IOWN ®

From Vision to Reality

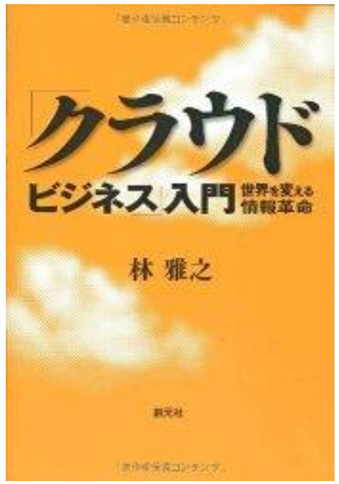
2023.10.31

NTT Communications

Masayuki Hayashi

Self-Introduction

- **NTT Communications Corporation**
  Innovation Center IOWN Promotion Office, Technology Strategy Division
  Evangelist (IOWN, Cloud, Web3, AI, etc.)
- **Visiting Reseach Fellow at GLOCOM International University**
- ITmedia alternative blog Blogger (more than 5,950 days a day/16 years)
- NewsPicks Topicks Owner
- Voicy personality
- **Twitter @masayukihayashi / @cloud_1topi**




IOWN
Open and Wireless Network
in order to contribute to the resolving of social issues and create business

IOWN Global Forum Annual Member Meeting(2023.5)

Video Message by Prime Minister KISHIDA Fumio at the IOWN Global Forum Annual Member Meeting

May 8, 2023

Tweet Share Share

[Provisional translation]

This is KISHIDA Fumio, Prime Minister of Japan.

I am truly glad to hear that so many companies, educational organizations, research institutes and related parties playing a key role for the future of IT have come together here in Japan from all over the world. I would also like to extend my heartfelt congratulations on the holding of this 3rd IOWN Global Forum Annual Meeting in Osaka.

Today, in the world, people's lives are being significantly enhanced thanks to innovations in ICT such as AI. The spread of COVID-19 has further highlighted the need for ICT. But these changes have also dramatically increased the volume of data exchanged and the power consumed for data processing, and if this trend continues, the entire world will not be able to sustain this pace. Our pursuit of convenience and prosperity for society requires global-scale innovations to reduce environmental impacts and realize the sustainable growth of society toward carbon neutrality.

I also have visited NTT Laboratories and have listened to Japanese and global researchers engaged in R&D on IOWN. IOWN can be a key to resolve common global issues, and the Government of Japan will provide firm support for it.

However, it is impossible for any one country alone to lead IOWN to success. We must bring together wisdom from every corner of the globe. The IOWN Global Forum is an international initiative gathering wisdom from all around the world.

Everyone works in unison to embody the ambitious IOWN concept of reducing impacts on the environment as well as pursuing prosperity. These are truly laudable goals, and I would like to express my respect once again.

