EDGE X FOUNDRY™

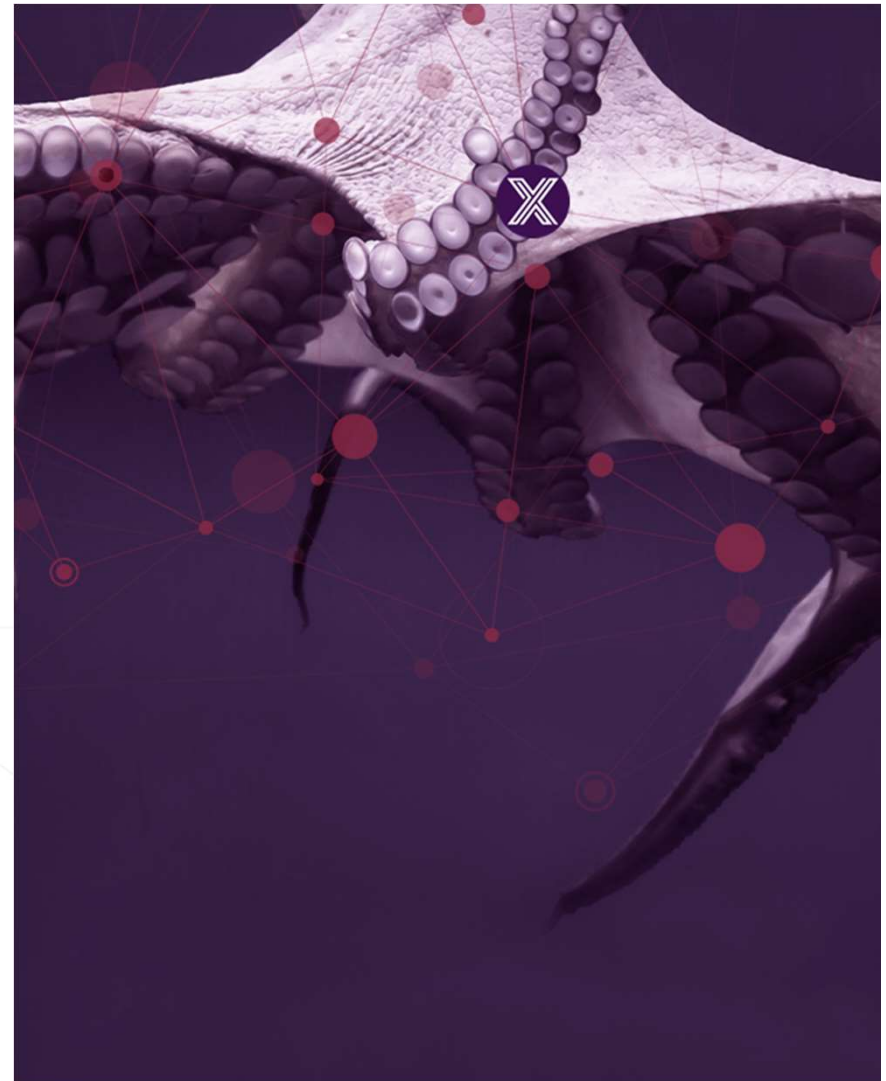## Vertical Solutions Working Group

July 28, 2020

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Working Group Co-chairs:
Camilo Dennis (Intel) – camilo.a.dennis@intel.com
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Agenda

Jiangxing Intelligence, an edge computing service provider based in Nanjing, China, to present their EdgeBox platform which is based on EdgeX.

