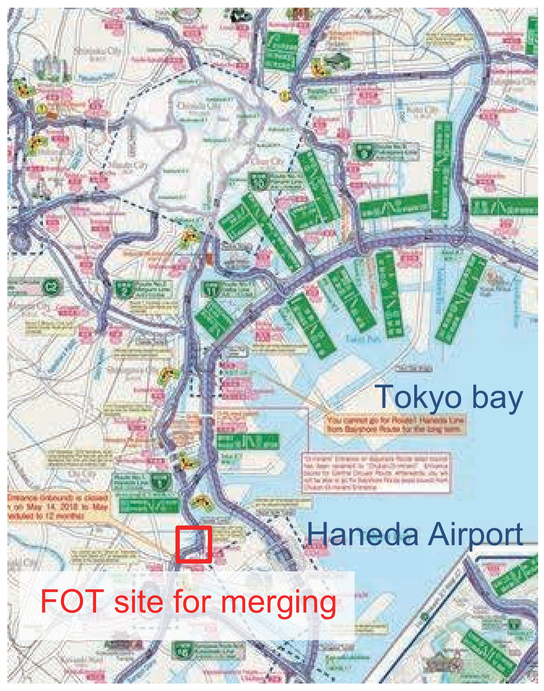
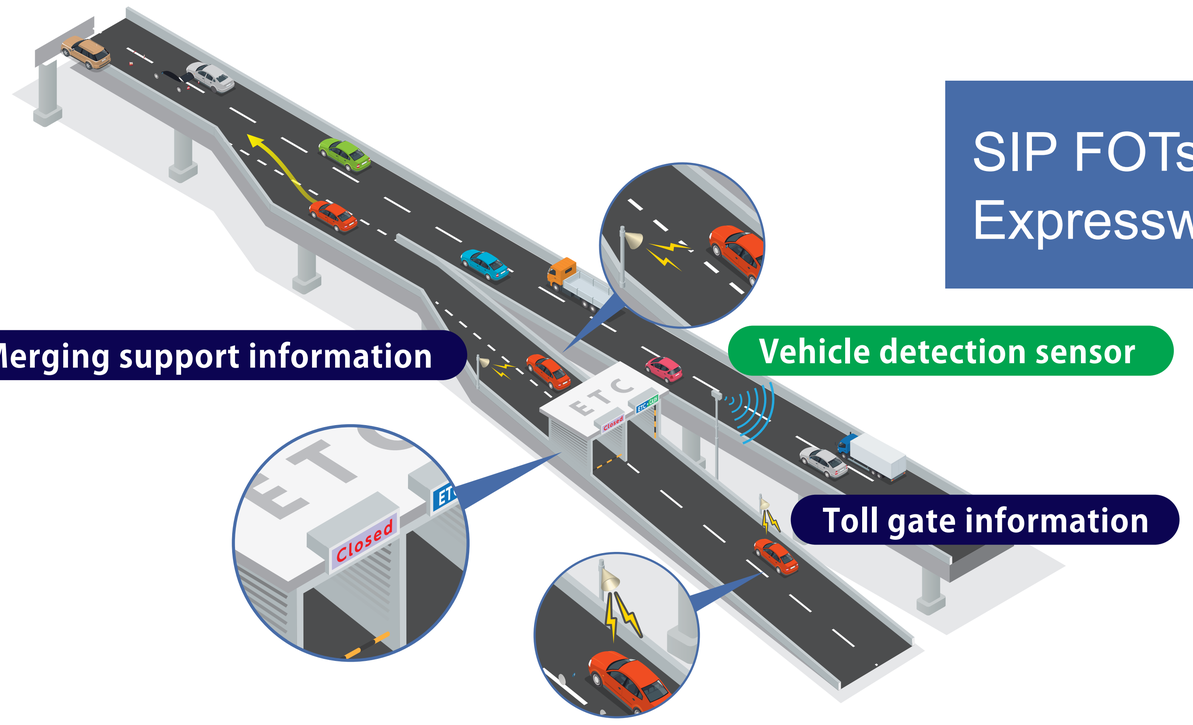
SIP-adus Workshop 2019

Merging Support System and ETC Gate Provision Service in SIP-adus FOTs





SIP FOTs on Metropolitan Expressway

Provide outcomes

1 Public-Private Joint Research for C-ITS

Background

- Automobile manufacturers are conducting research and development to achieve Automated Driving(AD) on expressways.
- In order to realize smooth AD, it is essential to provide the following two types of information through V2I.

1. look ahead information, including Toll gate information
2. Merging support information: Main-lane traffic information at merging sections

Purpose of the joint research

- Realization of C-ITS for smooth AD and efficient road management through V2I.
- Implementation period: January 2018 to March 2020

R&D Objectives (Technical problem)

- Consider contents of information on look ahead information(A) and merging support (B) and make technical specifications
- Aim to deploy services through FOTs

Participants of the joint research

Automobile manufacturers (4)	TOYOTA, NISSAN MOTOR CORPORATION, HONDA, Mercedes-Benz
Electronic equipment manufacturers (13)	DENSO, Panasonic, OMRON, MITSUBISHI ELECTRIC Changes for the Better, OKI Open up your dreams, Orchestrating a brighter world NEC, MITSUBISHI HEAVY INDUSTRIES MACHINERY SYSTEMS, HITACHI Inspire the Next, FUJITSU, SEIWA, Pioneer, faurecia clarion, SUMITOMO ELECTRIC
Map companies (1)	ZENRIN
Road administrators (6)	NEXCO 東日本, NEXCO CENTRAL, NEXCO WEST, Hanshin Expressway, Metropolitan Expressway Company Limited, Honshu-Shikoku Bridge Expressway Company Limited
Foundations (5)	ORM, JARTIC, HIDO, VICS, Japan Weather Association

