Edge Computing Solutions

Altaf Hussain

Business Development Manager

November 2018 |

SECURE CONNECTIONS
FOR A SMARTER WORLD
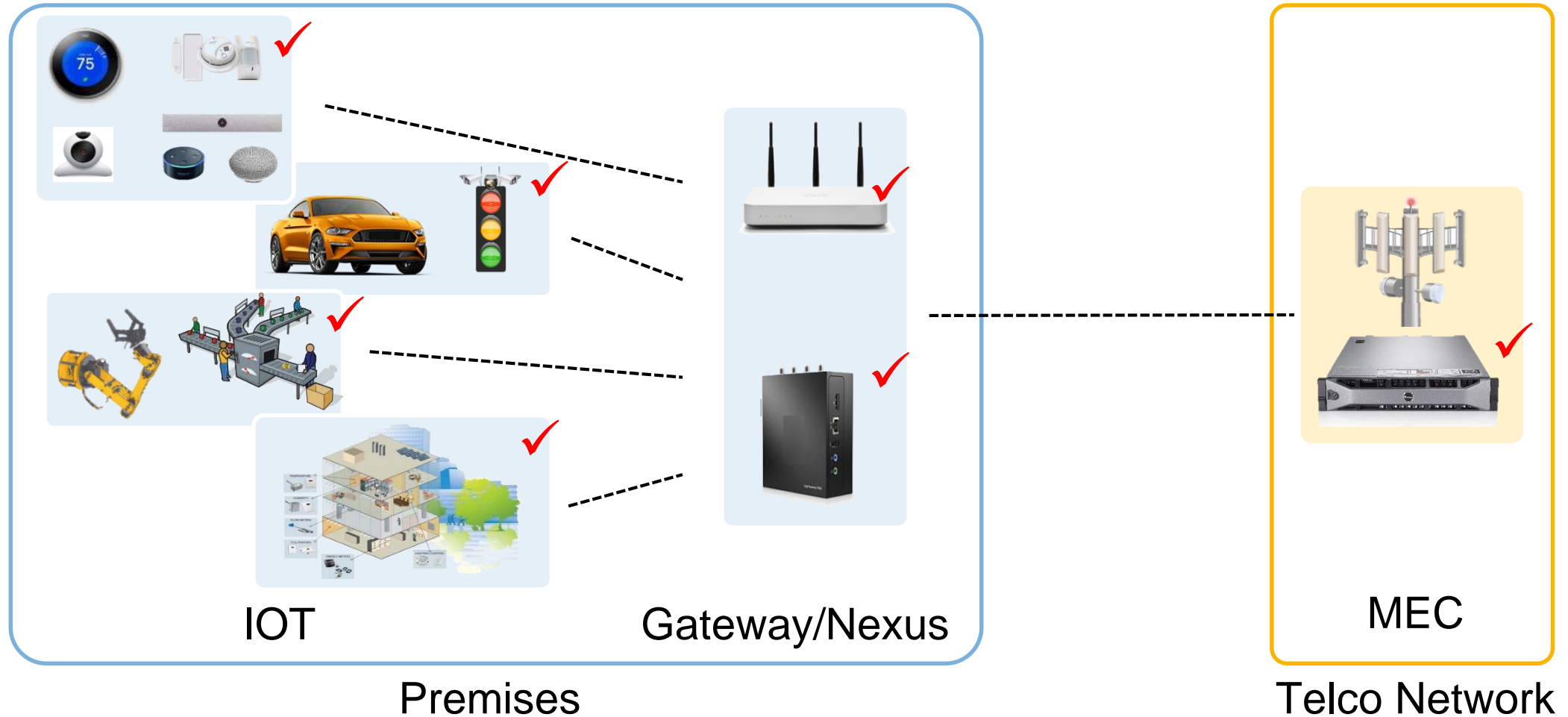
Agenda

- Introduction

- Security Challenges

- Introduction to EdgeScale

- EdgeScale Device Management

- Chain of Trust

- Applications

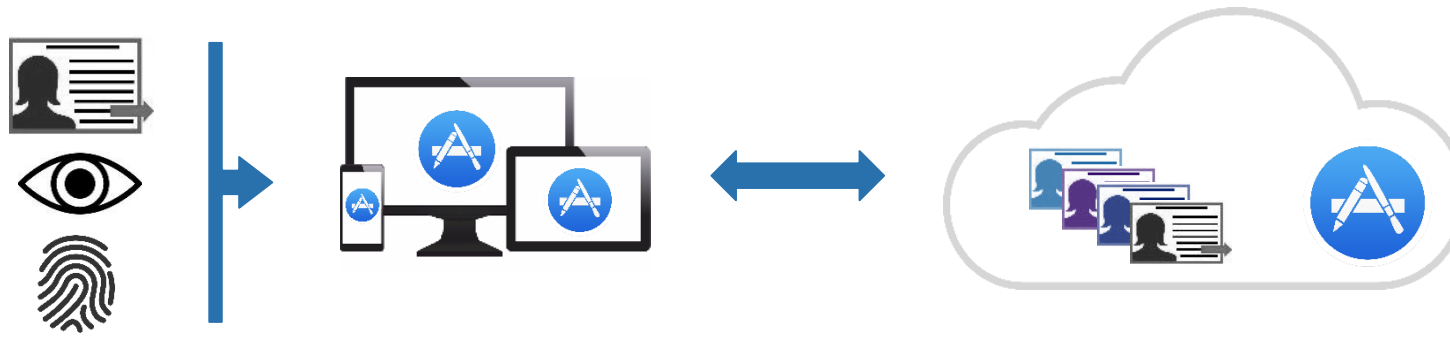# Edge Computing Is On Premises or in the Network