Meeting recording & slides to be posted to:
https://wiki.edgexfoundry.org/display/FA/Vertical+Solutions+Working+Group
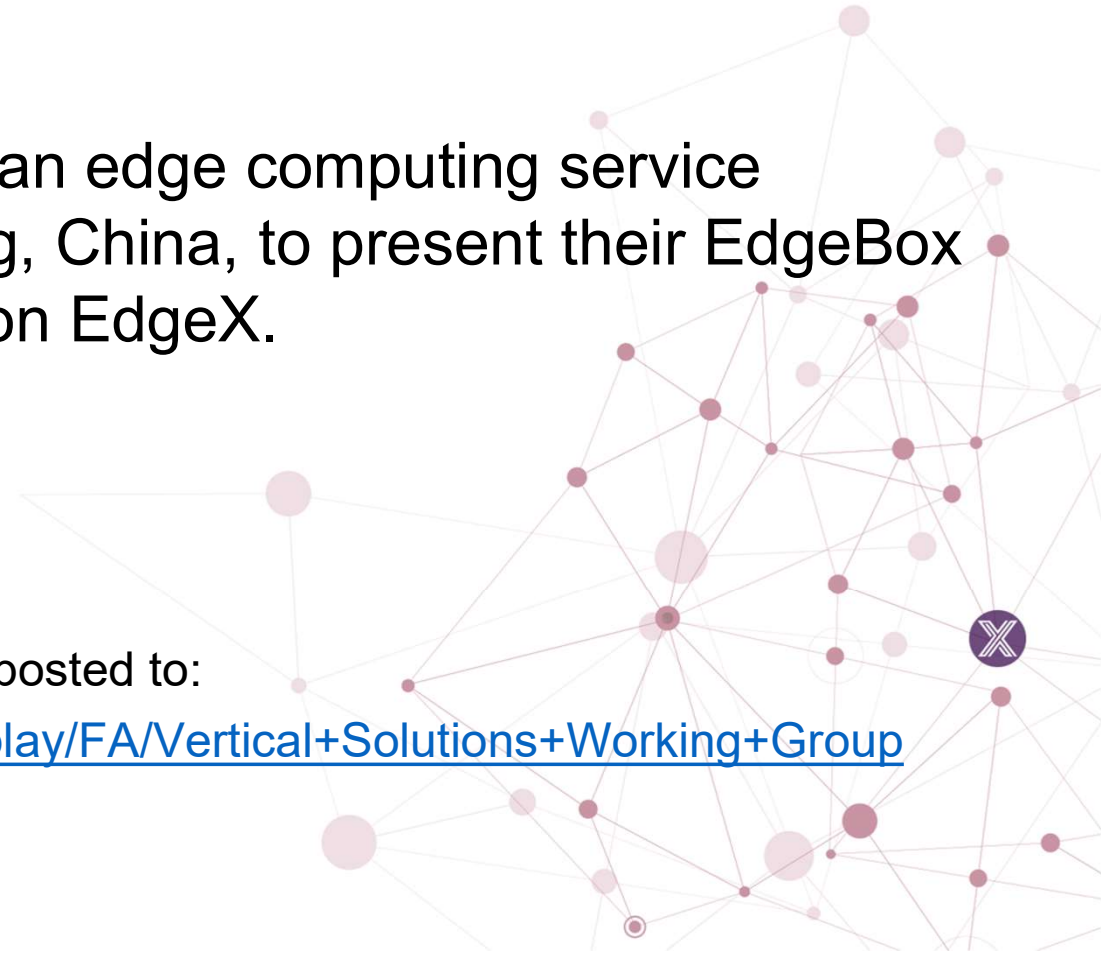
Engaging the Future with Edge Intelligence

Jiangxing Intelligence Inc.

