一部抜粋資料

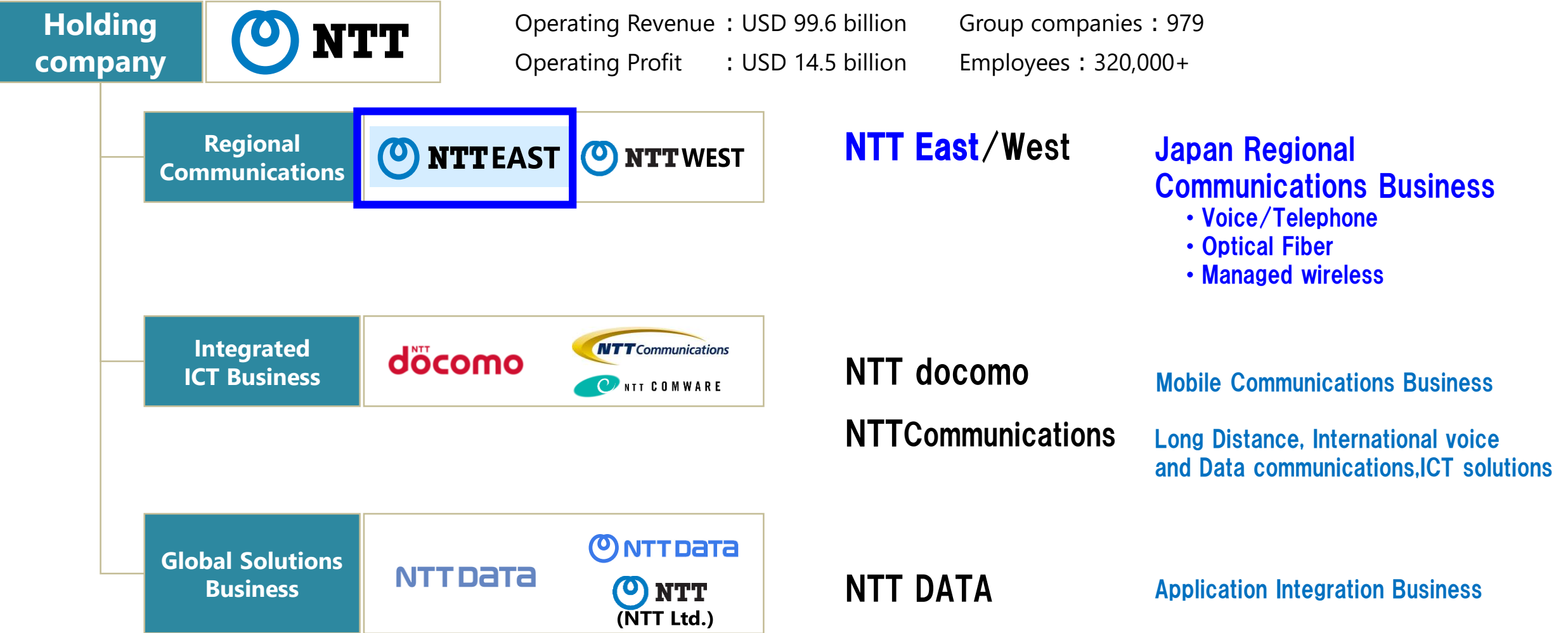# Expectations for 11ah and Taiwanese Companies

June 6, 2024
Norikazu Watanabe

Ⅰ． The World Aimed for by NTT East Group

Ⅱ． 802.11ah case study

Ⅲ. Towards further development of 802.11ah

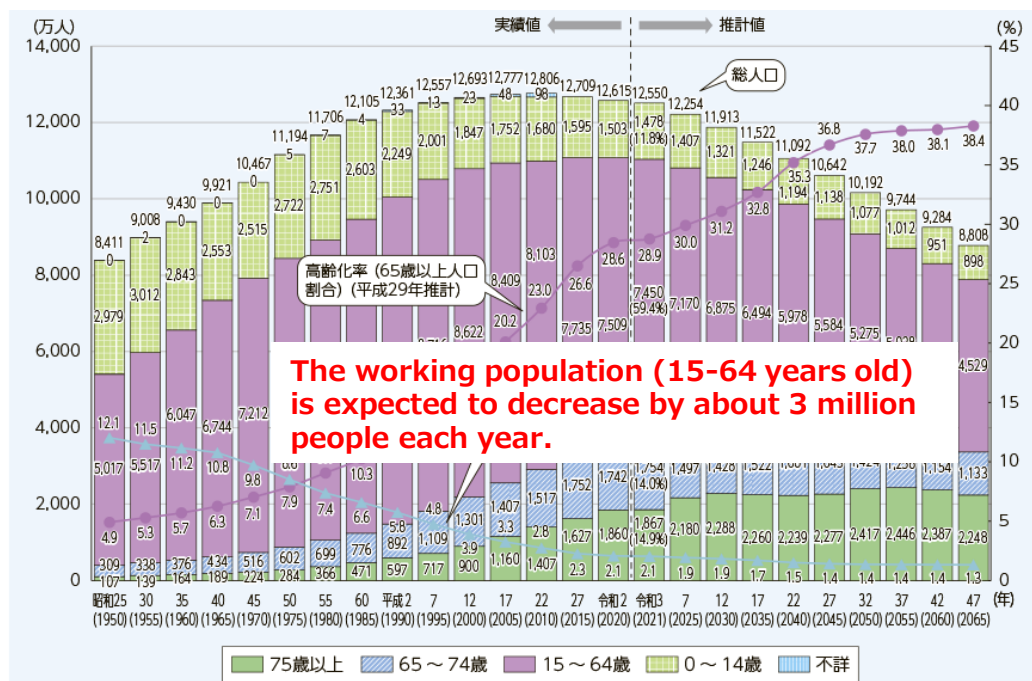# Ⅰ．The World Aimed for by NTT East Group

