LF Edge and IOWN
Joint PoC Plan

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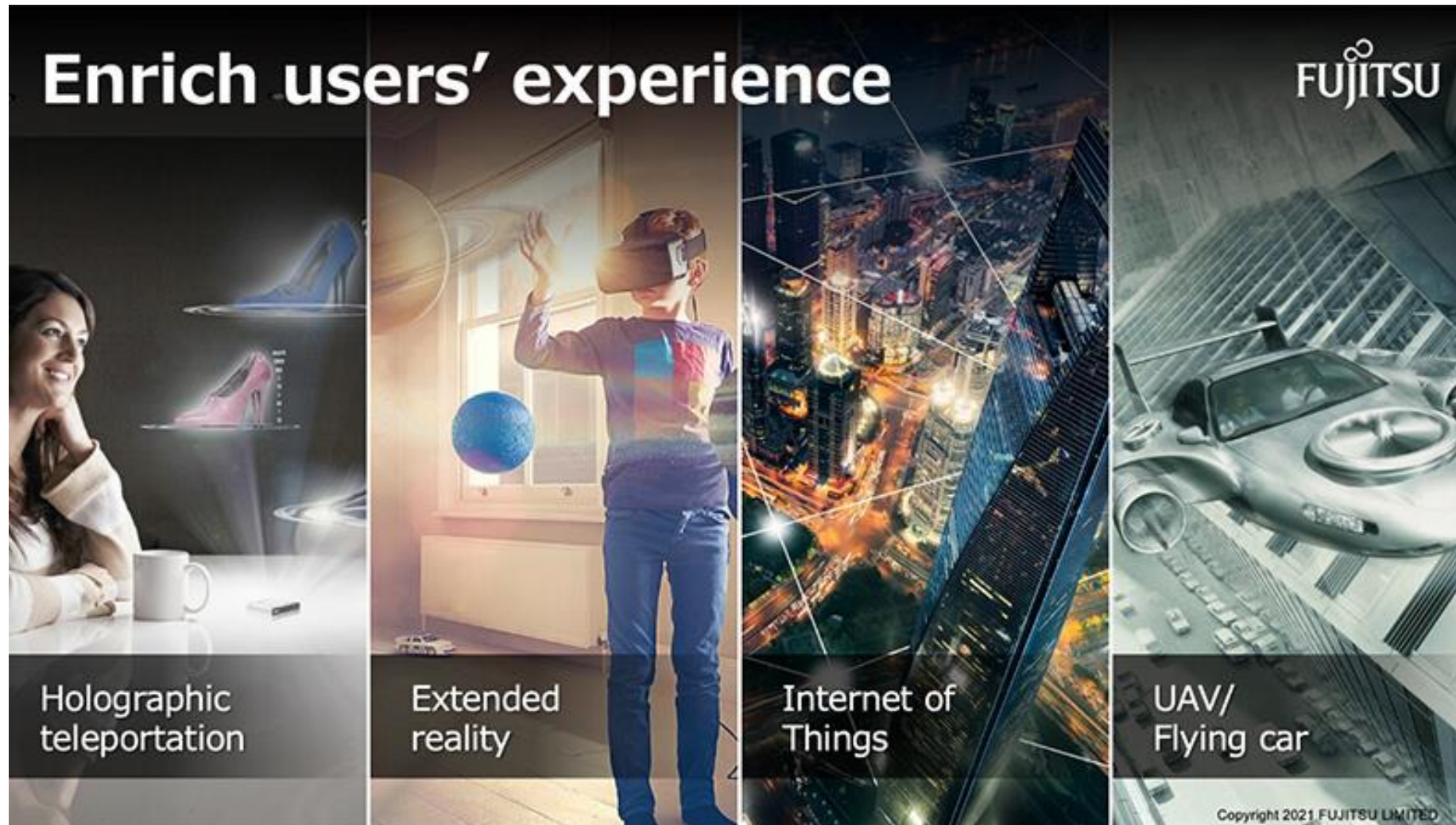
Introduction