CONTENTS

1

About JX

Founder Introduction

Dr. Jiangchuan LIU

Chairman & CEO

Professor in Simon Fraser University
Fellow of Canadian Academy of Engineering
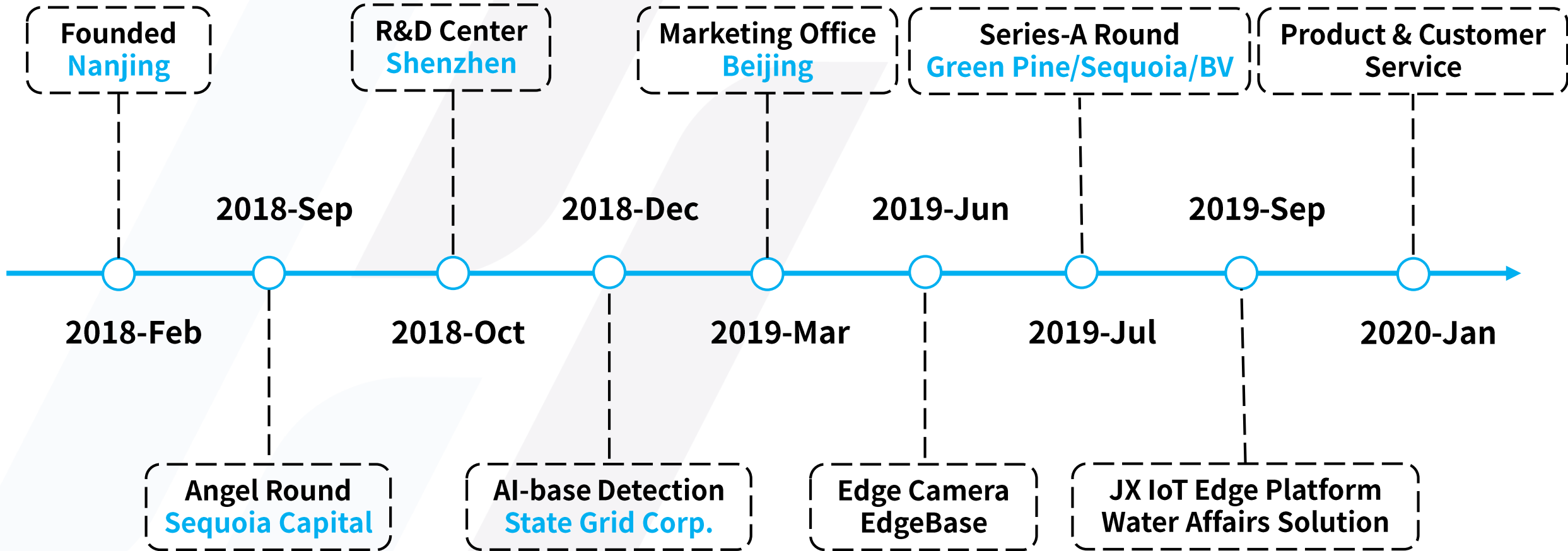Fellow of IEEE
Microsoft Research Fellow
PhD from The Hong Kong University of Science and Technology
BEng (Cum Laude) from Tsinghua University

Partner
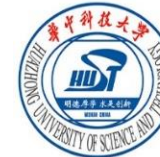
EdgeBox

Challenges in Edge Computing

10x

Architecture and OS

100x

Protocols

100x

DevOps

1000x

Solutions

Devices, DevOps, Applications, Vendors...

Cost

Superlinear

Sublinear

IoT Applications
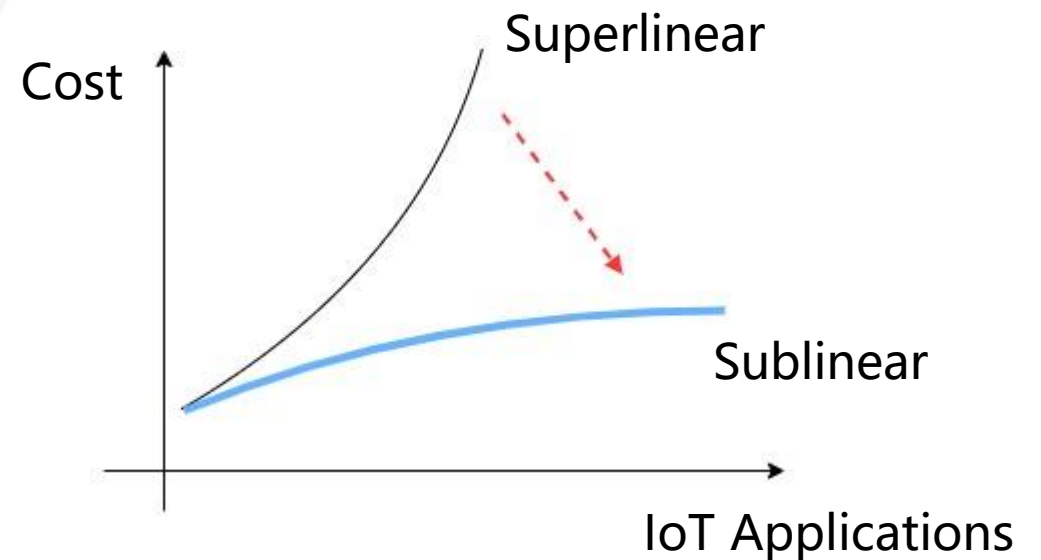
Why EdgeX Foundry?