IOT

Gateway/Nexus

Premises

MEC

Telco Network

MEC = multi-access (mobile) edge computing

Management and Security Challenges

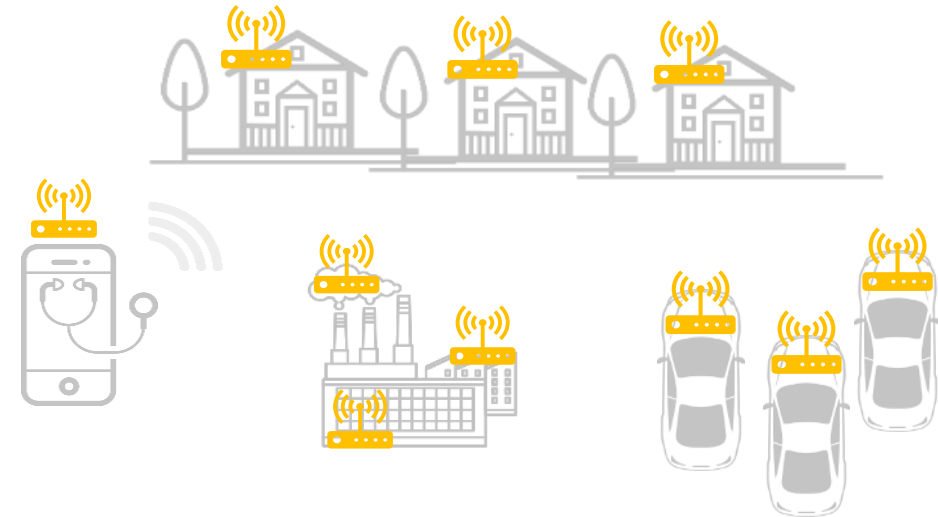**SOLUTION: CLOUD-BASED MANAGEMENT AND SECURITY FOR EDGE**

- Manage devices, apps remotely
- Secure provisioning, upgrades
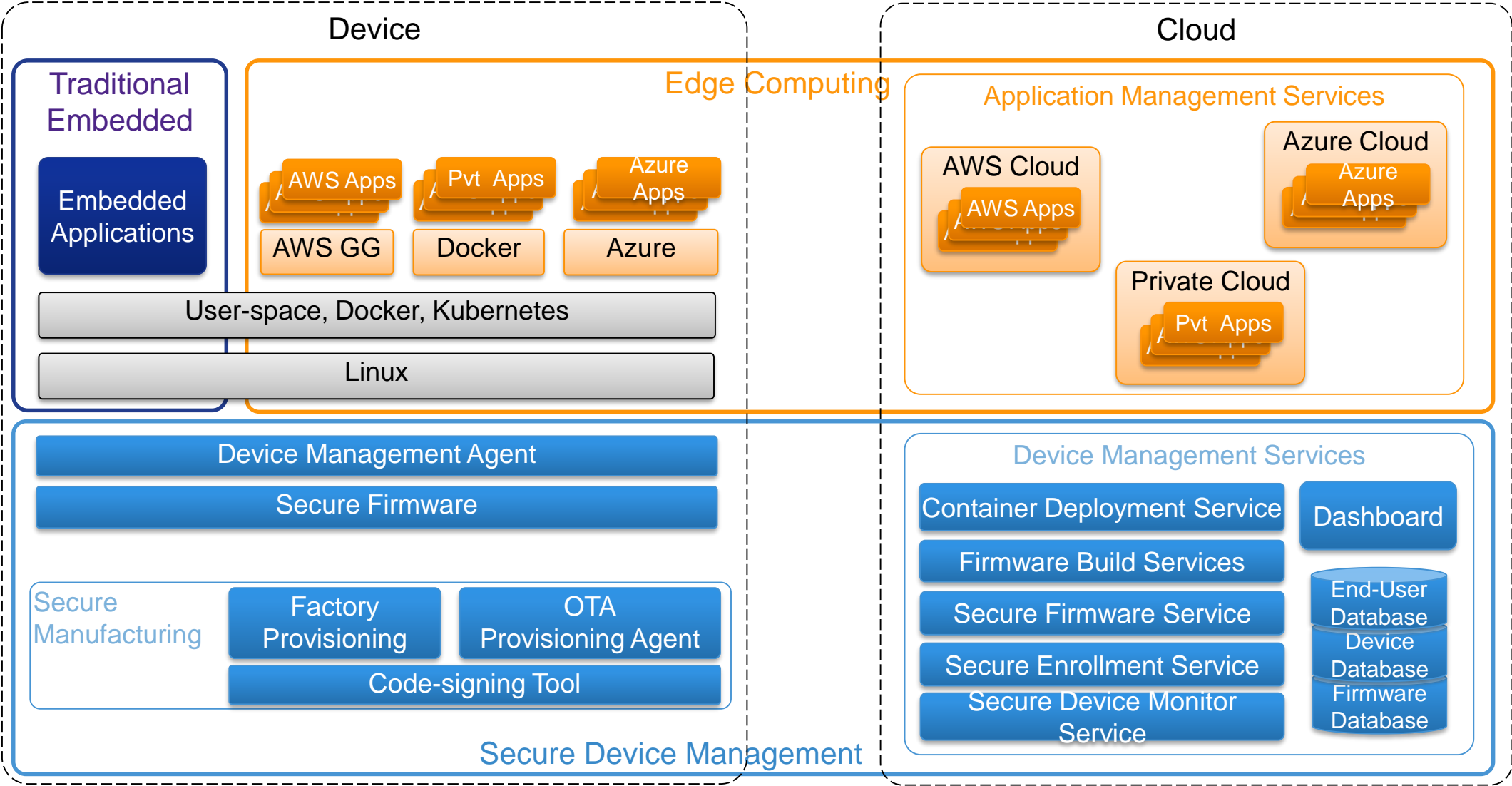
TRADITIONAL PC, MOBILE DEVICES

- Multiple authentication mechanisms
- Cloud-based security and application management

EDGE COMPUTING DEVICES

- Traditionally embedded devices
- Not physically accessible, or lack display
- Can be many (10s, 100s, 1000s) per user

Introducing EdgeScale

Device

Traditional Embedded
- Embedded Applications

Edge Computing
- AWS Apps — AWS GG
- Pvt Apps — Docker
- Azure Apps — Azure
- User-space, Docker, Kubernetes
- Linux

