The Informal Working Group (IWG)
on Intelligent Transport Systems (ITS)
2021

SIP-adus FOTs in Tokyo waterfront area

− **A**utomated **D**riving for **U**niversal **S**ervice−

Masato MINAKATA
(TOYOTA Motor Co.)
SIP-adus International Cooperative WG

28 Feb. 2022

ADS (Automated Driving Systems)

Safe and secure mobility for all

Competition

Cooperation

Realization of Society 5.0

SIP

➢ **Technology**

    ①Dynamic Map
    ②Safety Assurance
    ③Cybersecurity
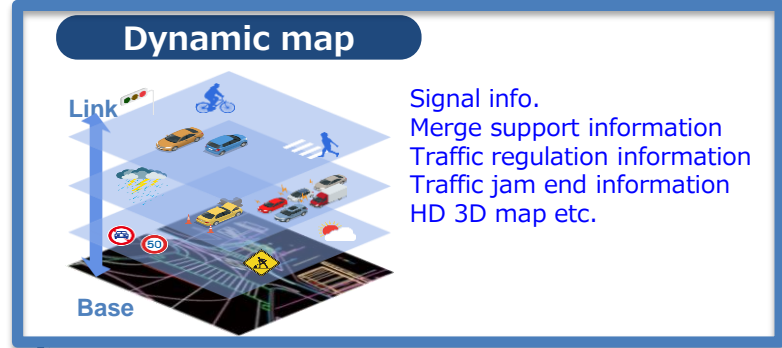   ④Geospatial dynamic data utilization
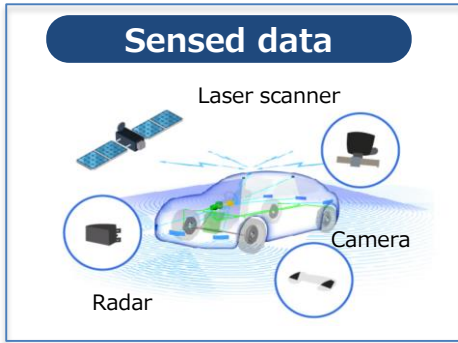   etc.

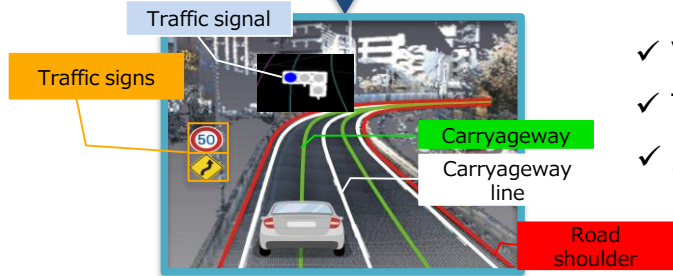➢ **Int. cooperation/Standardization**

➢ **Public acceptance**

➢ **Deregulation/Regulatory reform**

Traffic environment info. in autonomous driving

Mechanism of automomous driving

Sensed data

Laser scanner

Camera

Radar

Dynamic map

Link

Base

Signal info.
Merge support information
Traffic regulation information
Traffic jam end information
HD 3D map etc.

Traffic environment info.

Traffic signal

Traffic signs

50

Carryageway

Carryageway line

Road shoulder

✓ Vehicle position estimation

✓ Travel route planning

✓ Advanced driving support

Development in the area of cooperation

Realization of Society 5.0

SIP

2

Examples of V2X systems introduced in 2015

- **Right-turn
  Collision Prevention (V2I)**
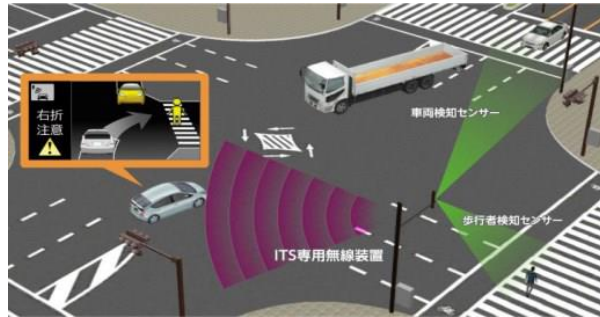
- **Communicating
  Radar Cruise Control (V2V)**
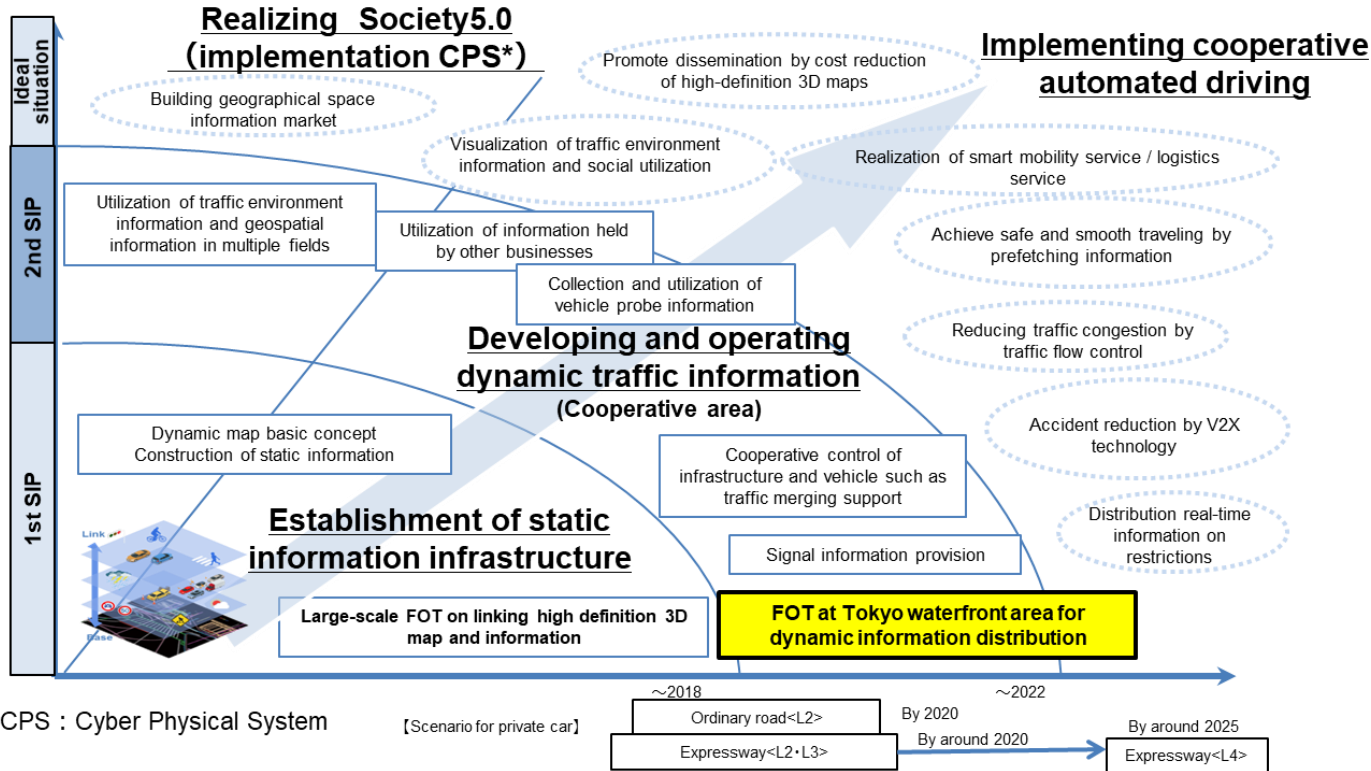

