

Second Phase of the Cross-Ministerial Strategic
Innovation Promotion Program
Automated Driving for Universal Services
(SIP-adus)

the outline of
the Tokyo Waterfront Area
Field Operational Test report

1. Background of the FOTs*

*FOTs Field Operational Tests

(1) Objectives

○ To verify common technologies in inter-sectoral collaboration for the development of automated vehicles with dynamic environmental information provided through infrastructures such as traffic signal data on general roads and merging support information on expressways, along with to evaluate impact of these technologies on mixed traffic conditions.

○ To promote international cooperation and standardization and others, by organizing and reviewing worldwide and open forums.

(2) Implemented

○ from October 2019 to the end of March 2021

(3) Infrastructures and on-board units installed



Waterfront city area with

- Traffic signal data from deployed ITS roadside units
- High Precision 3D map linked with the traffic signal data
- others



Haneda airport area with

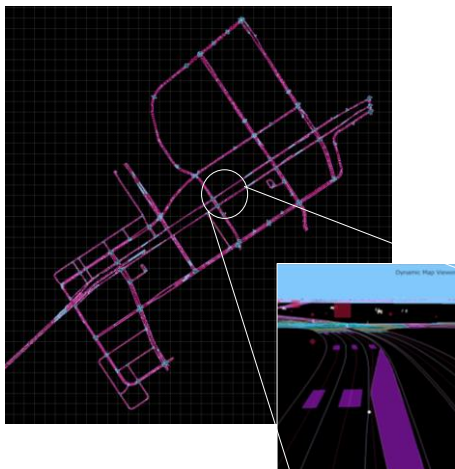
- Traffic signal data from deployed ITS roadside units
- Lanes magnetic markers disposed, provisional bus stops *
- Reserved lanes*



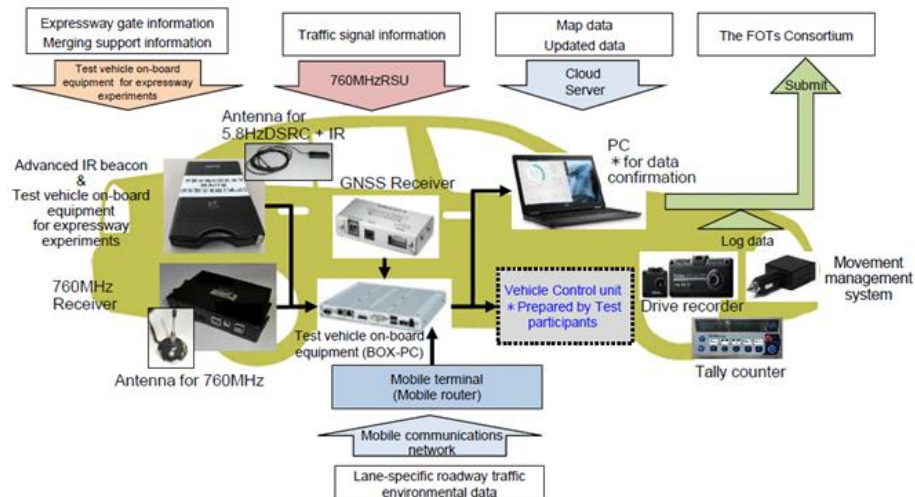
Expressways connecting HND and Waterfront city area with

- Merging support information
- ETC gate status information
- Lane-level traffic regulation information and others

Each color on the map corresponds to the test area descriptions



High Precision 3D map image
in Waterfront city area



Network structure for On-board unit in FOTs

(4) Participants

○29 institutions including domestic and foreign automobile manufacturers, auto parts suppliers, universities, start-ups and others



Alphabetical order. A total of 29 institutions



2. Waterfront City area (traffic signal information)

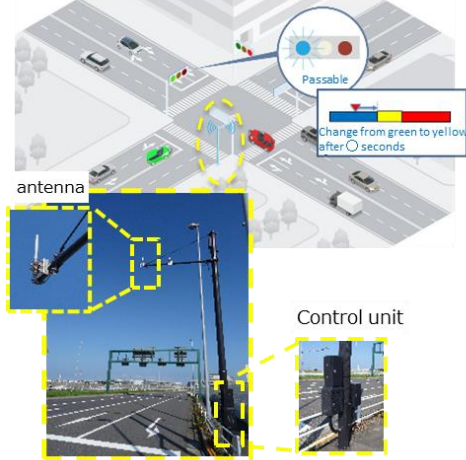
Goal

A society with traffic safety secured by minimum accidents

How

Distribution of data for:

- Real time signal color
- Time in seconds remaining to a next color

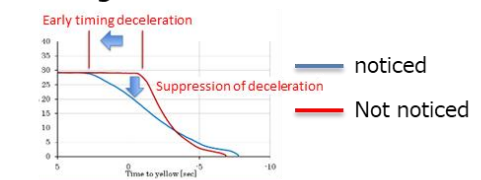


Result

- Systems successfully recognized the signal colors even under bad weather, backlight and other indistinct circumstances



- Vehicles safely and smoothly stopped without hard braking, by noticed timing of signal color change