Cloud

Application Management Services
- AWS Cloud — AWS Apps
- Azure Cloud — Azure Apps
- Private Cloud — Pvt Apps

Secure Device Management
- Device Management Agent
- Secure Firmware
- Secure Manufacturing
  - Factory Provisioning
  - OTA Provisioning Agent
  - Code-signing Tool

Device Management Services
- Container Deployment Service
- Dashboard
- Firmware Build Services
- Secure Firmware Service
- Secure Enrollment Service
- Secure Device Monitor Service
- End-User Database
- Device Database
- Firmware Database
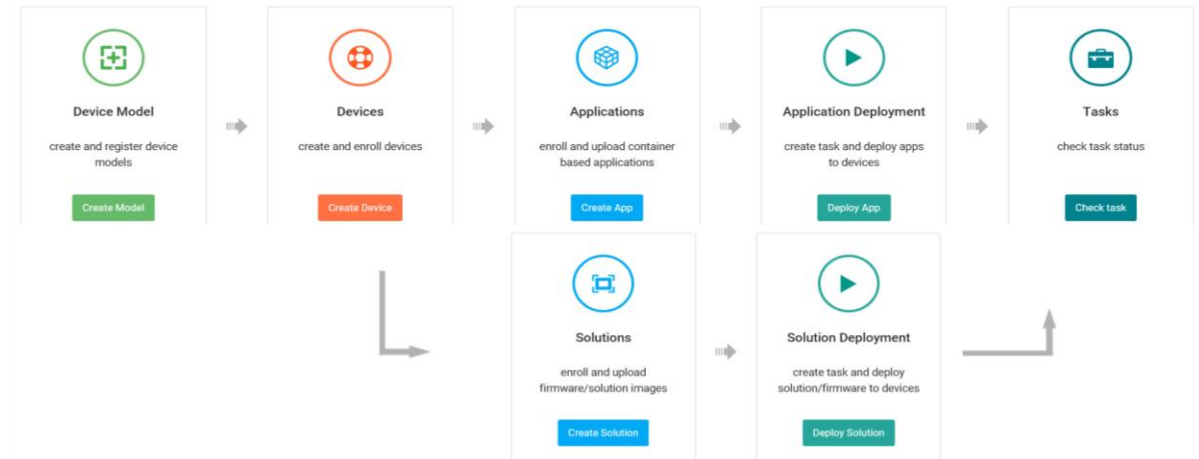
Legend:
- NXP Provides
- Open-Source
- Embedded Apps
- Cloud Apps

NXP

EdgeScale Device Management

EdgeScale
Device Management

Remotely Manage Edge Compute nodes deployed anywhere in the world

Common Portal

Secure Enrollment, Firmware updates, Container Deployment, Device Monitoring & More

EDGESCALE

HELP b11892

EdgeScale - Making Edge Compute Secure and Manageable

EdgeScale is a scalable and powerful platform which helps you to easily connect Iot things, manage devices and deploy your applications. This page provides you a typical workflow of how to register device and deploy applications.

Get Started

Device Model
create and register device models
Create Model

Devices
create and enroll devices
Create Device

Applications
enroll and upload container based applications
Create App

Application Deployment
create task and deploy apps to devices
Deploy App

Tasks
check task status
Check task

Solutions
enroll and upload firmware/solution images
Create Solution

Solution Deployment
create task and deploy solution/firmware to devices
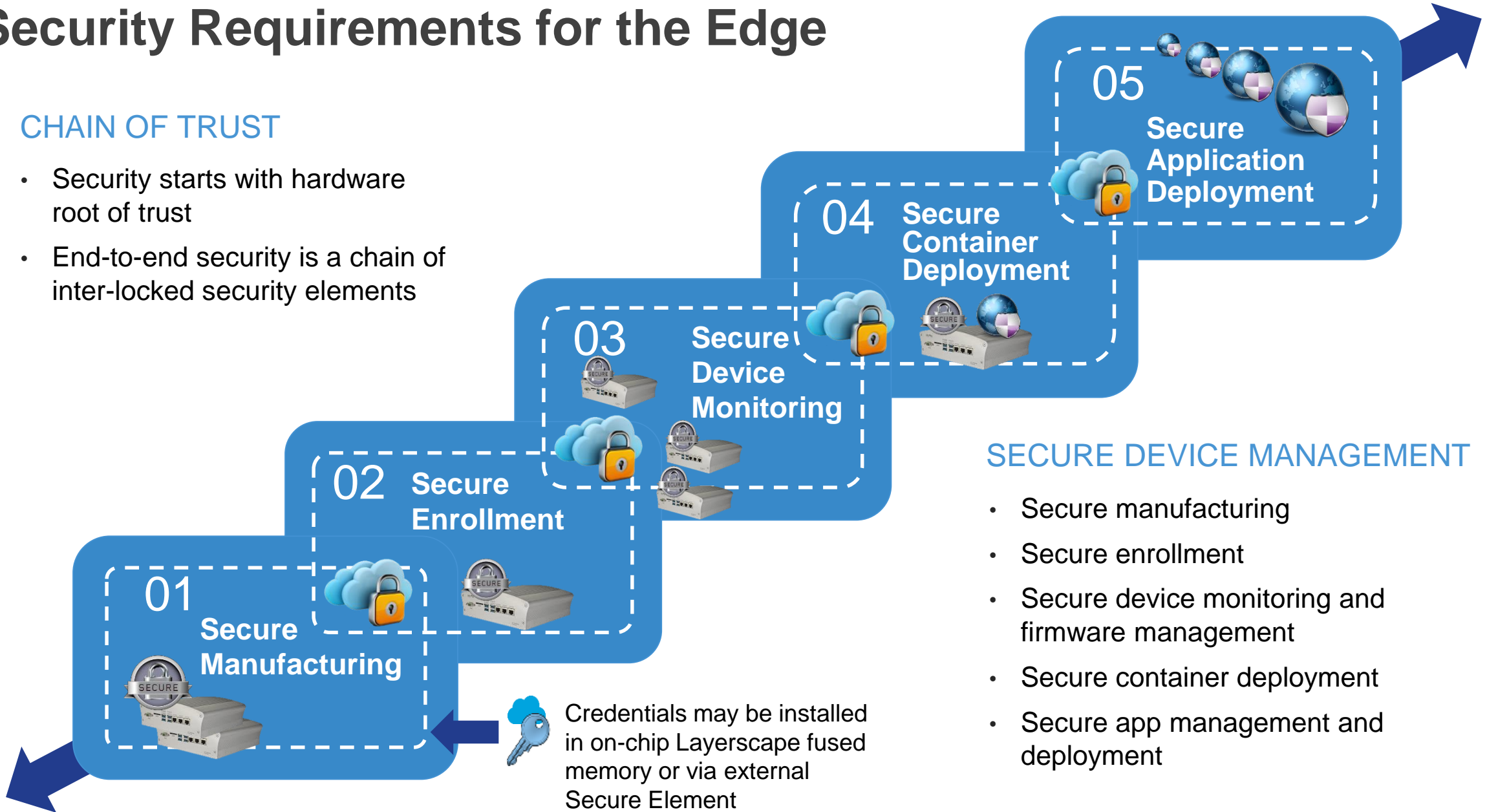Deploy Solution