Introduciton of NTT East

■ NTT East is a Japanese telecom service provider.
  The main domain is regional telecommunication such as telephone and optical fiber.

| Holding company | **NTT** | Operating Revenue ： USD 99.6 billion | Group companies : 979 |
| | | Operating Profit ： USD 14.5 billion | Employees : 320,000+ |

Regional Communications	NTT EAST NTT WEST	**NTT East/West**	**Japan Regional Communications Business** ・**Voice/Telephone** ・**Optical Fiber** ・**Managed wireless**
Integrated ICT Business	docomo NTT Communications NTT COMWARE	NTT docomo	**Mobile Communications Business**
		NTTCommunications	**Long Distance, International voice and Data communications,ICT solutions**
Global Solutions Business	NTT DaTa NTT DaTa NTT (NTT Ltd.)	NTT DATA	**Application Integration Business**

NOW

- **Decrease in working population （including the future※）**
- **Difficulty in going to work due to COVID-19**

※**Aging trends and future prospects**

The working population (15-64 years old) is expected to decrease by about 3 million people each year.

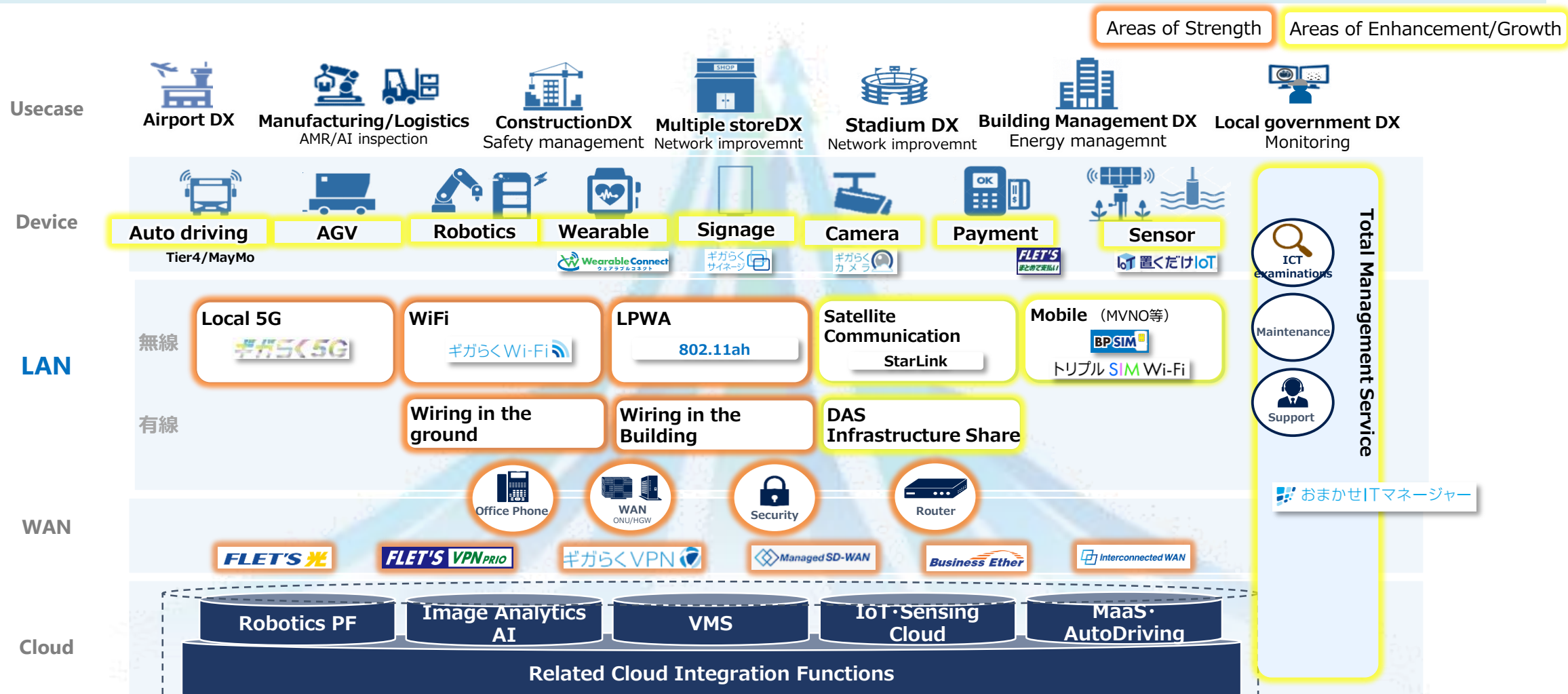Source：Cabinet Office（2022）「令和4年版高齢社会白書」

FUTURE

- **Promoting automation by utilizing the characteristics of IoT and AI**

  ✓ **Expand business scale without increasing manpower**

  ✓ **Business can be maintained even if human resources cannot be secured**

【**Ex:Automation of conveyor belt sushi**】
Leading conveyor belt sushi companies are early adopters of on-site automation

■ **DX solutions : Wireless technology , AI , IoT , Robotics will enliven Japan and the region**

■ **Developing concrete the greatest challenge "Labor shortage and manpower shortage"**

Areas of Strength   Areas of Enhancement/Growth

Usecase
Airport DX | Manufacturing/Logistics AMR/AI inspection | ConstructionDX Safety management | Multiple storeDX Network improvemnt | Stadium DX Network improvemnt | Building Management DX Energy managemnt | Local government DX Monitoring

Device
