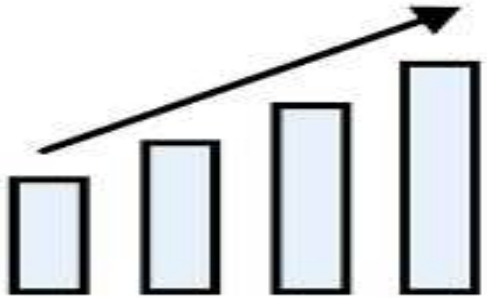
Zaif Siddiqi
Executive Director & Head of 5G IoT Global Services
NTT Communications Corporation

# Fundamental Principles of New Value Creation & Sustainability 2027of NTT Group

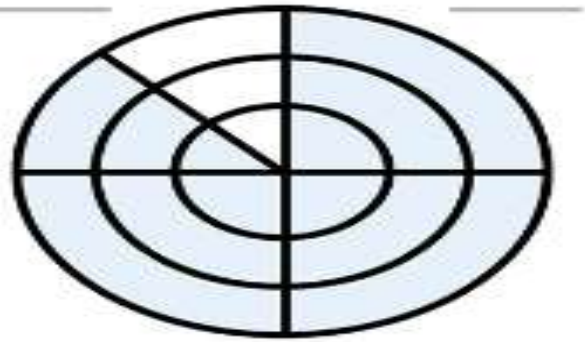
## Innovating a Sustainable Future for People and Planet

# NTT Group at a glance

**$107 billion**
Total Revenue

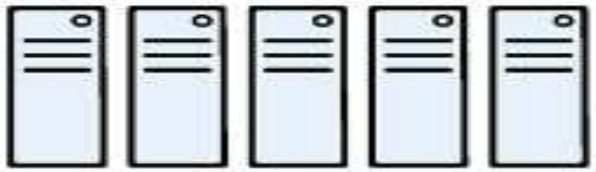


More than
**85%**
Fortune Global 100 choose us

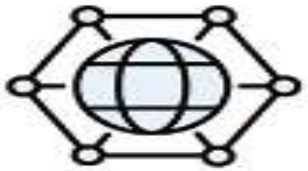


**Top 5**
Global IT Services Provider

**#1 Data center**
In Telegeography



**#4 Internet Backbone**
In Dyn Research



**300,000+**
Employees Worldwide

**TOP 100 GLOBAL INNOVATOR**
In Clarivate Analytics

**Countries & regions:**

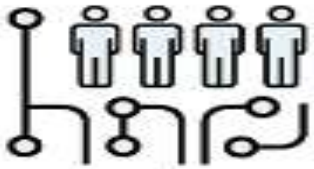
Network Coverage
**190+**

Local Presence
**88**

**$3.6B***
Annual Investment

**R&D**

**5,500**
Professionals



**120+ years**
Heritage

**EP 100**
Contribution to make smarter energy

*Annual average for the next 5 years

Note: As of May 2019

# NTT Group Formation

NTT

**NTT**

Nippon Telegraph and telephone Corporation (Holding Company)

Operating revenue :
(Consolidated) ¥13,374.6billion
Operating income :
(Consolidated) ¥1,922.9billion
No. of employees : 338,450
No. of subsidiaries : 967

| | | |
|---|---|---|
| **Integrated ICT Business** | NTT docomo<br>NTT Communications | Operating revenue : ¥6,140.0 billion<br>Operating income : ¥1,144.4 billion<br>No. of employees : 51,050<br>No. of subsidiaries : 127 |
| **Regional Communications Business** | NTT EAST<br>NTT WEST | Operating revenue : ¥3,183.2 billion<br>Operating income : ¥ 437.7 billion<br>No. of employees : 67,200<br>No. of subsidiaries : 58 |
| **Global Solutions Business** | NTT DATA | Operating revenue : ¥4,367.4 billion<br>Operating income : ¥ 309.6 billion<br>No. of employees : 193,500<br>No. of subsidiaries : 598 |
| **Others (Real Estate, Energy and Others)** | Other group companies<br>NTT Urban Solutions<br>NTT Anode Energy | Operating revenue : ¥1,632.9 billion<br>Operating income : ¥ 59.8 billion<br>No. of employees : 26,700<br>No. of subsidiaries : 184 |

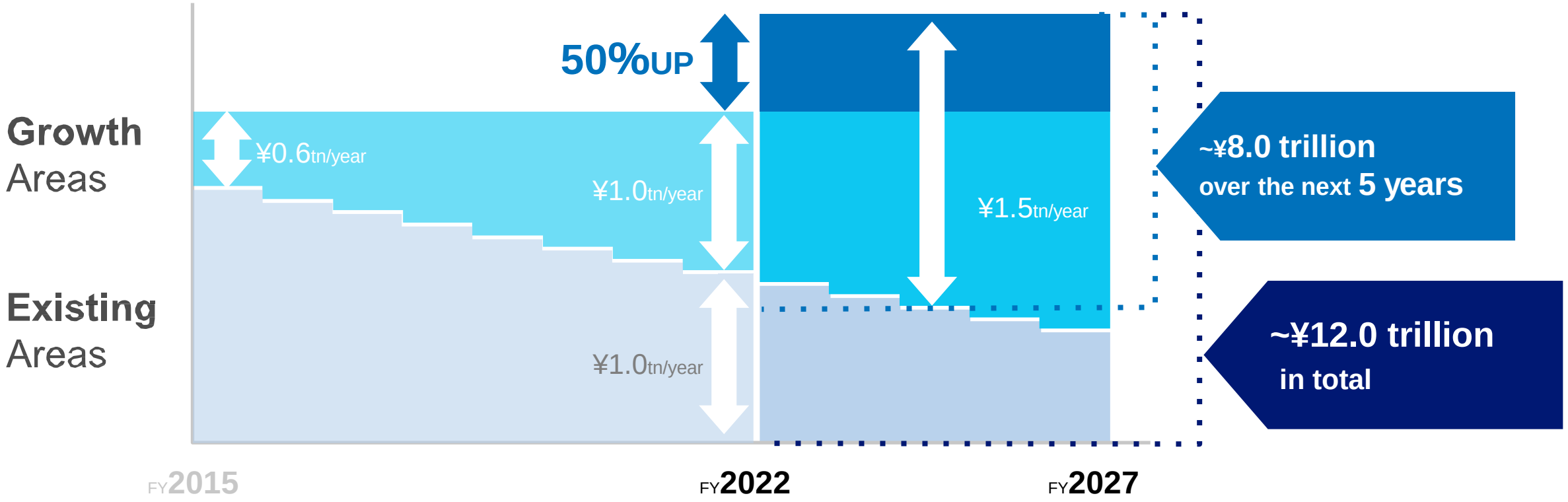
*57.7% stake in NTT DATA (as of March 31, 2024)

- Operating revenue and operating income for each segment are FY2023 figures including inter-segment transactions..
- No. of employees and subsidiaries are as of the end of March 2024.

