

Problem Statement of IoT integrated with Edge Computing

draft-hong-iot-edge-computing-01

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Contents

- Background
- New challenges for IoT services
 - originated from the changes in the IoT environment
- Edge computing
 - as an emerging technology in IoT
- Use cases of Edge computing in IoT utilizing EdgeX (two demo videos)
 - Smart constructions providing a monitoring service of construction site
 - Real-time control monitoring system by Rotary Inverted Pendulum system

Background

- IoT is generally characterized by real world small things that are widely distributed but have limited storage and processing power
- Cloud computing has been an emerging technology which has virtually unlimited capacity in terms of storage and processing power
- Thus, IoT with Cloud computing has been recognized as an efficient way to overcome those IoT issues

Environment changes/Paradigm shift

- Now with IoT,
 - vast volume and variety of data will be generated by things at edge networks
 - many applications will be deployed on the edge networks to consume these IoT data
 - Some of the applications may have very short response times, some may contain personal data, and others may generate vast amounts of data
- Moving all data from edge to a cloud data center may not be an efficient way anymore to process vast amounts of data
- In Cloud computing, users traditionally only consumed IoT data through Cloud services. Now, however, users are also producing IoT data with their mobile devices

New challenges of IoT

- Strict Latency
- Constrained Network Bandwidth
- Constrained Devices
- Uninterrupted Services with Intermittent Connectivity to Cloud
- Privacy and Security

IoT integrated with Edge Computing

- Edge computing is one of the candidate to satisfy the new IoT challenges
- The main philosophy of Edge computing is
 - Put the required functions near to users and data
 - and distribute the functions

IoT Data in Edge Computing

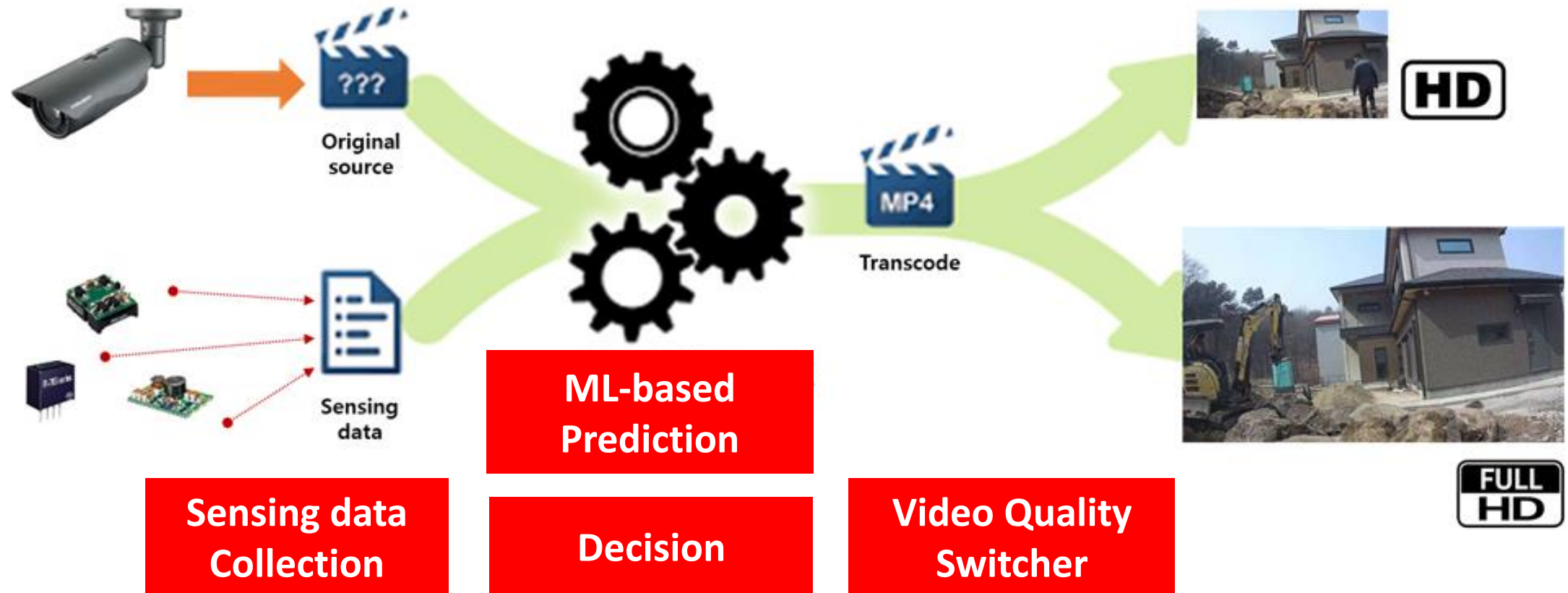
- Edge computing can provide many capabilities for IoT services because IoT systems are based on sensors and actuator devices in edge area and IoT data generated from sensors and actuator devices are gathered through a gateway
- In this draft, we concentrate on IoT data's aspect because the benefit of Edge computing with IoT data is very big in use cases
 - Data storage
 - Data processing
 - Data analyzing

