NTT East's Best-Mix Network Strategy and Wi-Fi HaLow Deployments

NTT東日本の無線ネットワーク戦略とWi-Fi HaLowの導入事例を紹介し、多様な産業・公共分野での活用を提案してい

New Business Development Headquarters
Norikazu Watanabe

Agenda

Ⅰ. Introduction to NTT East Inc.

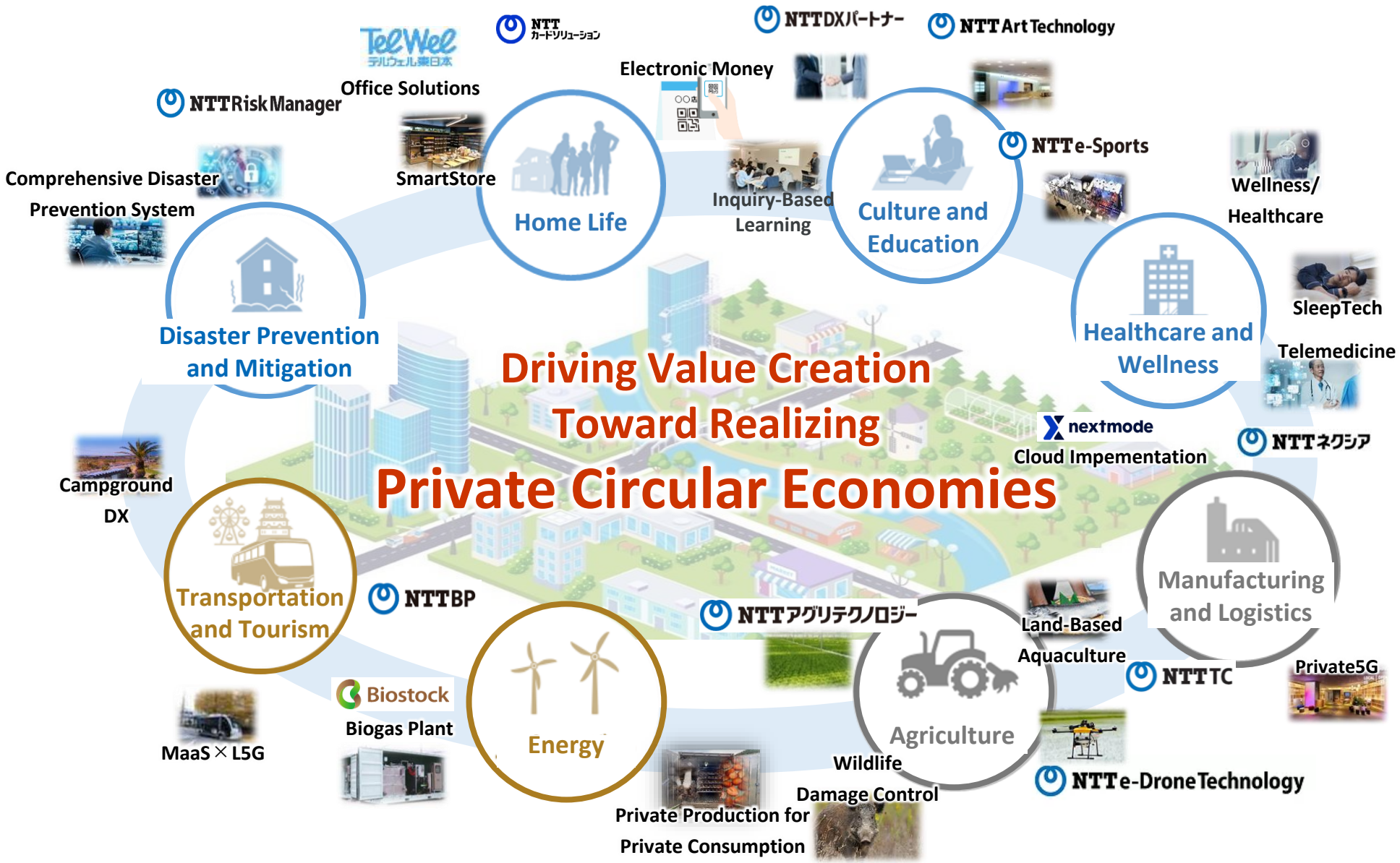
Ⅱ. NTT East Group’s Wireless Lineup and Topics

Ⅲ. Latest Case Studies of Wireless + DX Solutions

Ⅳ. Conclusion

I . Introduction to NTT East Inc.

NTT East's initiatives



NTT East Group's wireless business

- **Expanding into IoT/robotics with strengths in connectivity –especially optimized private wireless-.**
- **Solving labor shortages via connectivity × AI/digital twins × on-site execution.**

Existing Capabilities　Core Domain（LAN/Wireless）　Growth Domains triggered by LAN/Wireless

Industry-Specific DX

Transportation: Autonomous Driving
Factory: AGV/AMR Control
Delivery,Security: Cooperative Control
Marketing: AR Promotion, Human Flow Analysis
Disaster Prevention: Awareness, Simulation

Device: AV BUS, AGV, Robotics, Drone, Wearable, Signage, Camera, IoT Sensing

LAN

Wireless: Private 5G, Wi-Fi（ギガらくWi-Fi）, HaLow 802.11ah, LPWA, Satcom StarLink, Mobile※MVNO トリプルSIM Wi-Fi
Wired: LAN wiring, Optical wiring, Infrastructure sharing

WAN

FTTH, IOWN APN, VPN, Leased line

Cloud

Factory Facilities, Construction Site, Airport, CF, Roads

3D Digital Twin・Physical AI

Robotics PF, AI video analysis, VMS, IoT PF, MaaS･AV

Cyber-and-Physical

Engineering Capabilities

BPO/ITO
- Regional Engineering Resources
- Service Delivery

Security
- UTM
- Unti-virus
- Education Training
- Risk Assessment

Rising Importance of Private Wireless

- **Industrial demand → wireless usage & data volume growing.**
  Advanced requirements (low latency, reliability) → single standard insufficient
- Carrier constraints + evolving standards.
- Need for private wireless deployment where needed.

Demand Trends

<Industry DX → rising wireless & data demand>

- **Expanding wireless demand**
  - **Mobility (robotics, autonomous driving)**
  - **Massive connections (sensors) + virtualized connectivity**
- **Advanced requirements**
  - Real-time control / Low latency / Handover
  - Network design for scale, coverage, and uplink traffic

Supply-side changes

<Carriers>

- Limited CapEx efficiency; full industrial coverage difficult
- **Shared public networks → variable QoS**
- **Higher frequency(5G/6G/7G) → shorter range, weaker coverage**

<Technology-specific challenges>

- Wi-Fi: QoS issues (interference, AP control limits, range)
- Satellite: indoor coverage limits (factories/buildings), mobility, capacity

Single standard limitations
Capacity constraints

Need for hybrid private wireless + multi-RAT integration

Carrier efforts alone fall short of industrial requirements

Ⅱ. NTT East Group’s Wireless Lineup and Topics

Multi-access private network

Contributing to industrial DX and solving regional issues

through Private 5G/Wi-Fi HaLow and other multi-access private networks providing best network solutions combining wired and wireless networks.

Combine the best NW fitting the application

Managed･Wi-Fi『Giga Raku Wi-Fi』

Cloud-based managed Wi-Fi service with 400,000 Aps in operation,
One of the largest managed Wi-Fi services for enterprises in Japan.

Approximately 400,000 Aps in operation (March 2026)

Managed Wi-Fi: GigaRaku Wi-Fi High-End 7 (Aug 2026)

NTT EAST

Cloud-managed Wi-Fi 7 (IEEE 802.11be) with support
6GHz + Wi-Fi 7 features → stable in high-density environments

Cisco/CW9174I

High-End 7 Features

- ■ Wi-Fi 7: high throughput / high capacity (max 11.5Gbps, ~4×)
- ■ Stable with many devices (~150 concurrent connections)※1
- ■ Plug & play via LAN (pre-configured AP, no onsite setup)※2
- ■ Daily support 9:00–21:00 (remote troubleshooting)

※1 Concurrency depends on environment and router performance
※2 Existing configs (e.g., static IP) may require changes; phone support available

Wi-Fi 7 Key Features

6GHz Band — Clean spectrum → stable connectivity
- Less interference (no overlap with legacy / DFS)
- Reduced contention → higher stability

MLO — Multi-band use → low latency, stable
- Dynamic band selection (2.4/5/6GHz)
- Seamless failover → no session drops

320MHz Bandwidth — Wider channel → higher throughput
- Higher data volume per transmission
- Smooth for HD video / large files

Multi-RU — Efficient concurrent transmission
- Fine-grained RU allocation per user
- High concurrency → reduced congestion

Managed Private 5G: GigaRaku 5G

NTT EAST

- **Leading Private 5G** package in Japan market.
- **Main + Select plan (integrated compact base station).**

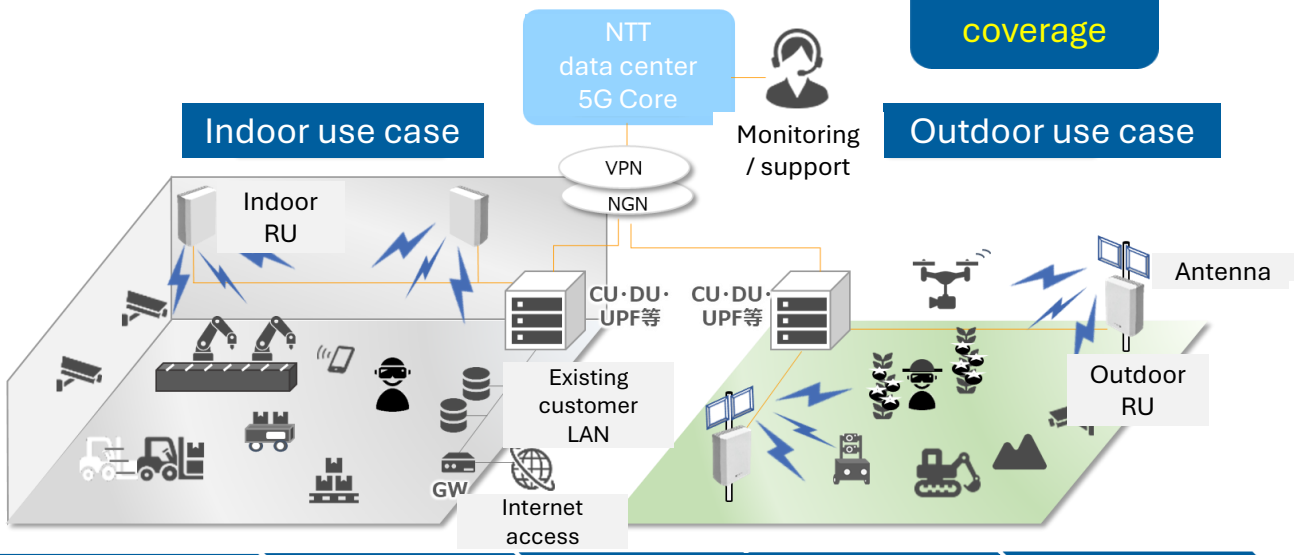
Main Plan

- End-to-end ITO (design, build, operate) with 5G SA

5G ギガらく5G

MMRI 2022
MM総研大賞
スマートソリューション部門
ローカル5G分野
最優秀賞

Nationwide coverage



RF simulation → Site acquisition / network design → License/application support → Network / solution build → Operations / customer support

Select Plan

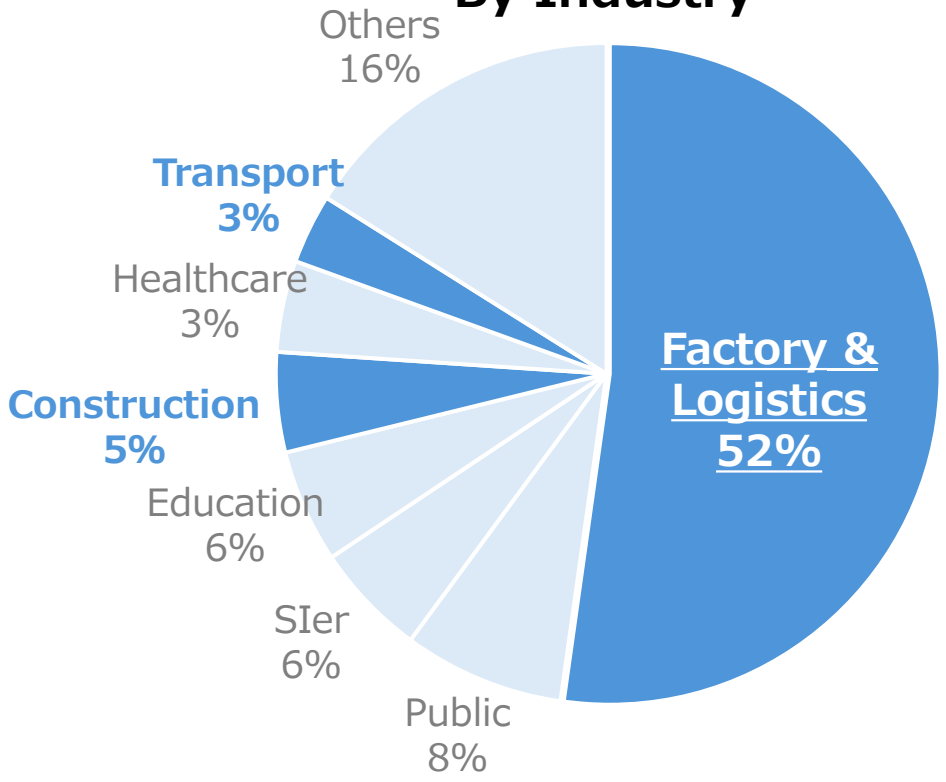
- Integrated base station (servers bundled) → simplified deployment