# Edge Computing Frameworks
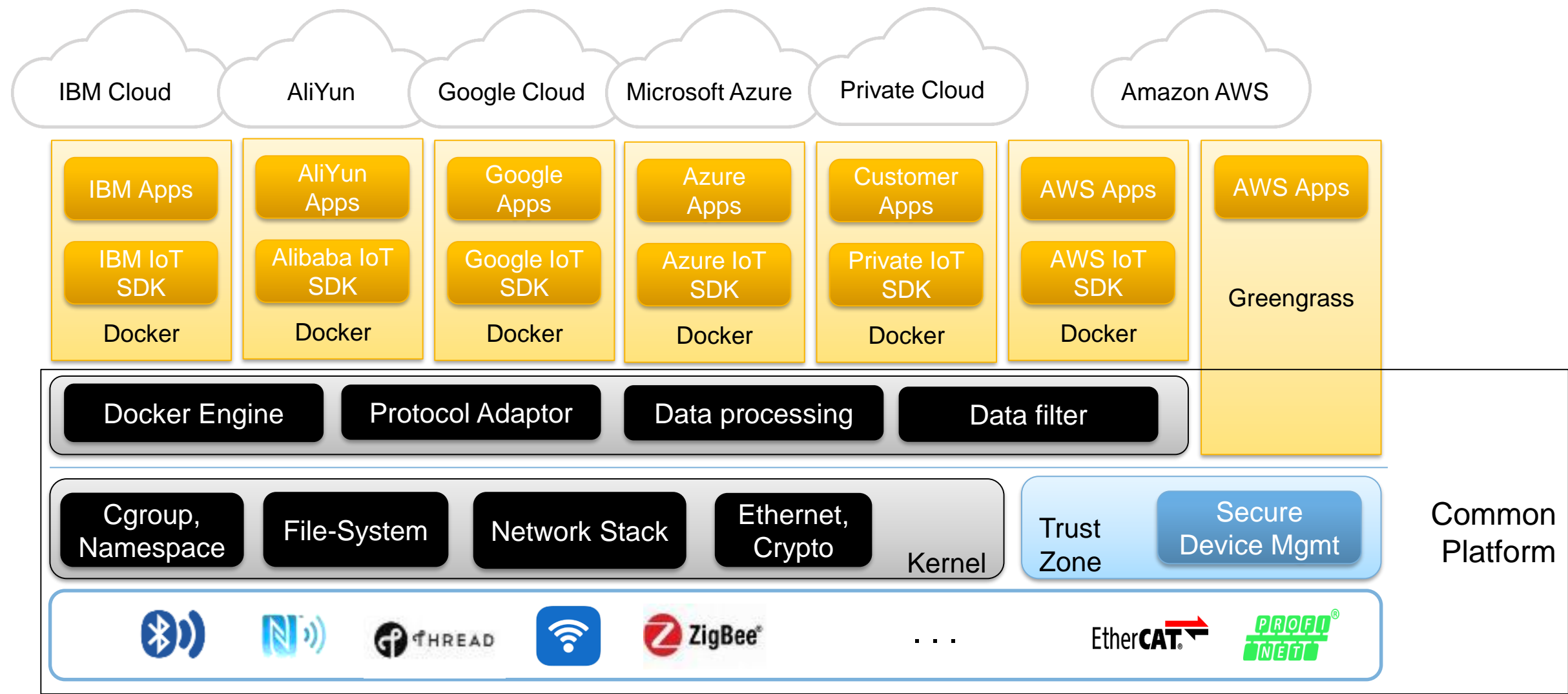
Security Requirements for the Edge

CHAIN OF TRUST

- Security starts with hardware root of trust

- End-to-end security is a chain of inter-locked security elements

05 Secure Application Deployment

04 Secure Container Deployment

03 Secure Device Monitoring

02 Secure Enrollment

01 Secure Manufacturing

Credentials may be installed in on-chip Layerscape fused memory or via external Secure Element