Auto driving (Tier4/MayMo) | AGV | Robotics | Wearable (Wearable Connect) | Signage (ギガらくサイネージ) | Camera (ギガらくカメラ) | Payment (FLET'S まとめて支払い) | Sensor (IoT 置くだけIoT)

LAN

無線
Local 5G (ギガらく5G) | WiFi (ギガらくWi-Fi) | LPWA 802.11ah | Satellite Communication StarLink | Mobile （MVNO等） BP SIM トリプル SIM Wi-Fi

有線
Wiring in the ground | Wiring in the Building | DAS Infrastructure Share

Office Phone | WAN ONU/HGW | Security | Router

WAN
FLET'S 光 | FLET'S VPN PRIO | ギガらくVPN | Managed SD-WAN | Business Ether | Interconnected WAN

Cloud
Robotics PF | Image Analytics AI | VMS | IoT・Sensing Cloud | MaaS・AutoDriving

Related Cloud Integration Functions

Total Management Service
ICT examinations | Maintenance | Support

おまかせITマネージャー

Ⅱ. 802.11ah Case Studies

Major examples so far

Advancing demonstrations utilizing 11ah for various applications in collaboration with local partners.

Project	Field	Needs	Points for selecting 11ah
Farm Field monitoring	Farm Field	• Countermeasures against crop theft • Monitoring of illegal dumping	• Real-time video
Fishery Monitoring	Lake	• Deterrence against illegal Fishing • Efficiency of water temperature surveys	• Real-time video • Sensing
Factory Facility Monitoring	Large-scale factories	• Efficiency of data acquisition through retrofits to existing equipment	• Utilization of high-quality still images • Sensing
Environmental Monitoring	Golf courses	• Remote monitoring of environmental turf conditions • Confirmation of course progress	• Utilization of high-quality still images • Real-time video
Water Level Monitoring	Urban areas	• Reduction of patrol operations in flood-prone waterways near urban areas	• Utilization of high-quality still images
Communication means for Forestry Workers	Mountainous areas	• Communication in areas with poor mobile reception	• Wide-ranging use • Utilization of IP devices

■ **To address issues such as illegal dumping, crop theft, and wildlife damage in fields, we utilize real-time video.**