<u>Speaker</u>

Reo Inoue
Fujitsu

・Current work:
　・Research and development
　　about 6G infrastructure
・Career:
　・Development for wireless NW
　・Development for wireless edge
computing
　・Favorite things: Marathon

Haruhisa Fukano
Fujitsu TSC member,
LF Edge Akraino Project

・Current work:
　・Business and architecture planning
　　about 6G infrastructure
・Career:
　・Heterogeneous computing R&D
　・FPGA design for NW equipment
・Favorite things: Camping

Use Cases in 2030s

Enrich users' experience

FUJITSU

Holographic teleportation

Extended reality

Internet of Things

UAV/ Flying car

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https://www.fujitsu.com/jp/microsite/fujitsutransformationnews-en/2021-06-29/01/

Performance Required to Realize Use Cases in 2030s

a. Ultra high speed

· Access communication speed is 10 times faster than 5G
· Core communication speed is 100 times faster than current

b. Ultra low power consumption

· 1/100 of current power consumption

c. Ultra low latency

· Low latency, 1/10 of 5G
· High-precision synchronization of Cyber-Physical Systems

※ https://b5g.jp/

Challenges in Achieving Performance

› Slower reduction in power consumption resulting from progress in process miniaturization

› →Computer performance will not meet future technology requirements

Slowing down gradually
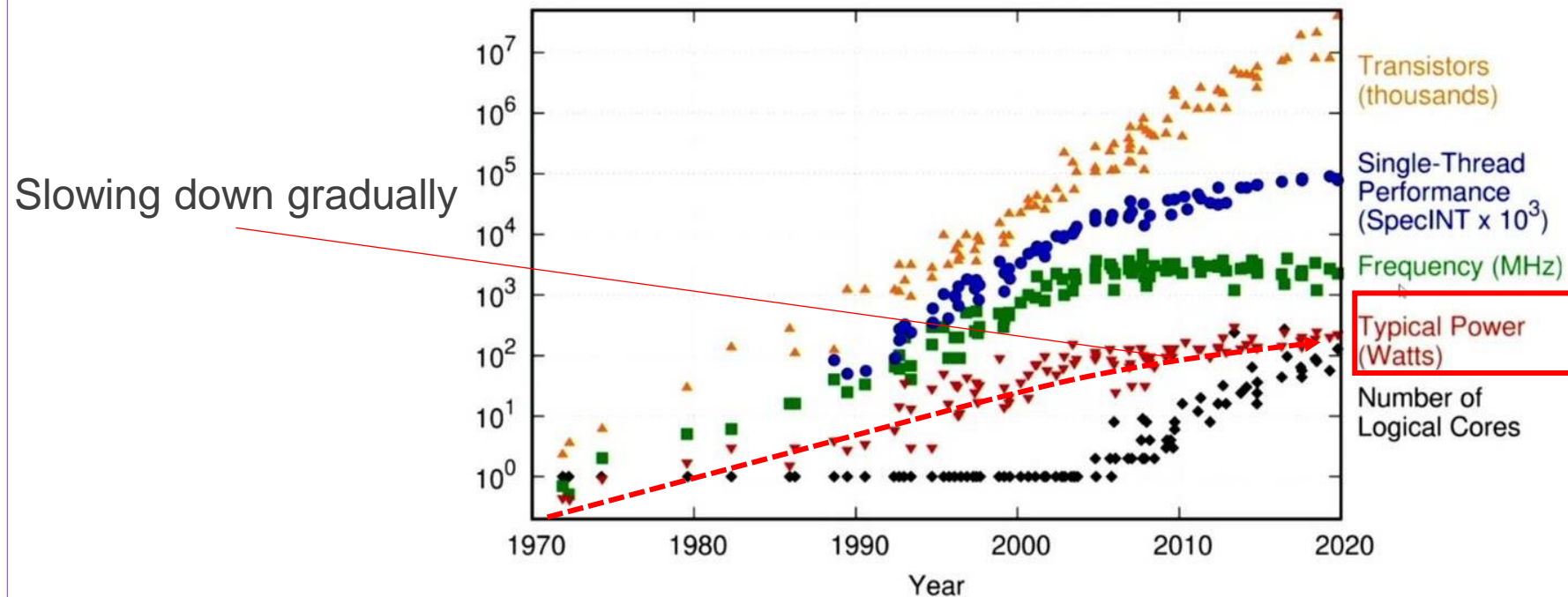
Need breakthrough to fulfill the requirements in the future