SECURE DEVICE MANAGEMENT

- Secure manufacturing

- Secure enrollment

- Secure device monitoring and firmware management

- Secure container deployment

- Secure app management and deployment

NXP

Chain of Trust
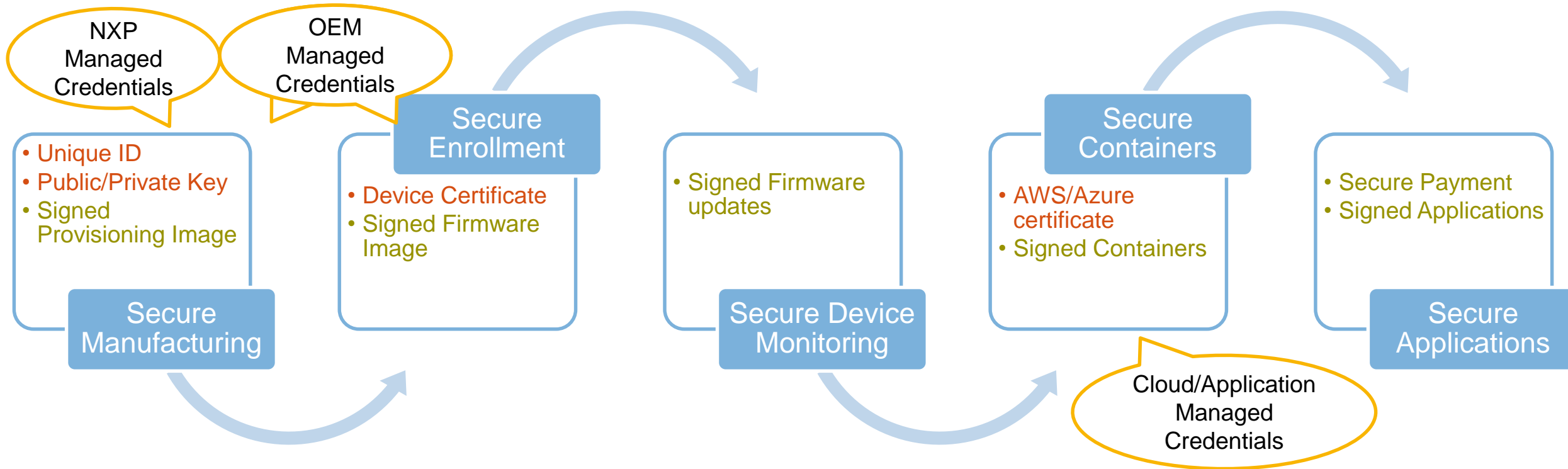
- Hardware forms the Root of trust.
- Multiple layers of tamper-detection - each level validates the next.
- Multiple levels of secrets – can revoke at any layer.
- Mutual authentication between device and cloud using Asymmetric cryptography.
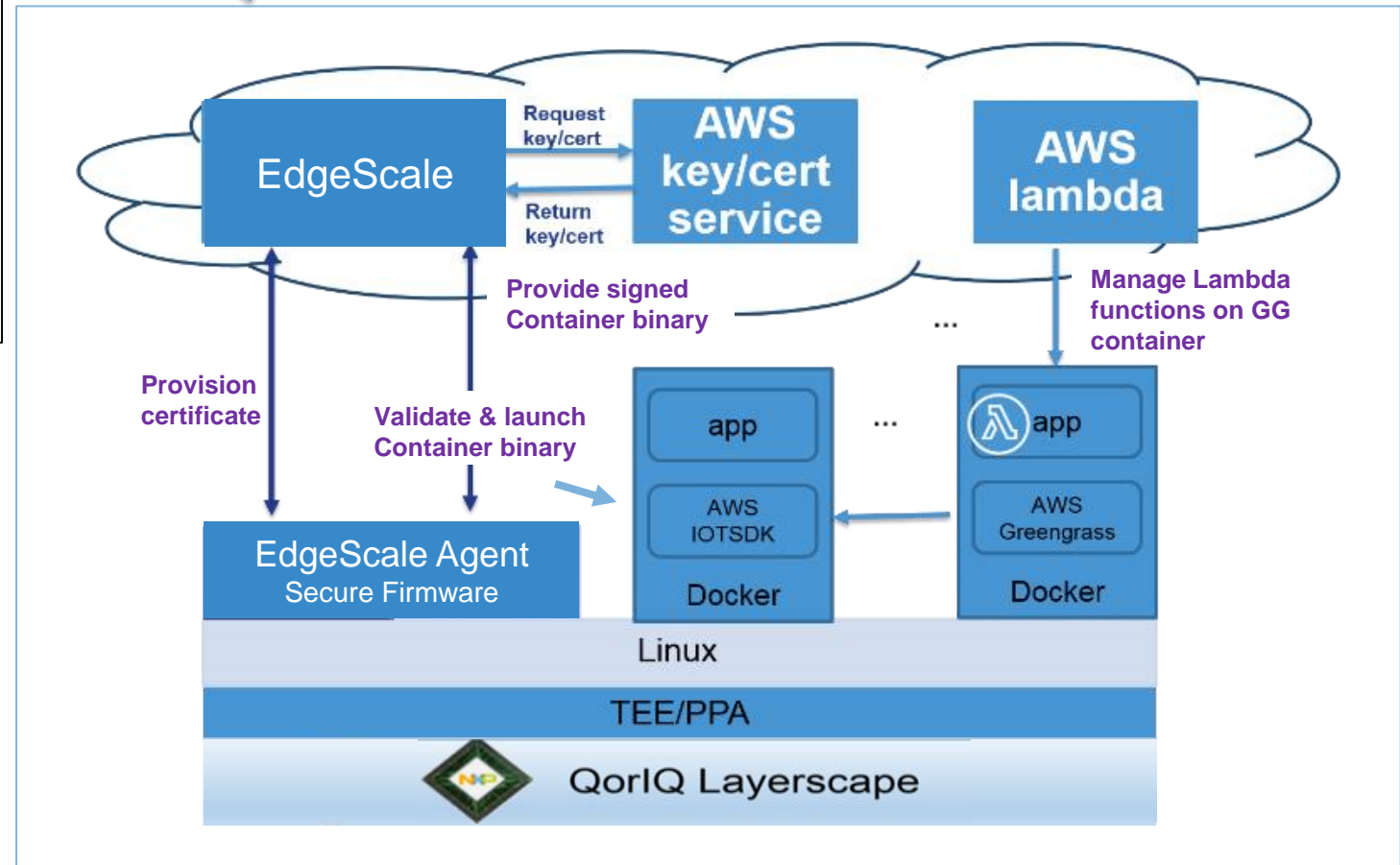
How NXP makes AWS Security Simpler

Today - Manual Greengrass Deployment

Generate key pair at cloud

amazon web services™

Get key pair and greengrass image

Copy key pair to device

SSL talk

Copy greengrass to device

NXP devices

EdgeScale automates Greengrass key distribution and software deployment

EdgeScale

Request key/cert

Return key/cert

AWS key/cert service

AWS lambda

Provide signed Container binary

Manage Lambda functions on GG container

Provision certificate

Validate & launch Container binary

app

AWS IOTSDK

Docker

app

AWS Greengrass

Docker

EdgeScale Agent
Secure Firmware

Linux

TEE/PPA

QorIQ Layerscape

EdgeScale solution:

- Automates AWS IoT and Greengrass software and key distribution.