RF simulation → Site acquisition → License/application support → Network / solution build → Operations / customer support

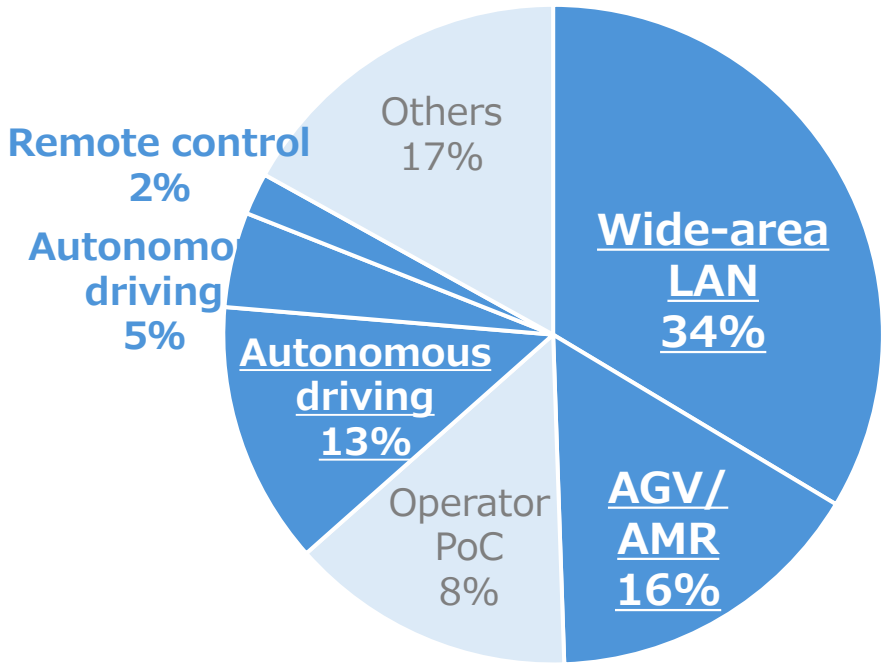
Private 5G Pipeline Overview

- **>1,000 inquiries; ~50% Mfg & Logistics.**
- **Trend shift: cost down + advanced DX connectivity demand.**
- **Use cases: wide LAN → AGV/AMR control.**
- **Expanding to robotics: autonomous driving / remote ops.**

By Industry



By Use Case



The adoption of Wi-Fi HaLow in Japan

- Device ecosystem expansion + 850MHz band study → accelerating adoption.
- NTT East: ongoing R&D and field trials.

Device Ecosystem Expansion

Smartphone integration (Kyocera)

Mass production of modules (Murata)

長距離Ｗｉ－Ｆｉ部品量産

遠隔管理向け、村田製作所など普及にらむ

今後活用が見込まれる領域

監視	数百メートル離れた場所から工場の出入り口や設備の映像を送信
設備管理	工場内の生産設備やロボットのソフトウエアの更新
情報収集	流量計や温度センサーなど、長距離での有線通信が難しい場での データ収集
自動運転	重機や建機の位置や映像、地図データの受送信

Expanding lineup (global vendors)

850 MHz Expansion Potential

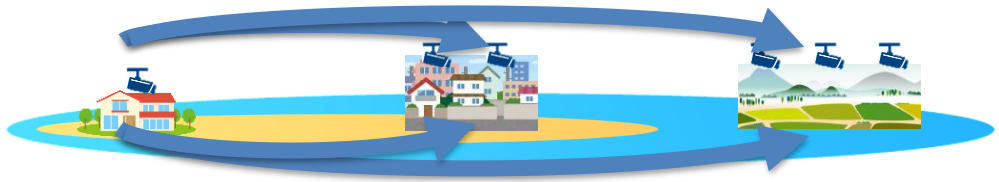
Current : 920 MHz

＋

New band: 850 MHz

- No duty cycle → higher throughput
- Up to 200 mW → extended coverage

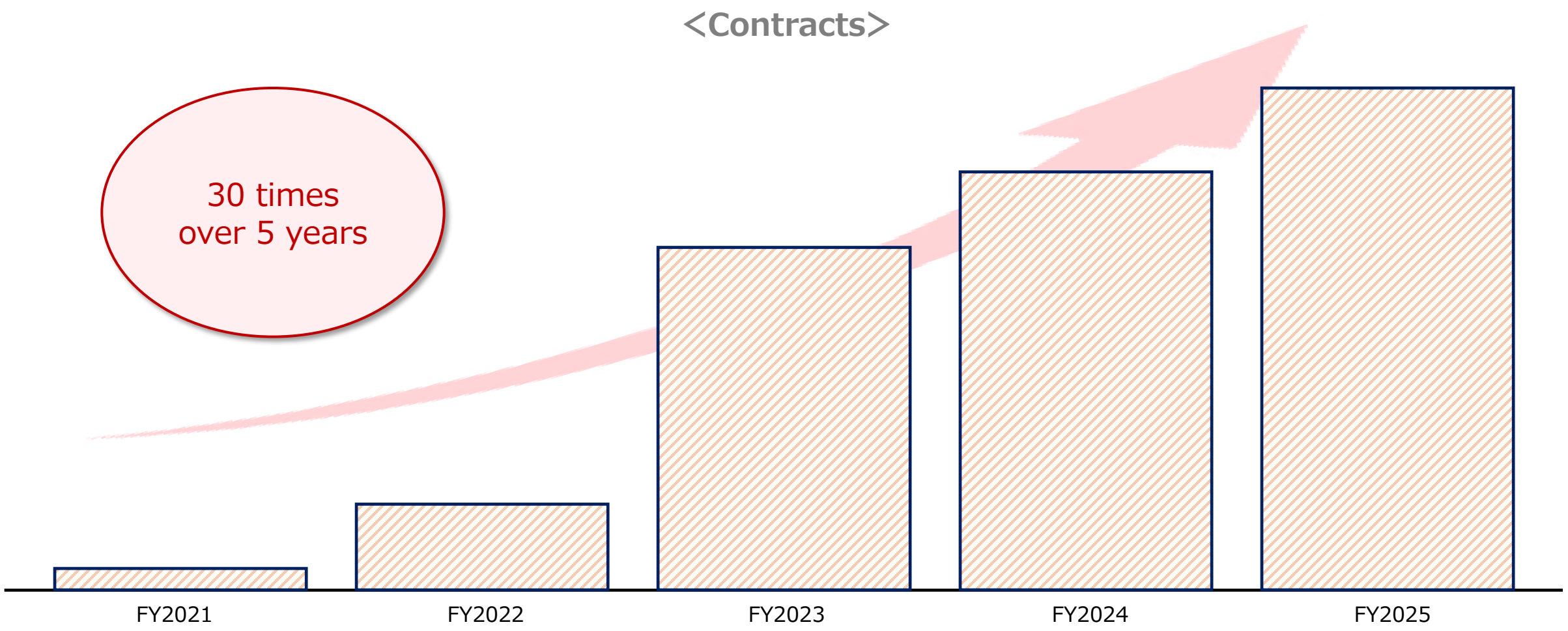
Expanded use cases



Wider coverage

Activity Results of Wide-Area Wireless/IoT Projects

- Providing LPWA (802.11ah, LoRaWAN, etc.) as basic infrastructure to municipalities.
- Since 2021, we have accumulated many cases of municipal and wide-area IoT.
- From 2023 after, projects utilizing 802.11ah (Wi-Fi HaLow) has been increasing.



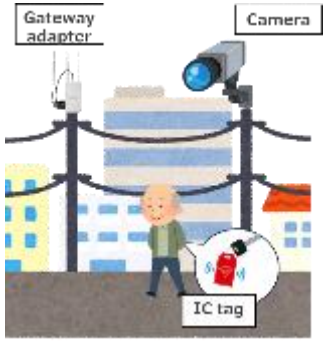
Wi-Fi HaLow Current Status and Outlook

- Indentified key use cases in **public and industrial environments**.
- Rising demand for **camera-based safety and efficient inspections in non-coverage areas**.

Public/wide-area

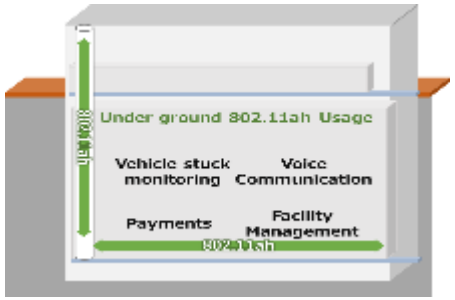
Remote monitoring

Watching over Private residents



Industrial/in-plant

In-building basement wireless



Facility Inspection DX

Ⅲ. Latest Case Studies of Wireless + DX Solutions

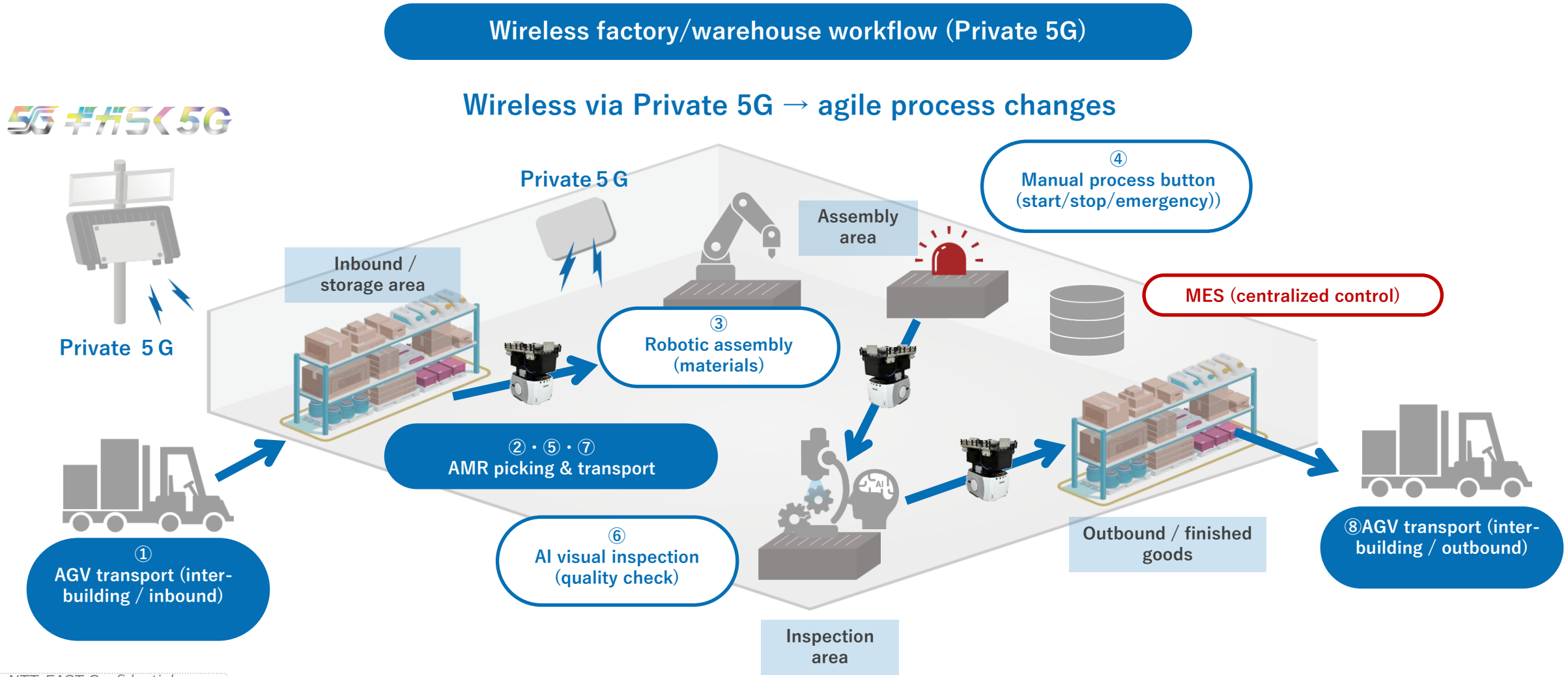
Manufacturing & Logistics

<Powered by Private 5G>

High capacity	Wide coverage	Seamless handover	Ultra-low latency

Smart Manufacturing & Logistics with GigaRaku 5G

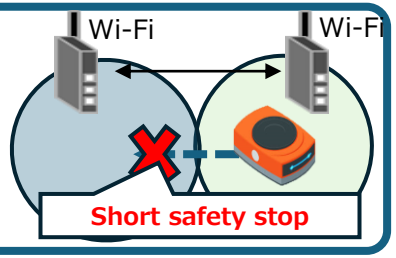
- **Frequent process changes for efficiency and competitiveness.**
- **Unified wireless infrastructure → flexible operations & rapid response.**



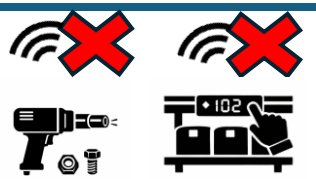
Common Infrastructure Issues in Factories

With increasing wireless use in smart factories, even brief connectivity losses can cause downtime. This slide summarizes four key causes.

