NTT DATA

# Japan's First High-Precision Indoor Positioning Driven by Geomagnetic Technology Used at Narita Airport

~Foreigners visiting Japan can now seamlessly navigate through Narita Airport's intricate complex~

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NTT DATA Corporation

**NTT DATA Corporation (hereafter, NTT DATA) and Narita International Airport Corporation (hereafter, NAA) will release an airport navigation app called "NariNAVI" on September 20, 2018. This app can be used within Narita International Airport's terminals and uses a High-precision indoor location information technology(Note 1) leveraging radio frequency and geomagnetism (the earth's magnetic field) to determine one's position. This will be the first time that the technology is used within an airport in Japan.**
**NariNAVI uses geomagnetic positioning to display the user's current position on their smartphone in real-time on a map of the airport. In addition to the 2D map, NariNAVI also displays a 2.5D map of the airport's intricate facilities which extend over multiple floors. This intuitive and user-friendly map will help foreigners visiting Japan seamlessly navigate their way around Narita Airport.**
**Aside from the use of this highly-accurate navigation service within Narita Airport, NTT DATA is also considering the use of more location information services within NAA in the future such as for managing employees and articles. NTT DATA aims to expand its business by developing location information services for companies with indoor facilities.**

## Background & Summary

NAA has been considering the idea of an airport navigation app that allows users to pinpoint their location within Narita Airport in real-time, so that foreigners visiting Japan and other first-time visitors can seamlessly navigate through the airport much like they can do outdoor but is not normally possible indoor because of lack of GPS signal. NTT DATA proposed to NAA the development of an app that utilizes the High-precision indoor location information service(Note 2) which started back in June 2018. NTT DATA then proceeded to develop NariNAVI after being chosen by NAA.
This app is the first of its kind to be used within an airport in Japan, and uses precise indoor localization technology through geomagnetism. The app uses a digital map sent from a precise indoor digital mapping system(Note 3) which NTT DATA started offering to NAA back in October last year. The app allows users to view a three-dimensional map displayed in 2.5D on their smartphone using 2.5D map platform technology(Note 4).

## Technology Offered to NariNAVI

- **Precise Indoor Positioning Technology**

  The technology developed by GiPStech and deployed jointly with NTT DATA is based on the advance collection of information transmitted by BLE beacons and geomagnetic signals distributed throughout the building to generate a map of signal on multiple dimensions. The map information

and the information collected by the user's own smartphone are then compared and analyzed to accurately give the user their current position within the facility and to update it based on user' actual movements.
NariNAVI now allows users to confirm their current position in real-time by displaying their current location in real-time on a map of Narita Airport.

- **2.5D Map Platform Technology**

  This map platform technology allows hierarchical outdoor and indoor maps (planar maps containing information on floors and heights) to seamlessly be transmitted and displayed. This technology can generate simple three-dimensional maps by combining planar map data with height information.
  NariNAVI will allow users to comprehensively grasp their current position and their target location by displaying an intuitive and easy-to-understand three-dimensional map to help them, for example, navigate their way from the 1st floor to the 4th floor of Narita Airport.