- Deploys Greengrass core as signed Docker image.

- Provides on-device trust computing and secure storage for GG Apps.

EdgeScale Benefits

Ease of Security
- Let NXP manage credentials for you.
- Secure programming of credentials in factory.
- Chain of trust from HW to OS to application.

Anti-Counterfeit
- Unique NXP and OEM ID per-device
- Unique keys per-device
- Secure credential programming

IP Protection
- Firmware Encryption support
- Unique keys per-device.
- Chain of trust from HW to OS to application.

Run-time Protection
- Prevent device from running older firmware.
- Run-time Tamper Detection
- Ensure firmware integrity from cloud.

Rapid Deployment
- Secure enrollment from cloud.
- Track deployment in real-time.
- On-the-fly firmware selection.

Asset Monitoring
- Remotely manage device activity.
- Provision new devices
- Retire old devices
- Monitor health and proactively replace.

In-field upgrades
- Securely deploy new applications from cloud.
- Leverage/deploy AWS, Azure, Google, Ali on the fly.

Customized experience
- 'Skinned' UI for remote management.
- Integrate into own framework.
- Run on any private/public cloud.

Edge Compute use-cases

Fleet Management
Tracking, location, temperature, road conditions, optimized routing
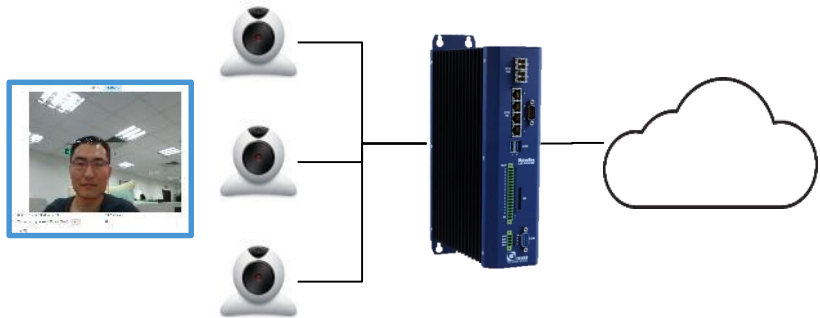
Security, Building automation
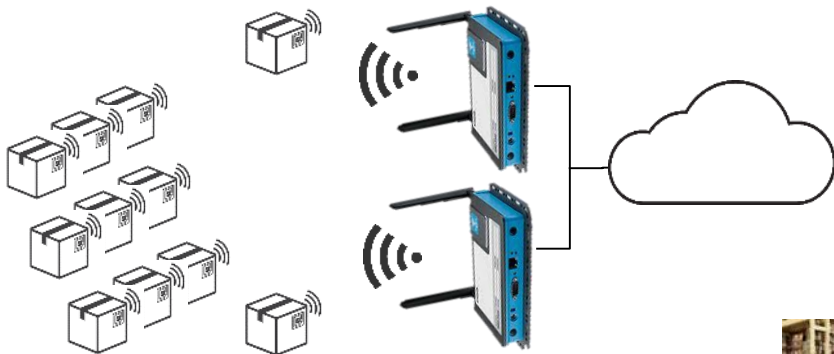Face-recognition, object recognition, pattern detection, temperature, lighting controls

Industrial Analytics
Real-time data acquisition, analytics, inventory control, Real-time object recognition, asset tracking.

Cloud-based Deployment & Management

Retail (Inventory Management)
Analytics, monitoring, inventory tracking, warehouse management.

Retail (Consumer personalization)
Face recognition, pattern identification, personalized shopping, targeted ad insertion, product recommendations.

Healthcare
Tracking, analysis, privacy-filtering, emergency response.

Smart Building Automation

Edge Gateway Platform
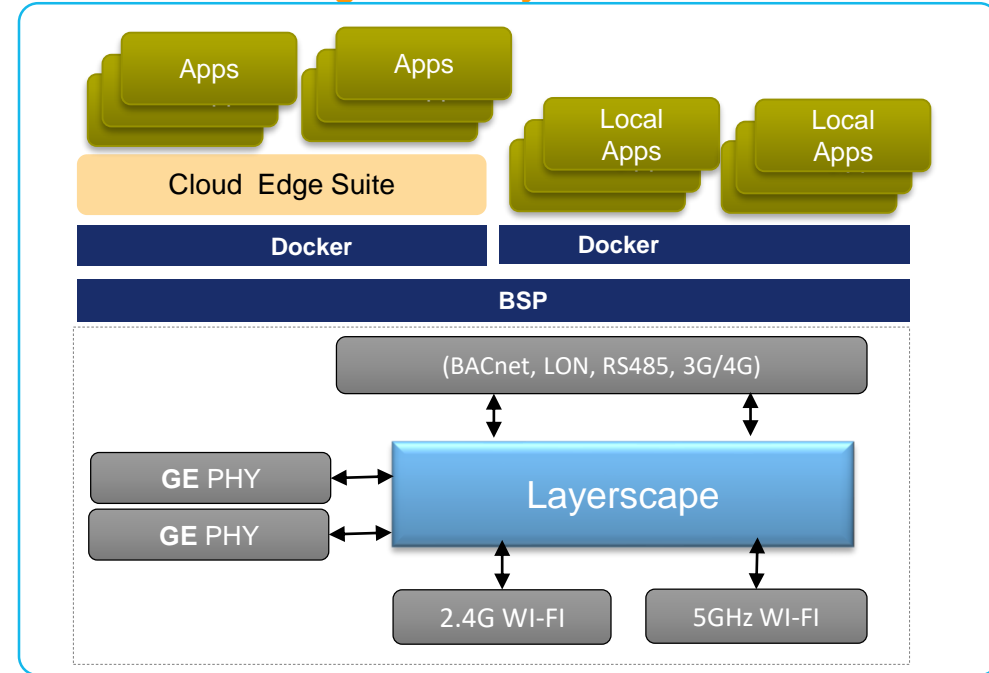
- Intelligent Surveillance
  - Start/stop HVAC when employee arrives/leaves
  - Number plate recognition / facial recognition
  - Building Access Control
- Weather Forecast
  - Plan Vs react
- Sensors / Alarms
  - Warn if unusual electric load, Items piled up near boilers etc.