# For that purpose, NTT Group will increase investments in growth areas

## Will invest ~¥8.0 trillion (54B USD)

### in growth areas over the next 5 years



# Mobility is a Growth Area

docomo business

Video Distributed Management Platform Service

Mobiscan モビスキャ

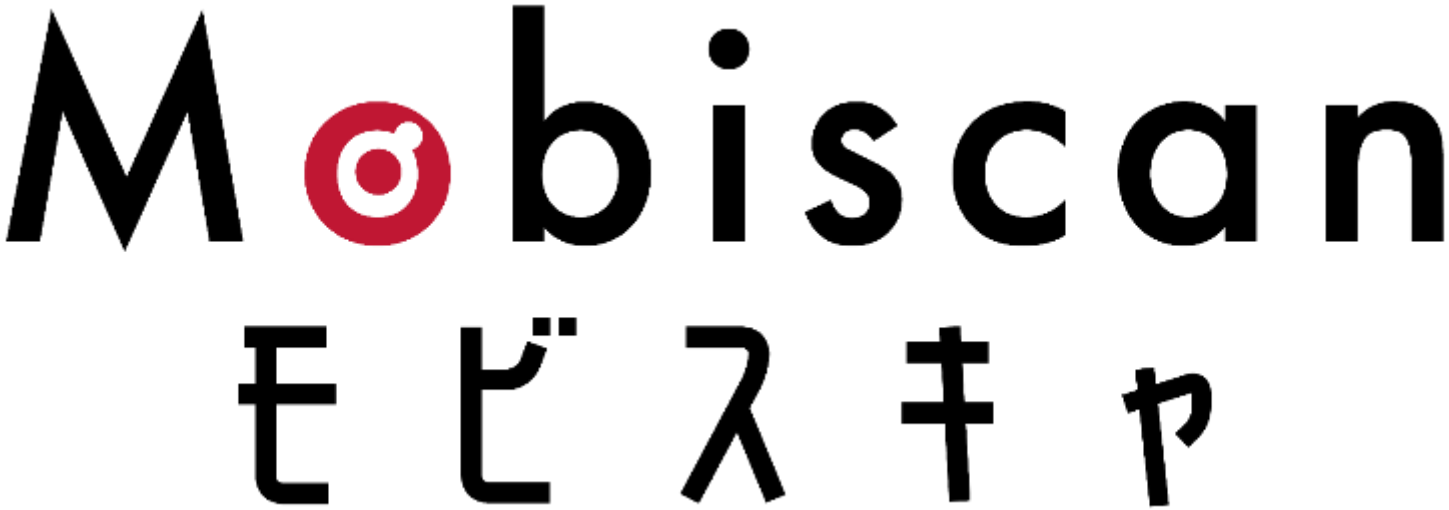
Cloud-based Driving Assist Platform

LINKEETH

Network in the Air

docomo sky

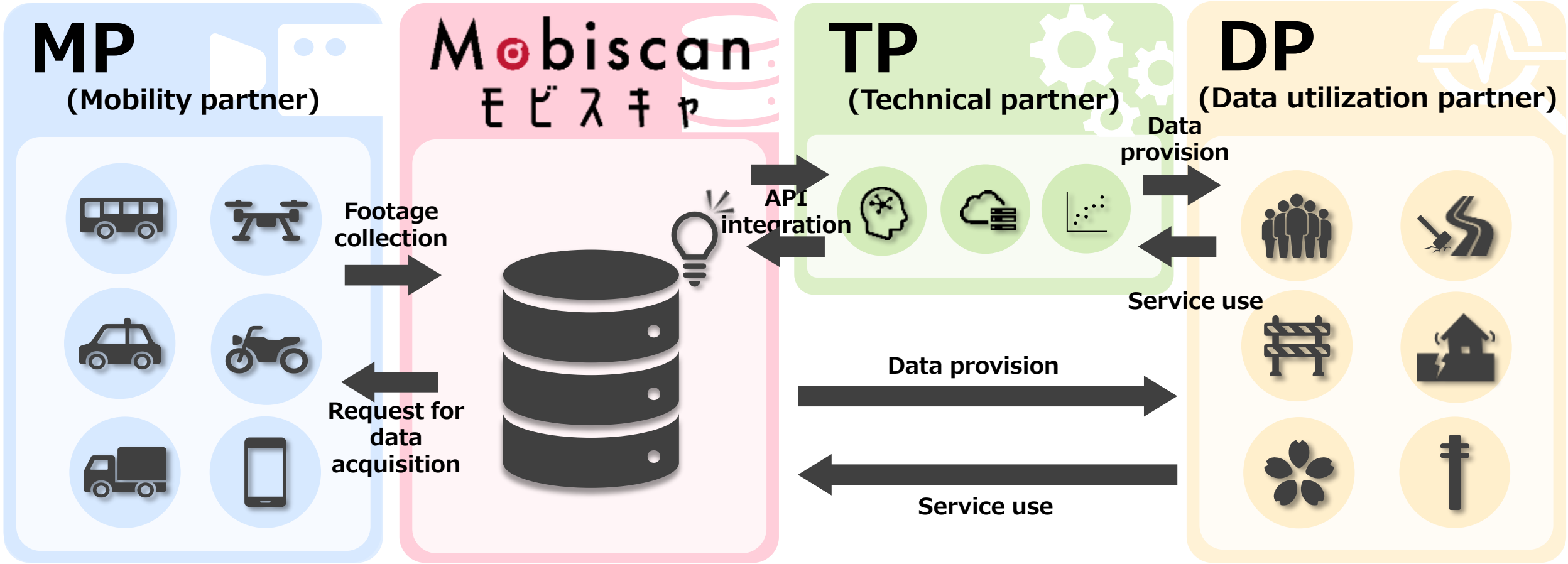
# Video Distributed Management Platform Service



# Mobiscan Service Overview

**Video distributed management platform service** for effective accumulation of video data in urban areas

Video data required by DPs* can be collected and utilized.






*Data utilization partner

# Issues of Video Big Data Utilization

## Data collection

Methods for collecting footage across the city, preparation and operation of human resources and equipment

## Data quality and organization

Technologies to enhance data quality by identifying unnecessary data, sorting out appropriately and taking out only significant information

## Privacy protection

Attention to pay to personal information and privacy in footage

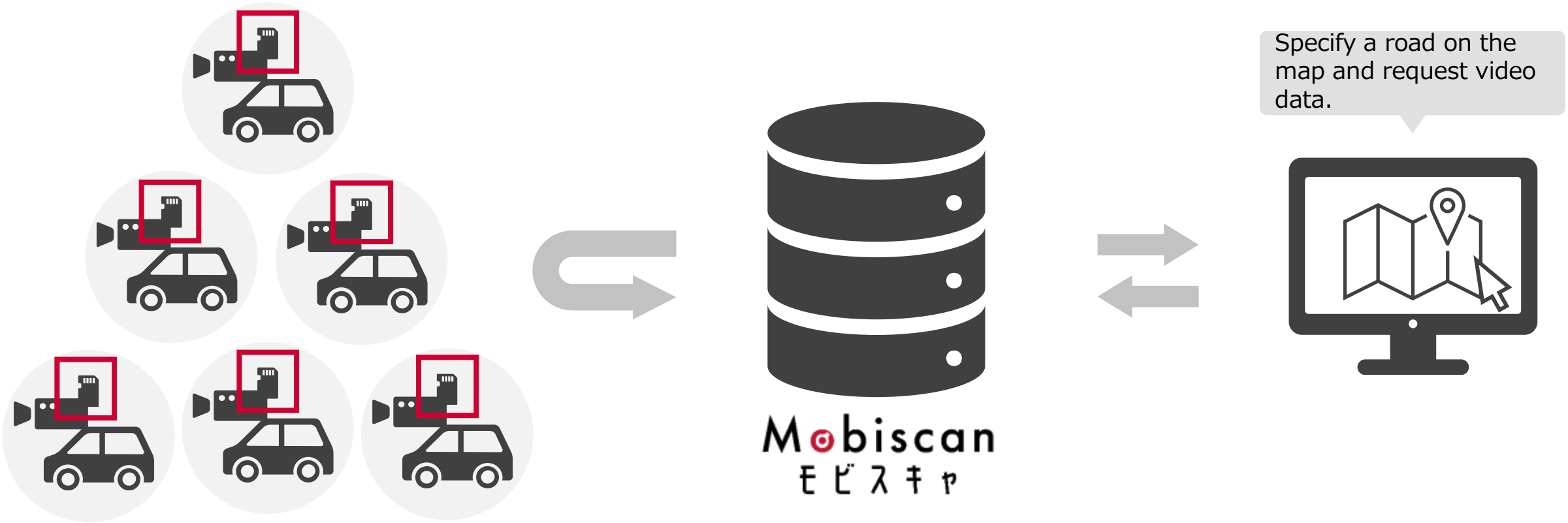
## Maintenance / management cost

High-cost operation required for IT infrastructure holding a large amount of storage and advanced processing capacity

