.

And the Volume Forecast is as follows:
- 2021: 500 pcs
- 2022: 3,000 pcs
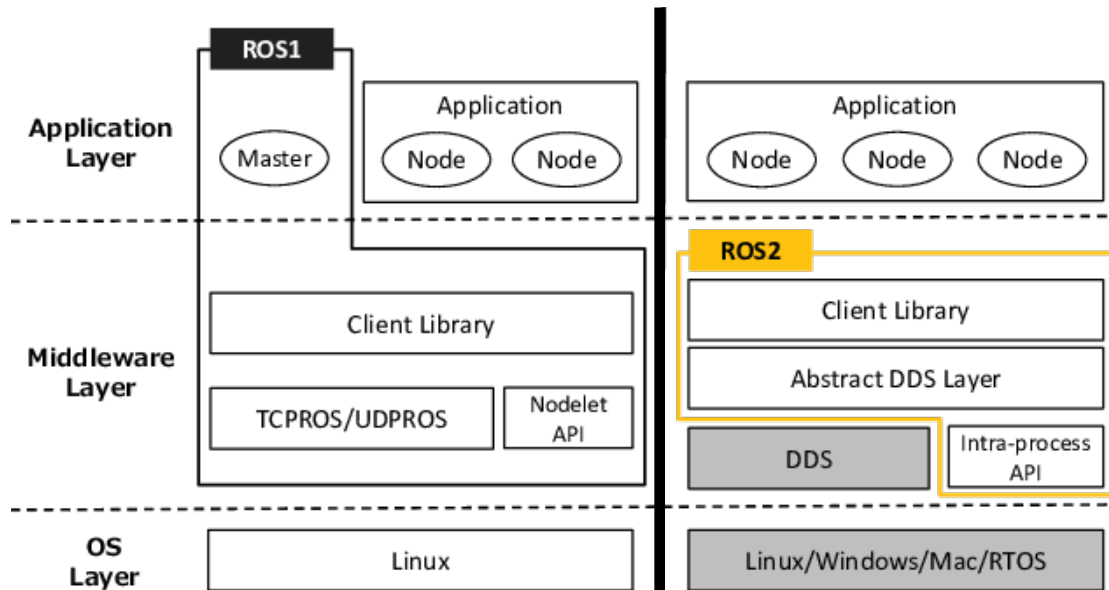- 2023: 20,000 pcs

# Case Study

Smart Robotics

ROS2 Overview

Robot Operating System (ROS) is a development framework for building robot applications, which is used to quickly and efficiently develop distributed robots with low coupling of processes. Its main features are as follows:

- Channel: ROS provides a publish-subscribe communication framework to build each running node simply, quickly and independently, and finally form a distributed computing robot as a whole.
- Tools: ROS provides a large set of tools to configure, start, self-check, debug, visualize, log in, test, and terminate distributed computing systems.
- Powerful Libraries: ROS provides a wide range of library files to implement robot functions based on mobility, operation control, and perception.
- Ecosystem: The support and development of ROS relies on a strong community. With a particular focus on compatibility and support documentation, ros.org provides a "one-stop" solution for users to search and learn from thousands of ROS packages from developers around the world.
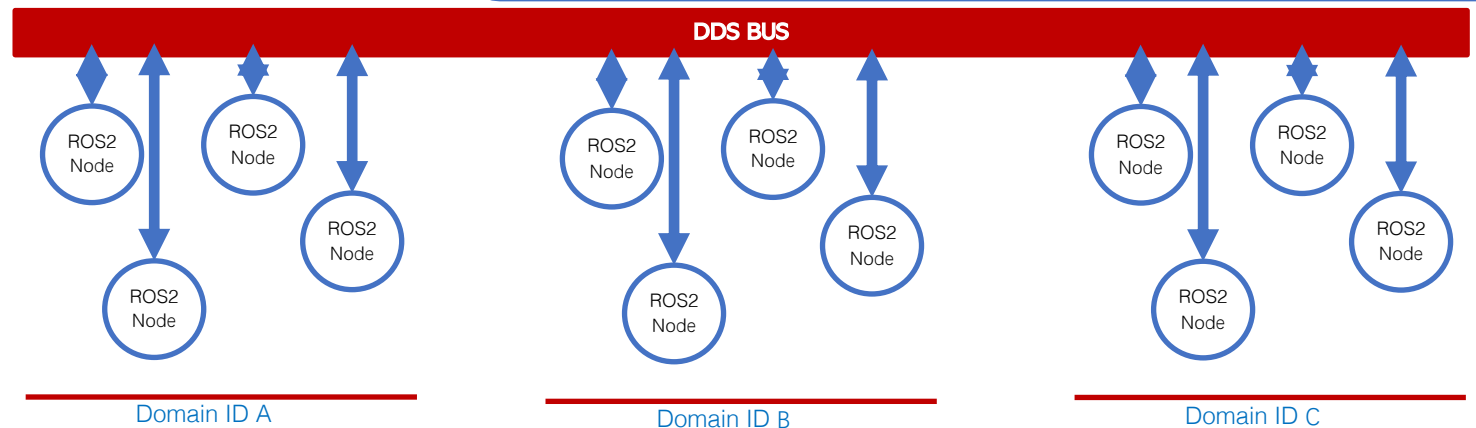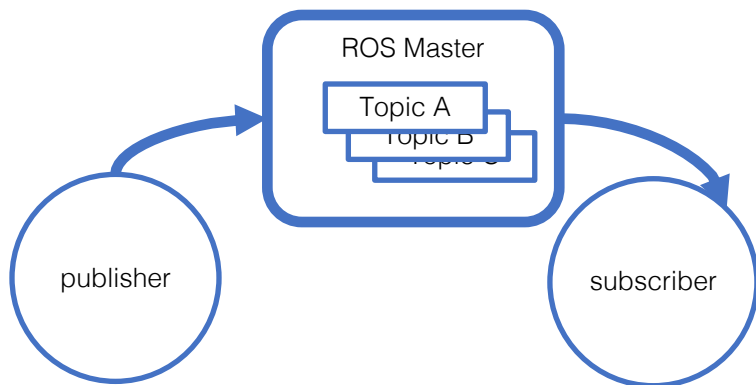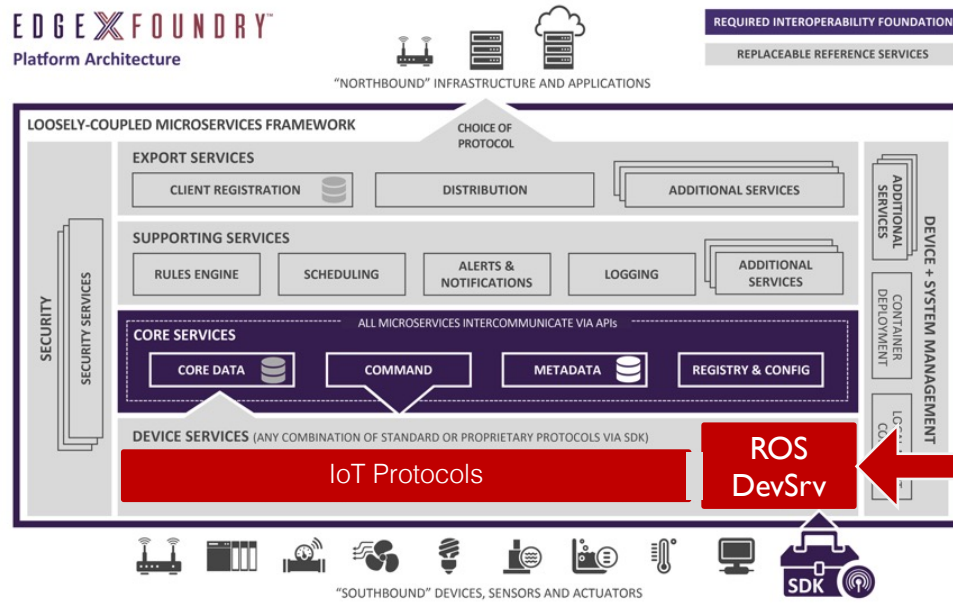
• To connect within the LAN, you need to set the node IP and the IP and port of the MASTER.