あしたの暮らしを動画でもっとわかりやすく
政府インターネットテレビ

トップに戻る　English

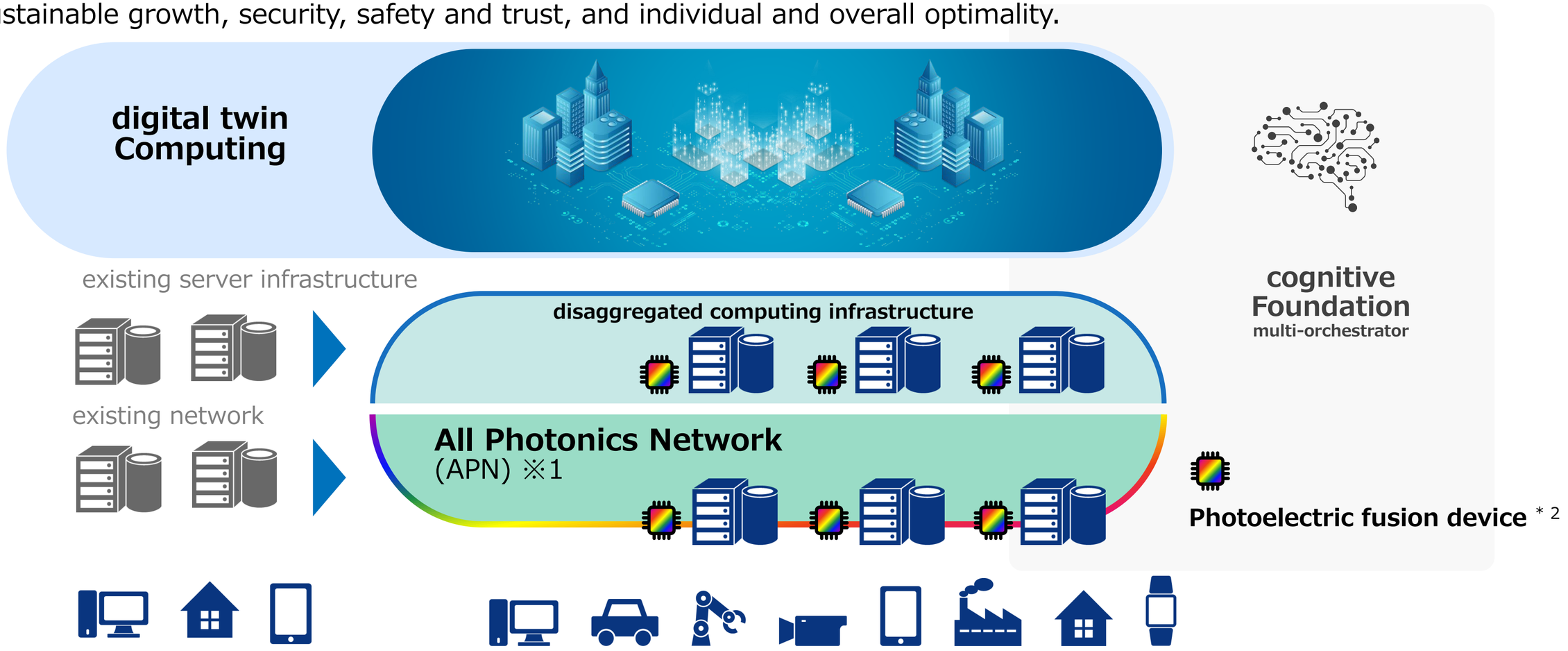
Video Message by Prime Minister KISHIDA Fumio at the IOWN Global Forum Annual Member Meeting

We must bring together wisdom from every corner of the globe. The IOWN Global Forum is an international initiative gathering wisdom from all around the world.

https://www.kantei.go.jp/jp/101_kishida/discourse/20230508contribution.html

IOWN ® (Innovative Optical and Wireless Network) Concept

NTT promotes the most advanced **concept of network and information processing infrastructure utilizing optical technology and information processing technology** toward the realization of a smart society that generates various values such as sustainable growth, security, safety and trust, and individual and overall optimality.



APN, * 1,: Realization of high capacity, low latency and low power consumption by occupying optical wavelengths in all sections of the communication network
Optoelectric fusion device * 2: Device that achieves performance improvement such as high speed and low power consumption in addition to miniaturization and economy by fusing optical and electric circuits

Source: Nippon Telegraph and Telephone Corporation

IOWN & Innovation Will Change

Smartphone without charging for 1 year (around 2030)

Two hours of movies.
To download

4G: 1 in 5 minutes
5G: 1 in 3 seconds

Download 10,000 movies of 2 hours in a blink of an eye (0.3 seconds)

Undelayed distribution of sports that can be enjoyed by remote spectators

Music ensembles, surgeries, autonomous driving, etc., from remote locations

NTT's "IOWN" is a 6G platform that challenges the world again - Nihon Keizai Shimbun (nikkei.com)