①Dropout during Wi-Fi AP handover



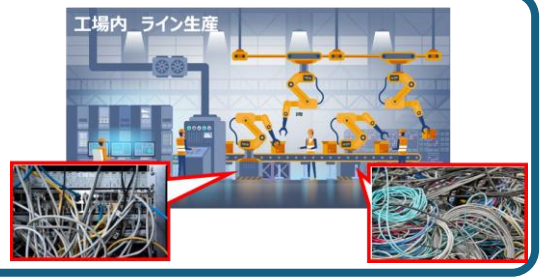
②Congestion from increased device connectivity



Hundreds of units

③Areas without carrier signal coverage in factories

④ayout constraints due to extensive cabling

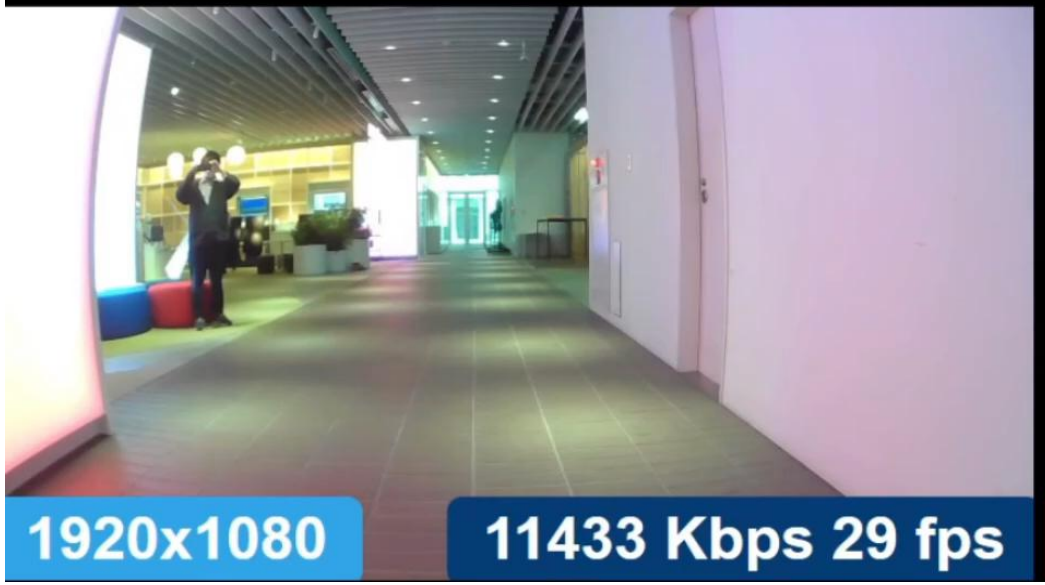


Solution①: Private 5G–Wi-Fi AP Handover Test

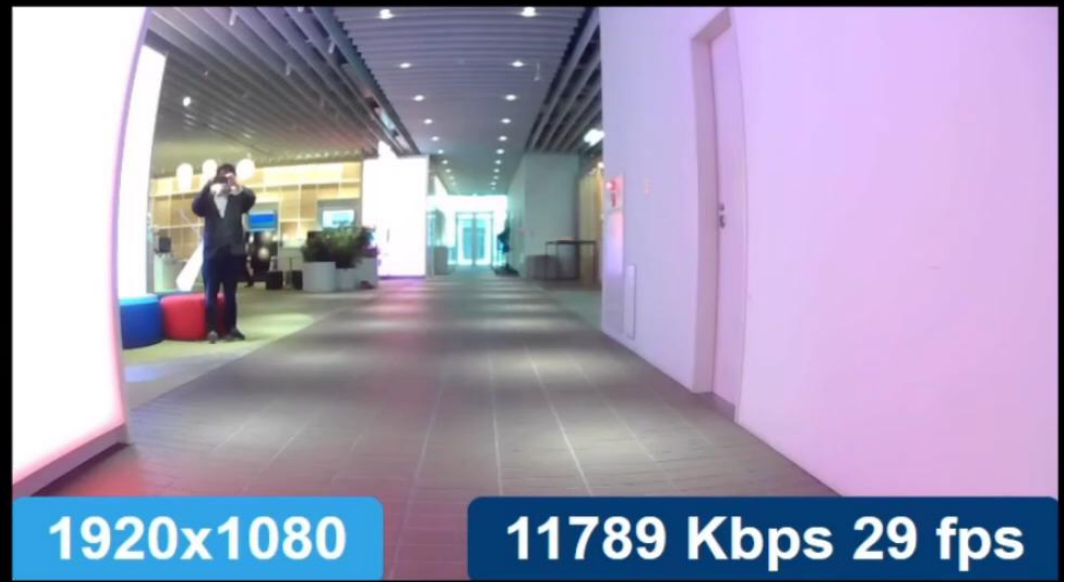
台車構成と遠隔映像受信PC

俯瞰映像

ローカル5G遠隔配信映像



Wi-Fi遠隔配信映像

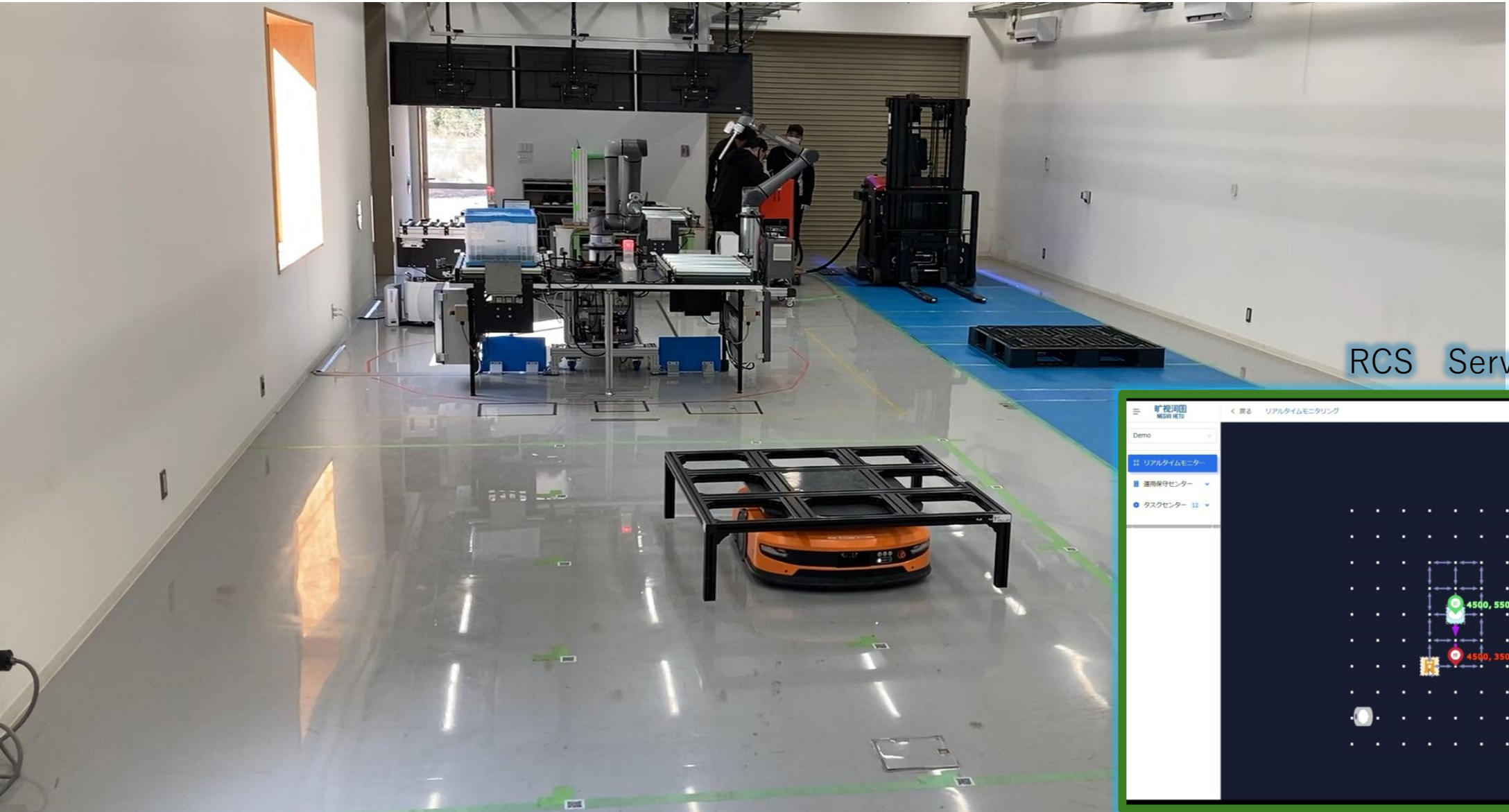


Private 5G　　Wi-Fi

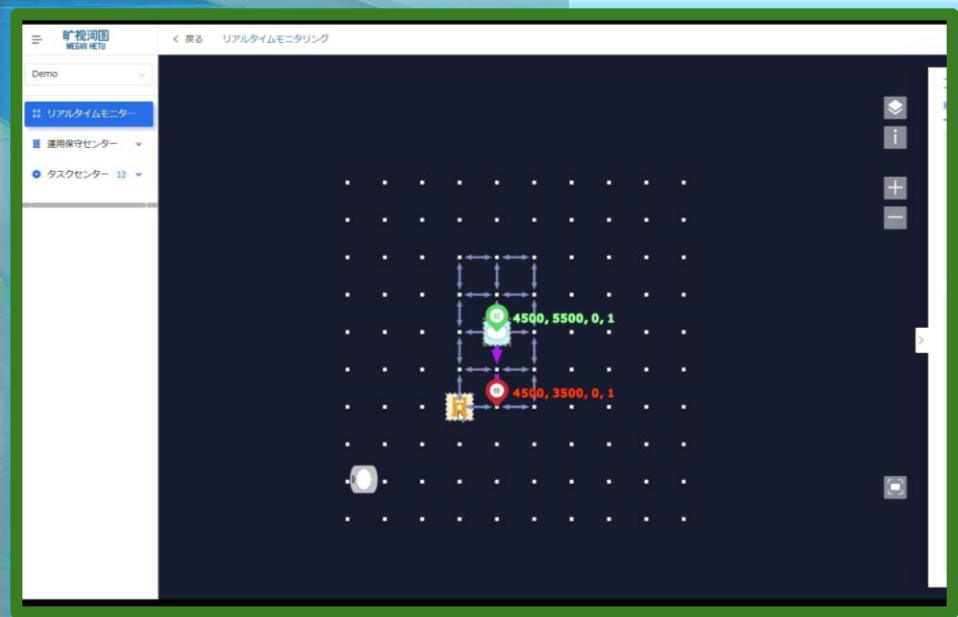
20

Private 5G × AGV

Autonomous driving via local 5G connected to the vehicle’s LAN port



RCS Server

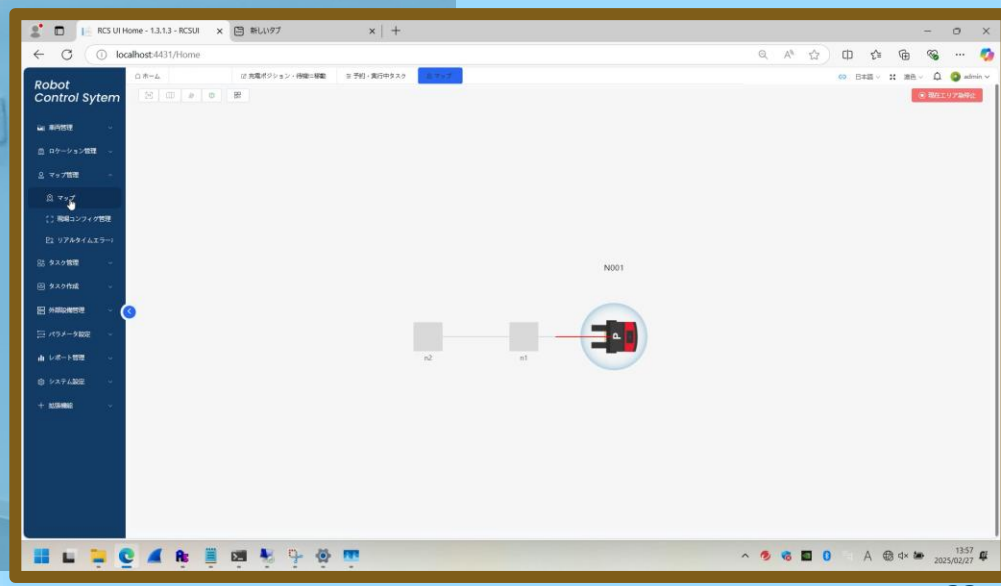


Private 5G × Smart Factory (AGF Validation)

NTT EAST

AGF

RCS Server



Private 5G Smart Factory & Logistics Lab

■ Testbed for end-to-end manufacturing with Private 5G.
■ Opened Jan 2024; ~200 companies (visits & PoC).

Private 5G-enabled Equipment

Remote AGV

Inbound / Outbound

eve autonomy Inc.

Nutrunner

Manual assembly

Atlas Copco

AI visual inspection

Inspection

Brains Technology Inc.

