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Unleashing the Future: Deployment of a High-Capacity, Low-Latency Communication Environment to support the advancement of Industrial Complexes Using IOWN® APN and 60GHz wireless LAN

-Toward the establishment of a foundation for outdoor smart maintenance-

NTT EAST, Inc.
NTT DOCOMO SOLUTIONS, Inc.
NTT DATA Group Corporation
1Finity Inc.
Mitsubishi Chemical Corporation

Four NTT Group companies - NTT EAST, Inc., NTT DOCOMO SOLUTIONS, Inc., NTT DATA Group Corporation, and NTT DOCOMO BUSINESS, Inc.- (hereinafter referred to as the "the NTT Group"), 1Finity Inc. of the Fujitsu Group (hereinafter referred to as "1Finity") and Mitsubishi Chemical Corporation of the Mitsubishi Chemical Group (hereinafter referred to as "Mitsubishi Chemical"), aim to reduce the burden on workers inspecting outdoor factory facilities by implementing smart maintenance through the use of the IOWN® APN [1] and AI.

In the case of outdoor factory facilities, due to imitations in the communication environment and the scarcity of use cases for smart maintenance, progress on both "improving the communication environment" and "implementing smart maintenance" has been hindered.

To address these challenges, in February 2026, the companies conducted a verification test in the Mizushima Coastal Industrial Zone ("Mizushima Industrial Complex") in Okayama Prefecture to establish a high-capacity, low-latency communication environment utilizing the IOWN® APN and 60GHz wireless LAN (WiGig [2]).

The validation confirmed that establishing a high-capacity, low-latency outdoor communication environment enables smart maintenance by leveraging external computing resources.

Going forward, based on the communication environment validated this time, the companies will expand the range of smart maintenance applications - such as anomaly detection technologies using video and audio data from multiple robots and devices - and work to reduce the burden on site workers in actual site operations.