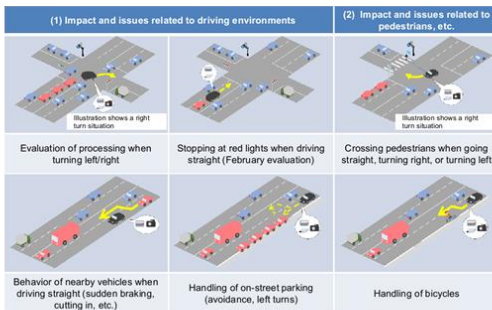
3. Waterfront city area (Impact assessment)40,

Goal

Smooth merging to general roads under mixed traffic for automated vehicles

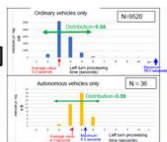
How

- Clarification of impact caused by merging automated vehicles under actual traffic mixed with conventional vehicles and pedestrians

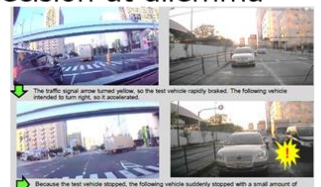


Result

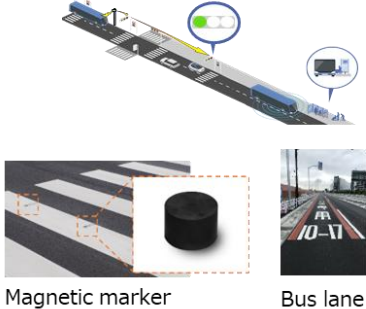

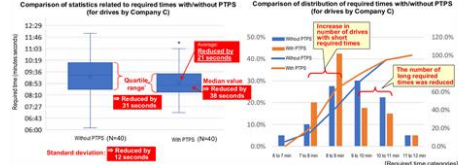
- No significant change found on traffic volume and pedestrian behaviors for automated cars' left and right turn at intersections



- Hard braking caused by vehicles following automated cars, of which the drivers made another decision at dilemma zone

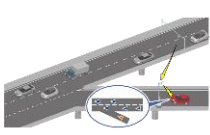
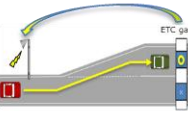
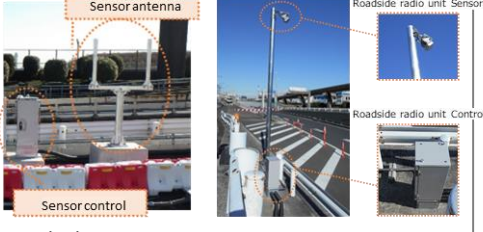




4. Haneda Airport area (next generation public transportation system)

Goal	<ul style="list-style-type: none"> Friendly bus for elderly and people with disabilities, realizing right positioning at stops and slower accel-brake control Punctual and express transport service with bus priority signal 	
How	<ul style="list-style-type: none"> Deployment of magnetic markers for position estimation and auto start-stop-turn control Application of bus priority policy with PTPS for signal information distribution and "Go" signal time extension by network communication and with reserved lanes  <p>Magnetic marker</p> <p>Bus lane</p>	<ul style="list-style-type: none"> Positioning of bus realized at stops right and close enough for wheelchair access without support  <ul style="list-style-type: none"> Shorter average travel time and more punctuality realized with the systems 

* FOTs for "Next generation transport system" with Level 4 closed in Nov. 2020

5. Metropolitan Expressway (merging support / ETC gate information)

Goal	Smoother driving at merging points on Expressways	
How	<ul style="list-style-type: none"> Distribution of information about traffic to merge into as support data toward vehicles on merging lane Distribution of status information of ETC gates at blind spot    <p>Sensor antenna</p> <p>Sensor control</p> <p>Roadside sensor</p> <p>Roadside radio unit</p> <p>Roadside radio unit Sensor</p> <p>Roadside radio unit Control</p>	<ul style="list-style-type: none"> Traffic correctly recognized enough in advance even at merging points with walls blocking the view  <ul style="list-style-type: none"> ETC gate status data caught and resulted to define a lane to get into before recognizing the oncoming gate 

6. Program history

2018	Mar.	The Japanese government started to study installation of the traffic infrastructures in the Tokyo waterfront area, in response to requests from industrial groups at the 14th Council on Investments for the Future
	Nov.	Implementation of the Tokyo Waterfront Area Field Operational Test officially announced
2019	Jan.	The call for the field test opened (to March)
	Jun.	Participants selected
	Oct.	The Tokyo Waterfront Area Field Operational Test launched
2020	Mar.	The test on the Metropolitan Expressway started
	Jun.	The test on the Haneda Airport area started
2021	Mar.	The operational test period extended

7. The Report

about the Tokyo Waterfront Area Field Operational Test

<https://www.sip-adus.go.jp/rd/>



8. Get to know more about SIP-adus

(1) SIP café ~Automated Driving~

<https://sip-cafe.media/>

(2) Tokyo Waterfront Area Field Operational Test Official page
(For professionals)

<https://www.sip-adus.go.jp/fot/>