All Photonics Network (APN) Features

IOWN APN

All Photonics Network

	Low power consumption Power efficiency * 1	High capacity, high quality Transmission capacity # 2	low delay End End delay * 3
Service start point (March 2023)	1.0 times	1.2 times	1/200
final goal (After 2030)	100 times	125 times	1/200

*Provided by NTT East and West

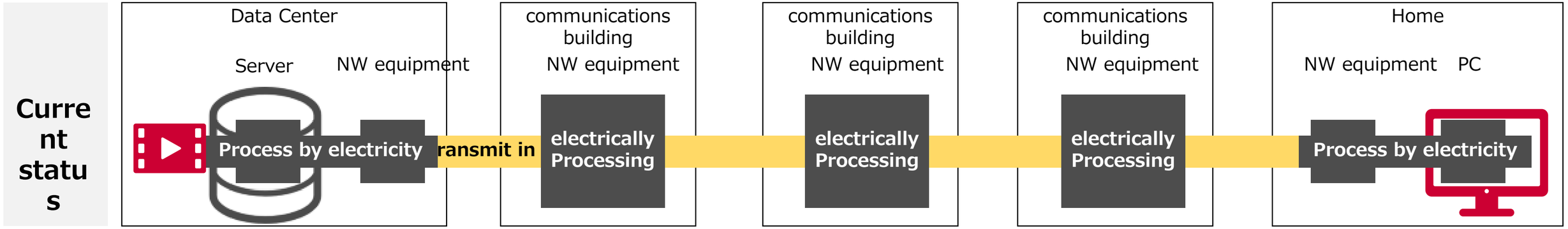
The Osaka and Kansai Expo 2025 will offer an advanced version of the current model.

*1 Target value of the power efficiency of the photonics technology application part
* 2 Target value of the communication capacity per optical fiber
* 3 Target value of the end end delay in the video traffic that does not require compression processing in the same prefecture

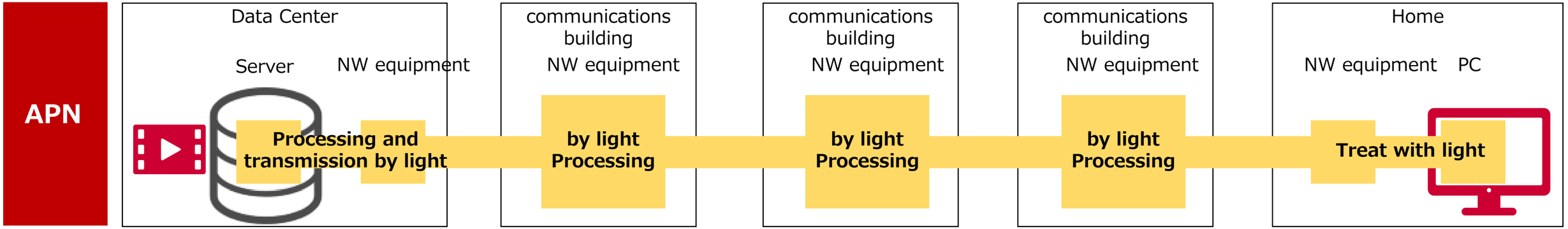
Differences between APNs and conventional optical networks

High capacity, low latency, and low power consumption by using light to process data previously processed by electricity

So far: Convert data from electricity to light to electricity ・・・, using lots of energy



