

Co-creation Activities through “LOCAL 5G OPEN LAB”



Norikazu Watanabe
New Business Development Headquarters
NTT East

1. Introduction

“Local 5G” refers to 5th Generation of Mobile Communication System (5G) that can be constructed and used in a flexible manner by a variety of entities according to regional and individual industrial needs^[1]. It is anticipated that Local 5G will be used in regions in which 5G coverage by mobile operators cannot be provided anytime soon and be used in new ways by exploiting the 5G features of high-speed, large-capacity communications, wide-area coverage, etc. compared with Wi-Fi.

Given the expanding use of mobile devices such as smartphones, NTT East has been providing private network services including Wi-Fi to corporate customers since 2011. It has so far introduced more than 200,000 Wi-Fi access points as part of its “Giga-Raku WiFi” service. It is also promoting the construction of “Low Power Wide Area (LPWA)” networks such as LoRa and Enocean in fields that need wide-area coverage such as agriculture and river monitoring by local governments.

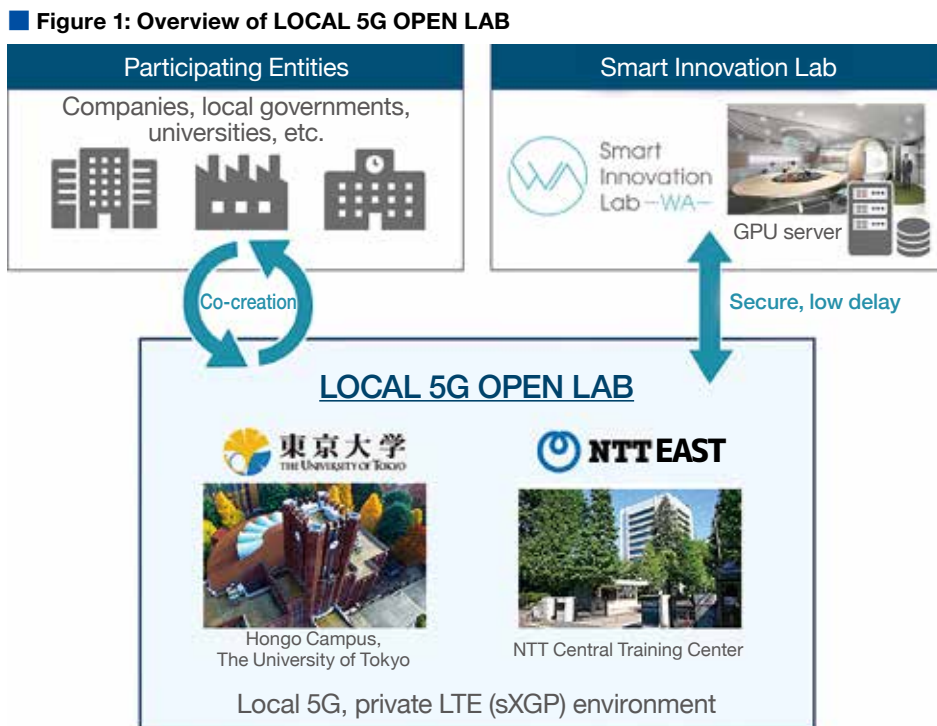
Local 5G is also expected to be used as a private network for corporate customers, and NTT East aims to provide a lineup of Local 5G end-point solutions for needs that have so far been difficult to satisfy by Wi-Fi or similar services.

This article introduces examples of co-creation activities between NTT East and various partners centered about “LOCAL 5G OPEN LAB,” which has been working on various projects since the Japanese government began accepting applications for licenses to operate Local 5G.

2. LOCAL 5G OPEN LAB

2.1 Background to establishment

Local 5G is expected to meet the latent needs^[2] of users and regional companies with no specialized knowledge of wireless or network technologies. On the other hand, barriers to its use are not necessarily low given the need to obtain an operating radio license at the time of implementation and to procure equipment that has yet to drop in price. Against this background, NTT East and The University of Tokyo (Nakao Research Laboratory) jointly established “LOCAL 5G OPEN LAB” in October 2019 as Japan’s first industry-academia joint demonstration environment with the aim of demonstrating Local 5G use cases in which local governments and companies can openly participate^[3]. Then, in February 2020, NTT East concluded a collaboration agreement with the Tokyo Metropolitan Government and The University



■ Figure 2: Interior of LOCAL 5G OPEN LAB



Open space



Testing room



Conference room

of Tokyo on deploying and using Local 5G environments^[4]. This agreement marked the beginning of research and testing at LOCAL 5G OPEN LAB and elsewhere with the aim of revitalizing industry and fostering innovation.