**Difficult for individual users to take advantage of big data**

# Patent Technology ① Distributed data storage

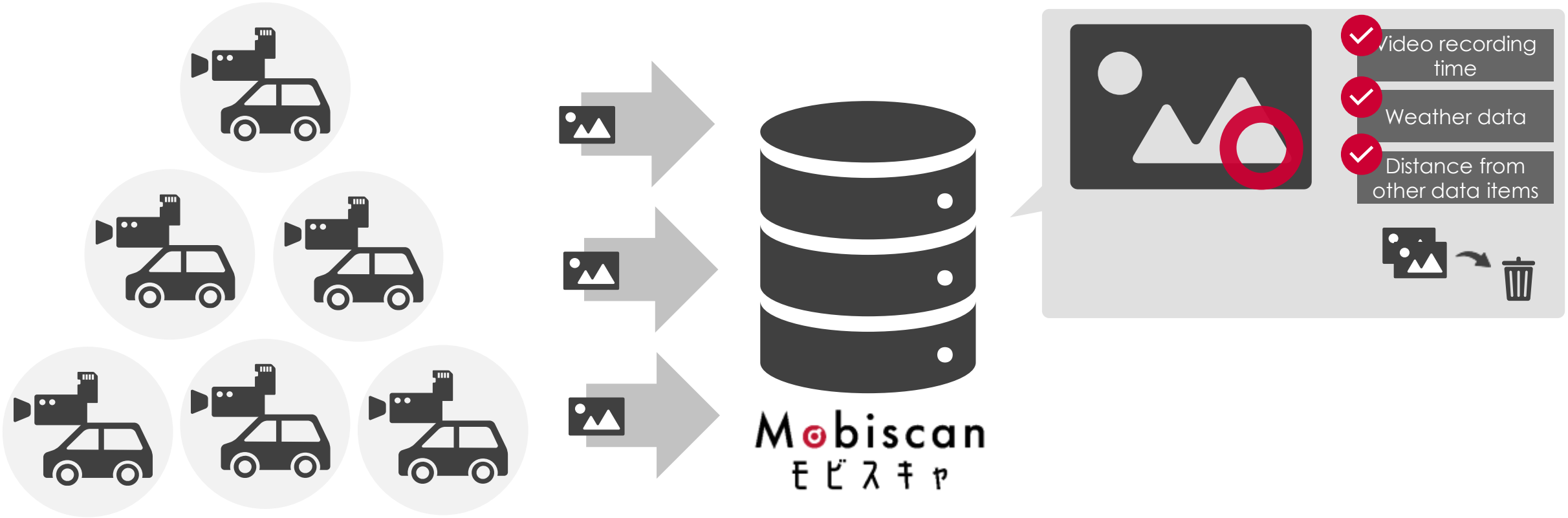
Video data is saved in each SD card and retained for a certain period. When a new request or need arises from a DP*, data can be provided as appropriate.




*Data utilization partner

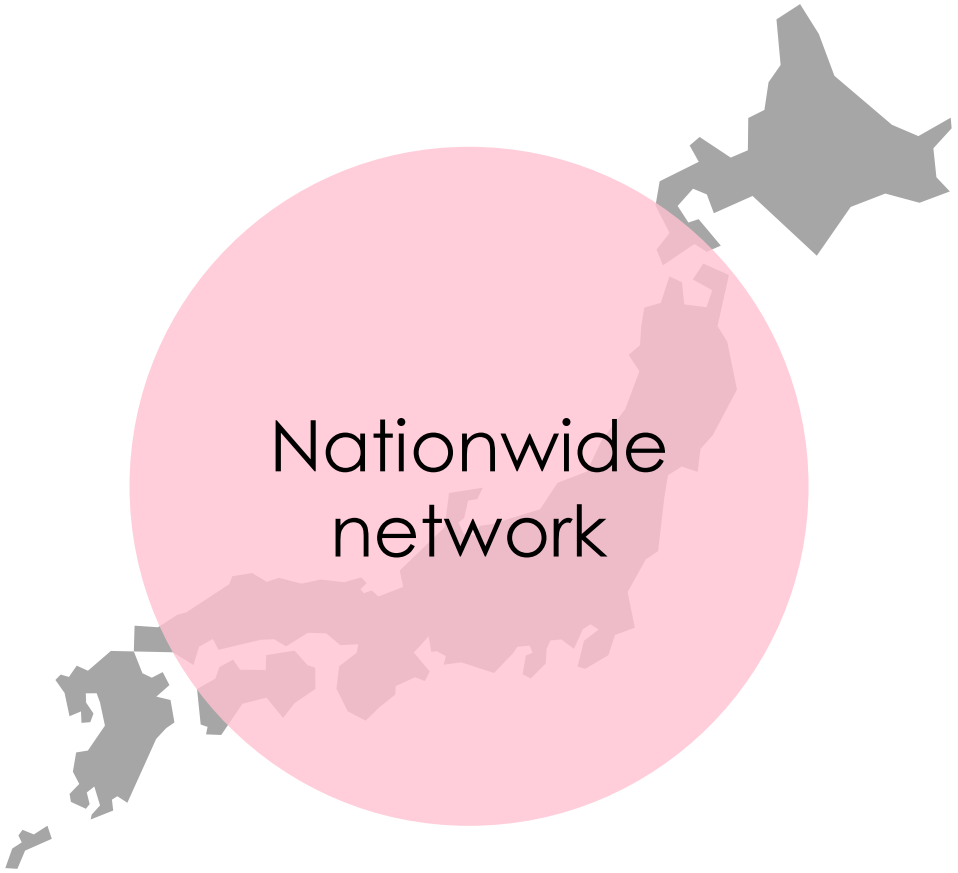
# Patent Technology ② Selective storage of best video

When video data of the same place is received from multiple mobility partners, this function selects and saves the most relevant data.



# Mobile Network

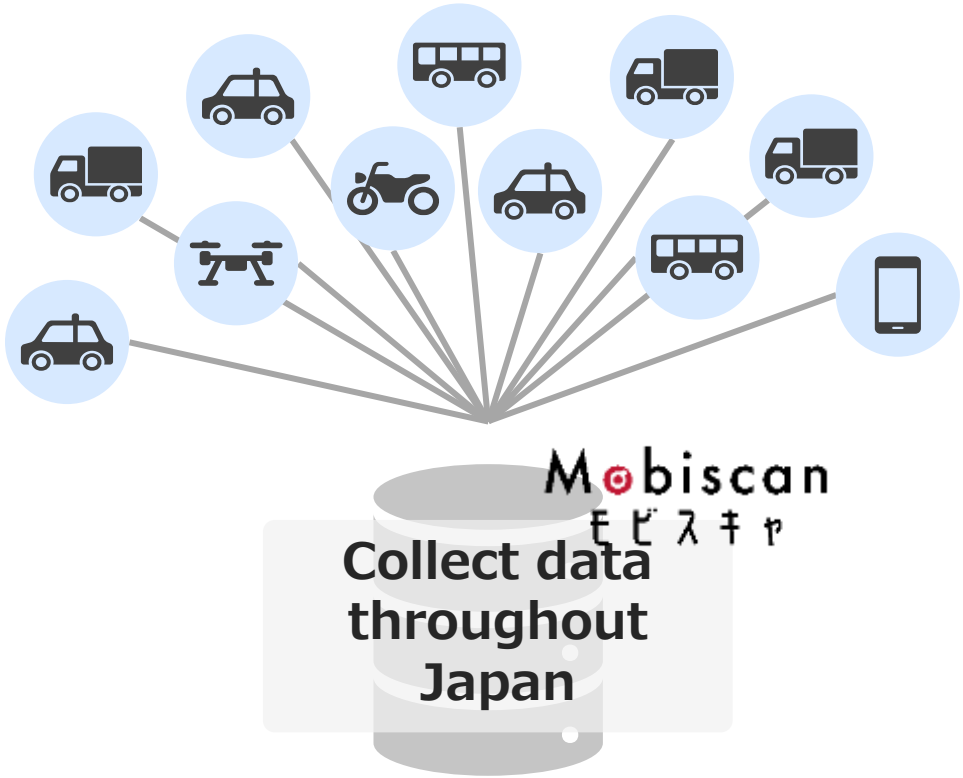
We have established a system to collect information necessary for a range of service developments by distributing drive recorders with a SIM to mobility partners.




Aim to establish a system for collecting information from **a variety of entities with mobility** in addition to drive recorders.