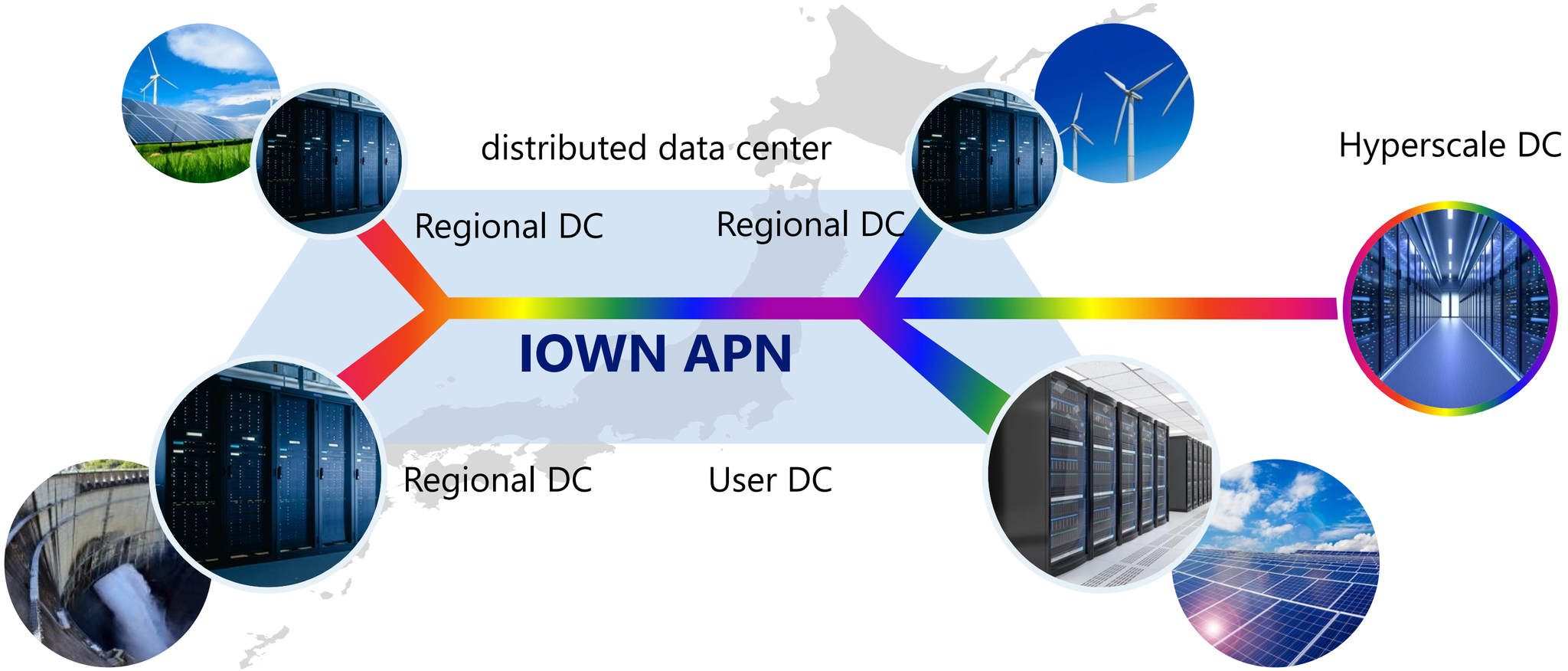
Future: Reduce wasted energy by processing data from servers to PCs with light



Connecting between user bases by optical wavelength path

Use Case: Data Center to Data Center Connection

- By connecting data centers (DCs) via APNs, functions can be distributed and high availability can be achieved. Promoting the use of renewable energy by promoting the use of local small and medium-sized data centers



Source: Nippon Telegraph and Telephone Corporation

Industries and industries with a large number of customer issues

Financial

Government offices and universities

Smart City (+ Industrial clusters)