• Domain ID needs to be set for connection within the local area network.

The communication between robot and IoT devices

Through the connection between EdgeX and ROS2, a southbound network that supports both IoT communication protocols and robot messages is formed


- In EdgeX, add Device Service for receiving/sending ROS messages;

- Add a ROS node for converting ROS messages and calling EdgeX API in the ROS2 system;
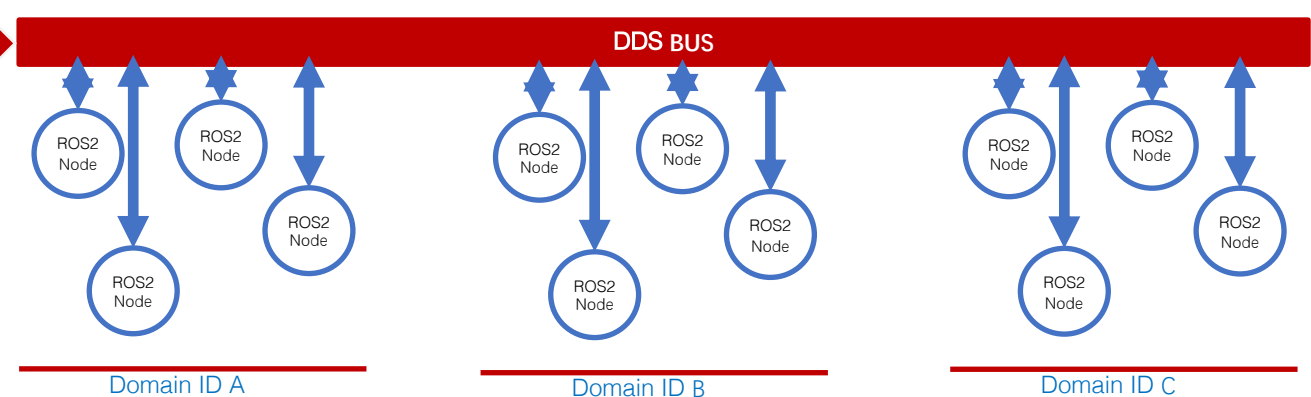
Building a RaaS platform via EdgeX

- ❖ Through the EdgeX northbound network, the Export Service of EdgeX is used to communicate with cloud services and connect with third-party systems. It is convenient for robot control and status monitoring to connect with platforms of various application scenarios.

- ❖ Through the EdgeX southbound network, robots can interoperate with IoT devices outside the range of ROS2, for obtain environmental data, and assist robots in making behavior decisions.

- ❖ For ROS2, it is completely decoupled from cloud services, and the tasks of data reporting and obtaining instruction messages are delegated by EdgeX. ROS2 will focus more on the processing of tasks such as robot self-navigation and obstacle avoidance.