# Customer base　n-to-n Video Sharing

Leverage the customer base of docomo business, promote collaboration with enterprises and organizations which can be an MP*1 or DP*2, and accumulate more comprehensive and better-quality video data to achieve a business model available at a lower price.



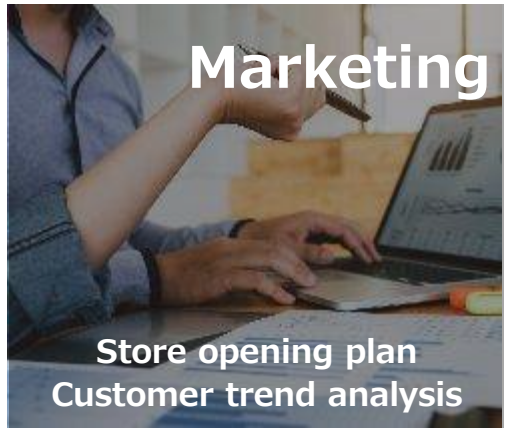

Data provision


*1 Mobility partner,　*2 Data utilization partner

# Utilization of urban area footage

Real-time urban area footage will be useful in the following fields.
We aim to contribute to society, bring solutions to local issues and improve business efficiency.







# Cloud-based Driving Assist Platform

LINKEETH

# LINKEETH Service Concept in Smart World

## Nature, energy, city, mobility, medical care, education

**People living on earth face various issues. We intend to identify common social issues across various domains and achieve DX in social sectors through data utilization, new technology and new system development.**

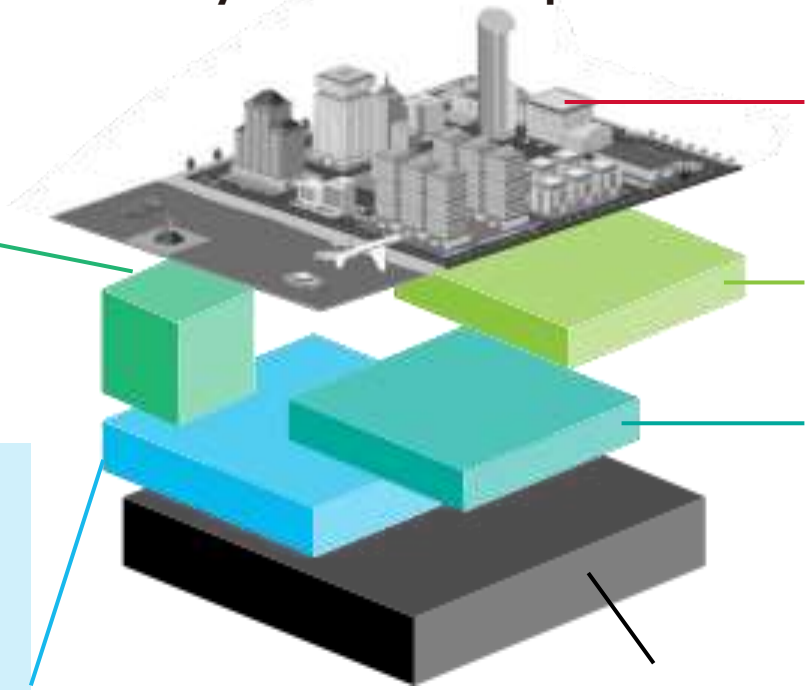
### DX integration

Integration with BI tools, business systems and external services
(Portal, chat, mail, attendance, expense, vehicle management)

### LINKEETH

DX leveraging location, vehicle movement and video data

Contribution to SDGs by supporting customer's DX
- Reduction of accidents involving company vehicles
- Reduction of company vehicle management operation, reduction of number of vehicles
- Reduction of gasoline consumption
- Alcohol check (cloud type)



### Smart Mobility

Contribution to evolution of vehicle technology, offer of new mobility business

### MaaS provider

Provision of mobility data

### Other telematics operators

Configuration and provision of unique telematics services

### MAXIV

Mobility data platform with functions such as collection of mobility data, integration with external services and data analysis

# What is LINKEETH?

LINKEETH is a **service brand of next generation telematics/mobility**.
Currently, two services are available: **'LINKEETH DRIVE'** for safe driving assistance and vehicle management and **'LINKEETH ALC CHECK'** for cloud-based alcohol check.
LINKEETH is designed to improve business efficiency. **Each service can function collaboratively** to drive further improvement of customer's business efficiency.

LINKEETH Service lineup

*Services introduced in this deck

## LINKEETH DRIVE

**Safety: Safe drive support service**
Cloud-based integrated management of driving records from drive recorders

**Location: Vehicle movement management service**
Real-time management of vehicle locations and conditions

## LINKEETH ALC CHECK

**Cloud-based alcohol check service**
Integrated management of alcohol measurement data and photo data when measuring

**Each service is integrated in LINKEETH!**


**External services are also integrated!**

Customer's business system
- Daily report
- Attendance management
- Vehicle management
- BCP

*Consultation available

# Fair and efficient training by data utilization

- ✓ **When a company has many employees and drivers, it is difficult to daily conduct a safe driving assessment for everyone.**
- ✓ **The drivers to be trained can be identified efficiently using a ranking report which includes the contents for efficient instructions.**

## Group ranking

① Select groups to be trained

| | | |
|---|---|---|
| 1 | Group A | 80 |
| 2 | Group B | 65 |
| 3 | Group C | 45 |

## Individual ranking in group

② Select drivers to be trained

Group C

| | | |
|---|---|---|
| 1 | Driver A | 70 |
| 2 | Driver B | 54 |
| 3 | Driver C | 38 |

## Individual report

③ Decide driver's characteristics and set a training date.

Driver C

| Date | Score | Dangerous behavior |
|---|---|---|
| 8/1 | 60 | 0 |
| 8/2 | 45 | 1 |
| 8/3 | 20 | 5 |
| 8/4 | 35 | 2 |
| 8/5 | 40 | 1 |

## Drive assessment

④ Give safe driving training based on assessment results and video data

# Visible DX and GX by data visualization

- If vehicle data is used only as a backup for emergencies, it becomes a wasted treasure. LINKEETH visualizes data and streamlines inefficient resources and operations to drive DX and GX.
- We offer consultation on data structuring for readability and data mining according to customer's needs.

**DX**
**Business efficiency**

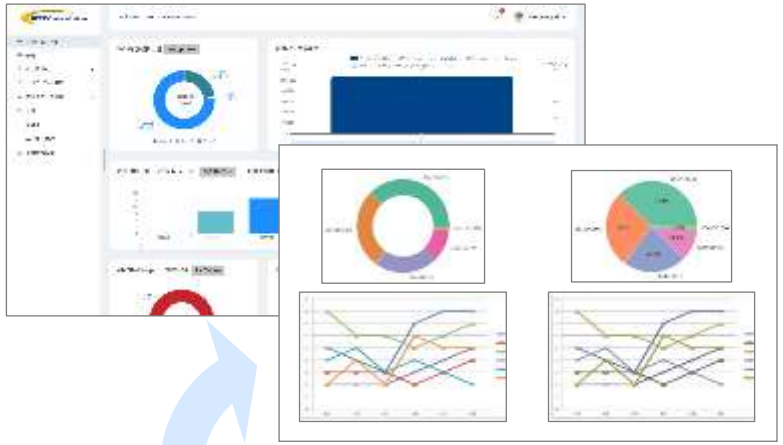
**GX**
**Cost reduction Decarbonization**

## LINKEETH as-is

- Vehicle operation state
- Idling time

- Awareness transformation by advanced driving assessment
- Improvement of fuel economy by ECO driving

## Application / Ingenuity



- ✓ Easily understandable visual report for operation ratio and idling time
- ✓ Quantification of $CO_2$ reduction amount based on vehicle data through NTT-Com asset integration

# Waterproof dashboard camera

**LINKEETH DRIVE**
**Waterproof dashboard camera**

**A dustproof/waterproof communication-type dashcam is included in the lineup as a new recording device that can be used in the environments exposed to wind, rain, dust and dirt, for example, in cases of external installation on a motorbike, bicycle, vessel, train and construction machine.**