■ **Multiple issues can be addressed through the use of video.**

Problems

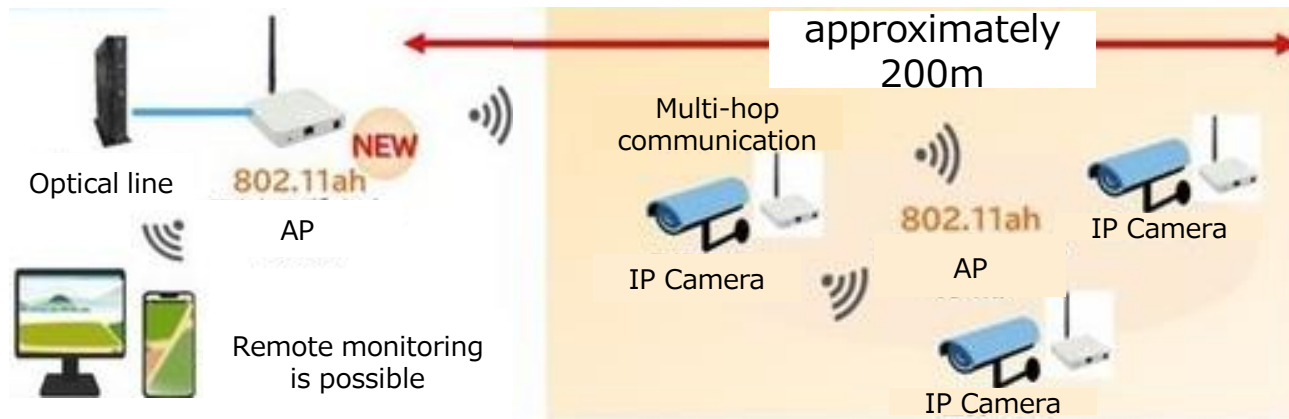| Prevention of Illegal Dumping	Prevention of theft of agricultural products	Prevention of Damage to Wildlife

Improvements with 11ah

Remote Situational Awareness and Information Accumulation

Using cameras to solve various problems

[Demonstration image]

Optical line

NEW
802.11ah

AP

Remote monitoring is possible

approximately 200m

Multi-hop communication

802.11ah

IP Camera

IP Camera

AP

IP Camera

IP Camera

<Actual photos >
Capable of recognizing people

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[Fishing ground monitoring] Poaching monitoring, water temperature sensing

NTT 東日本

■ **Video and water temperature sensing reduce the workload of illegal fishing surveillance and water temperature surveys**

■ **Using 11ah, video can be transmitted over a distance of approximately 1km, enabling combined use with sensing**

[Demonstration image]