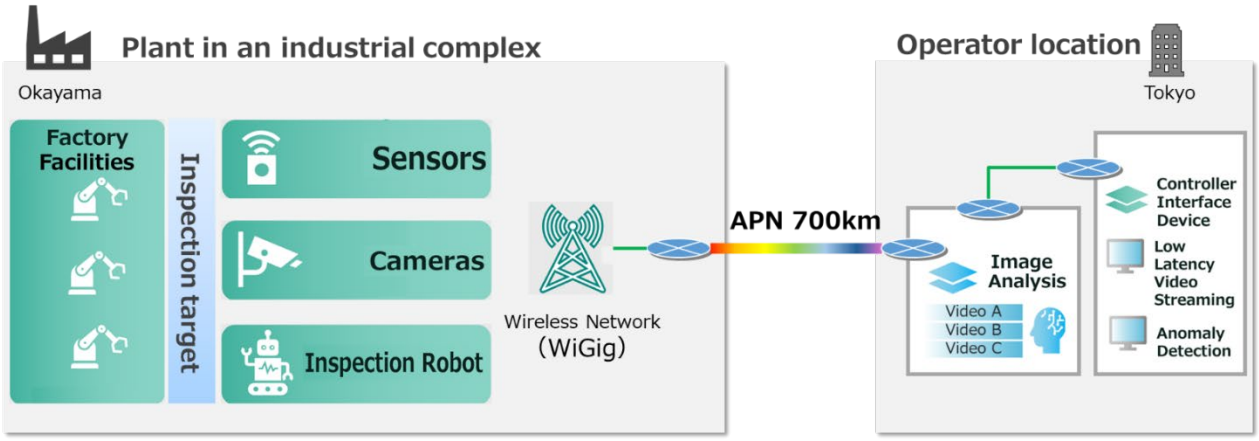

Figure 1. Diagram of this verification

Figure 2. Okayama Plant, Mitsubishi Chemical

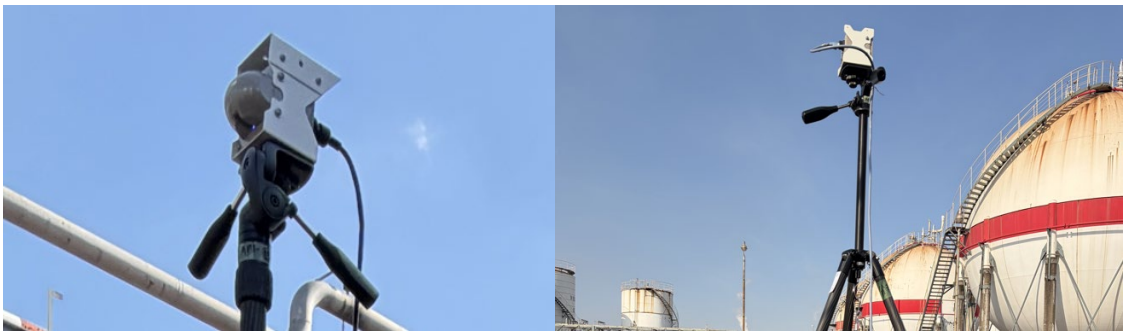

Figure 3. 60 GHz wireless LAN (WiGig) devices

1Finity Ultra Optical System L100

1Finity Ultra Optical System T250

1Finity Ultra Optical System T300

Figure 4. APN devices

Background

The NTT Group, 1Finity, and the Mitsubishi Chemical are participating in the IOWN Global Forum™ (hereinafter referred to as “IOWN GF”) as part of their initiative to realize a sustainable society. [3] The three members have been collaborating with IOWN GF partner companies to develop a reference implementation model for the “Remote Controlled Robotic Inspection” use case, which includes the functions and requirements for remotely operating robots to perform factory facility inspections. In 2024, the companies are conducting a pilot verification experiment for factory inspections that combines remotely operated robots utilizing the IOWN® APN with AI-based video analysis. [4]

Overview of the Verification

In industrial complexes where large-scale factory facilities are concentrated, regular outdoor inspections of the facilities are essential to ensure safe and stable operation. However, in large-scale facilities, inspection work requires significant man-hours, and some inspections - such as those involving work at heights - carry a risk of falls. As a result, reducing the burden on site workers has been a long-standing challenge.

On the other hand, in traditional industrial complexes, outdoor smart maintenance activities have not progressed sufficiently due to limitations in the communication environment. This has created a vicious cycle (a deadlock) where the lack of progress in smart maintenance hinders the advancement of communication environments.

In recent years, studies have progressed regarding the use of wireless technologies such as Local 5G; however, because Japan requires regulatory measures such as obtaining wireless licenses, significant hurdles remain in the development of the communications environment.

The companies have established a high-capacity, low-latency communication environment within the industrial complex by combining IOWN® APN with 60GHz wireless LAN (WiGig), a license-exempt wireless communication technology. Specifically, the companies established an IOWN® APN environment connecting the Mitsubishi Chemical’s Okayama Plant to an NTT Group building in Tokyo (approximately 700km away), and the companies set up a wireless communication environment using WiGig covering a distance of approximately 2km within the Okayama Plant in a about 6 hours.

Roles of each member in this verification

The NTT Group	Deployment of the IOWN® APN environment between the Okayama Plant and the Building in Tokyo, rapid deployment of the WiGig environment, and quality verification of video and audio data from sensors
1Finity	Provision of technical expertise regarding the construction of the IOWN® APN network, as well as the supply of related devices
Mitsubishi Chemical	Definition of functional and non-functional requirements for the communication environment necessary for factory facility inspections, and provision of the experiment site

Verification Details and Results

1. **Deployment of the IOWN® APN Environment**

For the connection between the Okayama Plant and the Building in Tokyo (approximately 700km), which served as the experiment site, the companies utilized “docomo business APN Plus powered by IOWN®,” provided by NTT DOCOMO Business, Inc.. Based on the IOWN initiative, this service utilizes innovative technologies centered on optical communications to deliver a high-capacity, low-latency communication environment capable of supporting 100Gbps transmission speeds. Furthermore, because the companies can make effective use of existing optical network infrastructure, the companies are able to guarantee high

quality and reliability even in areas across Japan where installation is particularly challenging. In this verification, the companies were able to provide the IOWN® APN environment to industrial complexes in regions outside the Tokyo-Osaka area.

2. **Deployment of the WiGig environment**

At the Okayama plant, the companies established a WiGig wireless communication environment covering a distance of approximately 2km from the APN endpoint to the experiment site using 18 wireless repeaters. This environment was set up in a short period of about 6 hours. At the verification site, the companies achieved a wireless communication environment with upload speeds of up to 900Mbps. The companies have also confirmed that it is possible to establish wireless connections with sensors carried by moving people, vehicles, and robots - a challenge that has long been associated with high-frequency band communications.