Robotic arm

Transfer / handling

OMRON

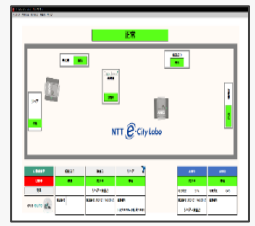
AMR

Inter-process transport

OMRON

MES

Process control



NTT East × Shin FA Corp.

Construction

<Powered by Private 5G>

High capacity	Wide coverage	High throughput	Ultra-low latency	Low power consumption

Construction DX (Civil / Tunneling) Nishimatsu Construction

IOWN/APN + Private 5G (GigaRaku 5G Select) Ultra-remote teleoperation for heavy equipment
Labor shortage + remote-site constraints addressed

＜Challenges in mountain tunneling＞
- High-risk worksite, aging workforce, labor shortage
- Network quality limits: video lag + image degradation poor depth perception, slower teleoperation

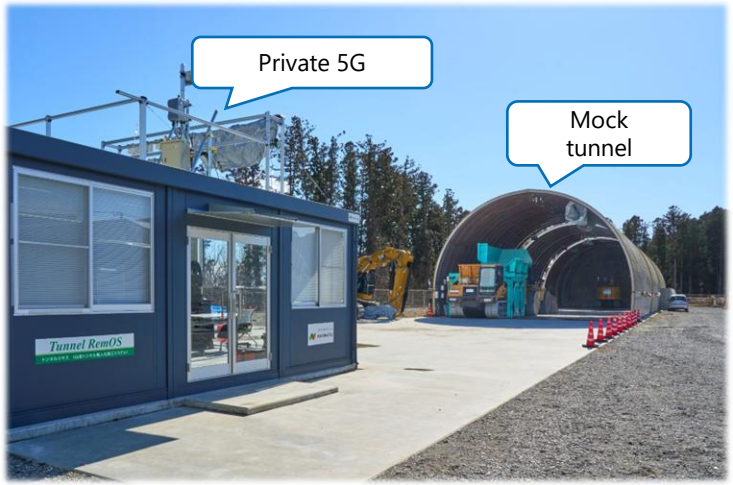
IOWN/APN × Private 5G
End-to-end low latency, high-capacity transport
Off-site operation without traveling to site
Video latency: 0.2sec

NTT Central Training Center (Chofu, Tokyo)

Ultra-remote teleoperation

IOWN APN
All Photonics Network

Nishimatsu test site “N-Field” (Nasu-Shiobara, Tochigi)

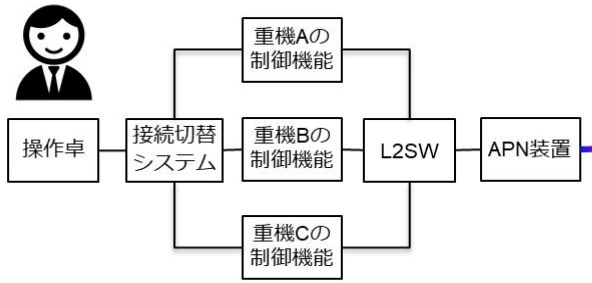


Ultra-Remote Operation of Construction Equipment

Construction DX (Civil / Tunneling) – Taisei Corp.

- **Remote heavy equipment via Private 5G × IOWN for labor shortage & remote operations.**
- **Equipment: excavator / crawler dump / bulldozer.**

Remote Control Site (Kuwana, Mie)

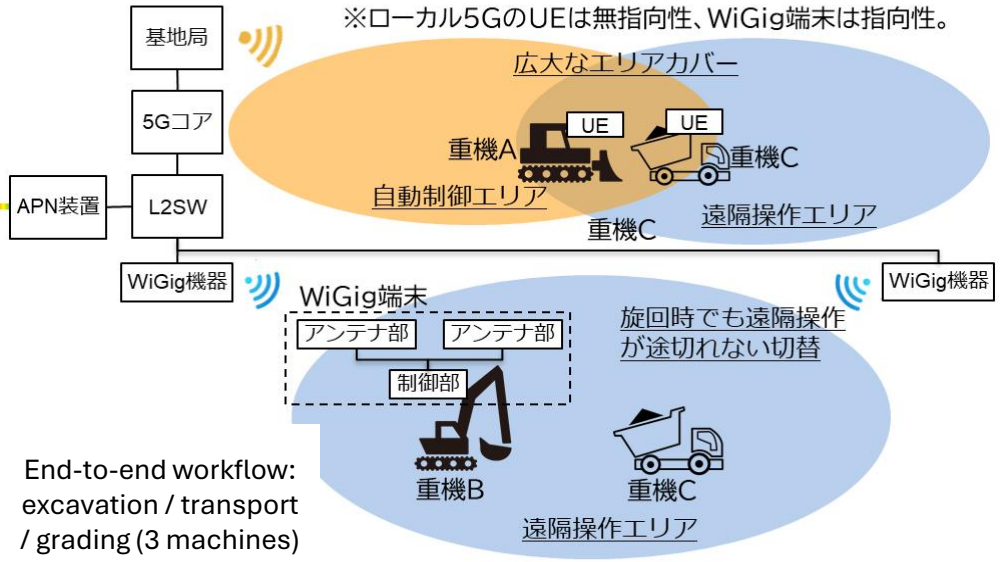


約10km

Multi-vendor control via switching system (remote + automated)

All-Photonics Connect (NTT西日本提供)

Field Site (Inabe, Mie)



End-to-end workflow: excavation / transport / grading (3 machines)

Remote Operation of 3 Heavy Machines

Autonomous Driving

<Powered by Private 5G>

High capacity	Wide coverage	High throughput	Ultra-low latency	Reliable in congested networks

NTT East Group: Autonomous Driving Initiatives

- **Route-specific autonomy: solving driver shortages + validating Local 5G use cases**
- **With municipalities: expansion to public roads → growth in 3D mapping, roadside infra sensing**

Local 5G × autonomous driving expertise

Outdoor (incl. underpass) Local 5G design
→ video QoS for AV monitoring

Public-road Local 5G + road infrastructure expertise

Public-road QoS design + carrier offload
→ road data visualization (LiDAR, etc.)

Narita Airport MIC PoC (FY2021–FY2023)

NARITA AIRPORT 成田国際空港株式会社

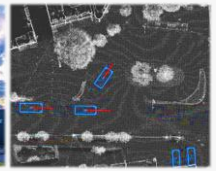
FY2021–22: Local 5G feasibility PoC /
FY2023: Regional digital infra program

Level 4-equivalent AV shuttle

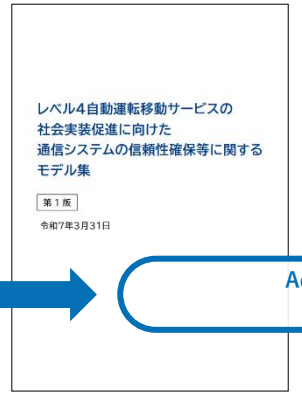
(restricted airport area)

Komae City Tokyo PoC (FY2024–)

東京都 狛江市



*令和6・7・8年度 地域デジタル基盤活用推進事業



2021 成田国際空港 総務省実証

2022 成田国際空港 総務省実証

2023 成田国際空港 総務省実証

NTT e-City Labo
Local 5G Open Lab launch

2024 狛江市 総務省実証

2025 狛江市 総務省実証

MayMobility・TierIV NTT実証拠点確立

2026 狛江市 総務省実証

採択

MayMobility・TierIV NTT実証拠点確立

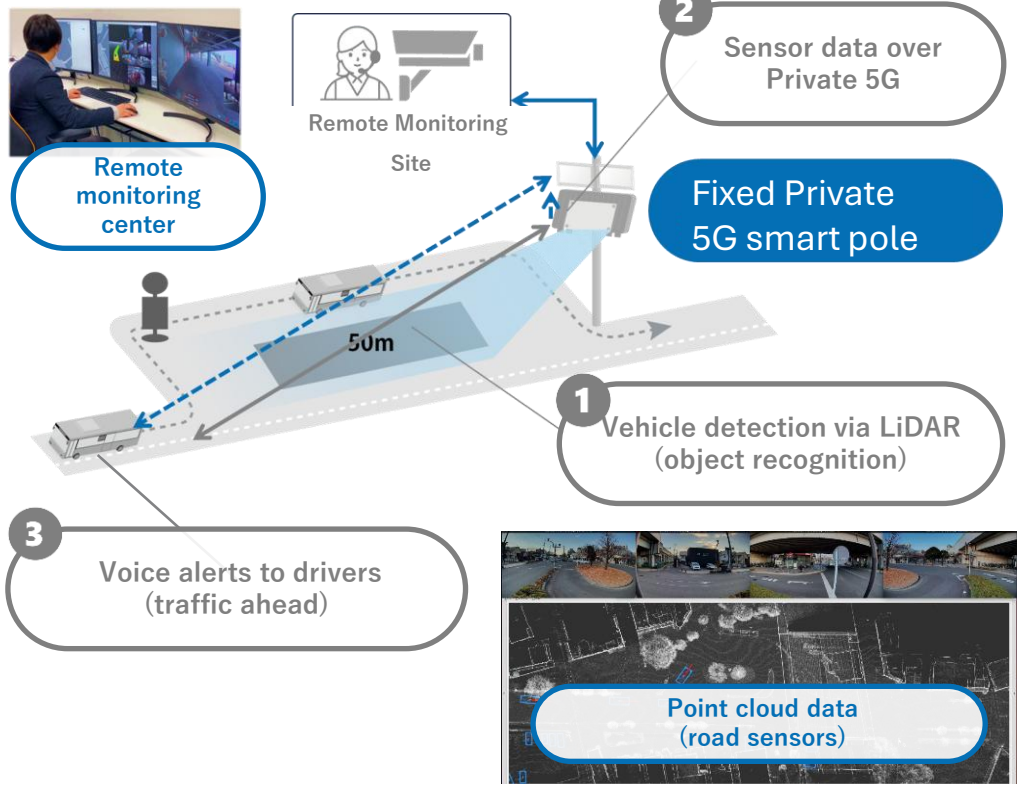
2027 AV site expansion

2030 Adopted in MIC model guidelines (Level 4 AV comms reliability)

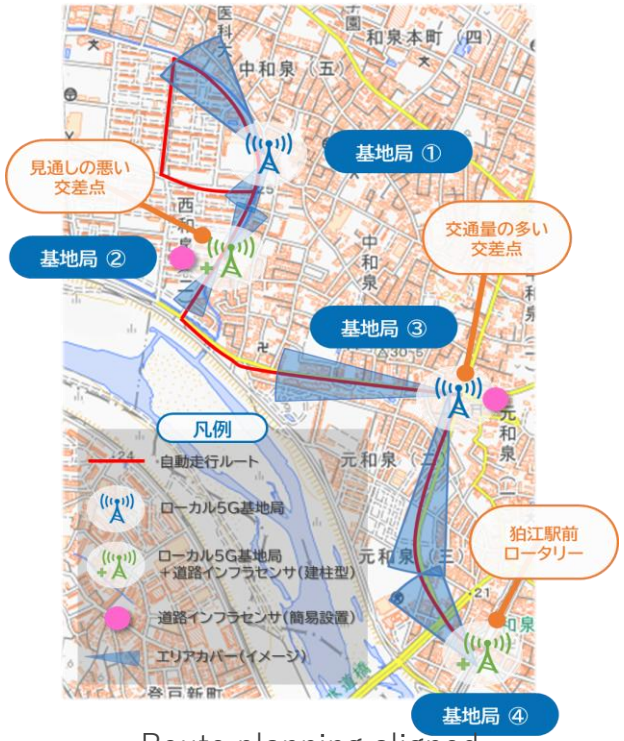
NTT East Group: Autonomous Driving Initiatives

- Deployed advanced road comms in Komae,Tokyo using carrier + private 5G.
- Used private 5G where carrier coverage is limited （stations, dense areas）.
- Enhancing L4 autonomy via V2X with real-time road data.