50m

11ahAP

11ah RP
+
Water Temperature Sensor

1km

11ah Camera
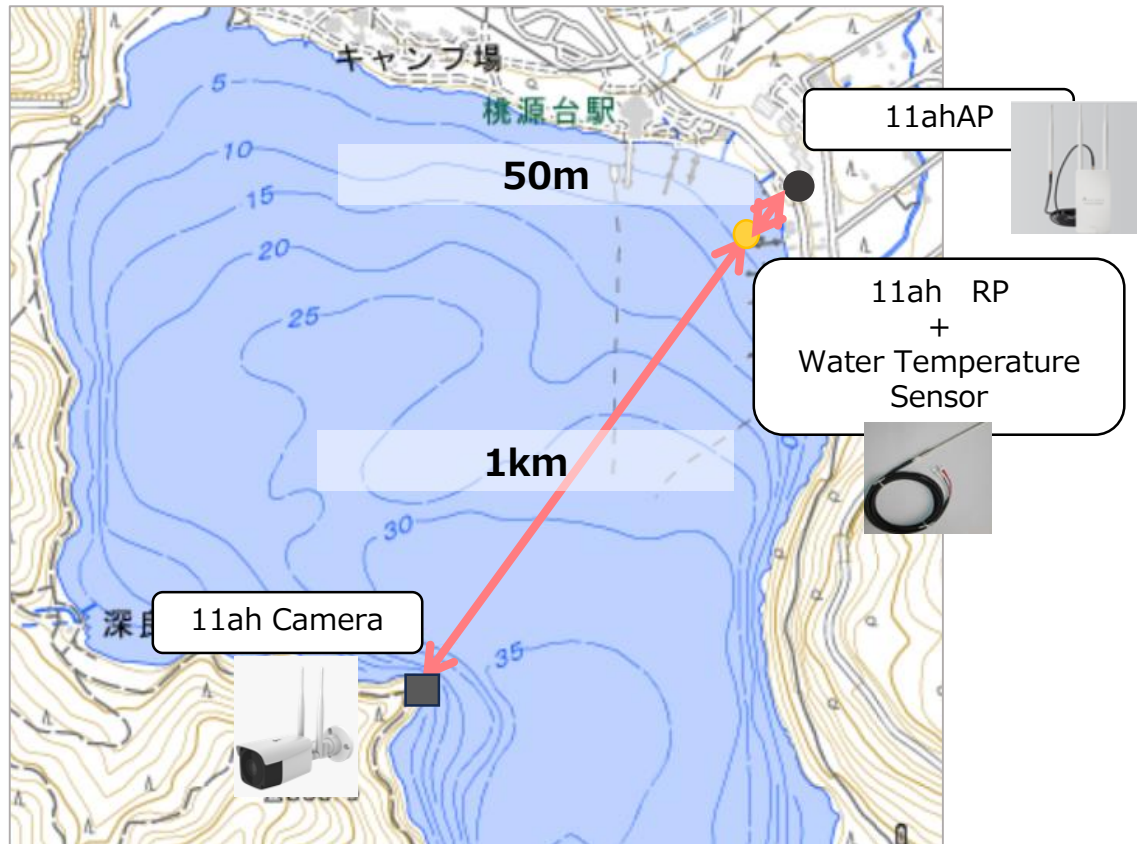
Problems

Preventing poaching

Providing water temperature information to recreational fishermen

Large amount of patrol and inspection work

Improvements with 11ah

Remote situation assessment, data accumulation, and reflection

Water Temperature Data

<Actual photo >
People can be identified

11
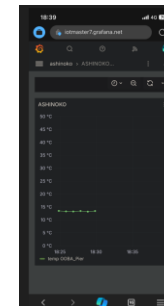
■ **Improve efficiency by using cameras/sensors to inspect the numerous devices in factories**
■ **AI recognition for gas flow meters using still images. In addition, it contains numerous current sensors and can monitor equipment remotely.**

[Demonstration image]

11ahAP

Wi-Fi HaLow

11ah Current Sensors

11ah Camera

Switchboards, etc.

Gas Flow Meter
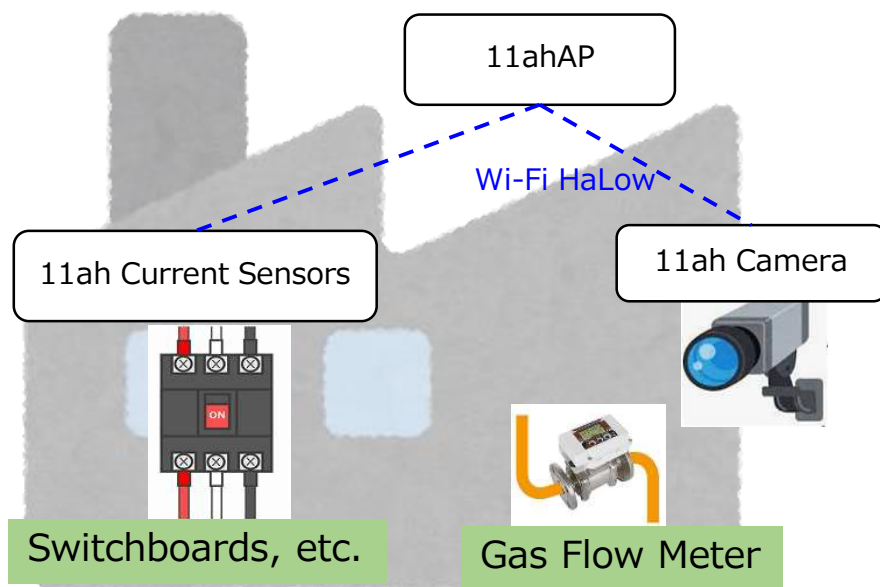
A large number of sensors can be accommodated in one network
→6 APs, 28 sensors, 6 cameras in the entire factory

Problems

· Difficult to obtain data from old equipment
· Analog operations using paper, etc.
· Inspection operations are burdensome in large factories

Burden of inspection operations
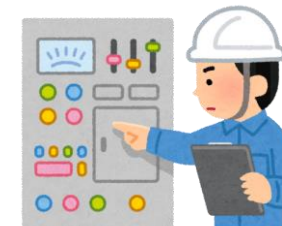
Improvements with 11ah

Remote situation assessment and information accumulation

· Retrofit cameras and sensors to old equipment to acquire data
· Remote equipment monitoring possible

<Actual gas flow meter photo>
AI recognition of camera images

NTT 東日本

- **A requirement to use video to monitor the progress of users over a wide area of the golf course**
- **In addition, we are considering reducing the number of daily inspections by capturing high-quality still images of the condition of the grass at 11ah.**
- **Since it will be used in a wide area and in places where wiring is difficult, measures such as solar panels are required.**

Problems

Understanding the user's progress

Turf condition monitoring

The course needs to be inspected regularly

Improvements with 11ah

・It is possible to build a network over a wide area that cannot be reached by normal Wi-Fi.