3. **Data Transmission Experiment Using a 4K Camera**

The companies successfully transmitted video data simultaneously using eight 4K cameras. (Total data transmission of approximately 400Mbps) The companies confirmed that data transmission with end-to-end latency of less than 0.1 seconds is possible in a configuration combining a WiGig wireless communication link spanning approximately 2km with an APN communication link covering approximately 1,400km round-trip. Even in outdoor environments, the companies were able to simultaneously collect large volumes of data - such as video and audio data - from multiple sensors while maintaining real-time performance.

The results of this verification demonstrated that it is possible to establish a high-capacity, low-latency communication environment capable of supporting outdoor smart maintenance even within industrial complexes facing imitations in the communication environment, and that such industrial complexes can be connected to remote computing resources, such as data centers.

This is expected to enable not only seamless video streaming over long distances and the simultaneous acquisition of video, audio, and other data using various devices, but also AI-assisted patrol inspection support based on high-precision, real-time status monitoring using multimodal AI [5]. These initiatives demonstrate the importance and effectiveness of developing communication and computing infrastructure for advancing smart maintenance in outdoor environments and accelerating its societal implementation.

Looking Ahead

The companies will further enhance the stable communication environment to enable the simultaneous control of multiple high-precision cameras and robots, paving the way for the full-scale deployment of the outdoor smart maintenance platform. In addition, the companies will proceed with studies and demonstrations aimed at establishing a network environment capable of supporting multi-site operations, as well as a computing infrastructure capable of handling multimodal AI processing.

Notes

1. IOWN® APN is part of the All-Photonics Network (APN) proposed by NTT. It is a next-generation network technology that enables ultra-low latency and high-speed communications by using optical signals instead of conventional electrical signals. “IOWN®” is a trademark or registered trademark of NTT Corporation.WiGig stands for Wireless Gigabit. It is a wireless LAN standard that uses the 60GHz band based on the IEEE 802.11ad standard.
2. IOWN Global Forum™ is an international organization established with the aim of realizing the IOWN (Innovative Optical and Wireless Network) initiative. Currently, more than 170 companies and organizations are members of the Forum. https://iowngf.org/
3. Unleashing the Future: Smart Robots Conduct Remote Inspections Using IOWN® APN https://www.nttdata.com/global/en/news/press-release/2025/january/012000
4. Multimodal AI is an AI capable of making integrated judgments using various types of input data (modalities), depending on the desired outcome. “Modal” refers to the type of inputs provided to the AI, such as video, sound, text and more.

[Comments from each company]

NTT Group

Takashi Yamaguchi, Senior Vice President, Head of Third Business Solutions, Business Solution Division, NTT DOCOMO BUSINESS, Inc.

“I am confident that the establishment of this communication environment using the IOWN® APN represents a major step toward realizing the ‘Industrial Complex of the Future.’ By eliminating geographical constraints through the IOWN® APN, I believe we can make a significant contribution to solving the serious social issue of labor shortages facing Japan. Through this infrastructure, we will digitize the technologies and insights cultivated on the ground in local communities and implement them as ‘Smart Maintenance’ that can be deployed globally, thereby vigorously driving the sustainable advancement of industry.”

1Finity

Hideki Matsui, Head of Photonics Systems Business Unit, 1Finity Inc.

“This initiative represents a significant step forward in developing the network technologies we have cultivated in mission-critical fields, in collaboration with our partners, to address societal challenges. The fact that IOWN® APN's overwhelming low latency and high reliability have proven effective in smart maintenance of plant equipment demonstrates its potential to significantly change the way industries operate. 1Finity will continue to pursue the ideal form of network that truly brings value to the site and society, and will accelerate co-creation with our partners toward the realization of a sustainable and resilient industrial infrastructure.”

Mitsubishi Chemical

Toshiya Katsuragi, Executive Consultant, Mitsubishi Chemical Corporation

"When it comes to collecting and utilizing large amounts of data outdoors, establishing a reliable communication infrastructure is the biggest challenge. This demonstration proposes a solution to that challenge. Now that the conditions are in place, we are ready to fully engage in challenging ourselves to create a new approach to monozukuri. We look forward to many companies joining this initiative."

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