Benefits

1. An ecosystem of interoperable plug-and-play components
2. A microservice, loosely coupled software framework
3. Hardware and OS agnostic

EDGE X FOUNDRY™

Data	Manage
APP	Resource

App	AI Inference	Pre-Process
TSDB	Streaming	Rule Engine

Device	Metadata
Translate	Control

Cloud-Edge

Applications

Device

Introduction of EdgeBox

EdgeBox is an advanced AIoT edge computing system

"NORTHBOUND" INFRASTRUCTURE AND APPLICATIONS

EDGE**X**FOUNDRY™

SECURITY CHIP

EXPORTING & APPLICATION SERVICES

TENCENT CLOUD		
BAIDU CLOUD	ALIBABA CLOUD	JX IoT EDGE PLATFORM

INDUSTRIAL APP&SOLUTIONS	UI	APPLICATION SERVICES

SUPPROTING SERVICES

influxdb   Grafana   mongoDB

MQ	VPN	CACHING QoS	AI INFERENCE
FS	APP MANAGEMENT	CONTAINER OPTIMIZATION	

CORE SERVICES

CORE DATA	COMMAND	META DATA	REGISTRY & CONFIG

DEVICE SERVICES

ONVIF	REST	SNAP7	OPC UA	BLE	NBIoT	Virtual	MCU/FPGA FIRMWARE CONTAINERIZATION
RTSP	MQTT	NEMA	MODBUS	LORA	ZigBee	Others	

SECURITY

ADDITIONAL SERVICES

AUTHENTI CATION

ADDITIONAL SERVICES

MGMT SERVICE AGENT

DEVICE SSH

MANAGEMENT

"SOUTHBOUND" DEVICES, SENSORS AND ACTUATORS

SDK

Industrial AIoT Edge Applications based on EdgeX

EdgeX 1.0 Release

Power Grid Monitoring Solution

JX IoT Edge Platform、EdgeBox Dev Kit

Connect to Baidu BIE

Energy Router

2019 05 — **2019 07** — **2019 09** — **2019 12** — **2020 01** — **2020 02** — **2020 03** — **2020 04** — **2020 05**

Edge Camera Service and Video Analysis

Water Affairs Solution

Sensing and Control Device Services

Edge IoT Gateway

Smart Substation Solution

Commercialization

国家电网 STATE GRID

京能集团

BEWG 北控水务
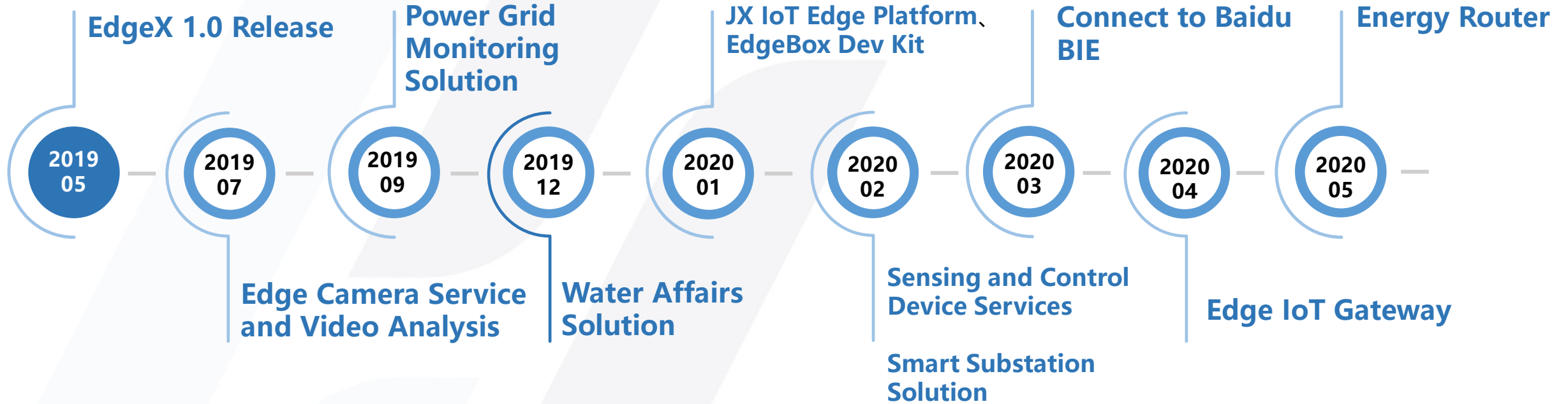
Grid Company   Power Plant   Water Affairs