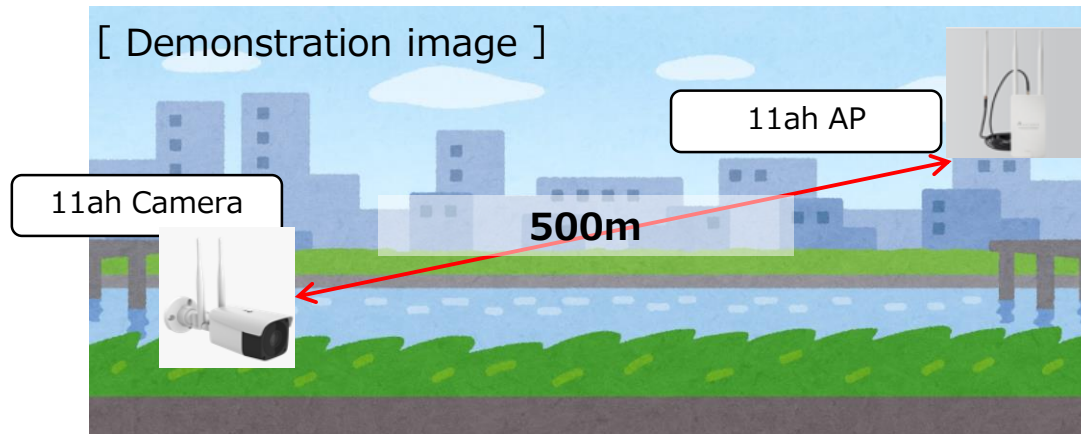・Compared to other LPWA standards, it is possible to transmit high-quality images and videos.

[Demonstration image]

Wireless communication via 11ah

11ah Camera

11ah cloud

office

Golf course

<Actual photo> People can be identified

NTT 東日本
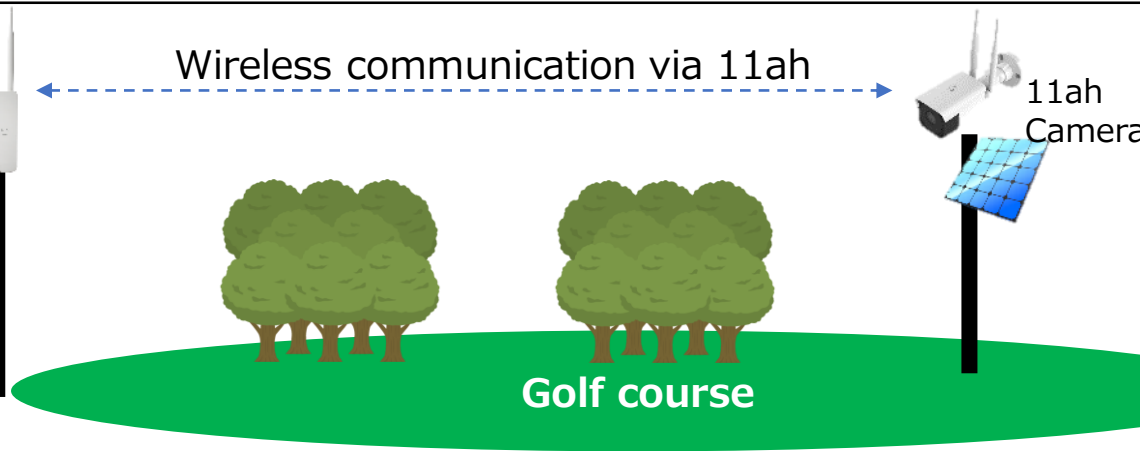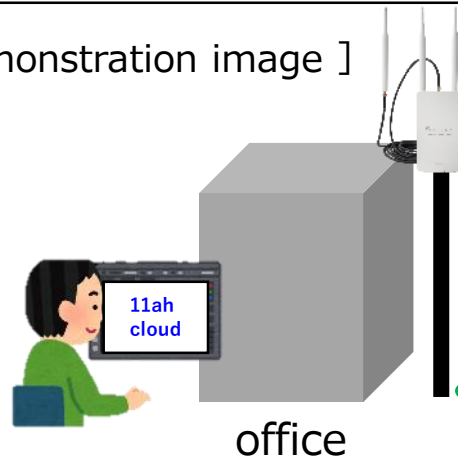
■ **There are many areas at risk of flooding, making patrols difficult.**
■ **By utilizing 11ah, water levels can be monitored with high-resolution still images day and night.**

[Demonstration image]

11ah AP

11ah Camera

500m

2023/12/18 15:53:24 nagai kasen1

\<Photo of an actual river\> Image quality that allows the water level to be read

Problems

There are **many river flooding areas near urban areas**, and patrol operations are required.