By the end of 2020, LOCAL 5G OPEN LAB had held discussions (including tours of facilities) with over 100 local governments and companies on the holding of demonstrations. In this article, we provide an overview of the same facilities and take up to two examples of demonstrations centered about collaborations with the Tokyo Metropolitan Government.

2.2 Demonstration environment (as of December 2020)

At LOCAL 5G OPEN LAB, a demonstration environment has been set up for multivendor systems supporting a millimeter-wave frequency band (28.2 – 28.3 GHz), which was systematized in December 2019. Going forward, there are plans to support systems using the Sub6 (4.7 GHz) band launched in December 2020. Specifications for this demonstration environment as of December 2020 are given below.

- Testing room
 - Provides a closed testing space about 100 square meters in size; equipment may be carried in.
 - Local 5G non-standalone (NSA) (28.2 GHz – 28.3 GHz band)
 - Local 5G-supporting terminals (customer premises equipment (CPE))
 - Shield box (anechoic chamber)

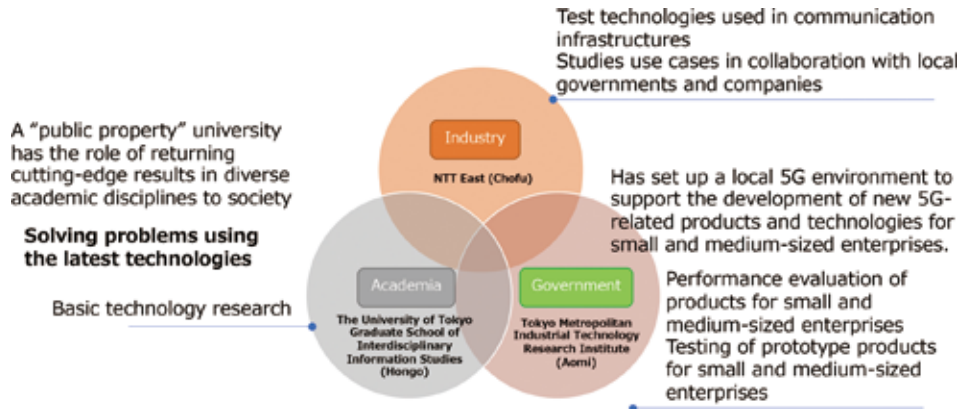
- Open space
 - Provides individual booths for concentrating on work as well as co-working space and solutions exhibition space
- Conference room
 - Provides space for meetings after testing, for consultation purposes, etc.
- Collaboration with Smart Innovation Lab
 - LOCAL 5G OPEN LAB works with Smart Innovation Lab, a joint demonstration environment having GPU resources, towards the social implementation of AI and IoT technologies.

3. Examples of Collaborative Projects with Partners

3.1 Collaboration with Tokyo Metropolitan Industrial Technology Research Institute

Tokyo Metropolitan Government, The University of Tokyo, and NTT East have entered into an agreement on the use of Local 5G. In June 2020, the Tokyo Metropolitan Government began to acquire licenses for Local 5G base stations for use by local governments, and in October 2020, set up a Local 5G environment in a millimeter-wave band at Tokyo Metropolitan Industrial Technology Research Institute (TIRI). TIRI supports the social implementation of cutting-edge technologies with a focus on small and medium-sized enterprises and promotes the digital transformation (DX) of society. As a public testing/research laboratory, it was the first in Japan to set up Local 5G base stations to provide comprehensive support for using Local 5G, robotic

■ **Figure 3: Overview of “Collaboration Agreement on Deploying and Using Local 5G Environments”**



■ **Figure 4: Demonstration environment at Tokyo Metropolitan Industrial Technology Research Institute**



■ **Figure 5: Test site at LOCAL 5G OPEN LAB**



technologies, and IoT technologies^[5].