Broadcasting and media

Construction and Real Estate

IT provider

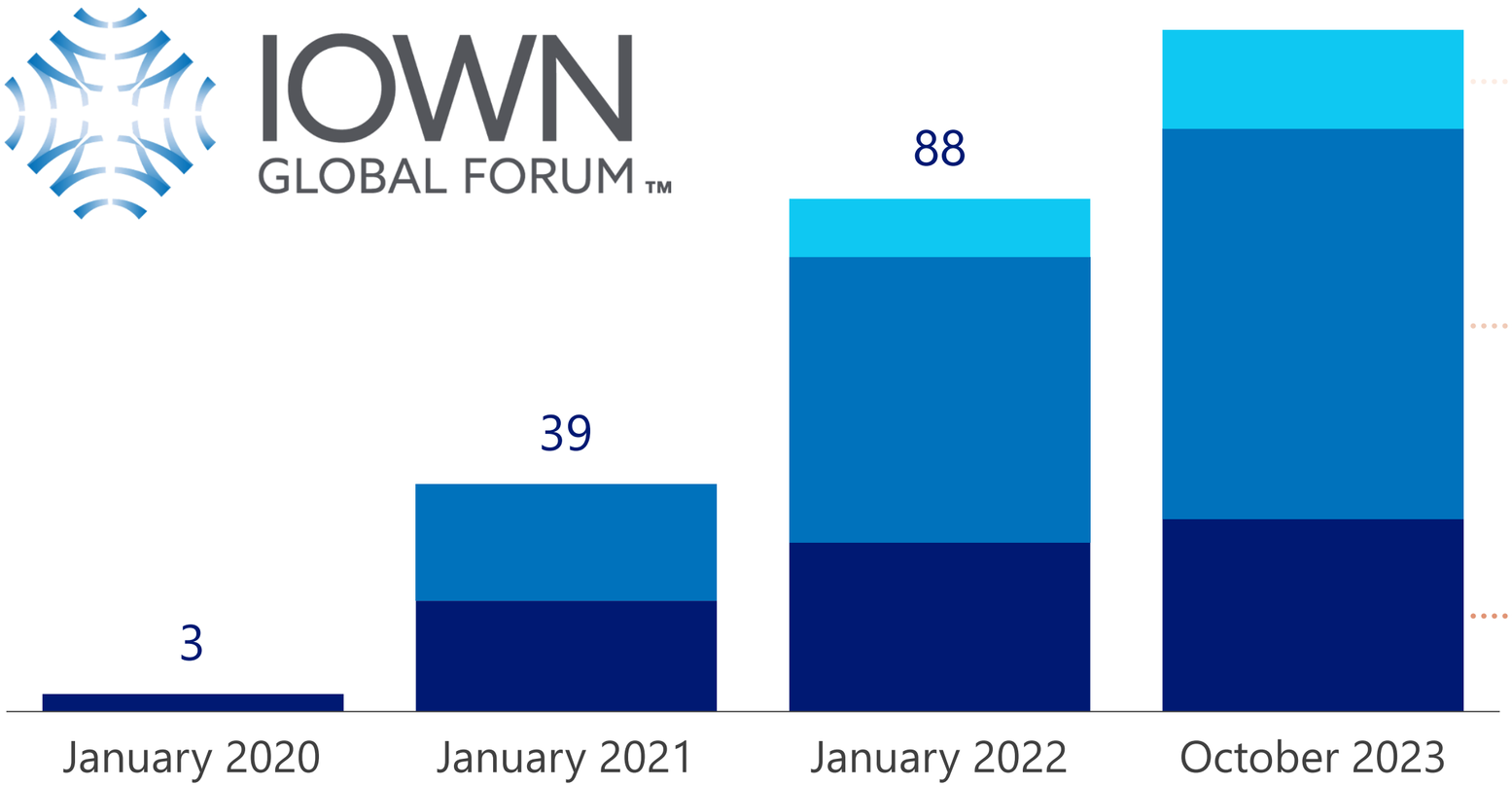
Electronics and electrical equipment

Railway and Transportation

Customers looking at medium- to long-term vision, digital strategy, infrastructure strategy, co-creation, etc. for 2030

Participation in the IOWN Global Forum

128 organizations and organizations including Asia, the United States and Europe participated * As of October 2023



Academic Research

General

Sponsor

Taiwan

中華電信 Chunghwa Telecom

ITRI Industrial Technology Research Institute

台灣雲端物聯網產業協會 Cloud Computing & IoT Association in Taiwan

財團法人資訊工業策進會 INSTITUTE FOR INFORMATION INDUSTRY

Source: Nippon Telegraph and Telephone Corporation

Activities of the IOWN Global Forum

NTT, Intel, and Sony at an International Forum for the Future of Communication
"Innovative Optical and Wireless Network (IOWN) Global Forum" established in the United States in January 2020.