Demo – Tiered AI/ML Solution with Cloud Training and Edge Inferencing
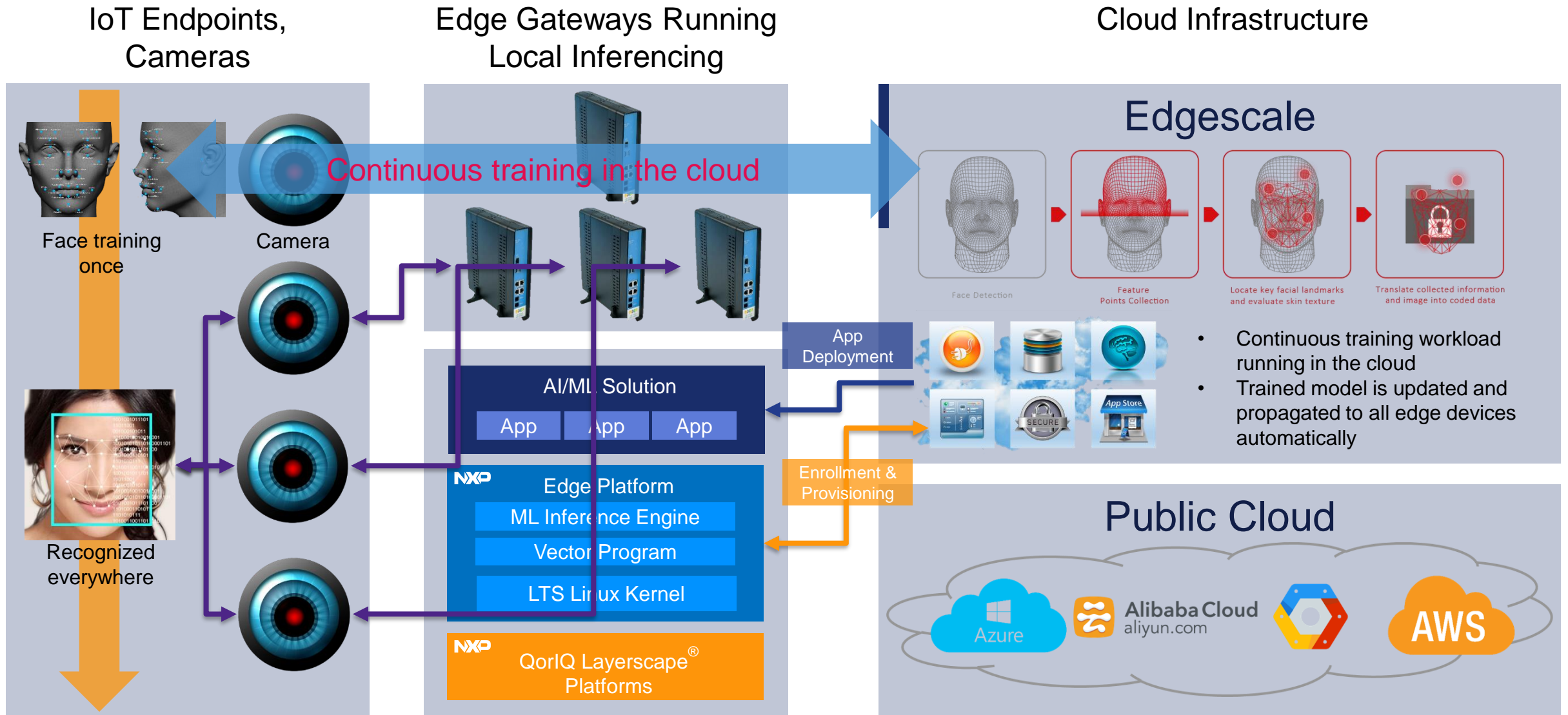
A Broad and Scalable Edge Computing Portfolio

arm

- All LS-series processors have rich set of IO – USB, PCIE, SATA, GPIO, I2C, SPI, UART
- All support Trust Architecture for platform security
- Support both embedded and PC Linux distros
- Support industrial temperature ranges
- Support long lifecycles

Large-scale video/image processing, data aggregation, backhaul

LS2084A
- Cortex-A72
- 4-8 cores
- 2.0GHz
- 8 x 10GE
- 20-35W

LX2160A
- Cortex-A72
- 8-16 cores
- 2.2GHz
- 10/25/40/100 GE
- 31W

LS1028A
- Cortex-A72
- 2 cores
- 1.6GHz
- 4-9W
- *Integrated TSN switch, GPU*

LS1043A
- Cortex-A53
- 2-4 cores
- 1.6GHz
- 1/10G Ethernet, USB, PCI
- 5-10W

LS1046A
- Cortex-A72
- 2-4 cores
- 1.8GHz
- 1/10 G Ethernet, USB, PCI
- 10-12W

LS1088A
- Cortex-A53
- 4-8 cores
- 1.6GHz
- 1/10 G Ethernet, USB, PCI
- 8-16W

Video/image processing, large-scale analytics, TSN Ethernet, Gateway applications