Improvements with 11ah

Regularly monitor water levels in areas at risk of flooding remotely
→**Reduce staff workload**

2023/12/19 03:09:39 motomachi river

\<Photo of an actual river\> River conditions can be monitored even at night

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- **In mountainous areas where forestry work is carried out, mobile phone signals often do not reach, so it is necessary to secure other means of communication.**
- **Using 11ah to create a wide-area radio wave environment. Improve the work environment, such as using operation apps and making emergency contacts.**

Problems

Contact in areas with no cell phone reception

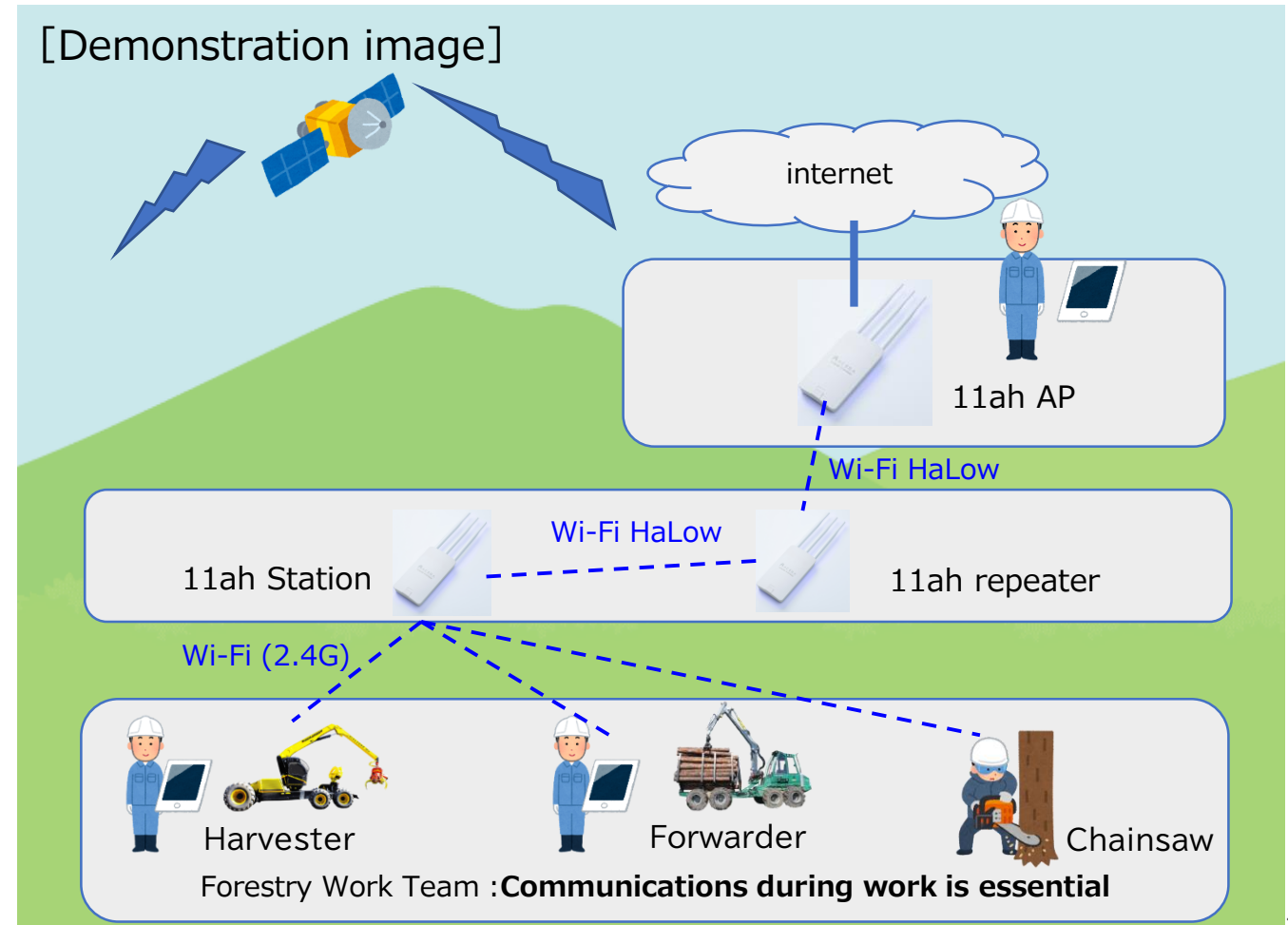Acquisition of location information

Improvements with 11ah

Use of messages and voice communications

By building a wide range of radio waves, it will be possible to communicate in emergencies.