Use Cases 1 : Smart Constructions

- Implementation of monitoring service of construction site
 - ETRI has been working on it with Korean vendor, HECAS
- Problem
 - Transfer videos to Cloud by wireless network (LTE) in construction site
 - very expensive and vast amount of video volume
- Solution by Edge computing
 - Collect construction data from IoT sensors
 - Noise, vibration, gas (9 types), video (4 types)
 - Analyze IoT data and predict abnormalness
 - Transfer videos selectively (quality, type, etc.) to Cloud
 - Transfer HD videos in normal
 - Transfer Full HD videos in abnormal

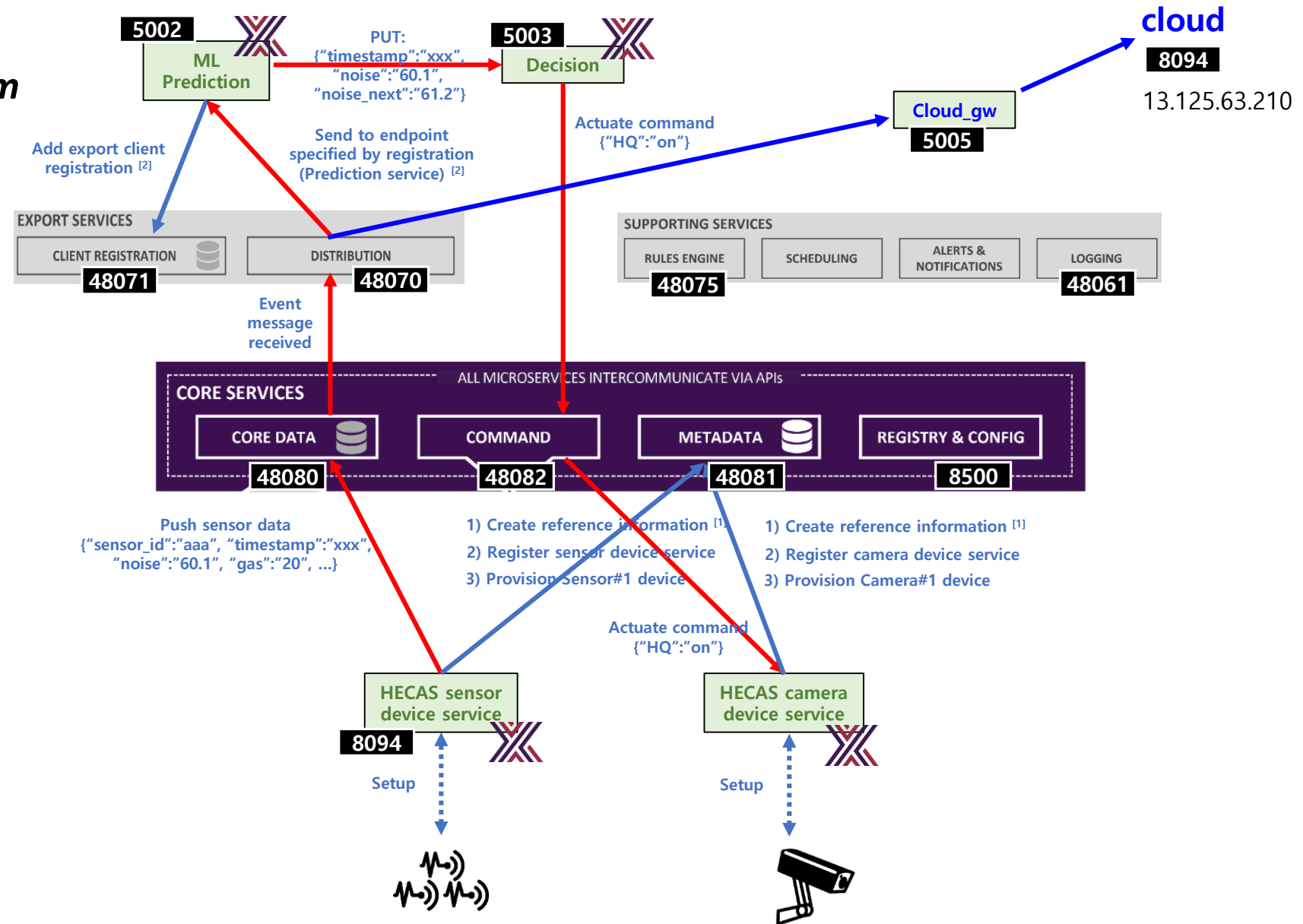
→ Cost saving and video volume reducing

Edge Computing based on Microservices