江行智能

边缘智慧 赋能未来 Engaging the Future with Edge Intelligence

3 Products

Products

Industry Enablement

JX IoT Edge

On-Premise Cloud | **Public Cloud**

IoT Platform

- IoT Management Platform
- Connect to Public Cloud
- Container Delivery
- Data Synchronization

APP | APP | APP | APP | APP

EdgeBox

Edge APP

Edge Middleware

Hardware

- Person Detection
- More than 200 substation object recognition
- More than 10 types of transmission line identification
- Isolator status detection
- Unmanned treatment plant inspection
- Garbage classification

intel® | ARM | NVIDIA | Rockchip

Solutions

- Software Defined Camera
- Mobile Surveillance
- AI Dev Kit、AI Chip Cluster
- Energy Facility Controller
- AIoT Gateway
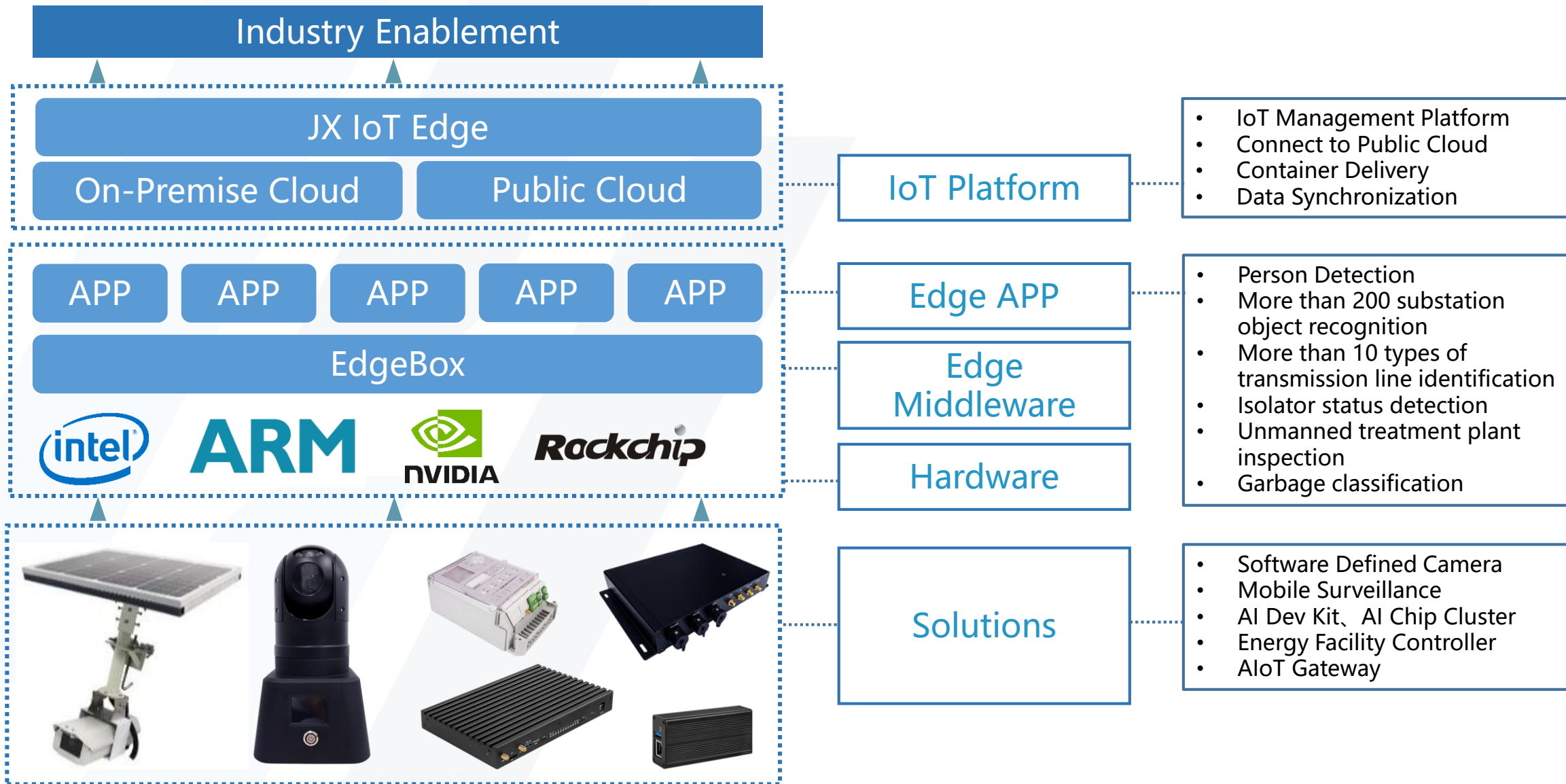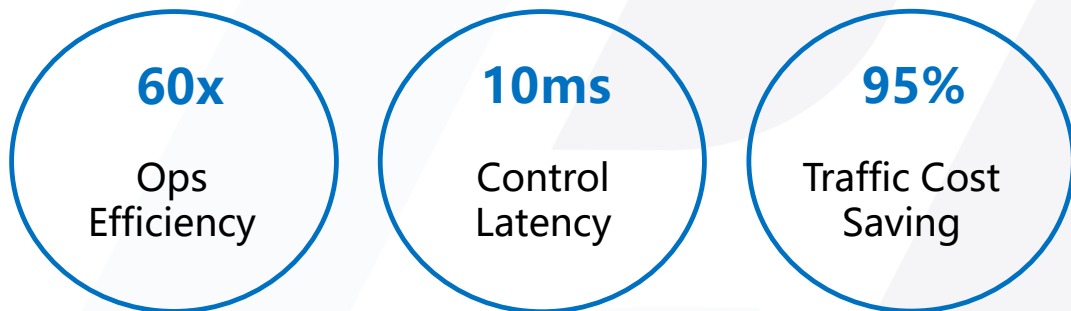
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4 Solutions