Facilitate the realization of a new communications infrastructure consisting of all-photonics networks, edge computing, wireless and distributed computing through the development of new technologies, frameworks, technical specifications and reference designs

Use case selection → technical roadmap Create → Preparation of technical specifications (Example: Architecture, Requirements) → Dissemination and deployment (Cooperation with Standardization Organizations)

Use cases and applications

(Vision of the IOWN Global Forum,
Motivational use cases, potential business impact estimates, technical requirements)

- Smart Energy
- Smart City
- Smart Mobility
- Smart Finance
- Smart Entertainment

Miscellaneous Use Cases and Applications

Technical Solutions

(Reference Architectures, Protocols, Interfaces, Specifications)

- Network (Optical/Wireless)
- distributed computing
- Photonics & optoelectronics
- Device, interface terminal

Other Technologies

Establishment of a photoelectric fusion device manufacturing company

June 2023 Established NTT Innovative Devices Co., Ltd.

(**Investment of 30 billion yen** Start with, then Consider **increasing capital.)**

Solution as **to increase power consumption due to increased use of AI**

Aiming for early commercialization **of photoelectric fusion devices that realize low power consumption.**

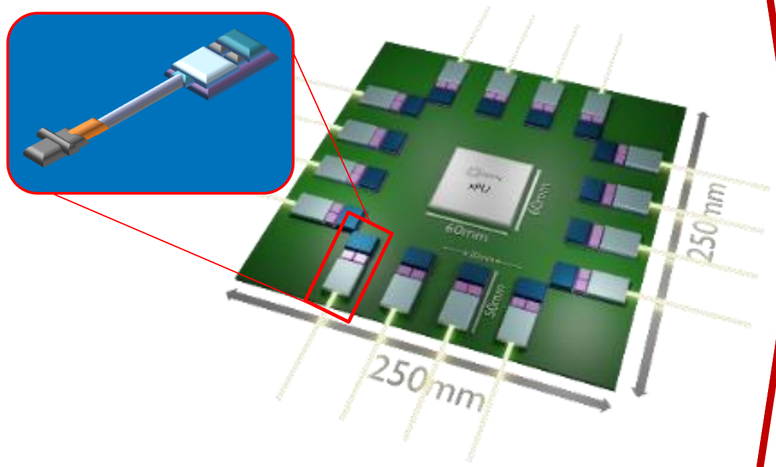
Source: Nippon Telegraph and Telephone Corporation

Roadmap for Photoelectric Fusion Devices

FY 2025 -

IOWN2.0

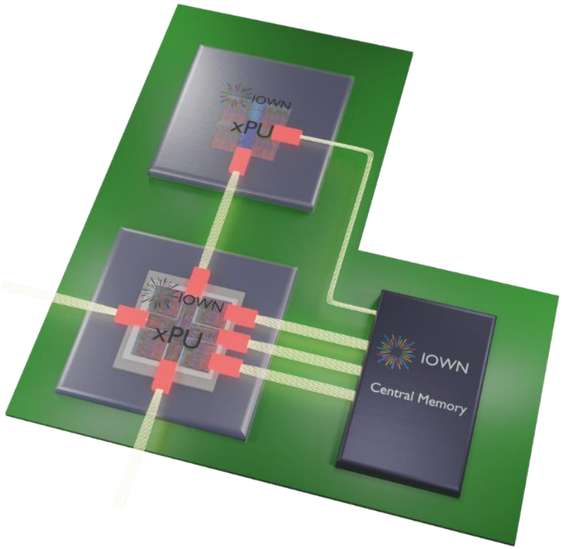
"Optical Engine"