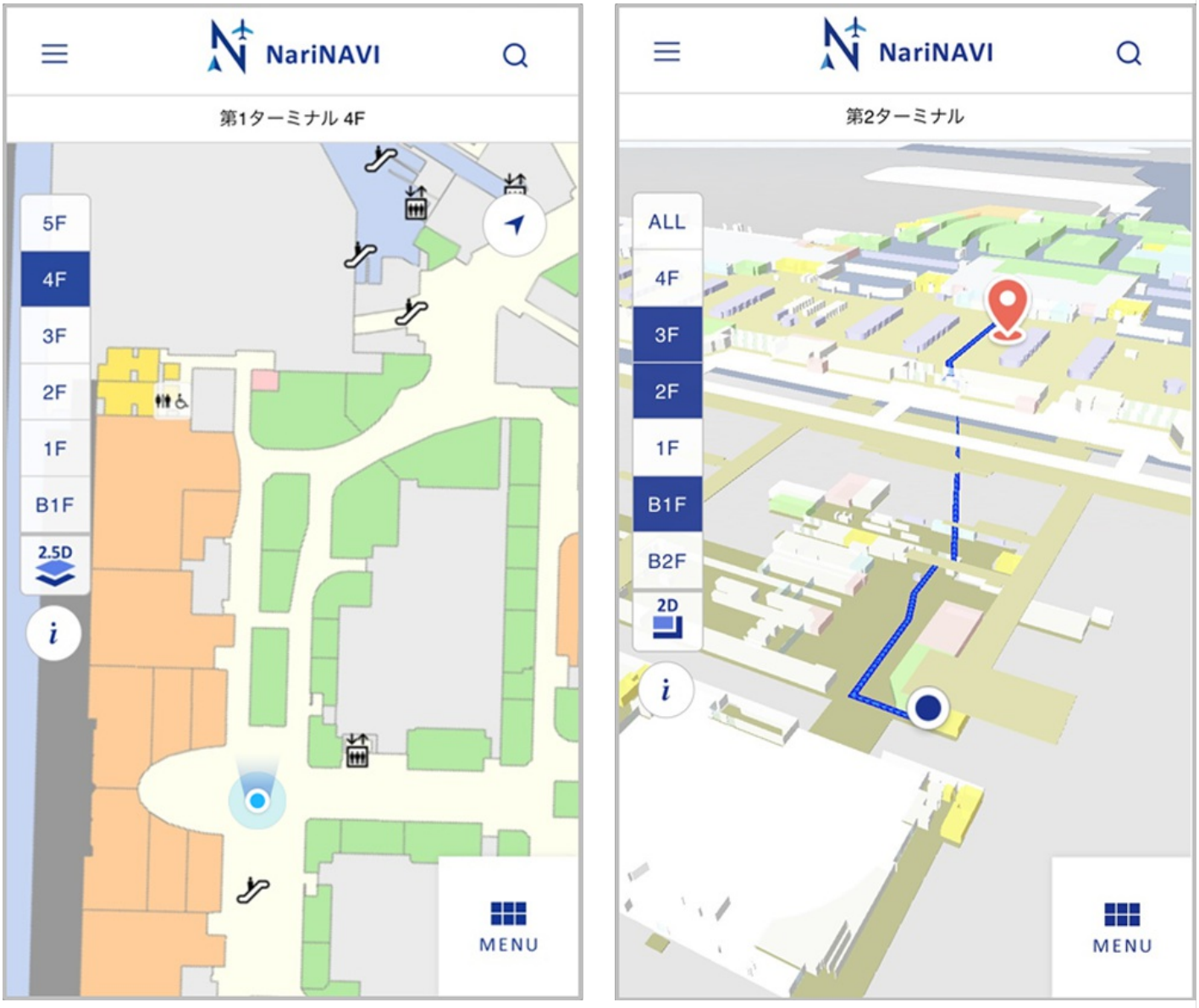

Figure 1: Image of current position (left) and 2.5D map (right) as displayed on NariNAVI