Going forward, the plan is to create use cases that give 5G functions to robots, IoT technologies, etc. and to support performance evaluations of developed products such as 5G-compliant devices.

3.2 Collaboration with Tokyo Development Foundation for Agriculture, Forestry, and Fisheries

In the area of primary industries, NTT East has entered into a three-party collaboration with the Tokyo Development Foundation for Agriculture, Forestry, and Fisheries, a public-

interest incorporated foundation and policy-linked body of the Tokyo Metropolitan Government, and NTT AgriTechnology Corporation, a company specializing in “agriculture × ICT,” with the aim of implementing cutting-edge agriculture using Local 5G^[6].

This collaborative project aims to achieve high-quality and efficient activities by using ultra-high-definition cameras, smart glasses, and autonomous driving robots to perform remote monitoring and support to enable remote farming in place of support activities that have traditionally been provided by agricultural instructors in the field. In the future, moreover, we can envision optimal support of farm operations based on data. This may take the form of diagnosing growing conditions as well as disease-and-pests conditions from collected video or displaying real-time information using smart glasses.

In December 2020, a test site connectable to the 5G system of LOCAL 5G OPEN LAB was constructed and demonstrations using millimeter waves began.

4. Conclusion

Local 5G is expected to meet regional needs and individual industrial needs, so there is a particular need for co-creation activities with partners that are facing such latent needs. Against this background, we presented examples of co-creation between NTT East and diverse corporate partners centered about LOCAL 5G OPEN LAB.

To further promote co-creation activities with even more partners at LOCAL 5G OPEN LAB as an open site for demonstrating Local 5G technologies, the plan is to expand support to Sub6 (4.7 GHz) band environments and multivendor,

outdoor demonstration environments as the need arises.

Moreover, in addition to LOCAL 5G OPEN LAB, NTT East is managing co-creation facilities that have the potential of regional revitalization. These include “eXeField Akiba,” an Esports facility of NTTe-Sports, NTT AgriTechnology’s “own farm” in Yamanashi Prefecture in Japan, and a cultural facility of NTT ArtTechnology. We aim to link these facilities with LOCAL 5G OPEN LAB and establish a system that can provide a range of services from administration to Local 5G technologies in a one-stop manner. In this way, we hope to accelerate initiatives toward the implementation of Local 5G in society.

References

- [1] [2] Ministry of Internal Affairs and Communications (MIC): “Information and Communications in Japan—White Paper 2020.” MIC. 2020-8-4. <https://www.soumu.go.jp/johotsusintokei/whitepaper/index.html> (last referenced 2021-01-15)
- [3] The University of Tokyo Graduate School of Interdisciplinary Information Studies, Nippon Telegraph and Telephone East Corporation (NTT East): Establishment of Japan’s First Industry-Academia Joint “LOCAL 5G OPEN LAB” by The University of Tokyo and NTT East.” NTT East. 2019-10-18. (in Japanese) https://www.ntt-east.co.jp/release/detail/20191018_01.html (last referenced 2021-01-15)
- [4] Tokyo Metropolitan Government, The University of Tokyo, Nippon Telegraph and Telephone East Corporation (NTT East): Conclusion of a Three-Party Agreement on the Use of Local 5G.” NTT East. 2020-2-21. (in Japanese) https://www.ntt-east.co.jp/release/detail/20200221_02.html (last referenced 2021-01-15)
- [5] Tokyo Metropolitan Industrial Technology Research Institute: “Opening of ‘DX Promotion Center’ for Comprehensive Support of Local 5G, Robotic Technologies, and IoT Technologies.” Tokyo Metropolitan Industrial Technology Research Institute. 2020-10-22. (in Japanese) https://www.iri-tokyo.jp/uploaded/release/detail/20200221_02.html (last referenced 2021-01-15)
- [6] Tokyo Metropolitan Government Bureau of Industrial and Labor Affairs, Nippon Telegraph and Telephone East Corporation (NTT East), NTT AgriTechnology Corporation: “Collaboration Agreement on Implementing Cutting-Edge Agriculture using Local 5G.” NTT East. 2020-4-3. (in Japanese) https://www.ntt-east.co.jp/release/detail/20200403_01.html (last referenced 2021-01-15)

■ Figure 6: Outlook for LOCAL 5G OPEN LAB