Network design: vehicles / roadside / control center



Hybrid network (carrier + Private 5G) / public road deployment

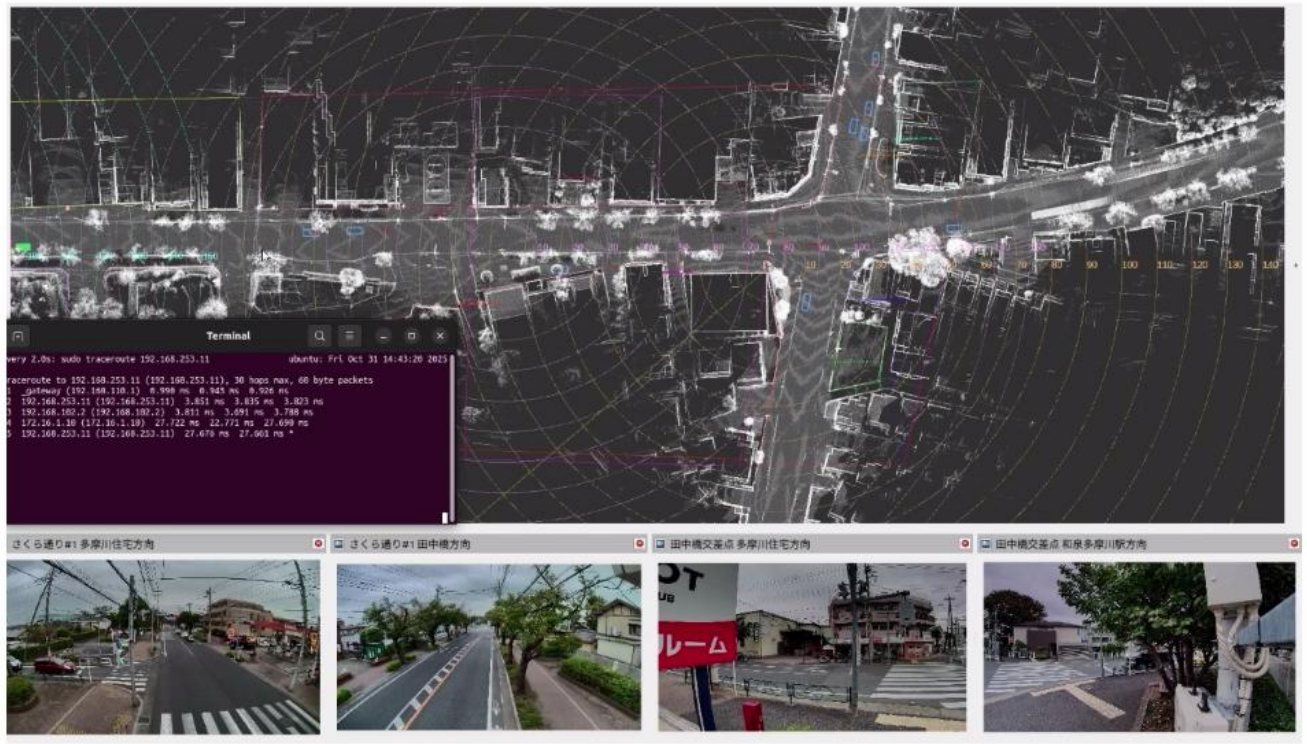


Route planning aligned with city traffic plans

Roadside sensors + 5G deployment (existing poles)

- 3D IR LiDAR
- High-resolution camera
- 5G terminal

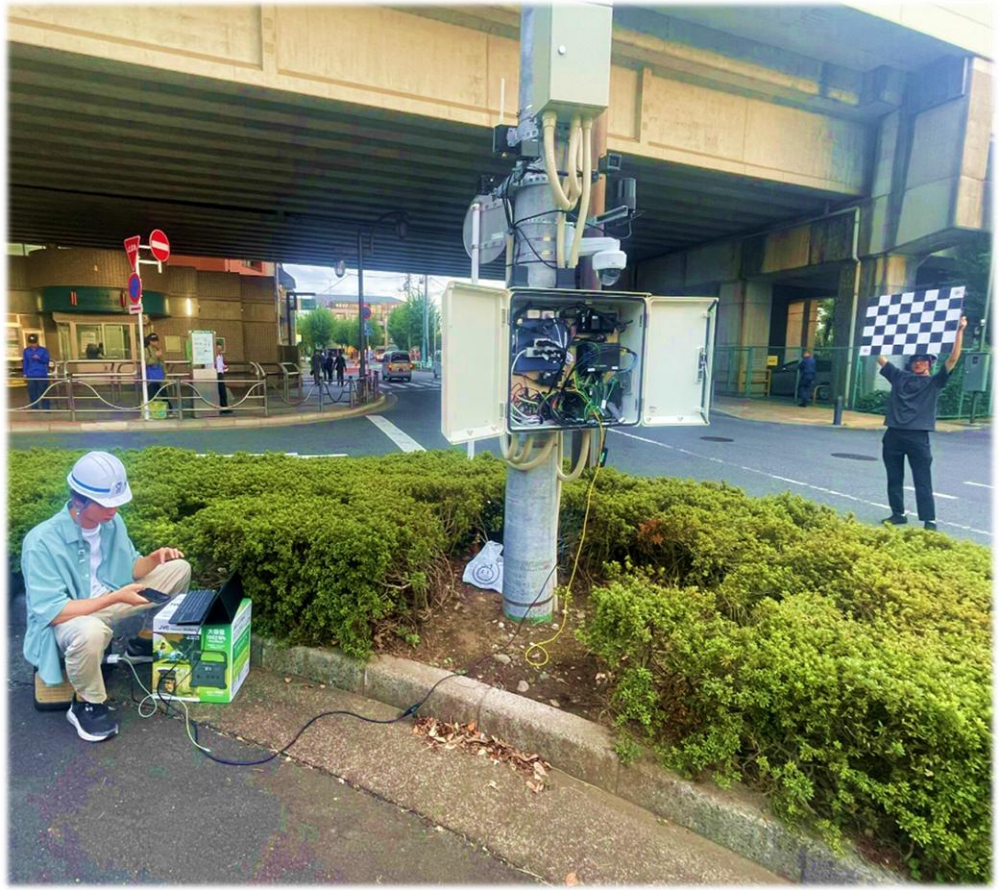
Infrastructure-Coordinated Autonomous Driving



Integrated Control Center (Top View)

Autonomous vehicle using roadside sensor data

On-Site Engineering Execution



Smart pole deployment & calibration (roadside infrastructure)

Compact smart pole calibration

Infrastructure (Telecom Construction)

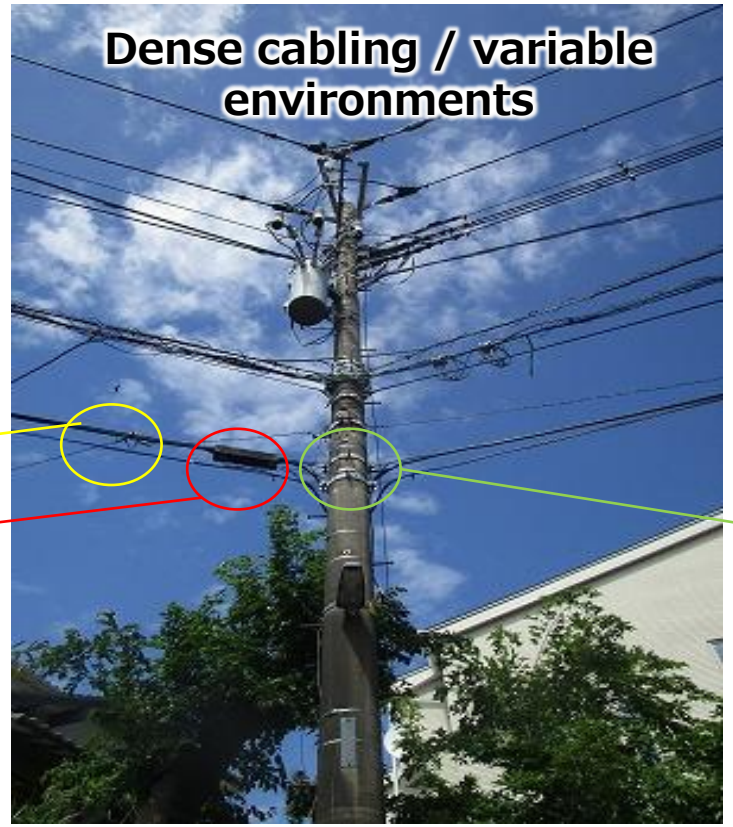
<Powered by Private 5G>

High capacity	Wide coverage	High throughput	Ultra-low latency	Reliable in congested networks

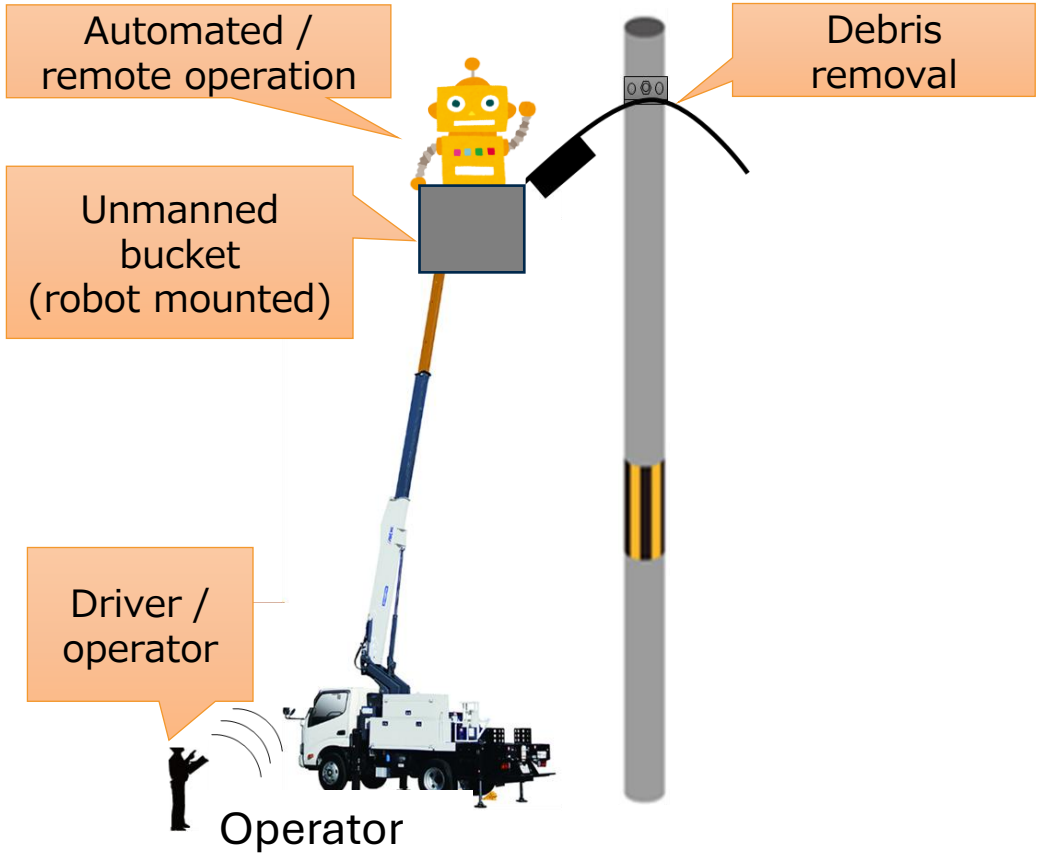
Robotics for Aerial Telecom Work

- **NTT field work involves precise tasks from bucket trucks near utility poles.**
- **Exploring robots and physical AI to address future workforce shrotages.**
- **Gradually assessing deployment due to comples, cable-dense on-site environments.**

Example: Aerial telecom work



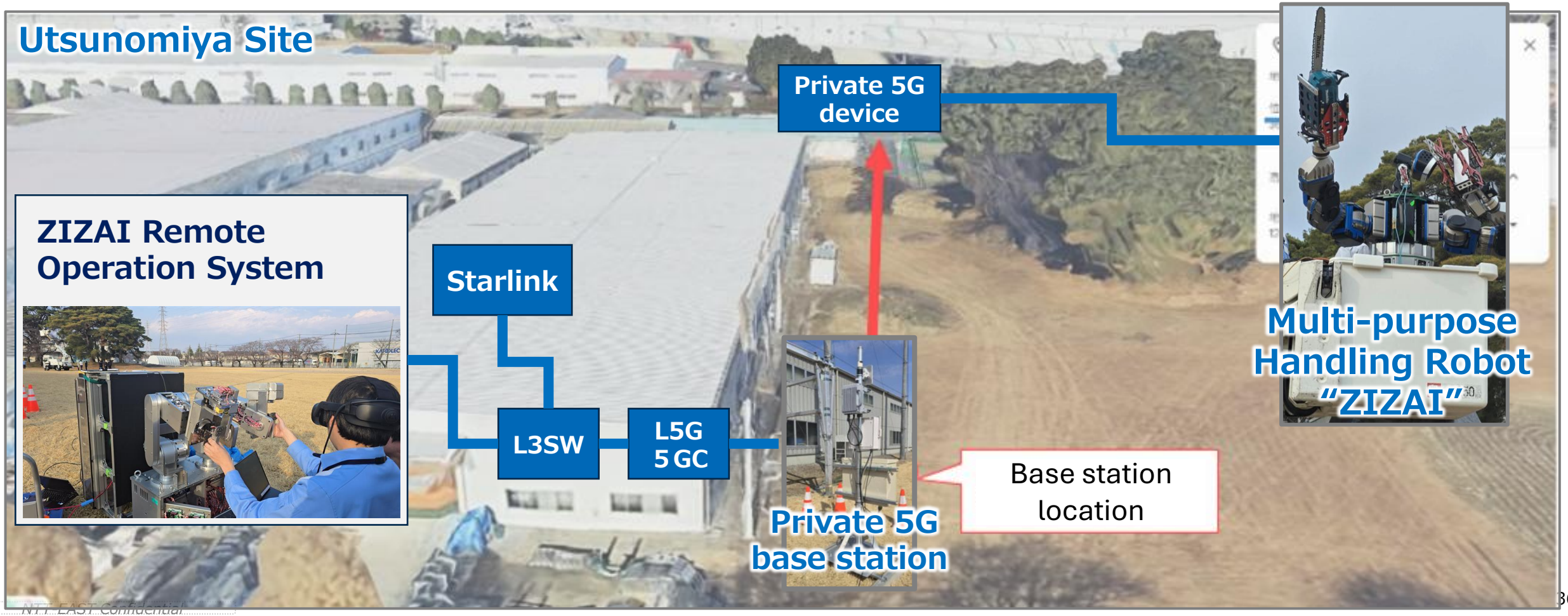
Robotics Use Case (Phase 1)



Advancing Robotics in Aerial Telecom Operations

NTT EAST

- Remote operation of multi-purpose robot (ZIZAI) via Private 5G (with Nippon Signal).
  ※ ZIZAI expanding to rail / civil / infrastructure use.
- Exploring Physical AI for telecom automation.