Body

Camera

**JVC KENWOOD STR-DR-30**

■Features

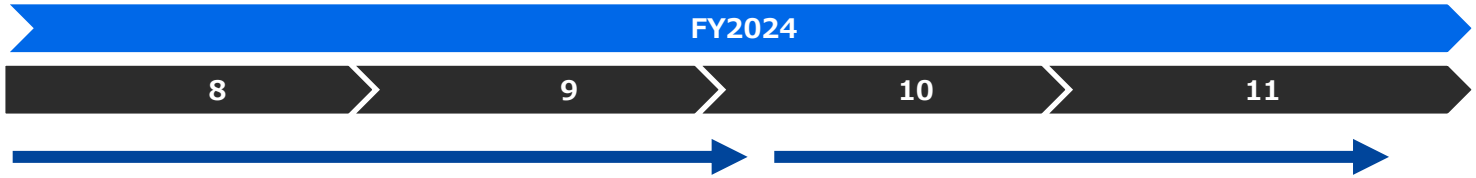
- Basic services of LINKEETH such as video and location information are available
- In addition to drive assessment logic for motorbikes, traffic offense detection linked with map data will be supported.
- Superior waterproof and vibration resistance are optimal for motorbikes, heavy machines and airport service vehicles.
- Since the camera and the body are of a separate type, the installation position of the camera is highly flexible.

## ■Examples of use scenes

**Motor bike** | **Electric bicycle** | **Railway** | **Construction equipment** | **Vessel**

## ■Schedule

*Schedule as of now, subject to change



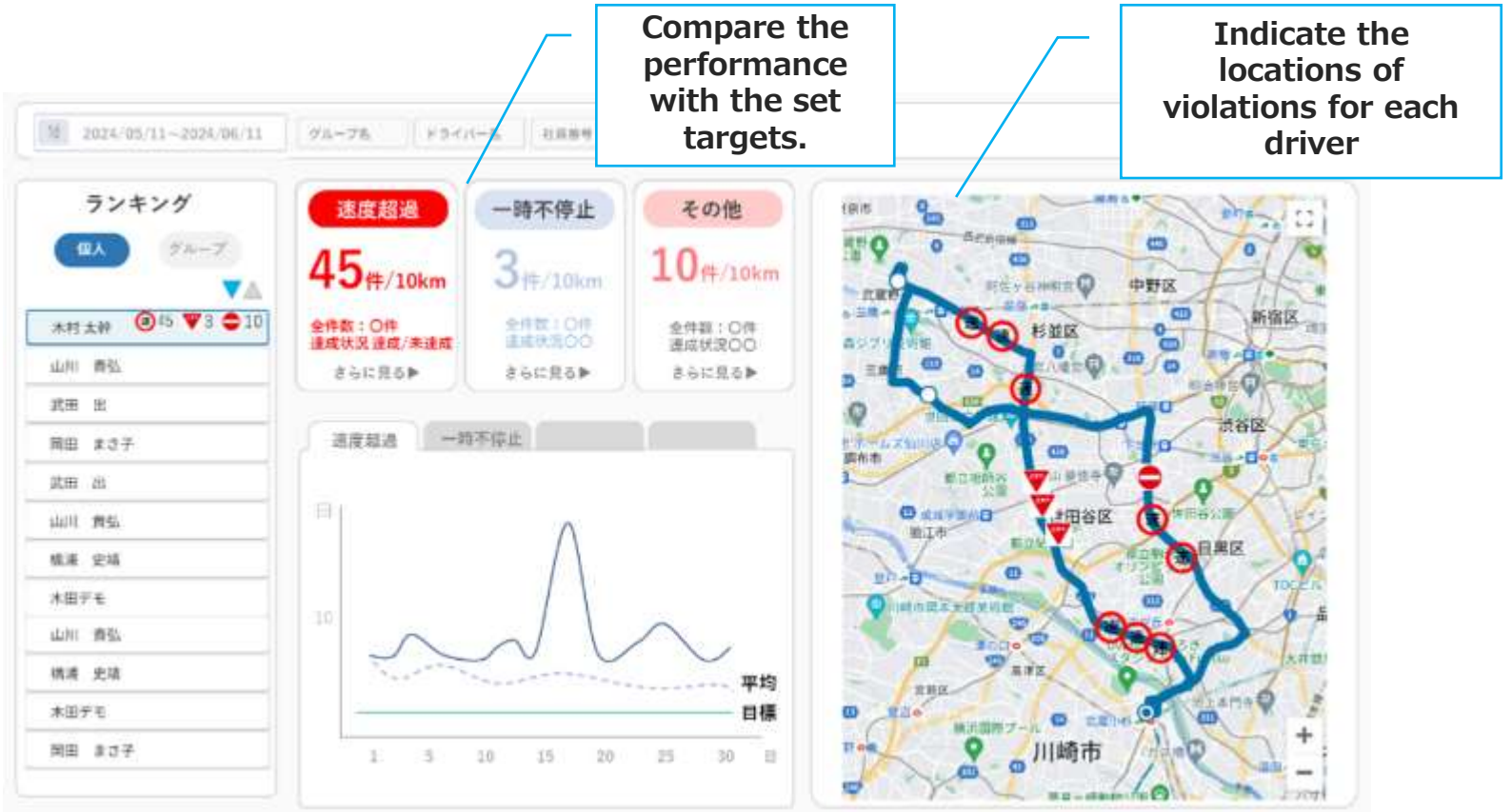

**System development / test/ quality check**

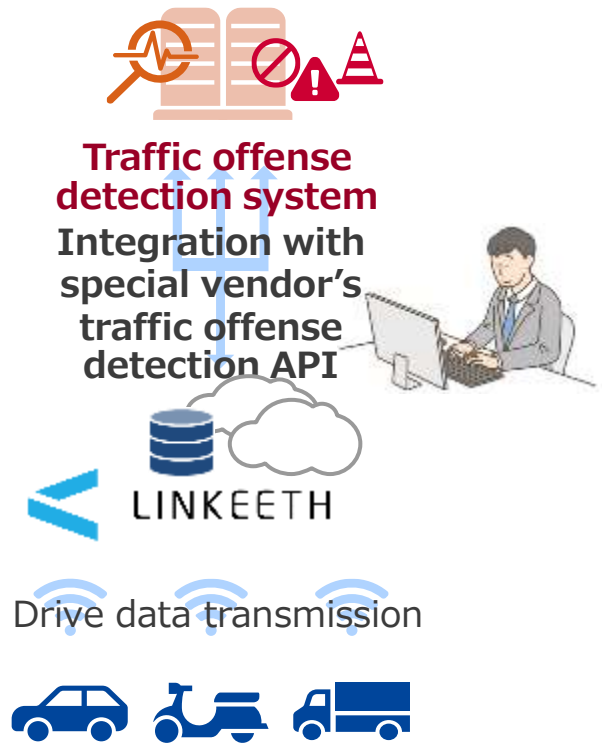
**Service-in**

# Traffic offence detection

- Started the field test of **‘Traffic offense detection function’** as LINKEETH DRIVE function expansion.
- Plan to detect violation of the speed limits by road type, stop sign violation, entry prohibition violation, etc.
- **‘Accidental violation’** which is not clearly shown on driving assessment scores is also **visualized** for further improvement of driver’s awareness.