Industrial AIoT Applications

Marketing Cap

The annual market scale of electric power industry AI-Ops is 50 billion CNY.

Tech Advantages

60x Ops Efficiency

10ms Control Latency

95% Traffic Cost Saving

Typical Customers

国家电网 STATE GRID	BEWG 北控水务	中国南方电网 CHINA SOUTHERN POWER GRID	京能集团
Grid Company	Water Affairs	Grid Company	Power Plant

Industrial AIoT Applications

IoT platform on public or on-premise cloud

Image Analysis	Grid Tower Inclination	Wire temperature measurement	Equipment Monitoring	Traffic Statistic	Safety Supervision

EdgeBox

Camera   Mobile Camera   AI Gateway   Robotics   … …

Energy Facility Controller

Background Info.

The capacity of power distribution transformer cannot match the load requirements of charging piles, especially in metropolitan.

- Costs too much for the power grid company to match.
- Each vehicle uses a pile, even fully charged, low efficiency.

Energy Controller with containerized charging scheduler App

-Connects charging piles, solar power sys. and power storage sys, etc.

-Schedule the charging load to balance the load peak.

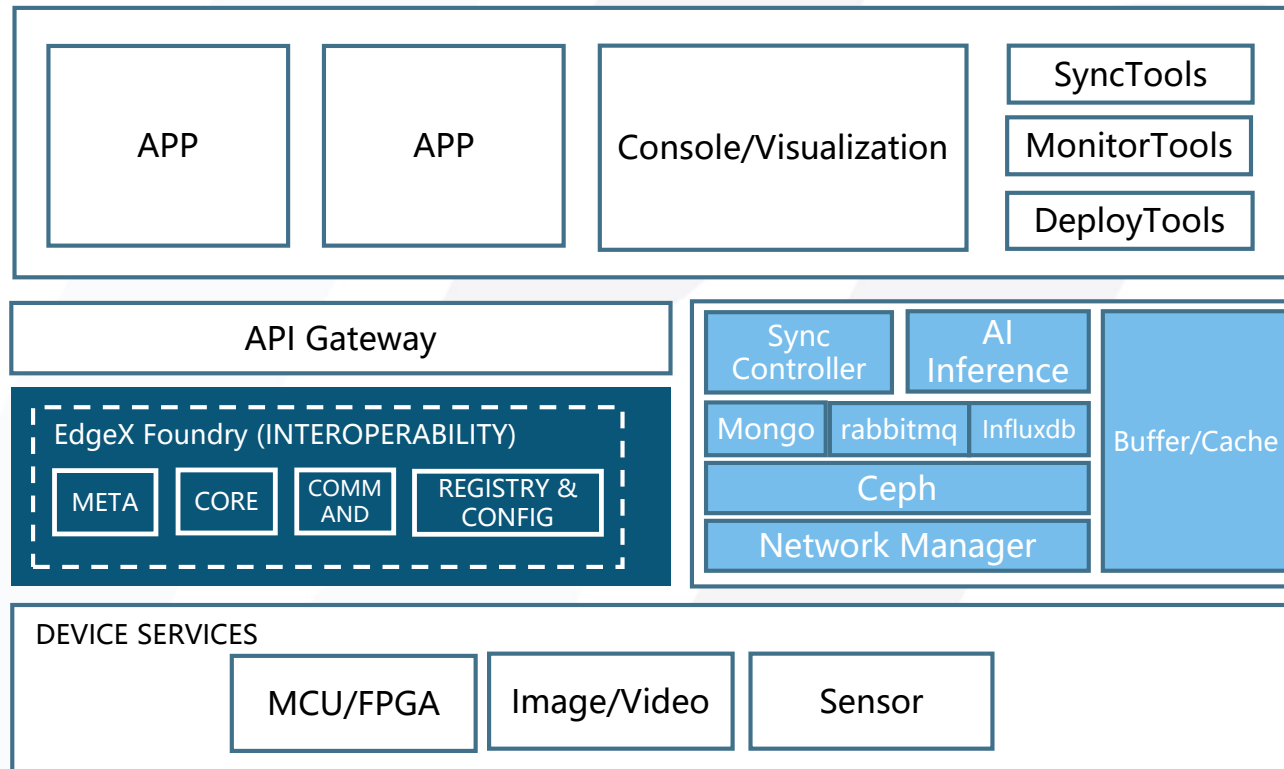-Save the power distribution sys. investment & the users' charging cost

Other applications with containerized Application:

- Power load inferences
- Power quality monitoring
- ...