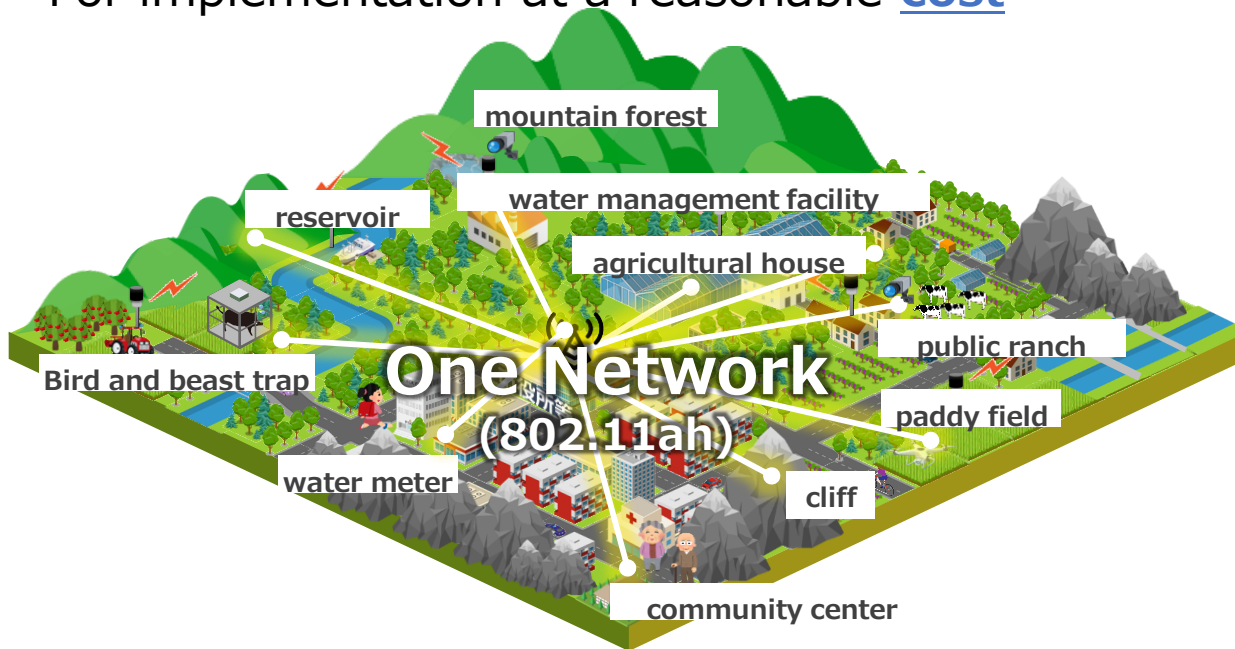[Demonstration image]

internet

11ah AP

Wi-Fi HaLow

Wi-Fi HaLow

11ah Station

11ah repeater

Wi-Fi (2.4G)

Harvester

Forwarder

Chainsaw

Forestry Work Team : **Communications during work is essential**

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Ⅲ. Towards further development of 802.11ah

In local government private wireless network and multi-use model

- ■ **Started proposing a single network with wider coverage than Wi-Fi based on 802.11ah.**
- ■ **We are making proposals to local governments to reduce costs by creating a single network that can cover multiple uses (multi-use).**

The following can be achieved with **one network**

- ✓ Communication **speed** that is sufficient to use the **camera.**
- ✓ **Wider coverage area** than Wi-Fi
- ✓ For implementation at a reasonable **cost**

mountain forest
water management facility
reservoir
agricultural house
Bird and beast trap
public ranch
One Network
(802.11ah)
paddy field
water meter
cliff
community center

Multi-Use

Ensuring the safety of forestry workers

Sending SOS and understanding location information by attaching a terminal
⇒**Preventing industrial accidents for forestry workers**

Watching over children and the elderly

Location information confirmation, life sensing
⇒**Improving the quality of monitoring**

Water meter reading

Water leak detection and flow monitoring using remote automatic meter reading
⇒**Improving meter reading efficiency and saving labor**

As experts in wireless and wired communications, NTT East Group will promote the expansion and use of 11ah.
Together with Taiwanese companies, we will contribute to the promotion of 11ah.

We especially expect manufacturers to
- The **video quality is better** than existing.

- Expansion of device lineup
  ・Addition of various sensors, cameras, GW, and wearable devices

- Power saving and portability with built-in power supply
  ・GW, camera, sensor

- Promotion of interconnection between manufacturers and cost reduction　etc

✓ It is often used outdoors, and there are high expectations for its **low power consumption.**

✓ Various application areas are becoming more specific in terms of both **performance and cost**, and we would like to move beyond PoC to **social implementation**.

Private wireless lab 「vLab」

We will introduce the expectations for private wireless, which has entered a new era, and **the new wireless technology devices** that form it, such as IEEE802.11ah and Wi-Fi6E, as well as **exhibit use cases** that combine these wireless systems.

The facility is now open to the public as a facility where you can think of new ways to promote business DX and utilize IoT implementation.
As NTT e-city Labo, we accept inspections from local governments, companies, and organizations.

Actual machine exhibition

Use case exhibition

Agriculture, forestry and fisheries, livestock fields

Smart factory/smart home

【location】**NTT East Central Training Center** （NTT e-city Labo）　（1-44 Irumamachi, Chofu, Tokyo）
https://business.ntt-east.co.jp/content/regional_revitalization/labo/