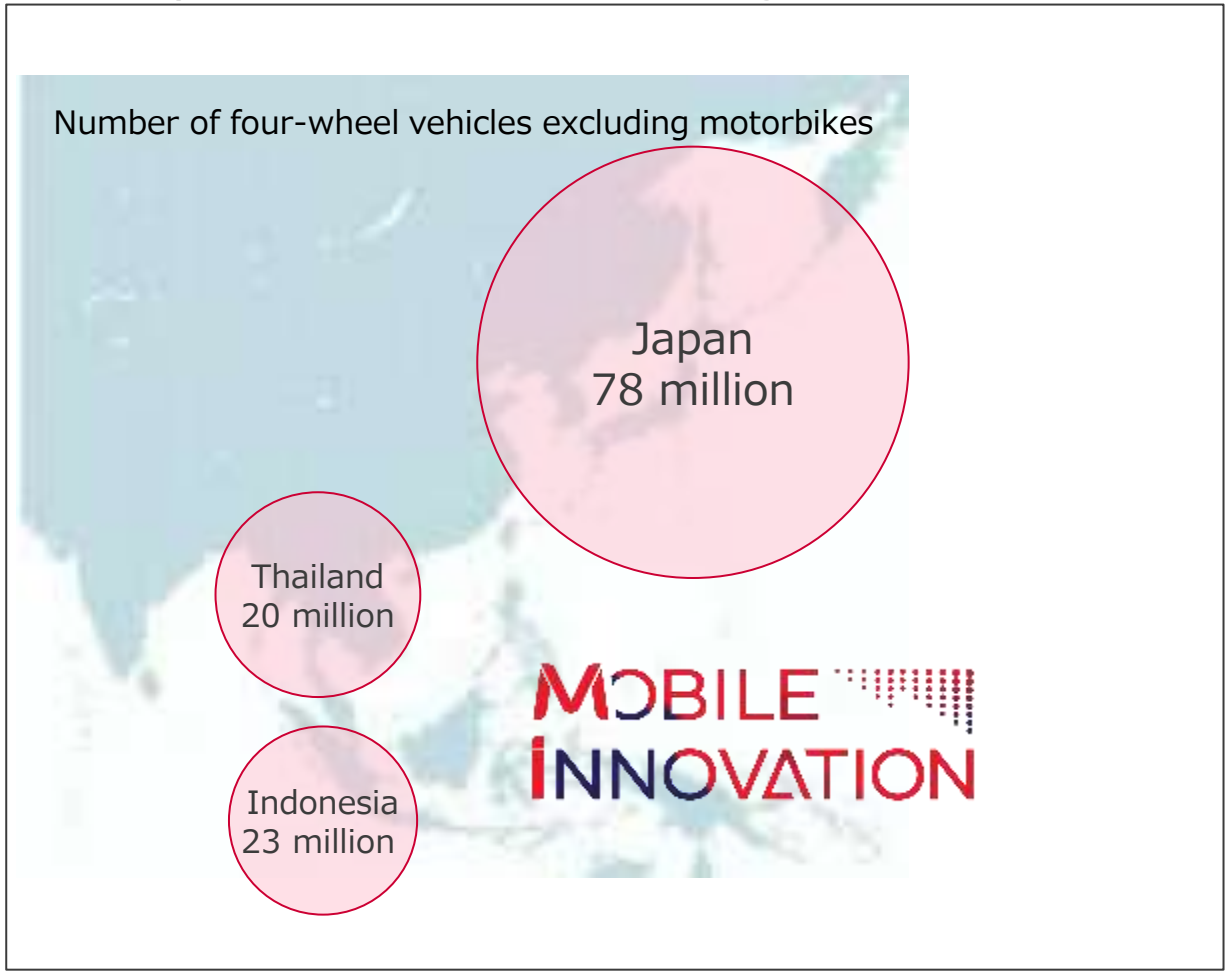
## Image



# Global deployment

- Set the telematics market in the Southeast Asia region as the short-term target in collaboration with overseas partner companies.
- Provide licenses for the partners in Thailand and Indonesia and investigate the marketability and potential in the Asian region.

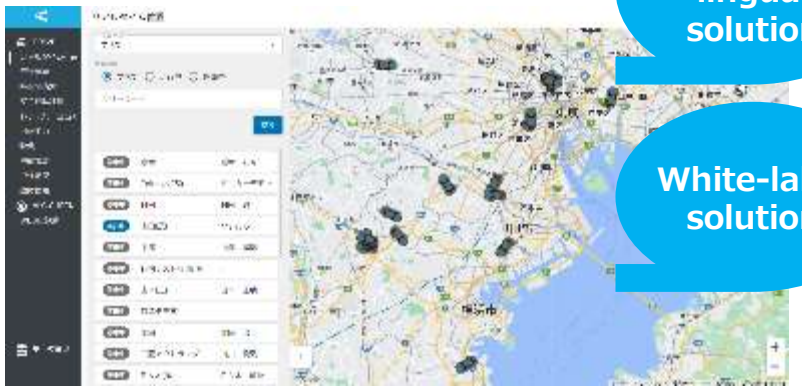



■ Service model (proposal)

Globally provide the LINKEETH functionality as a white-label solution in multiple languages.

Dashcam **LINKEETH DRIVE Location**

Dashcam **LINKEETH DRIVE Safety**



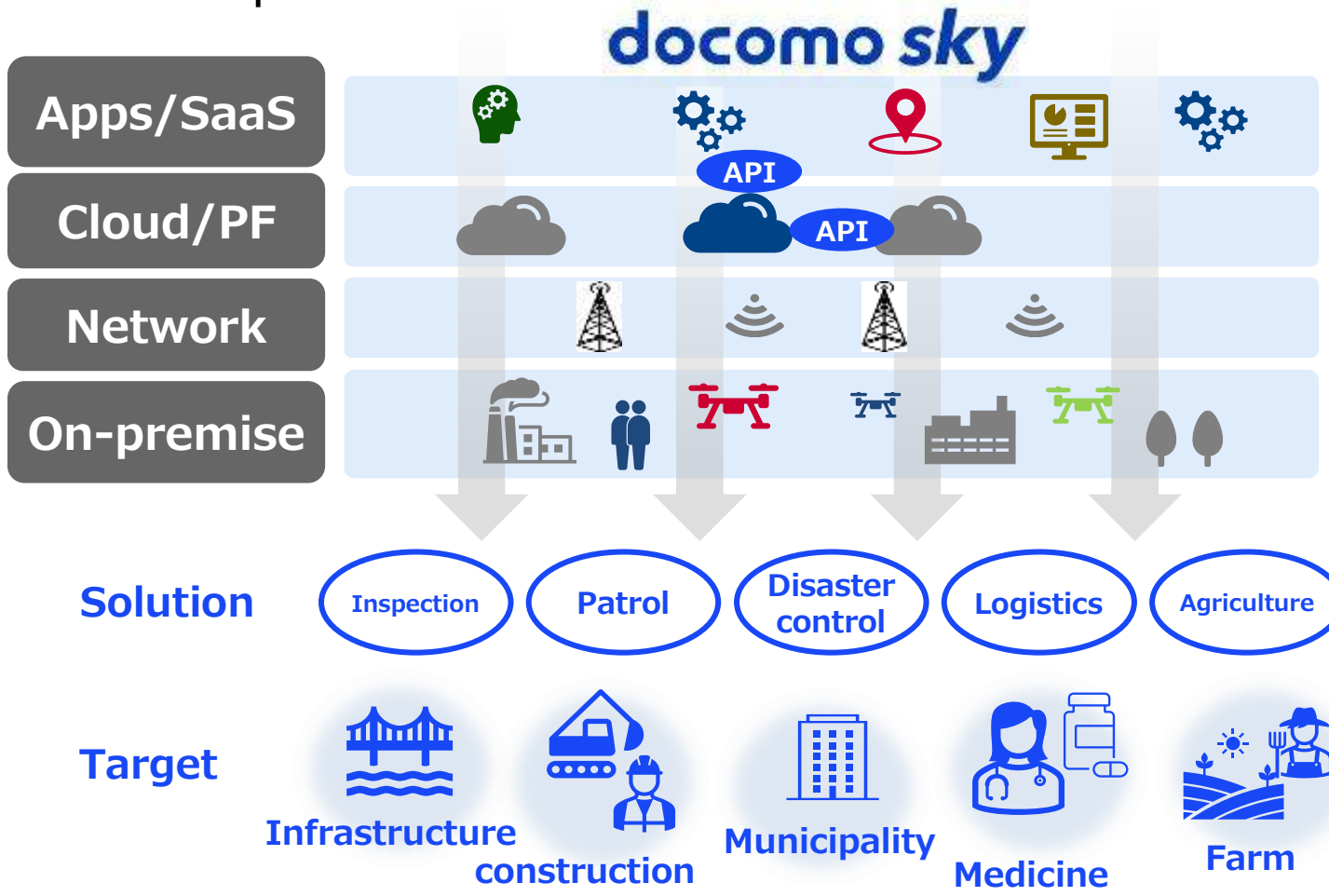
**Multi-lingual solution**

**White-label solution**

docomo business

# docomo sky Drone Business

We launched drone business with a brand name of ‘docomo sky’ in 2018, aiming to provide integrated solutions taking advantage of extensive flight experience and operation know-how as well as drone aircrafts, network, cloud and apps.