Buildings & Districts

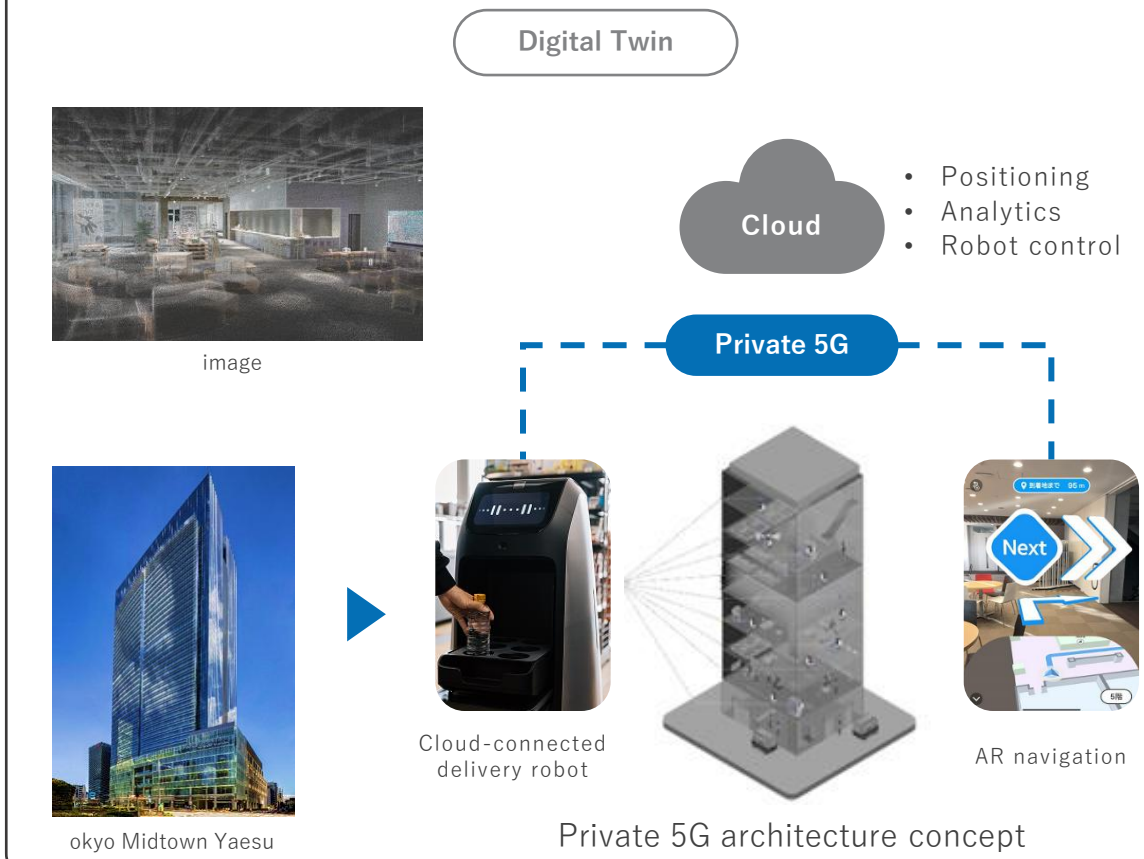
<Powered by Private 5G & Wi-Fi>

High capacity	Wide coverage	High throughput	Ultra-low latency	Reliable in congested networks

Use Case: Large Mixed-Use Complex

- **Private 5G deployment + joint solution trial at Tokyo Midtown Yaesu.**
- **Digital twin–based use cases: delivery robots + AR promotion / attraction.**

Architecture Overview



Private 5G architecture concept

Use Case Scenarios

AR Promotion／AR Attraction

- AR content: coupons / navigation / visitor guidance
- Enhanced user experience via AR
- AR can run on Wi-Fi

Floor guide / store promotions (coupons)

AR Attraction

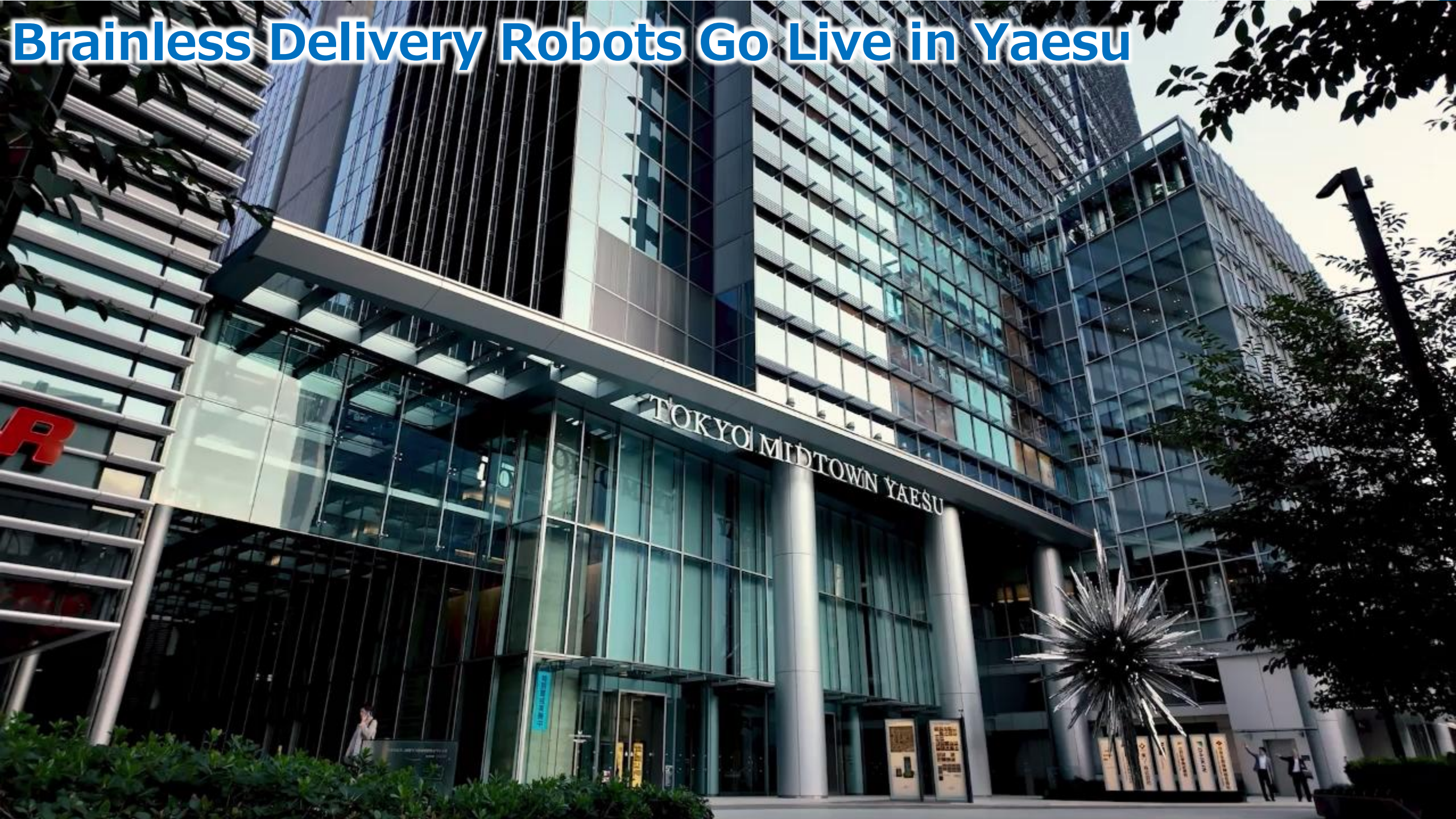
delivery service

- Robot dispatch via app (e.g., LINE); delivery service
- Cloud-based system → control ~100 robots
- High-res video → scalable via Private 5G

Order via app

Delivery robot operation

Brainless Delivery Robots Go Live in Yaesu



Public Sector: Disaster Prevention & Multi-Use

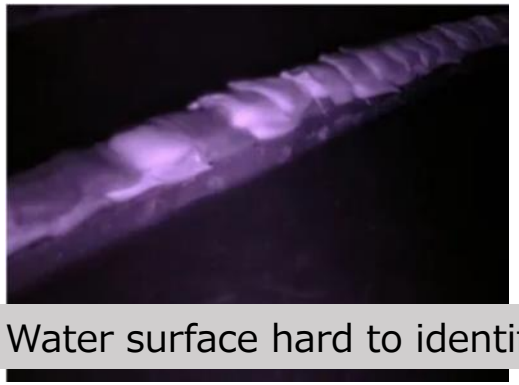
<Powered by Wi-Fi HaLow>

High capacity	Wide coverage	Wireless deployment	lower cost	Efficient data rate	Low power consumption

River Monitoring → Enhanced Disaster Resilience

- **Performance comparison: LoRa vs Wi-Fi HaLow (heavy rain).**
- **Clear quality gap; Wi-Fi HaLow rated higher (especially night).**
- **Update : Budget approved; deployment under consideration (FY).**

Test distance: ~480m from base stations

	Normal conditions	Heavy rain	Nighttime (Light Rain)
LoRa Camera ・Size : QVGA(320x240) ・Throughput : 5.47kbps Configurable resolutions: VGA (640x480), XGA[max] (1024x768)	 Blurry overall	 Flood level not visible	 Water surface hard to identify
Wi-Fi HaLow Camera ・Size : HD(1280x720) ・Throughput : 350kbps Configurable resolutions: VGA[min] (640x480)	 Water level clearly visible	 Flood depth visible	 Clear visibility even at night

Disaster Resilience Partnership with Nagai City, Yamagata (Aug. 2025)

- A five-party partnership was established to advance disaster-focused digital twin initiatives.
- Water level conditions are visualized on a digital twin dashboard.

Source: NHK News Web (Aug 6)

NEWS WEB トップ　新着　天気　社会　気象・災害　科学・文化　政治　ビジネス　国際　スポーツ

山形 NEWS WEB

デジタル技術で３Ｄ地図作成し防災に活用
長井市と企業が協定

08月06日　18時17分

最新のデジタル技術を使って３Ｄ地図を作成し、住民の避難などに生かそうと、長井市と技術を持つ企業などが６日、連携協定を締結しました。

３年前の記録的な豪雨で、長井市を含む置賜地域で河川が氾濫した

（3）リアルタイムな現場状況の可視化・モニタリング

- 長井市を流れる河川の水位状況や氾濫状況など、水位センサーやカメラを組み合わせることで、危険度をリアルタイムに可視化し、モニタリングできるようにします。

Digital Twin for Disaster Resilience (Nagai City)

Disaster Resilience Partnership: Miura Peninsula (May 2025)

Digital technologies to strengthen disaster response; partnership with 4 cities & 1 town

Agreement for disaster-resilient regional development

三浦半島4市1町とNTT東日本が災害に強い地域づくりに関する協定を締結

東日本電信電話株式会社（代表取締役社長：澁谷 直樹、以下「NTT東日本」）は、神奈川県三浦半島に位置する横須賀市、鎌倉市、逗子市、三浦市、葉山町（以下「三浦半島4市1町」）と、半島地域特有の災害リスクに対応し、半島全体で災害に強い地域づくりを推進することを目的とした防災連携協定（以下「本協定」）を2025年5月21日（水）に締結します。

本協定は、三浦半島4市1町が掲げる「三浦半島に暮らす市民・町民の皆さんの安心な生活の実現」をめざし、災害時の孤立リスクなど半島地域特有の課題に官民連携で取り組む協定です。

本協定は三浦半島4市1町が民間企業と締結する初の防災連携協定となります。また、2025年4月に設置した当社「防災研究所」が自治体と締結する初の防災連携協定となります。

ICTや先端技術を活用して三浦半島4市1町の地域防災の高度化を図るとともに、人流データや道路の被災情報などを活用した避難行動・物流の最適化などの研究を進め、持続的な地域の防災力向上をめざします。

三浦半島防災力強化プロジェクトでの取り組みポイント

三浦半島に暮らす皆さんの安心な生活や幸せの実現

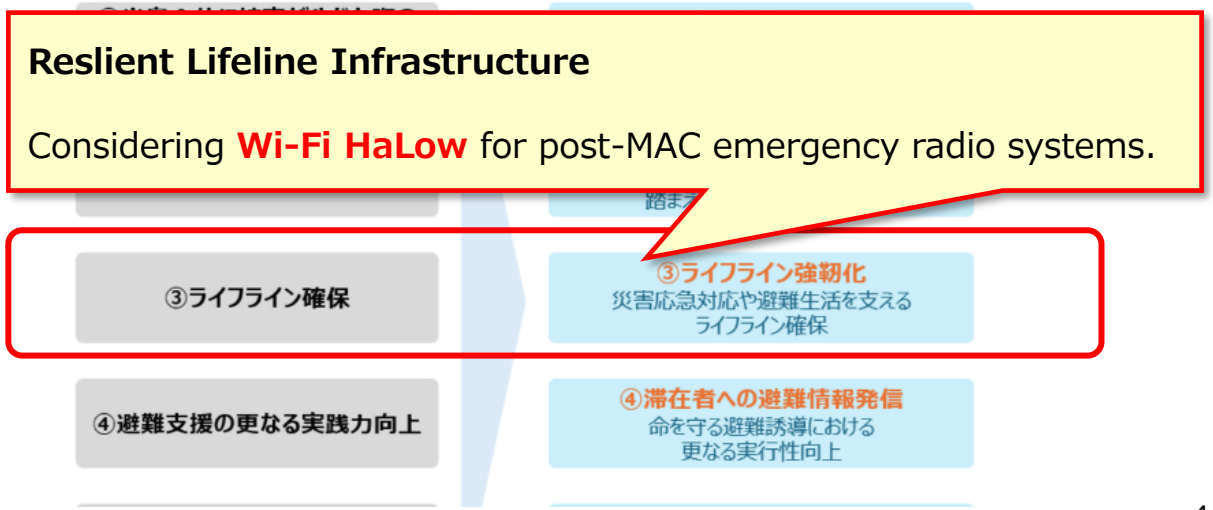
横須賀市 Yokosuka City　鎌倉市 Kamakura City　逗子市 Zushi City　三浦市 Miura City　葉山町 Hayama Town　NTT東日本 グループ

Five priority initiatives for resilience

三浦半島4市1町とNTT東日本防災力強化に向けた5つの重点取り組みテーマを設定
～自治体横断体制で災害に強い地域づくりを推進～

NTT東日本株式会社（代表取締役社長：澁谷 直樹、以下「NTT東日本」）は、神奈川県三浦半島に位置する横須賀

③ ライフライン強靭化	災害応急対応や避難生活を支えるための通信、エネルギーなどのライフライン確保・MCA（業務用無線）サービス終了に備え、Wi-Fi HaLowを活用した防災無線の実証を検討	逗子市



Reslient Lifeline Infrastructure

Considering **Wi-Fi HaLow** for post-MAC emergency radio systems.