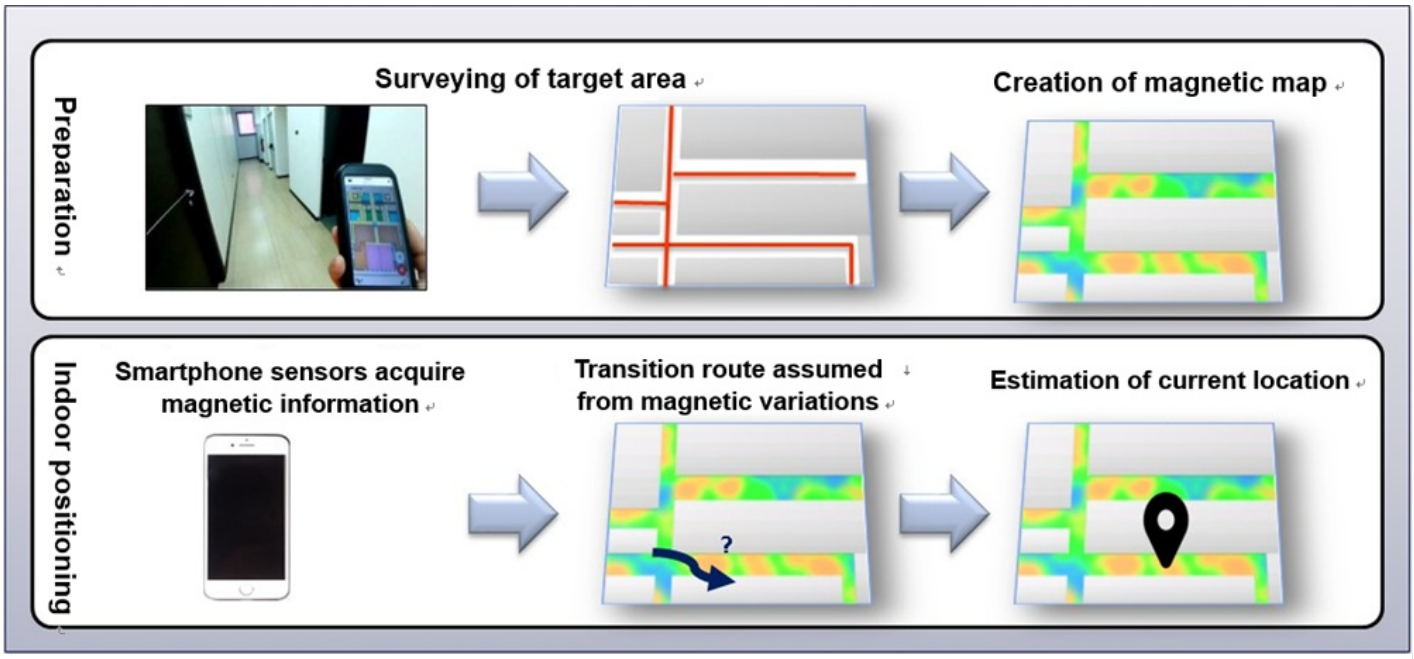


Figure 2: Structure of indoor localization through geomagnetism

## About the High-Precision Indoor Location Information Service

This service is a cloud service(Note 5) that is equipped with an indoor positioning function and a map delivery function for smartphones to realize a location information service within indoor spaces. This service will allow users to take advantage of location information in a wide variety of applications such as to improve guide services including its navigation service offered to visitors and to streamline operations by grasping the routes taken by employees.

## Future Outlook

NTT DATA will leverage this opportunity of introducing the High-precision indoor location information service at NAA to examine further advancement of navigation services and expand the application of location information at NAA such as to manage employees and articles. NTT DATA will also aim to expand its business in the future by developing location information services for public transportation and companies with large-scale indoor facilities.

## Reference

(Note 1)Geomagnetism refers to the earth's natural magnetic field, and this technology leverages anomalies to the magnetic field that are stable in time and naturally occurring in any man-made building because of building structures. High-precision indoor localization technology is a technology developed by GiPStech - a technology startup company specialized in indoor positioning and a spin-off from the University of Calabria (Italy)- and jointly deployed with NTT DATA Research and Development Headquarters. The technology, based on custom sensor fusion algorithms and covered by numerous patent filings, has been acclaimed as the best performing infrastructure-free technology at Geo IoT 2017.
(URL : www.gipstech.com (external link))
(Note 2) "NTT DATA Begins Distribution of High-Precision Indoor Location Information Service Based on Hybrid Geomagnetic Technology" on May 1, 2018.
http://www.nttdata.com/jp/ja/news/services_info/2018/2018050101.html
(Note 3) High-precision indoor digital mapping system provided to NAA on October 12, 2017.
http://www.nttdata.com/jp/ja/news/services_info/2017/2017101201.html
(Note 4) Basic 2.5D map technology is a technology developed by NTT Service Evolution Laboratories.
(Note 5) This service is offered from a cloud platform on Amazon Web Services (AWS).

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