LS1012A
- Cortex-A53
- 1 core
- 1GHz
- 1-2W
- Ethernet, USB, PCI

LS1021A
- Cortex-A7
- 2 cores
- 1GHz
- 2W
- Ethernet, USB, PCI

Data acquisition, analytics, monitoring, remote control

NXP

NXP Partner Edge-Box solutions

Scalys LS1012
Grapeboard

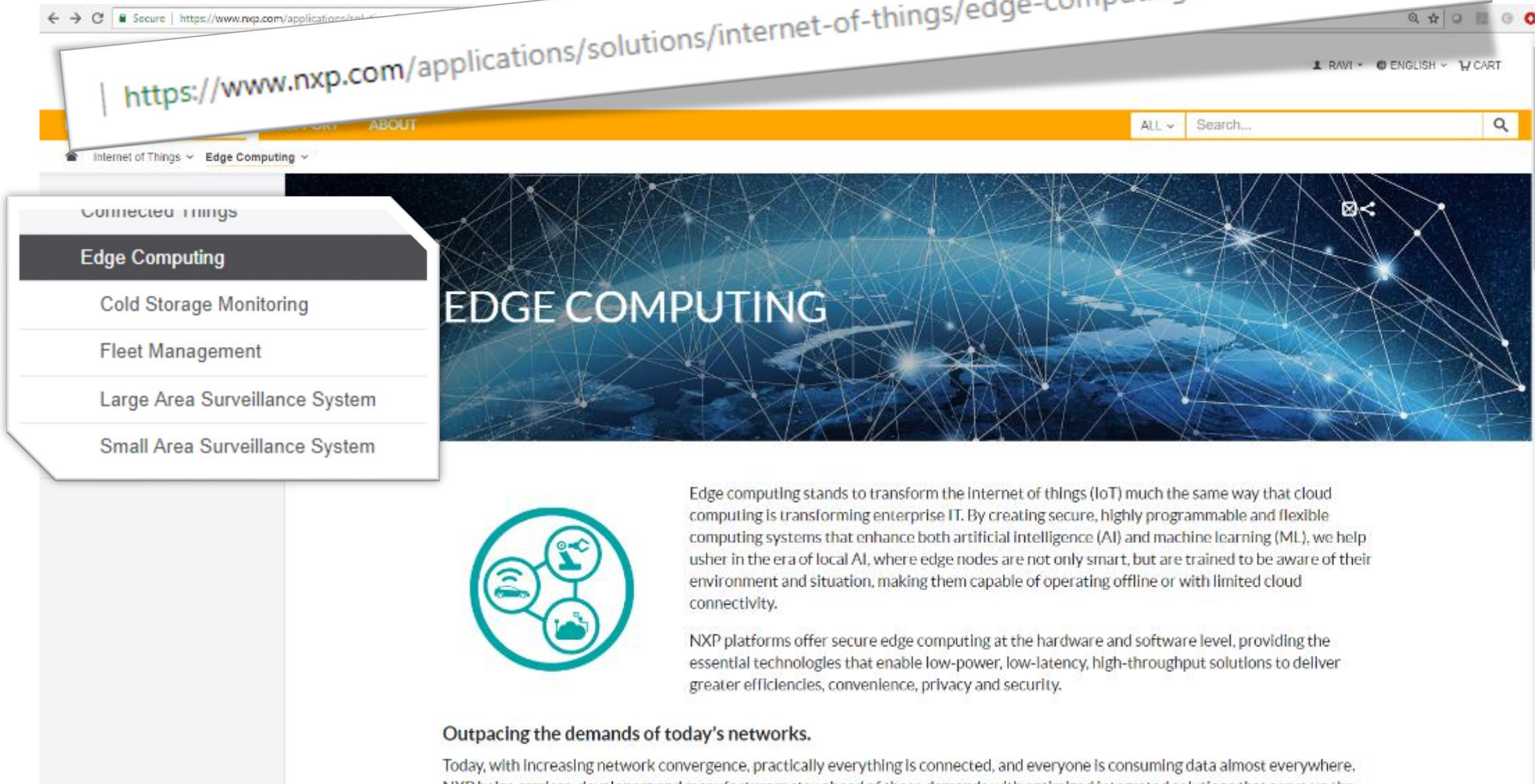Senao LS1043
Edge Whitebox

Imago LS2088
Vision-Box

Powered By EdgeScale
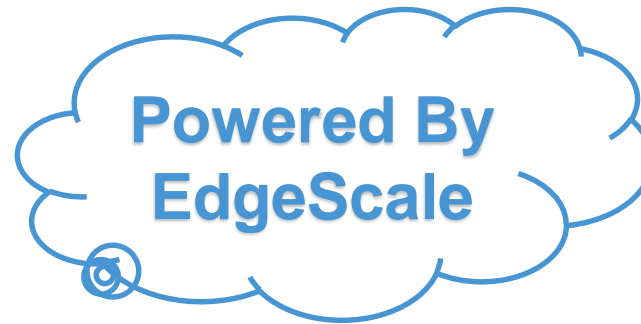
DNI LS1046
Enterprise Whitebox

Nexcom LS104x
Edge Gateway

Accton LS1043
IoT Gateway

More information …

Summary

- Edge Computing offers real-time, privacy and cost-reduction.
  - NXP Layerscape family provides a scalable portfolio for Edge Computing

- Edge Compute nodes need to be securely managed from the cloud.
  - EdgeScale provides a solution for securely managing Edge Compute nodes.
  - EdgeScale enables support for multiple Edge compute frameworks and Private clouds.
  - EdgeScale provides support to manage multiple platforms with a common cloud service.

- Security is a key component for Edge Computing
  - EdgeScale provides an End-End architecture for security.
  - NXP Trust Architecture provides underlying Hardware root of trust.

- For more Information on EdgeScale and Edge Computing
  - www.nxp.com

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