Ideas on How to Solve Challenges(1/3)

› Idea 1 Device-to-device communication using All-Photonics Network without CPU
  › Increased HW processing speed because of reduced CPU load
  › Improved network communication speed because of All-Photonics Network

› →Higher speed processing is achieved
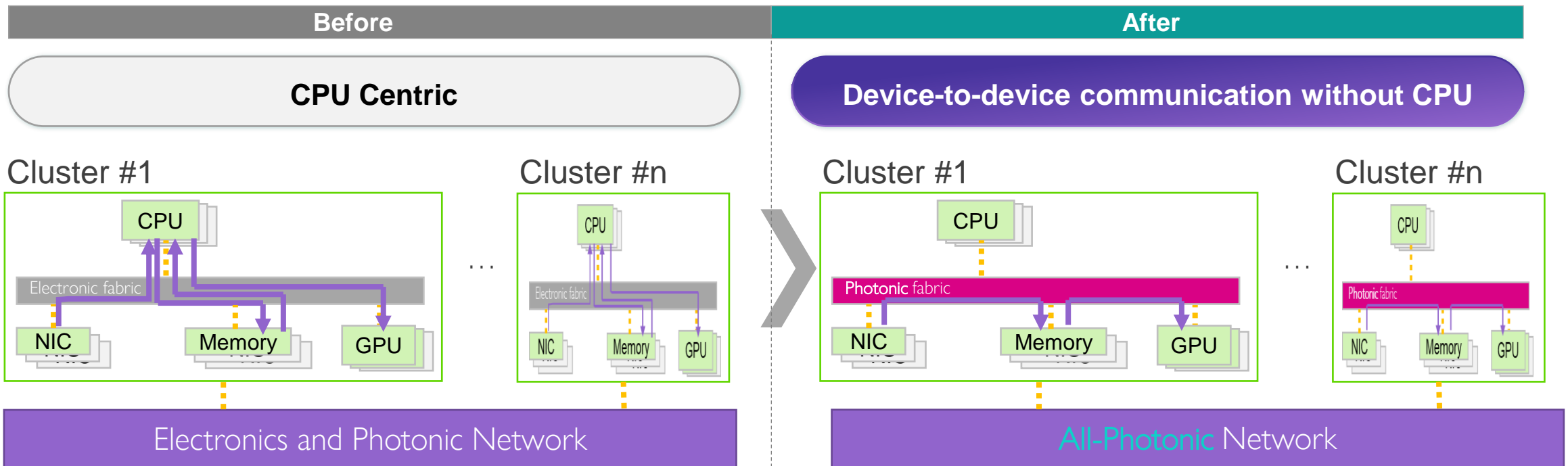
Ideas on How to Solve Challenges(2/3)