**Multi-cloud / business app**

**Japan’s first drone-specific LTE plan**

**LTE Jouku Riyou**

**Selectable drone bodies, enhanced implementation support**

**Product suite that addresses a range of use cases including labor saving, ensuring safety in inspection, agricultural reform, and new types of disaster control and logistics using air routes**

# docomo sky over the years

We have conducted a variety of PoCs including Japan's first test to advance efforts for commercialization.


PoC of unassisted long-distance flight

PoC of inter-island logistics


New charge plan for drones

docomo sky

New development of 'docomo sky'

PoC of long-distance flight and robot's last one mile delivery

2019

2021

Now



Simultaneous control of up to 37 units by large-scale drone control system


Total LTE control (successful long-distance flight)

PoC of medical products transportation in Wakayama City

PoC of heavy load transportation

# LTE AIR-USE PLAN

In July 2021, we started to offer ‘LTE Jouku Riyou Plan’ which is a special charge plan for drones that satisfy technical requirements in Radio Act.

<Plan overview and flow>

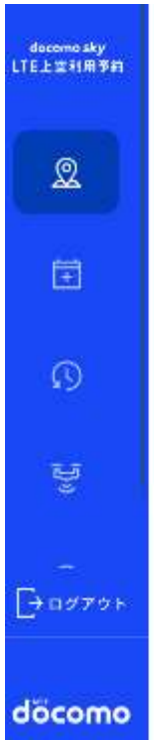
## LTE Jouku Riyou Plan

| | 月額料金 | 利用可能データ量 | 通信規格 | 通信可能エリア |
|---|---|---|---|---|
| サービス内容 | 49,800円 | 120GB/月 | 4G LTE | 全国 |
| | （税抜価格 45,273円） | | | ※LTE提供エリアのみ、3G・5Gエリアは除く |

### STEP1
**Contract**
Sign up at a docomo shop or via corporate sales rep.

### STEP2
**Flight booking**
Reserve the date, time and location for use

### STEP3
**Use**
Insert a special SIM compatible with the specs of a drone body

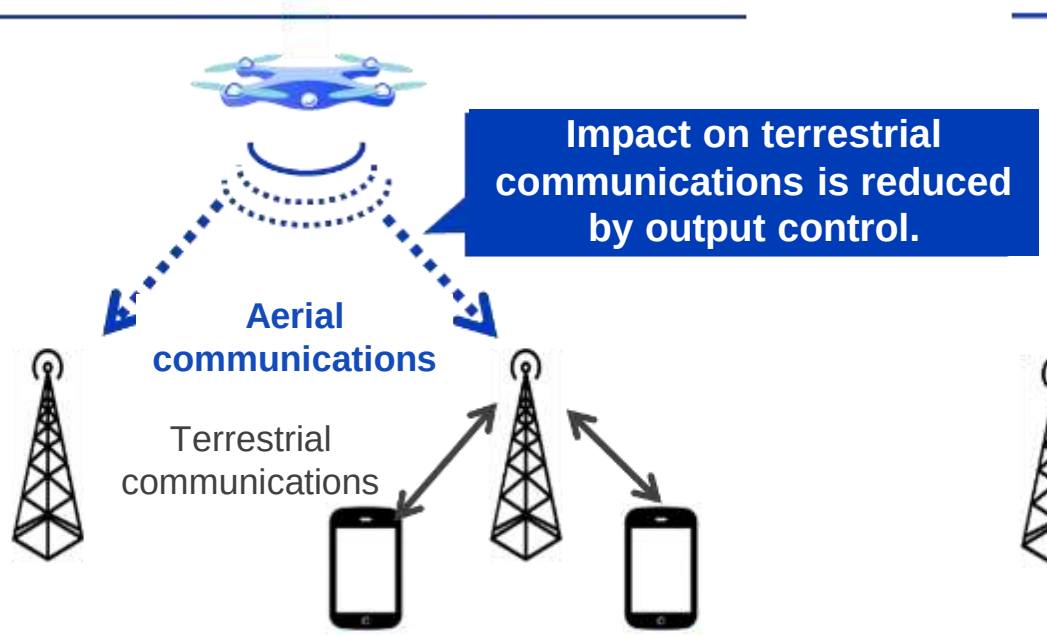



<LTE Jouku Riyou Booking webpage>


# docomo's technologies enabling LTE communications in the air

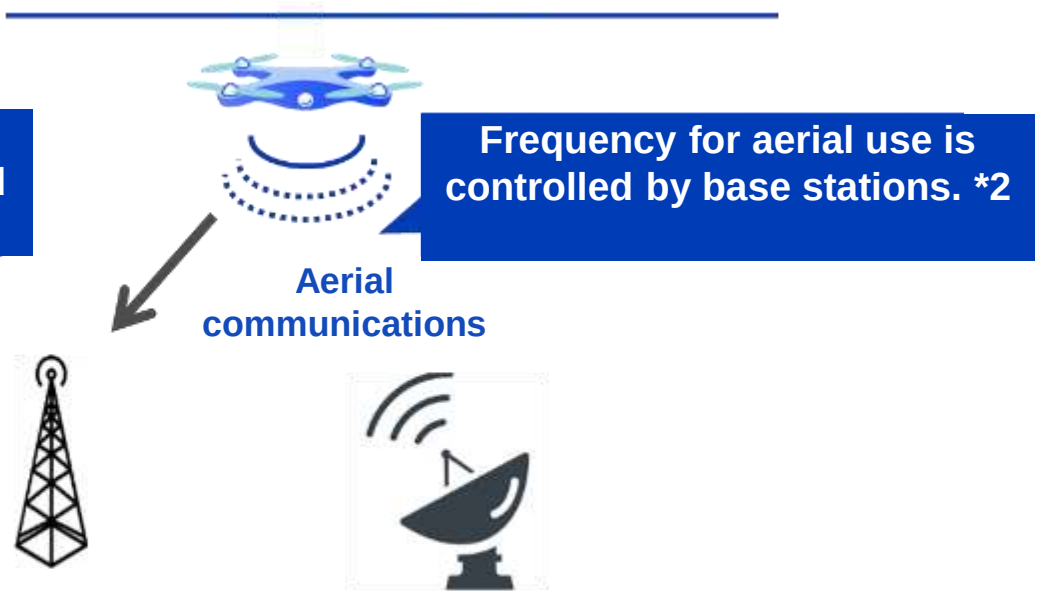
Technologies such as transmission power control and frequency restriction reduce the impact on terrestrial radio systems, which is **enabled by control from LTE networks.**
**Functional simply by inserting a SIM** without a drone-specific device *1

## Transmission power control




Communicate with base stations by controlling transmission power at the device side

## Frequency restriction




Prevent interference with other systems

※1 Functional with compatible devices
※2 Limited to band 1/3/19

# LTE Radio Wave Measurement Simulation Survey

We simulate radio waves calculated based on the information from base stations and conduct a radio wave measurement survey.

## Radio Wave Strength

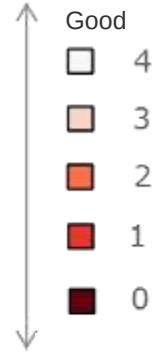
Indicator showing the strength of received radio waves
(signal quality indicator)

Clear and relatable guide:
The number of antennas displayed on a device
(though there are differences depending on devices)

Measurement result

Example : 2GHz、100m

Legend



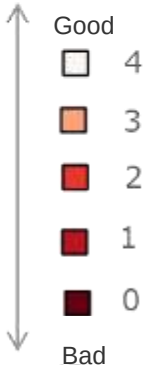

<Reference>
4: Equivalent to 4 antennas
3: Equivalent to 3 antennas
2: Equivalent to 2 antennas
1: Equivalent to 1 antenna
0: Equivalent to 0 antennas

## Radio Wave quality

Ratio of the whole received signal strength including received radio wave, noise and interference
(high-speed and large-capacity communication quality)

Clear and relatable guide:
User throughput

Example : 800MHz、125m




<Reference>
4: Capable of large-capacity file transmission [Tens of Mbps]
3: Capable of high-quality video transmission [approx. 10 Mbps]
2: Capable of image downloading [Several Mbps]
1: Drone body control signal
Capable of text data communication [Hundreds of kbps]
0: Around out of coverage [less than hundreds of kbps]

*Assumption that radio resource usage is 20%.