- ❖ For developers of applications, it is no longer required to understand the ROS2 system or implement the ROS protocol Messages to communicate with robots.
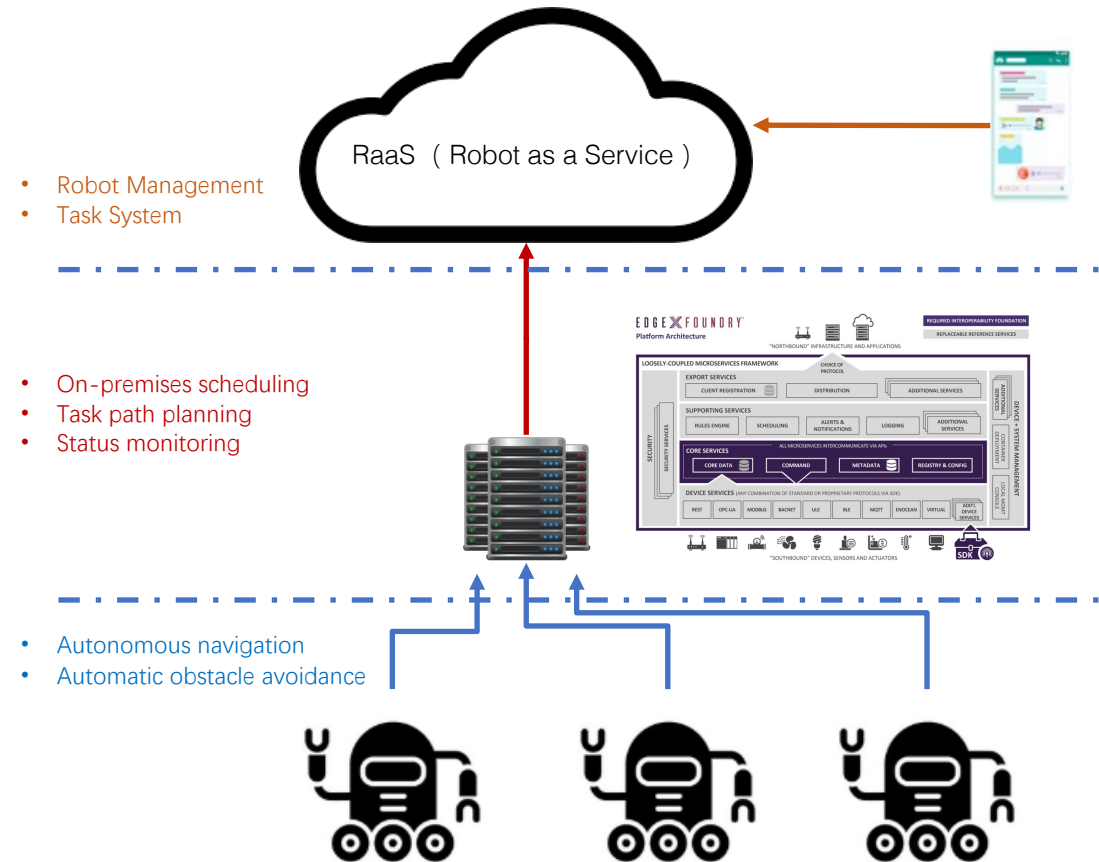
Case Study

Smart Building

Edge-Native Diagram

Security & Emergency Management
- Video Surveillance System
- Safety System
- Access Control System
- Parking Management System

Building Infrastructure Management
- Elevators & Escalators System
- Smart Water Management System

Energy Management
- Lighting Control System
- HVAC Control System

Temperature   Liquid level   Air quality   Pressure

RTSP / H.265 H.264

Device Management \ FOTA

Structure Data

IoT Harbor

CPU	Intel® i7-1165G7
Memory	Up to 16GB DDR4 3200 MHz
Storage	Up to 1TB SATA3.0

Edge AI Box

Deployment

CPU	64 Intel Xeon Cores
Memory	2TB
Storage	24 x 2.4T SATA HDD

Edge Server

AI&App Store

Modbus / RS232 / SNMP HTTP / MQTT

MQTT

CPU	Celeron® 6305E
Memory	2GB
Storage	64GB

Edge Controller

Mobile App

Devices & Sensors   **Device Edge**   **On-Premise Edge**   **Cloud**

EDGE X FOUNDRY

Customer Success Story：Shanghai GEM Park

Customer

The owner of Shanghai GEM Park is a well-known automotive system software provider in China. This building is its headquarters building, hoping to convey the high-tech image of the company to customers through smart space services. Shanghai GEM Park has 6 floors, 1652 desks, 39 meeting rooms, and 50 parking spaces


Challenge

Cost of acquisition Not only the cost of the devices needed to establish the IoT, but also SaaS, installation, and training costs.