› Idea 2 Utilizing new infrastructure, Data-Centric Infrastructure

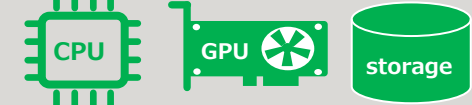 › Reduced power consumption because of absence of idle HW
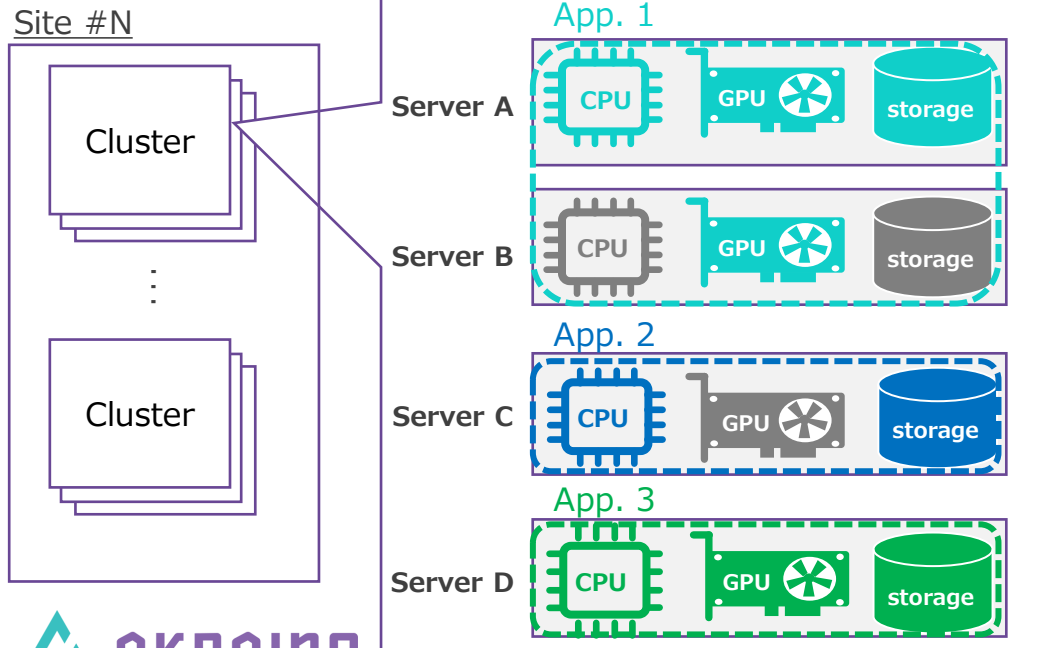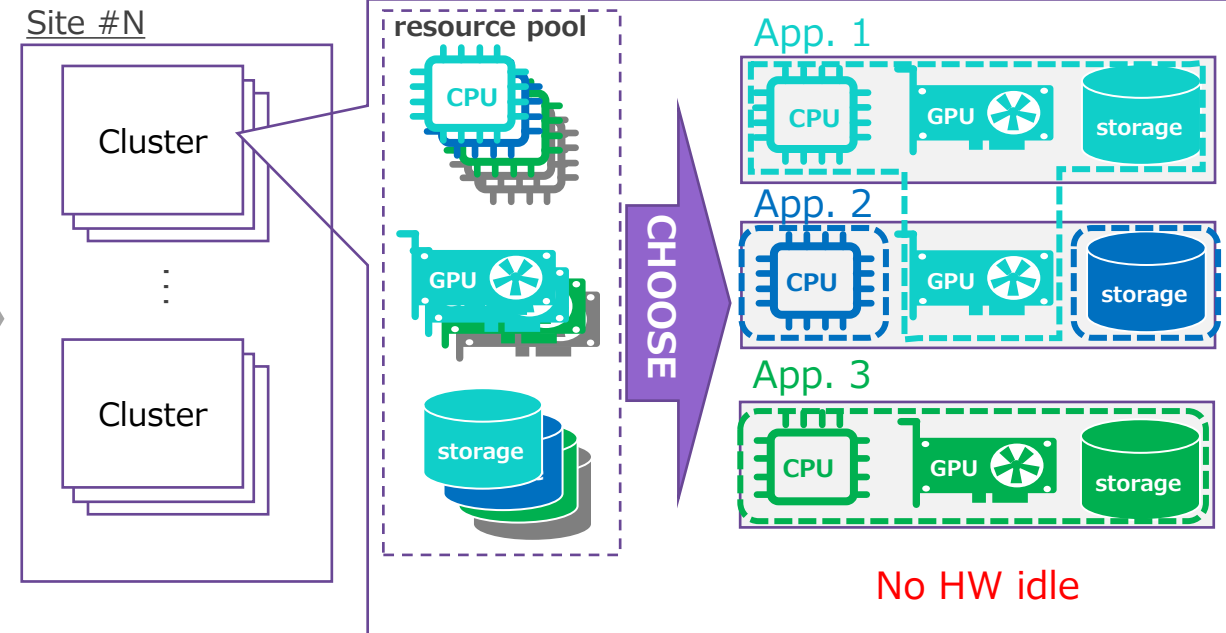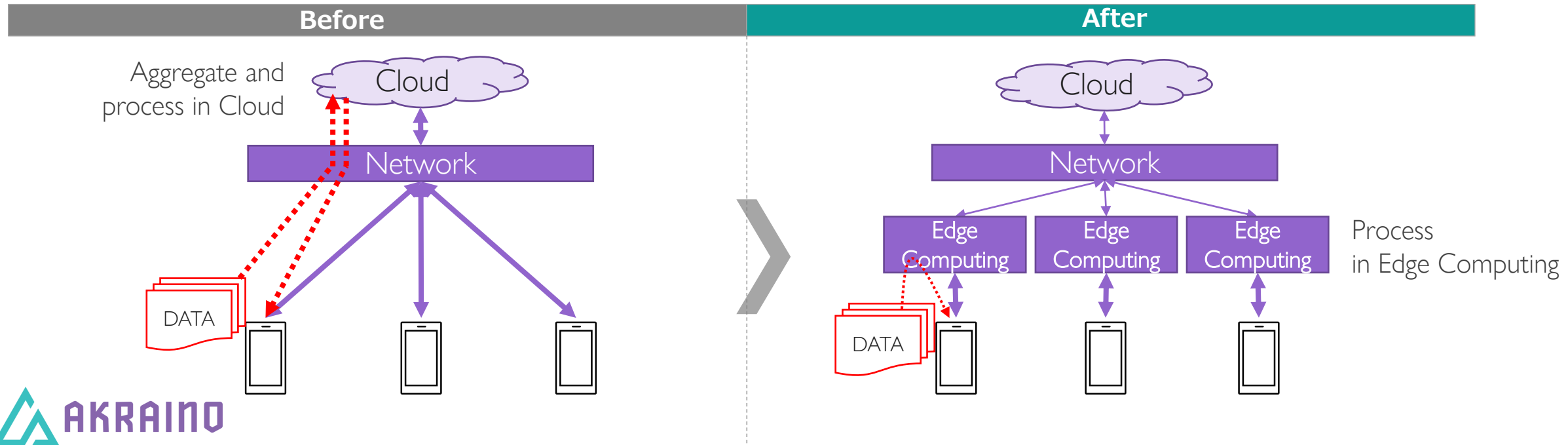
Ideas on How to Solve Challenges(3/3)