Board Connection

FY 2029 -

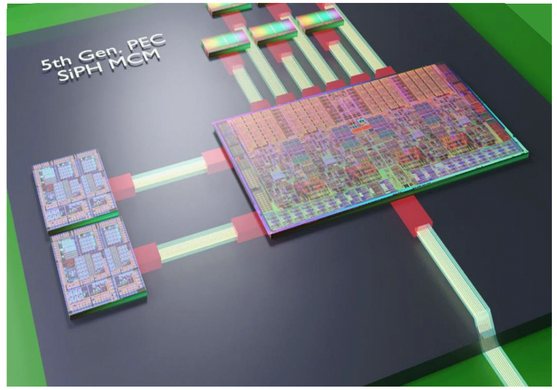
IOWN3.0



chip-to-chip connection

Fiscal 2030 or later

IOWN4.0



in-chip photonics

power efficiency 100 times

Source: Nippon Telegraph and Telephone Corporation

NTT to Visit the Yumesu Site of the Osaka and Kansai Expo Decided to offer all-photonics network

Nippon Telegraph and Telephone Corporation decided on July 20, 2023 to sponsor "All Photonics Network (Below, APN)" for the Future Society Showcase at the 2025 World Exposition (The following is the Osaka Kansai Expo.).
We will contribute to the success of the Osaka Kansai Expo by providing a network at the Yumesu venue that further evolves the APN IOWN 1.0 currently being offered.

The NTT Group will provide APNs with low power consumption, high capacity and high quality, and low delay transmission at the Yumesu site of the Osaka and Kansai Expo 2025.

By connecting major facilities such as pavilions and event facilities in the Yumesu venue, we provide a demonstration environment that enables sharing of various contents and events in the venue, and a sense of unity and immersion without feeling the distance.

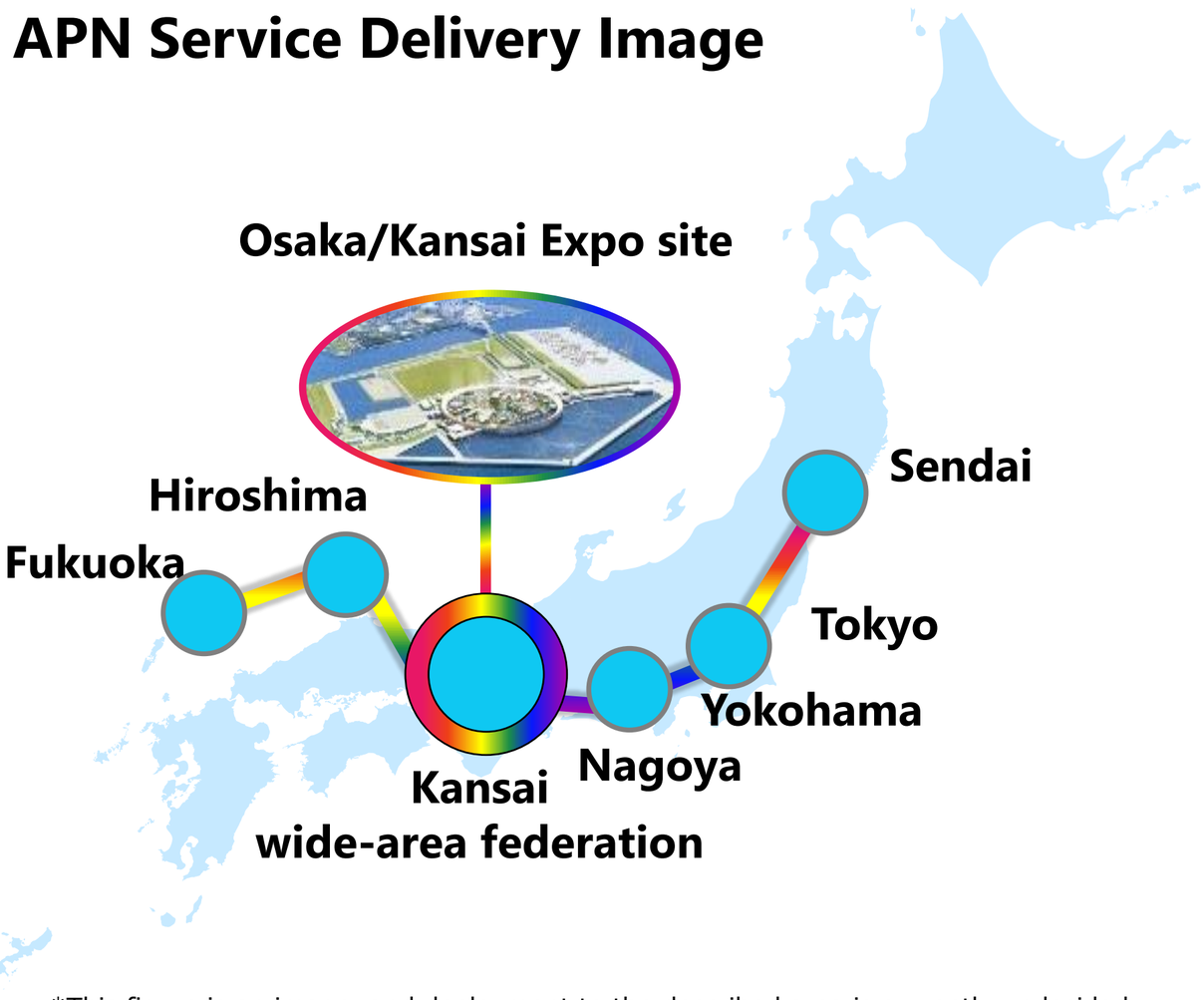
We will further advance our communications services with the experience and technological capabilities that the NTT Group has cultivated, and by co-creating with our many partners, we will realize an experience that is ahead of the future.