Cybersecurity concerns Every device connected to the IoT is a potential entryway for a malicious attack. Before companies branch out their IoT and begin collecting huge sums of data, cybersecurity takes precedence.

AI Integrations Due to the application of artificial intelligence, the camera is no longer just a monitoring device but as a data-driven sensor.

Solution

Orchestration　　　Edge-Cloud synergy　　　On-Demand AI　　　Human-Space interface
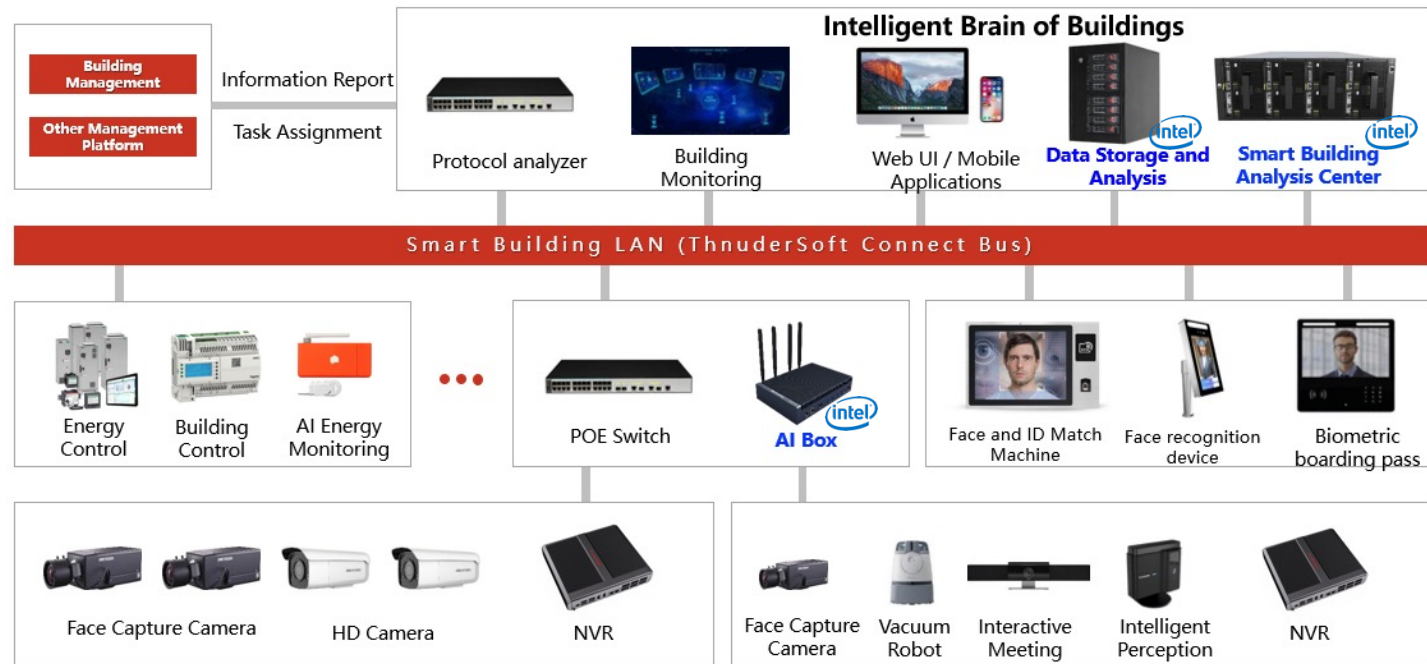
What's Next

- 《How to run EdgeX2.1 via Docker on Android》

- 《How to run EdgeX2.1 via iSula on openEuler》

- Lightweight EdgeX's API Gateway via Traefik

- Device Discovery by openHarmony Distributed Soft BUS

- EdgeX 2.1 performance and stability test on Intel core 11 i5

ThunderSoft

Thank You

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