› Idea 3 Utilizing edge computing

   › Edge computing is method that processes data at the edge, such as a terminal on device, sensor or server

   › Advantages of utilizing Edge Computing

      › Reduce power consumption because of reduced load on network

      › Low latency because of short transmission path

Ideas on How to Solve Challenges

› The following ideas are advocated by "IOWN"

  › Idea1 Device-to-device communication using photonics network without CPU

  › Idea2 Utilizing new infrastructure, Data-Centric Infrastructure

› The following idea is advocated by LF Edge

  › Idea3 Utilizing edge computing

What`s IOWN?

› IOWN (Innovative Optical and Wireless Network) is an initiative for networks and information processing infrastructure including terminals that can provide high-speed, high-capacity communication utilizing innovative technology focused on optics, as well as tremendous computational resources※

› Key technology
  › All-Photonics Network
    › Major improvement to information processing infrastructure potential
  › Data-Centric Infrastructure
    › Deploy resources from the resource pool according to the data to be processed by a application.
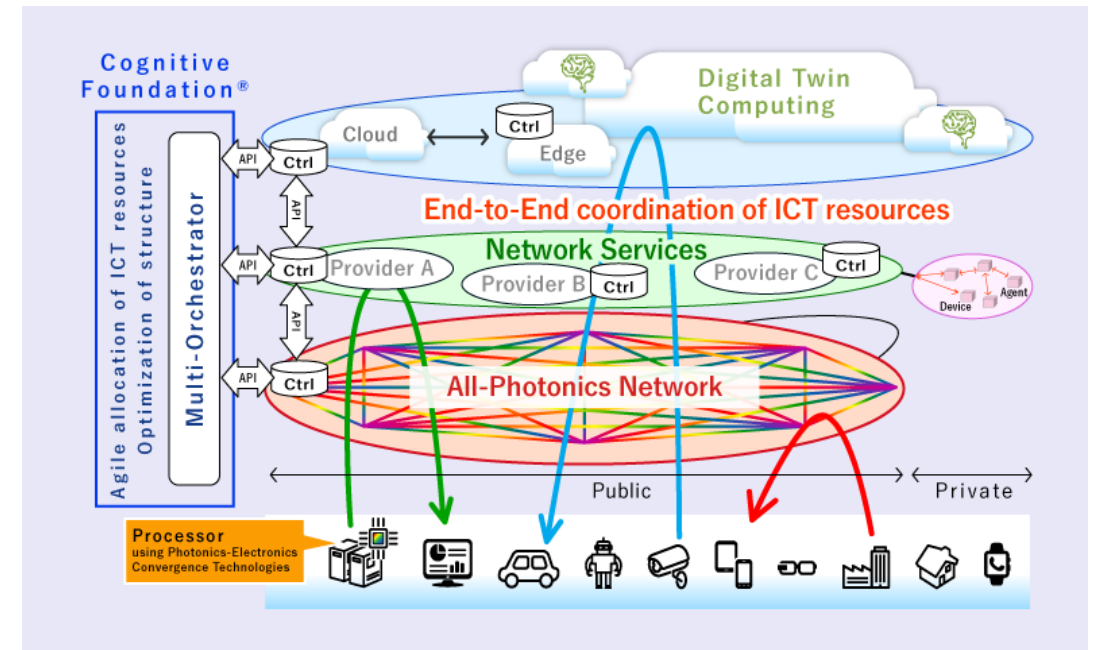
Utilization of IOWN accelerates solution of performance challenges

※ https://www.rd.ntt/e/iown/0005.html

LF and IOWN Signed MoU

› LF (Linux Foundation) and IOWN signed an MoU (Memorandum of Understanding)

› LF's collaboration with IOWN, a leader in telecommunications and computing infrastructure, will enable a one-stop innovation that considers everything from infrastructure to apps, which LF does not cover.

› Accelerate the development of integrated photonic network architecture with open source networking and IoT software (from Linux Foundation hosted projects within the ecosystem)

https://www.linuxfoundation.org/press/linux-foundation-and-iown-global-forum-to-collaborate-for-future-smart-connected-world

Synergy Between LF and IOWN

› There are several common use cases in IOWN and LF Edge. Combination of LF OSS and IOWN infrastructure technology will make these use cases more powerful. (e.g. low latency, power consumption) Therefore, we are considering a Joint PoC using a use case (Blueprint) as the theme.
The result of the PoC will promote each technology and OSS to the market.
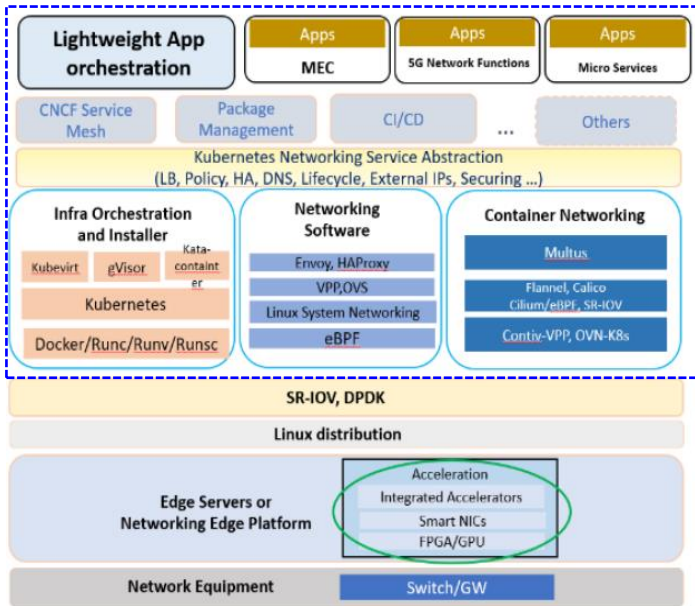

IOWN and LF edge Joint-PoC

IOWN GF

Use case Working Group
- Create future use cases
  - AI-integrated communication
  - Cyber physical system
  - Metaverse

Technology Working Group
- Reference implementation model
- All-Photonic Network
- Data-Centric Infrastructure
- Data hub

Linux foundation

LF Edge

Akraino
- Create edge use case and OSS stack
  - Robot BP
  - IEC type3 cloud gaming
  - IEC type4 AR/VR oriented edge stack

EdgeXFoundry,Fledge,EVE, HomeEdge,OpenHorizon, etc..