OSAKA, KANSAI, JAPAN
EXPO 2025

NTT decides to provide all-photonics network to the Yumesu site of Osaka and Kansai Expo | News Release | NTT (group.ntt)

Expansion of NTT's all-photonics network services

At the Osaka/Kansai Expo
APN Service Delivery Image



*This figure is an image, and deployment to the described area is currently undecided.

Fiscal 2022 -

- of an all-photonics network
  Start of early service
- Expand use cases through external partner collaboration

Fiscal 2024 -

- Demonstrate business with business partners by connecting major cities

Fiscal 2026 -

- Accelerate nationwide expansion

Source: Nippon Telegraph and Telephone Corporation Interop2023


EXPO 2025
NATURAL

NTT, Chunghwa Telecom, and IOWN Conclude a basic agreement for the realization

Nippon Telegraph and Telephone Corporation and Zhonghua Telegraph and Telephone Corporation (hereinafter referred to as Zhonghua Telegraph and Telephone Corporation have entered into a basic agreement for the realization of international network connectivity through IOWN on October 25, 2023. In the future, IOWN's innovative communication technology centered on the All Photonics Network will enable international network connectivity between Japan and Taiwan, as well as business and security cooperation related to IOWN.

President of NTT Shimada (left) and CEO of Chuka Telecom Kuo (right)

Outline of the agreement

Based on their strengths in optical and wireless transmission technologies, as well as NTT and Chunghwa Telecom's achievements in implementing these technologies in society, we aim to realize international network connectivity between Japan and Taiwan by utilizing IOWN's all-photonics network technology.
In addition, we aim to establish interfaces and international connection rules for the realization of communication transparency in international network connections.

Future development

NTT and Chunghwa Telecom aim to contribute to a prosperous society that can accept diversity through the realization of use cases utilizing various IOWN technologies through international network connections using IOWN technologies such as the All Photonics Network, which is a robust communication infrastructure.

NTT and Chunghwa Telegraph conclude basic agreement to realize international network connectivity by IOWN | News Release | NTT (group.ntt)

IOWN is:

Through co-creation,
To **Reality**

start

from Vision