*Note that the results of radio wave state measurement are based on the findings at the time of this survey. These measurement results are neither absolute nor sustained depending circumstances and environments of survey target areas.

# Image of LTE Radio Wave Measurement Simulation Results

Based on the base station information (location, radio wave output, etc.) in the flight target area, we examined ‘radio wave strength’ and ‘radio wave quality’. The results are classified and displayed by color. (See the image below.)


※ This information is a sample, not actual data.

# <Case> Medical Product Transportation in Cooperation with Medical Helicopter Command Center

We conducted a PoC to deliver medical products (2kg) in Wakayama City in March 2023. In cooperation with a medical product wholesaler and university hospital, we identified issues for implementing air delivery of medical products and verified operation rules.

## PoC Overview

On the assumption that a medical product wholesaler, KSK Co. Ltd, received an order of medical products from Wakayama Medical University, a drone delivered placeboes onto the rooftop of the hospital building.


## Verification Results

**(1) Transport quality**

・Equipped a **medical box** for quality control of medical products

・Flied while checking that the contents were maintained in an appropriate manner with the mounted **temperature/acceleration sensors**

**(2) Confirmation of receiver by facial recognition**

・Conduced facial authentication using **AI facial recognition software 'SAFR'** when hospital staff received placeboes.

・Confirmed that hospital staff appropriately received the delivered goods.

**(3) Cooperation with medical helicopter command center**

・Confirmed cooperation with the medical helicopter command center considering practical application.

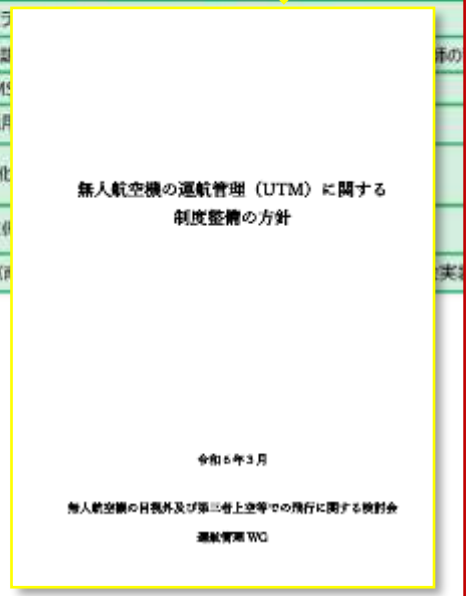
・Flied while ensuring safety through close cooperation, although the medical helicopter was dispatched during the PoC.

Press release: https://www.ntt.com/about-us/area-info/article/20230418.html

# External Conditions Affecting Drones

- ✓ Deregulation is progressing as Level 4 and Level 3.5 were set out in December 2022 and December 2023 respectively.
- ✓ Going forward, increase of flight frequency within the same airspace is expected in accordance with expansion of flights at Level 4 and increase of flights at Level 3.5 or below. Accordingly, Ministry of Land, Infrastructure, Transport and Tourism formulated 'Policy for Regulatory Framework Development for Unmanned Aircraft System Traffic Management (UTM)' in March 2024.
- ✓ **Therefore, utilization of UTM becomes essential to ensure safe drone flights in the future.**


○Quoted and adapted from the Public-Private Council at the Prime Minister's Office
Roadmap for the Industrial Revolution in the Sky 2022
(Decision by the Public-Private Council for the Development of the Environment for Small Unmanned Aircraft on August 3, 2022)

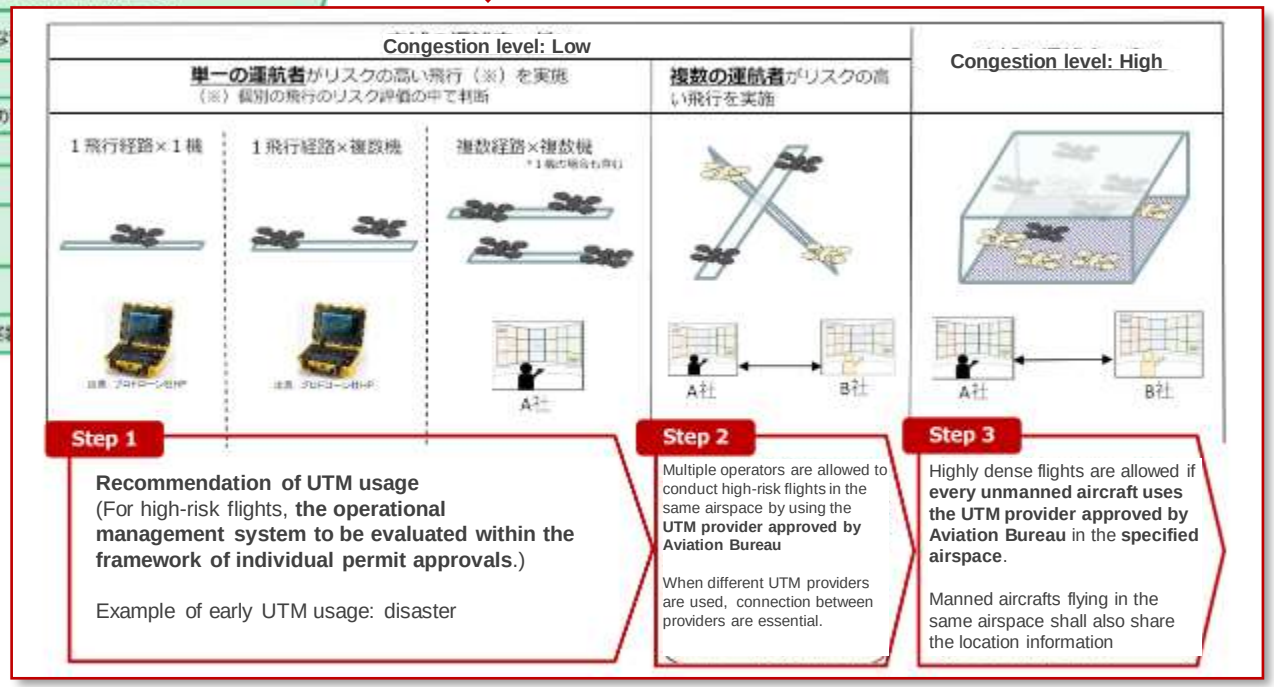

無人航空機の運航管理（UTM）に関する
制度整備の方針

令和５年３月

無人航空機の目視外及び第三者上空等での飛行に関する検討会
運航管理 WG

Excerpt from materials of study group on Study Group on Beyond Visual Line of Sight (BVLOS) and Overflight of Third Parties by Unmanned Aircraft
sankou.pdf (kantei.go.jp)

※**UTM**（**U**AS **T**raffic **M**anagement）




○Expert from Aviation Bureau of MLIT 001571740.pdf (mlit.go.jp)

# Overview of Automated Drone Flight Management (UTM)

- ✓ We have provided airpalette® UTM since 2017, applying our knowledge, accumulated over 40 years as NTT Group, about manned aircraft management systems and airspace utilization.
- ✓ This service is a software package to **achieve remote control and operation management of multiple drones as well as traffic management in drone flight zones**.

**docomo sky** powered by ***airpalette*** UTM

## Features / Strengths

### Highly flexible customization

The platform type package software allows you to add a

### Simultaneous flights of multiple drones

This is suitable for various types of communication networks. By setting a wide area as a drone flight zone, operation efficiency will improve.

### Application to a wide range of industries and drones

This is applicable to various industries and different types of drones.

### Easy flight planning

It is easy to create a flight plan in consideration of flight prohibited areas, weather conditions, terrain information, etc.

## Scope of offering


Others: API release for connecting externally with business apps, etc.

# Automated Flight Using airpalette® UTM