OPI

LF Networking

Common use cases

Infrastructure technology for higher performance

OSS to realize Edge UC

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About Joint PoC

・Step1(2023)
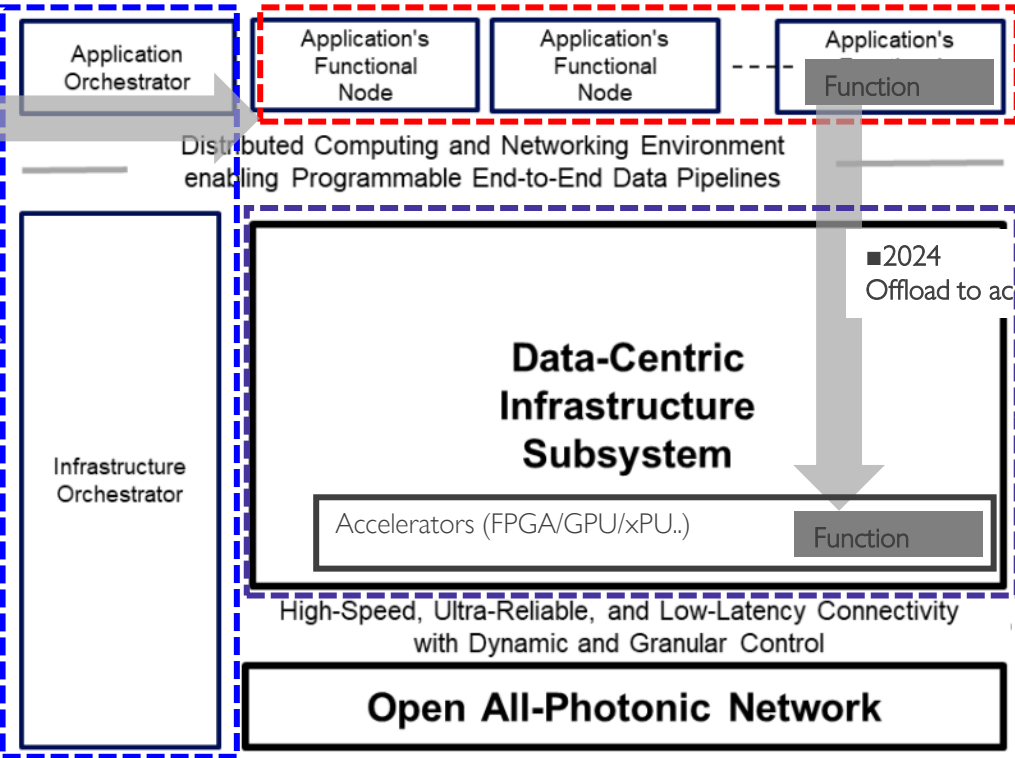Build SW stack using LF Edge Akraino Blueprint.

・Step2(2024)
Offload to accelerators to demonstrate the superiority of IOWN(6G infrastructure).

LF Edge Akraino Blueprint(Use case)
IEC type4(AR/VR) etc..

■2023
Build SW stack
Using Akraino Blueprint.

■2024
Offload to accelerators

Distributed Computing and Networking Environment enabling Programmable End-to-End Data Pipelines

Emulate with an existing CDI(Composable Disaggregated Infrastructure)

High-Speed, Ultra-Reliable, and Low-Latency Connectivity with Dynamic and Granular Control

LF Edge Akraino Blueprint IEC type2

IOWN overall architecture

Future Directions

› Currently developing use cases for a Joint PoC
› More updates of Joint PoC will be posted:
  › White paper (2023/12)
  › LF Edge industry solution showcase (2024/3)
  › ONE Summit (2024/4)

We are looking for Community Members!!!!

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