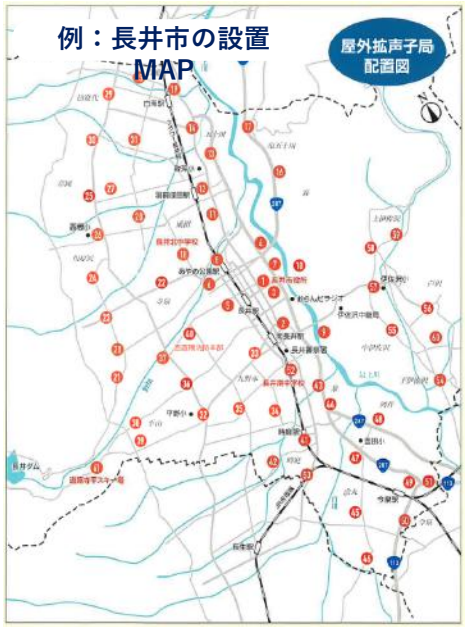
Termination of MCA Radio Service

- **Service to end May 31, 2029 (MCA Advanced: Mar 31, 2027).**
- **Used for emergency comms → alternative solutions required.**

Use Cases of Disaster Radio

Broadcast: Public alerts

Reliable public information delivery



Mobile: Staff communication

Stable comms during disasters

Disaster Radio +1 Solution package

- **IP radio alternatives face congestion risk → demand for better resilience.**
- **Expanding use cases: wildlife / road / snow monitoring.**
- **850 MHz (Wi-Fi HaLow) → congestion-free emergency + daily use.**

❶ Independent of carrier networks
- No congestion in emergencies
- Low interference (850 MHz)

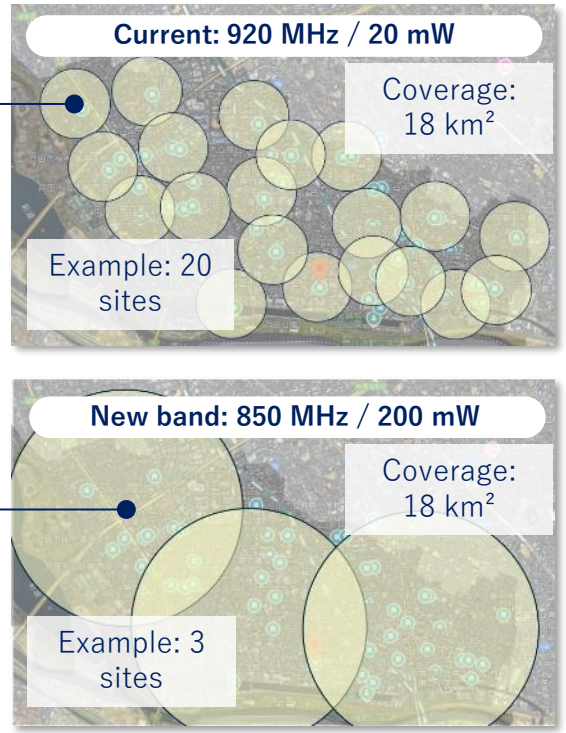
❷ Wi-Fi–based standard
- IP-based / highly interoperable
- Cost-efficient deployment

❸ Wide-area coverage
- Expanded coverage via 850 MHz

❹ マルチユース
- Reusable across multiple use

＜ Wide-area coverage via Wi-Fi HaLow＞

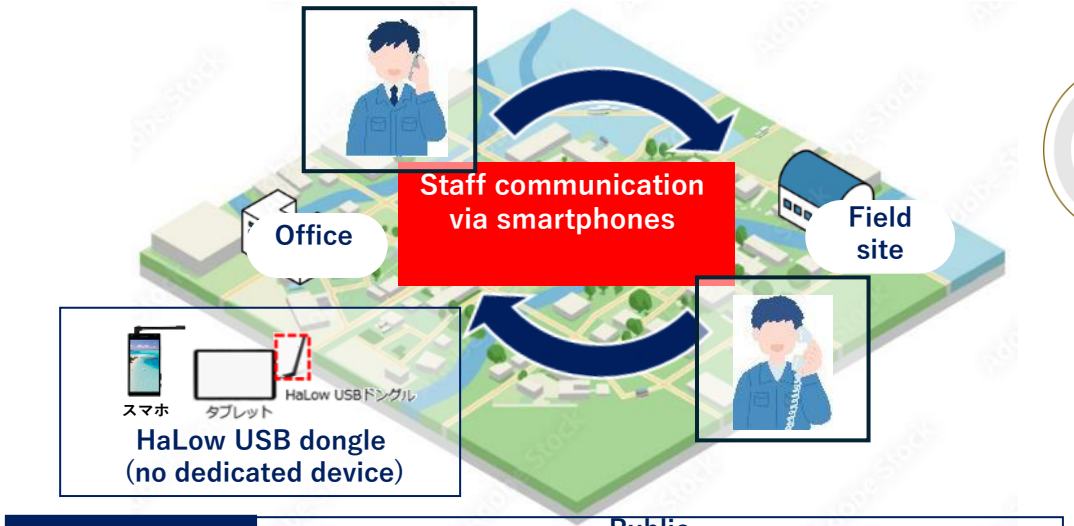
—image—
Rooftop antenna deployment



※新周波数帯は2026年4月に電波法改正見込み、カバーエリアは予測値

Use in wide HaLow network

Emergency: comms backup



Other Disaster Use Cases
- Flood / river monitoring
- Public information delivery
- Landslide detection

Normal operations

PHASE FREE

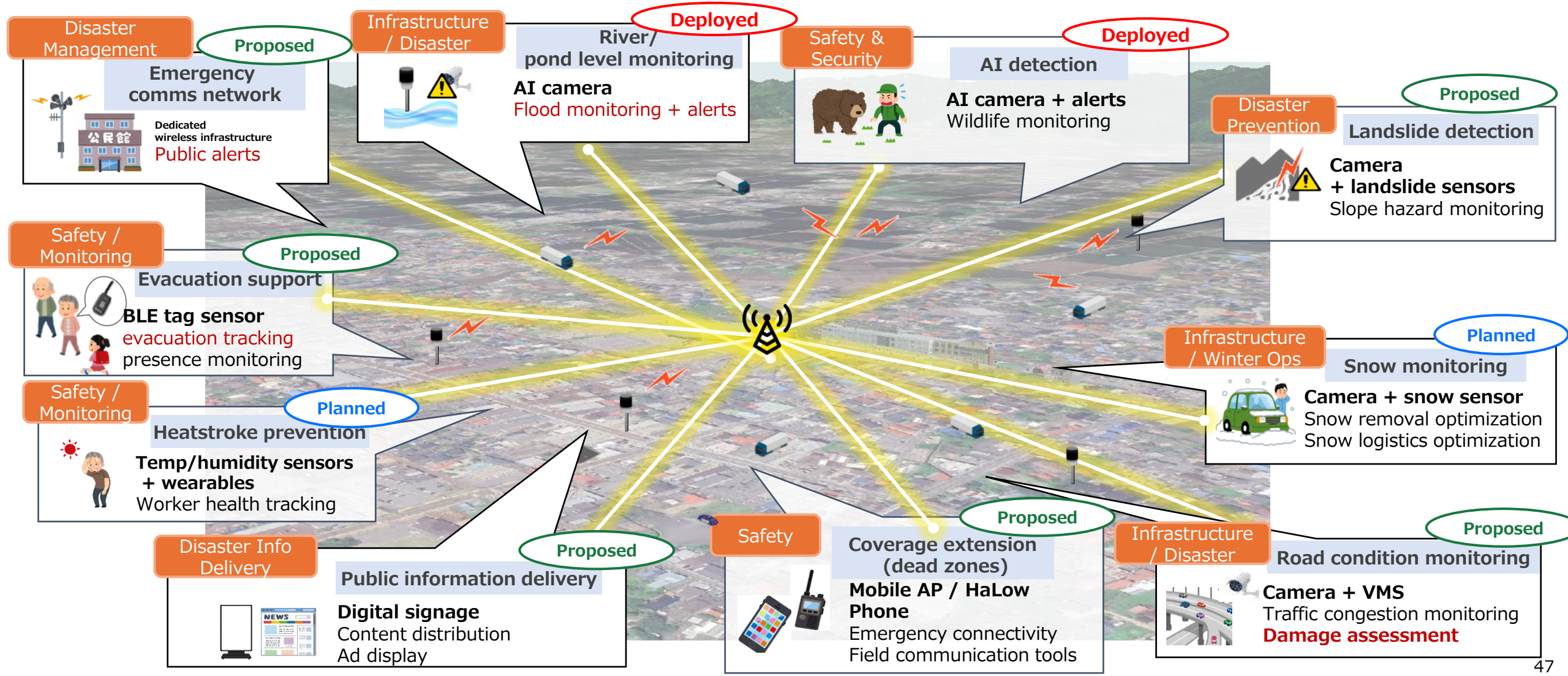
- Road monitoring
- Wildlife control
- Snow monitoring
- Child safety monitoring

and more

Multi-sensor data enables safer, more secure cities

NTT EAST

Private networks enable communication even in emergencies



Water Infrastructure

<Powered by Wi-Fi HaLow>

High capacity	Wide coverage	Wireless / cost efficient	Efficient data rate	Reliable beyond carrier coverage

Water Treatment Plant DX: Inspection Optimization

- **Manual inspection across many assets (~3,000 checks/day).**
- **Cameras / sensors / AI → workload reduction (PoC in Utsunomiya).**
- **Scaling nationwide with Metawater.**

Nikkei (Feb 23, 2026)

日本経済新聞　2026年2月23日）

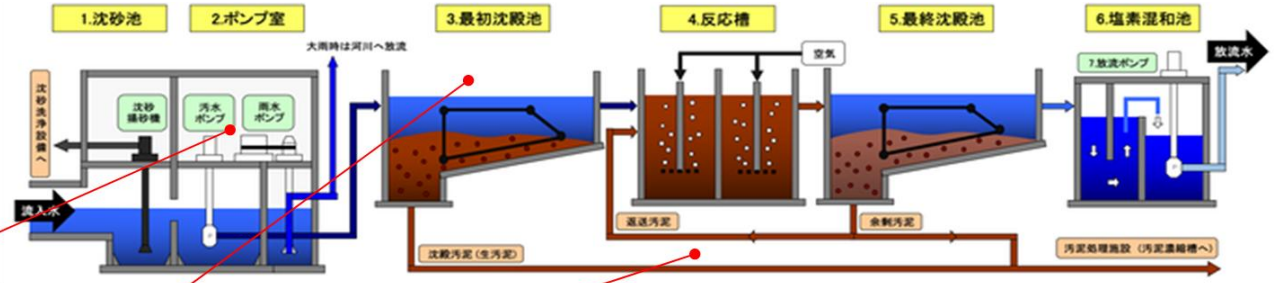
水道インフラ効率点検

メタウォーター　AI使い6割時短へ

建物診断 耐震診断

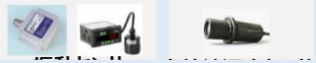
新日本管財

Water Infrastructure Inspection Efficiency



Pump equipment

・Vibration monitoring
・emperature check



Vibration / IR temperature sensors

Belt thickener

・Noise anomaly check

Acoustic / monitoring sensors

Pipelines

・Visual inspection (leaks / faults)