Power Transformer

Energy Controller with
containerized charging scheduler

Charging Piles　　Solar/Battery Energy
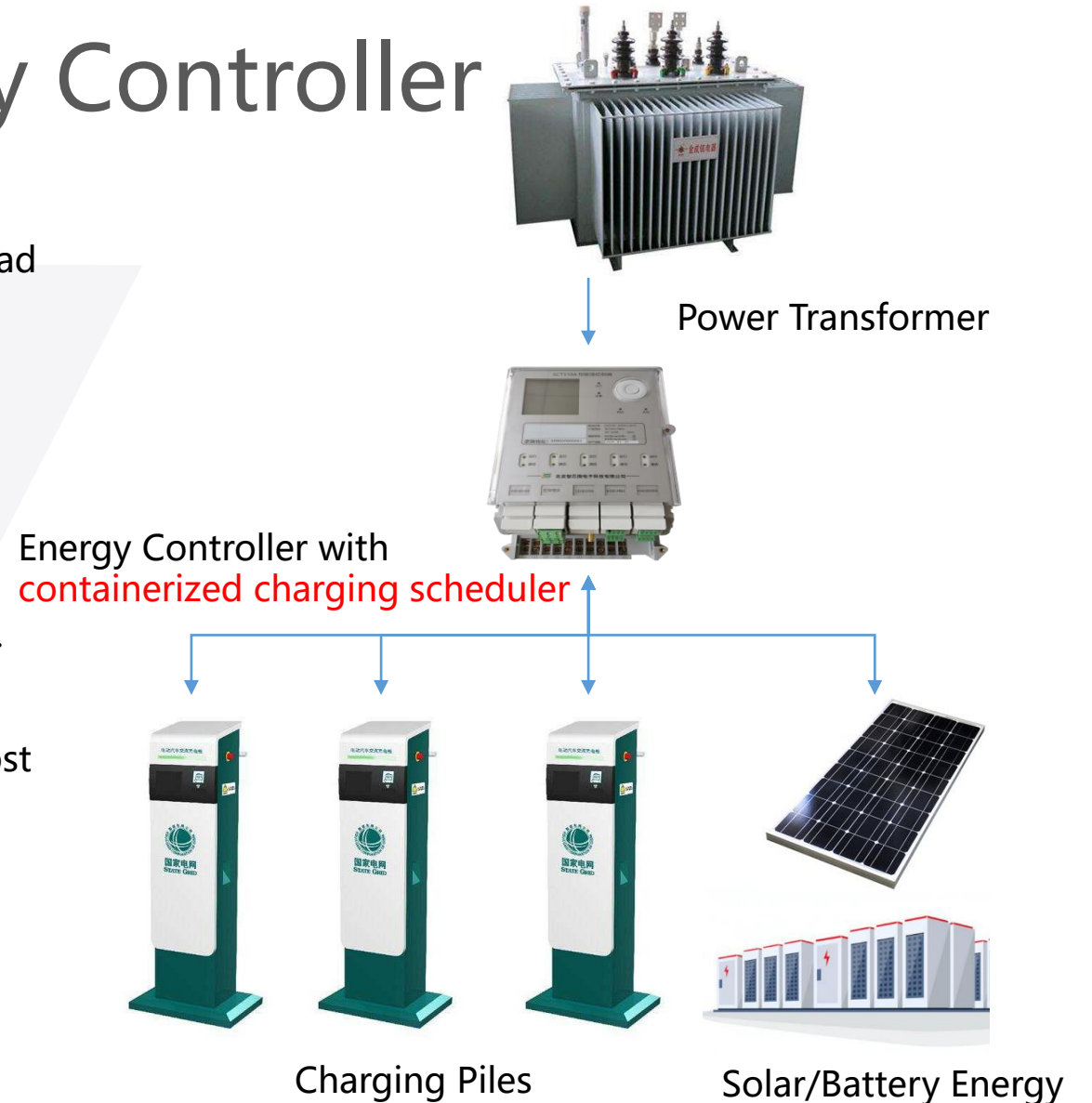
EdgeX @ Power Grid IoT

Based on EdgeX Foundry and EdgeBox framework, we developed AIoT applications to address the practical challenges in power grid scenarios.

APP

APP

Console/Visualization

SyncTools

MonitorTools

DeployTools

API Gateway

EdgeX Foundry (INTEROPERABILITY)

META

CORE

COMMAND

REGISTRY & CONFIG

Sync Controller

AI Inference

Mongo

rabbitmq

Influxdb

Ceph

Network Manager

Buffer/Cache

DEVICE SERVICES

MCU/FPGA

Image/Video

Sensor

Challenges:
1. Heterogeneous devices
2. Industrial AI inference
3. Quick Application Development
4. Generic Network Configuration
5. Monitor/Deploy/Sync tools

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Future Work

Our Roadmap
1. More convenient Dev and Deploy tools
2. AI Notification using EdgeX
3. A new resource management design
4. Faster video streaming analysis
5. Energy saving strategy

Helps from EdgeX Foundry
1. Lower performance overhead
2. Device registration optimization
3. High-availability service
4. More convenient UI
5. Compatible with more frameworks, e.g., NV DeepStream

Q&A

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Thank you