2 Tollgate Information

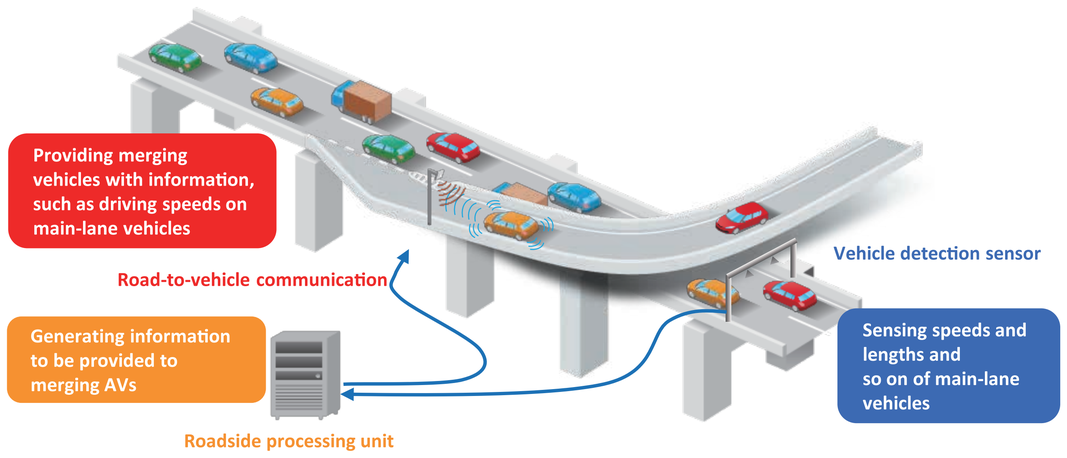
- A service to ensure safe and smooth driving in tollgate by providing operational information on each tollgate

Item	Example of information defined
Location of tollgates	Link Number, distance from link end
Number of booths	*Booth
Operational status of each booth	ETC, ETC/general mix, general, closed, etc.
Cause of closure	Failure, accident, inspection, etc.

3 Merging Support Service

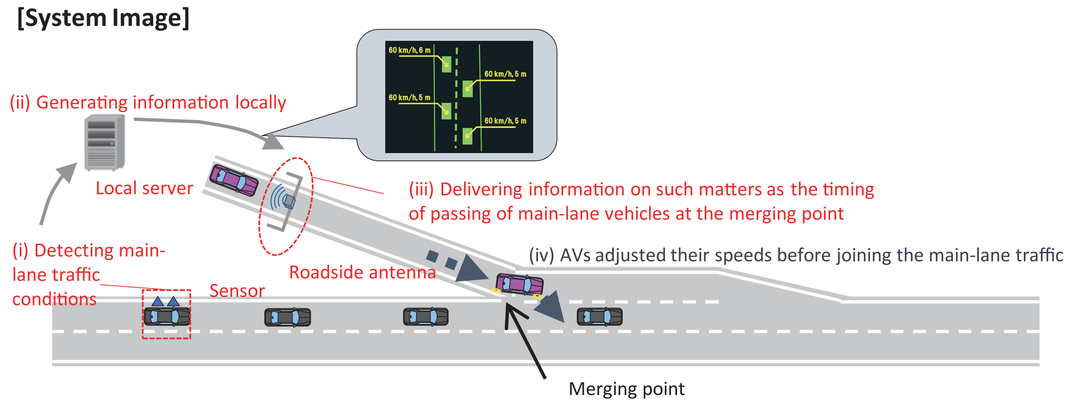
① Purpose

- Japanese urban expressways have relatively short acceleration lanes.
- A service to ensure smooth merging on expressways by providing information on the main lane to AVs intending to merge.



② Concept

[System Image]



③ Outline of the Information Provision Format

Information item		Content
Date and time of information generation	Date and time of information generation	
Merging Support System ID	Confluence Support System ID (Road administrator number + confluence number + direction, etc.)	
Specification version	Specification number	
System error	Automatic judgment of normal/abnormal condition of each sensor and system	
Target lane	Target lane number	
Summary of traffic conditions	Upstream (main lane)	Traffic volume, average vehicle speed, and average time between vehicles that have passed during the preceding 20 seconds
	Junction (main lane)	Traffic condition during the preceding 20 seconds
	Junction(merging lane)	Traffic volume in the preceding 20 seconds/ time elapsed after the last 3 vehicles have passed
	Downstream (main lane)	Traffic conditions downstream from the merging section
Meteorological condition	Weather, precipitation, and snowfall near the confluence	
Basic information (Junctions)	direction/length of acceleration lane / number of acceleration lanes / distance between location of information provision and merging point / latitude and longitude of merging point	
Basic information (main lane)	Distance between the sensor installation position and the merging point	
Timing of main-lane vehicles passing and information on vehicle position [repeat for vehicle number within the scope]	Number of target vehicles, vehicle number, calculated arrival time at the merging point, lane information, information reliability, vehicle length, speed, gap time with the front-running vehicle, vehicle position	