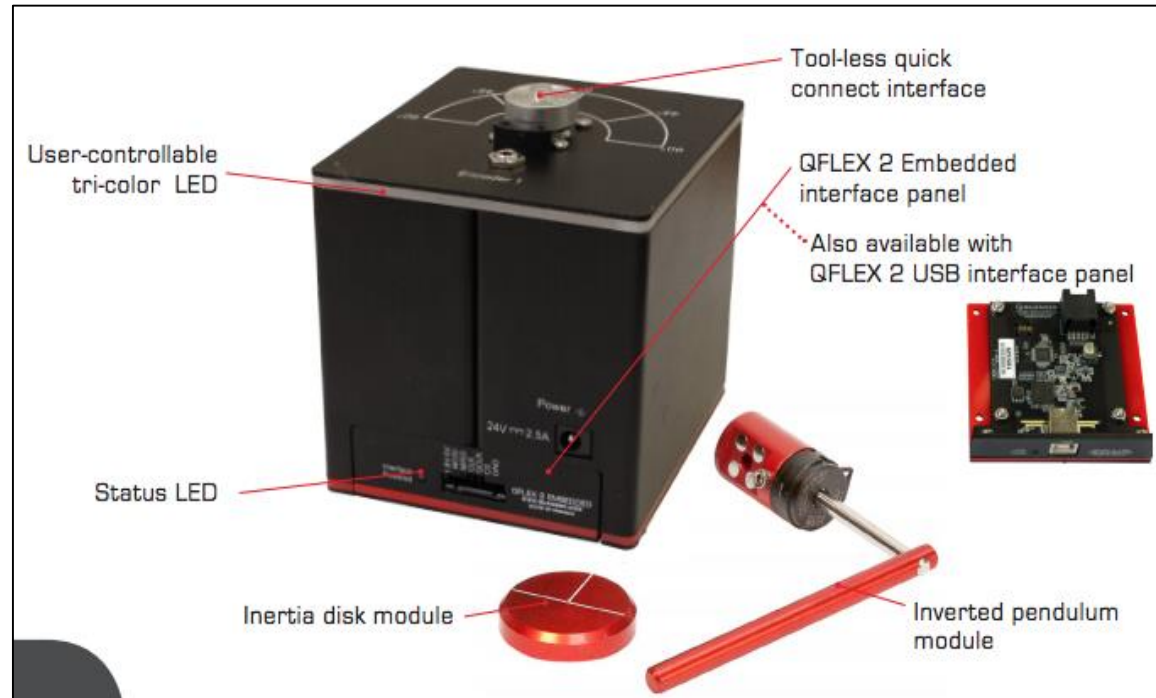
Utilizing EdgeX

EdgeX Foundry is an open platform

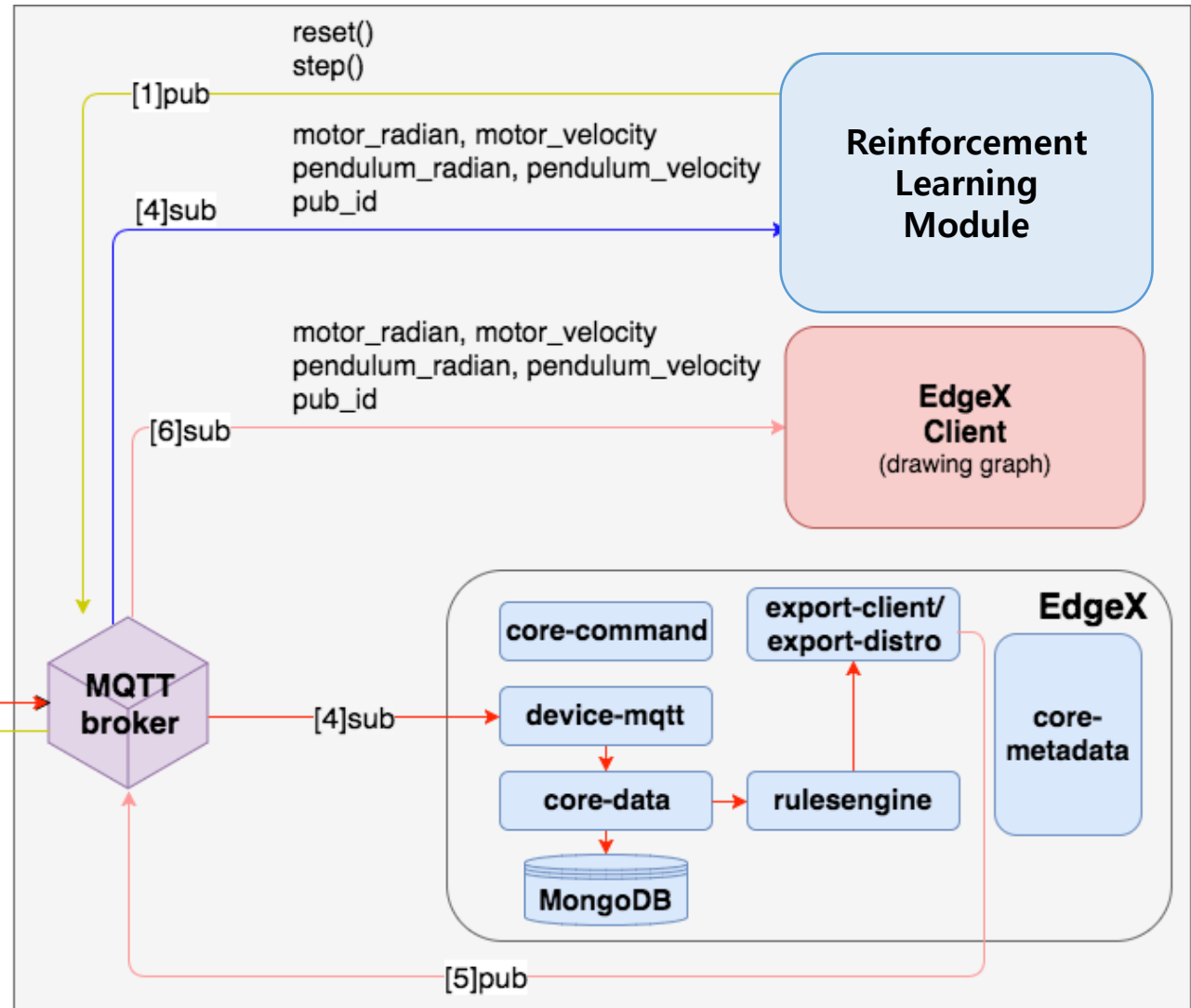
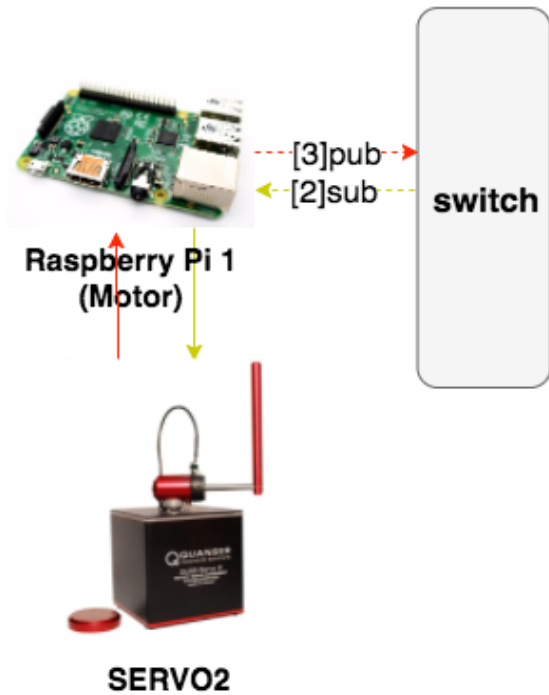


Use case 2 : Real-time control monitoring system

- EdgeX-based Rotary Inverted Pendulum system
 - Servo-2 control system



Edge Computing : utilizing EdgeX



Thank you!