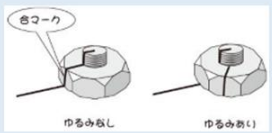
Camera / drone

Distributed assets

Analog meters

・Normal/anomaly check

Fastener condition



・Loose fasteners

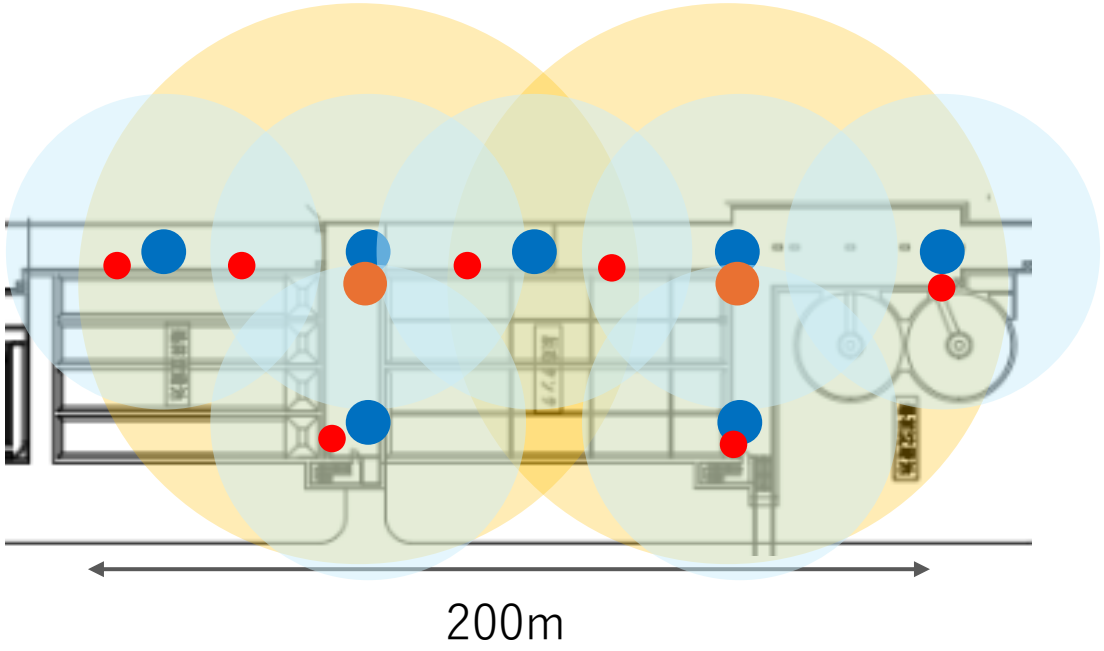
Camera / drone

Optimizing On-Site Communication Networks

- **Wi-Fi HaLow excels** in wide-area coverage across large facilities.
- Power constraints & scale → fewer, higher-quality APs via 850 MHz.
- Use cases: voice, tablets, drones → **migration to Wi-Fi HaLow**.

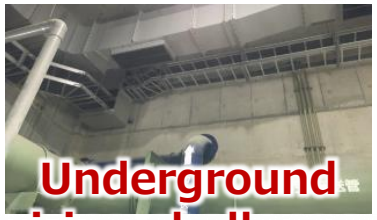
Wi-Fi HaLow Deployment in Water Facilities

Superior wide-area coverage for large inspection zones
Fewer base stations → lower wiring / piping / power costs



Large, dense structures → poor carrier coverage

Complex layouts with distributed assets



Underground wiring challenges / vertical routing constraints

Power availability (cost reduction)



Similar inspection DX needs across manufacturing, real estate, and transport

High=Resolution 3D Modeling & Field Visualization

Drone-Based Inspection for Sewer & Infrastructure

- Aging infrastructure → urgent need for advanced maintenance (Yashio incident).
- Drone inspection in dark / confined sewers + AI damage detection (PoC).
- Integrated workflow (inspection → analysis → repair → data) for predictive maintenance.

Sewer Inspection DX (Kawasaki City)

Using ERIOS3 / Skydio X10

Field test

AI analysis

End-to-End DX Model for Sewer Maintenance (Saitama)

2026–2027: validate end-to-end workflow

Apartment Buildings

<Powered by Wi-Fi HaLow>

High capacity	Wide coverage	Wireless / cost efficient	Efficient data rate	Low power consumption

Apartment Management Optimization (Musashi Corp.)

NTT EAST

- **Wi-Fi HaLow pilot to reduce property management workload.**
- **HaLow is "well-suited" for covering entire buildings and wide premises.**

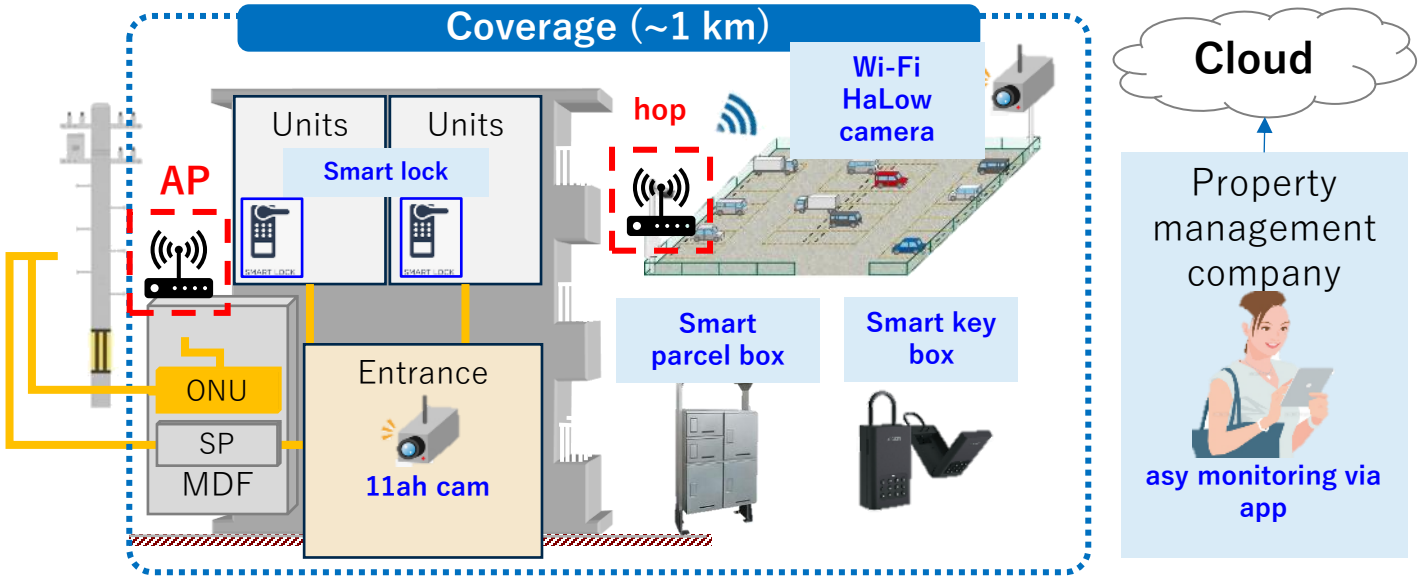
On-site response & asset value improvement → key DX challenges

Single AP covers entire building → remote monitoring

- Remote checks via tablets → fewer site visits
- No dedicated system → low-cost monitoring & security

Retrofit-ready wireless devices (low cost)

- IoT devices reduce onsite workload
- Improved tenant experience → higher asset value



Press Release: First in Real Estate —
Wide-Area Wi-Fi (IEEE 802.11ah) Pilot for Management Efficiency & Asset Value Improvement (Nov 2024)

武蔵コーポレーション株式会社　NTT東日本

（報道発表資料）

2024年11月5日
武蔵コーポレーション株式会社
東日本電信電話株式会社　埼玉事業部

不動産業界初！広域 Wi-Fi"IEEE802.11ah"を活用した
管理業務の効率化および物件価値向上に向けた実証実験を開始

武蔵コーポレーション株式会社（代表取締役：大谷 義武、以下「武蔵コーポレーション」）と東日本電信電話株式会社 埼玉事業部（事業部長：市川 泰吾、以下「NTT 東日本」）は、不動産管理業務の効率化および物件付加価値の向上を目的として、武蔵コーポレーションが保有する賃貸管理物件 10 棟において、従来の Wi-Fi と比較して広範囲に電波が伝搬し、簡易な画像や映像転送も可能とする広域 Wi-Fi『IEEE 802.11ah※1（以下、「11ah」）』とカメラを活用した実証実験を 2024 年 11 月 19 日より開始します。これは不動産業界初※2となります。

<実証イメージ>

Results & Future Outlook

- **Wi-Fi HaLow pilot: wireless coverage + reduced site visits.**
- **Camera-based monitoring → issue detection & prevention.**
- **Next: AI anomaly detection + compact solar devices under evaluation.**

Results

Live video → remote resolution (no site visit)
→~48 hrs/year workload reduction per building

Trash scattering

Illegal dumping

Bicycle parking violations

Property manager

Next Steps

Image-based detection with GenAI

Still images

Analysis

Trash area clutter → cleaning required

Alerts

- **Pre-defined incidents**
- **AI detection → app alerts**

Compact solar-powered devices

Mobile app access (remote use)

Property manager

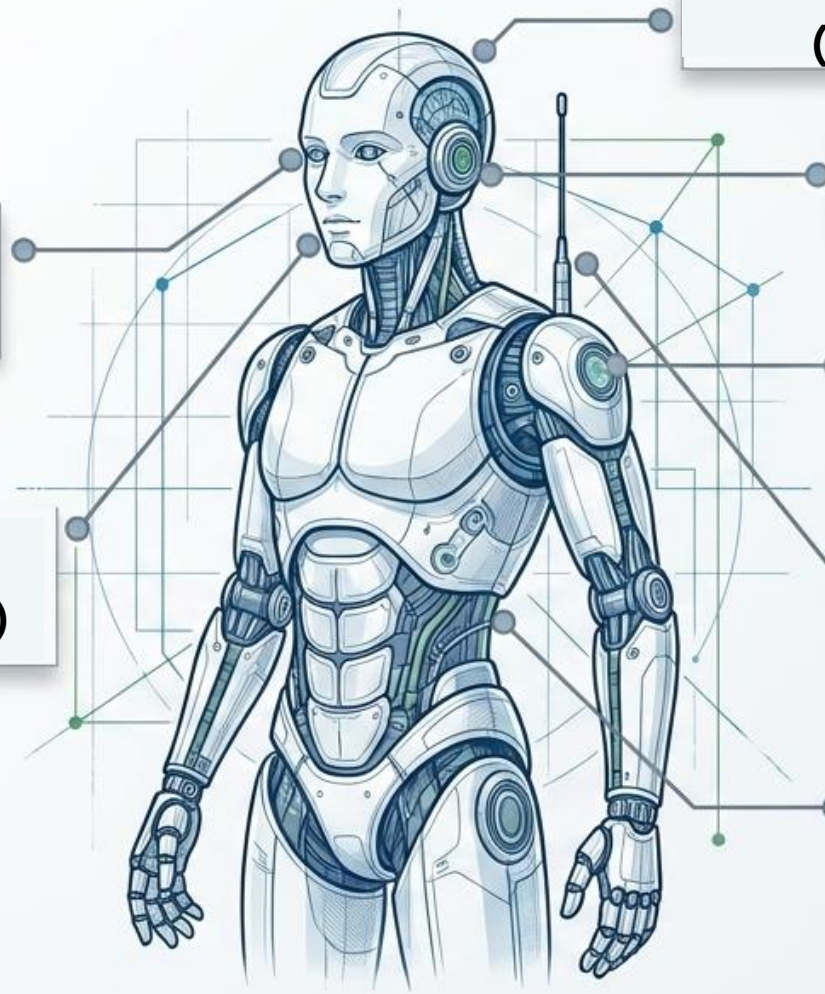
IV. Conclusion

Conclusion

- Optimizing the **best mix of** carrier, Wi-Fi, satellite, and **private wireless**.
- **Private 5G**: **entering deployment**, but specs still vary.
  → “Giga Raku 5G” remains the most reliable choice.
- **Wi-Fi HaLow**: a **right-fit option** for wide-area IoT
  → Now moving into full-scale deployment.
- Toward the **Humanoid** era… (next page)

Communications in the Humanoid Era

- **Integrated stack: advanced + high-capacity technologies**
- **Single technology insufficient → optimized multi-network integration**



7. Training data (Learning / evolution)
Now: large-scale data upload for training

1. Sensor data (Perception)
Now: IoT + increasing video /image data

Now: On-device / edge inference
3. AI inference (Cognition)

2. Control (Reflex loop)
Now: On-device control

4. Interaction (Communication)
Now: service robots / remote AV support

6. Teleoperation (Remote intervention)
Now: heavy machinery control / AV monitoring & intervention

5. Coordination (Swarm / social)
Now: multi-robot / AMR map sharing

NTT e-City Labo: Living Lab for Circular Communities

- **Wireless showcase + customer engagement; technology validation sites in operation**
- **Demo & validation hub; continuous updates; create new business opportunities**

3.5 years since launch
Visitors: 38,920
726 municipalities
1,924 companies
928 organizations

Local 5G Open Lab

Smart manufacturing & logistics

Autonomous driving

3D digital twin

Service robotics (cleaning / security / delivery)

Video AI anomaly detection

ICT urban farming

Remote water metering

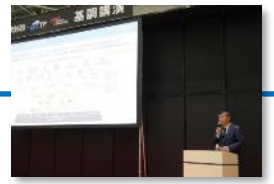
v Lab（802.11ah）

Smart home lab

Engaging presentations

Practical demos & exhibits

Media / article coverage



Presentations / speaking

Customers & partners

地域の価値創造企業へ

SOCIAL INNOVATION パートナー

NTT東日本グループ