- **Red Light Caution (V2I)**
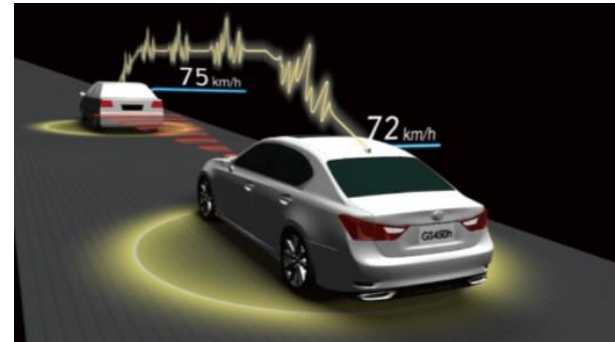
- **Emergency Vehicle Notification (V2V)**

SIP

3

Roadmap for traffic environment information

◆ Formulated "Traffic environment info. construction and utilization roadmap" and worked on standardization and practical application through demonstration experiments.

Realizing Society5.0 (implementation CPS*)

Implementing cooperative automated driving

- Building geographical space information market
- Promote dissemination by cost reduction of high-definition 3D maps
- Visualization of traffic environment information and social utilization
- Realization of smart mobility service / logistics service
- Utilization of traffic environment information and geospatial information in multiple fields
- Utilization of information held by other businesses
- Achieve safe and smooth traveling by prefetching information
- Collection and utilization of vehicle probe information
- Reducing traffic congestion by traffic flow control

Developing and operating dynamic traffic information (Cooperative area)

- Dynamic map basic concept Construction of static information
- Cooperative control of infrastructure and vehicle such as traffic merging support
- Accident reduction by V2X technology

Establishment of static information infrastructure

- Signal information provision
- Distribution real-time information on restrictions

- Large-scale FOT on linking high definition 3D map and information
- **FOT at Tokyo waterfront area for dynamic information distribution**

Ideal situation / 2nd SIP / 1st SIP

*CPS : Cyber Physical System

【Scenario for private car】

~2018	By 2020	~2022	By around 2025
Ordinary road<L2>			
Expressway<L2・L3>	By around 2020		Expressway<L4>

SIP

Outline of FOTs(2019FY～2020FY)

Objects
- **Promote practical application and standardization** in an internationally open experimental environment in an actual traffic environment.
- **Industry-academia-government collaboration** to draw out private investment and promote research and development in the form of a matching fund.
- Opportunity **to foster social acceptance.**

Location

Tokyo waterfront city area
- Realization of highly autonomous driving on general roads

Haneda airport area
- Realization of next-generation public transportation system (ART) by self-driving bus

Metropolitan expressway
- Realization of safe and smooth autonomous driving by look-ahead info.

Environment preparation

SIP
- Development and maintenance of infrastructure facilities

← Sharing →

Participants
- Preparation of experimental vehicles
- Experimental personnel / expenses

Participants

先進モビリティ　AISAN TECHNOLOGY CO.,LTD.　BMW MINI　BOLDLY
BOSCH Invented for life　中部大学　Continental　DAIHATSU
epitomical　Field.auto　HINO　HONDA
JTEKT　金沢大学 KANAZAWA　mazda　名城大学 MEIJO UNIVERSITY　Mercedes-Benz
MITSUBISHI ELECTRIC Changes for the Better　MITSUBISHI MOTORS　名古屋大学 NAGOYA UNIVERSITY　NISSAN MOTOR CORPORATION
SAIKO 埼工大　損保ジャパン SOMPO　SUBARU　SUZUKI
Tier IV Intelligent Vehicle　TOYOTA　Valeo　VOLKSWAGEN AKTIENGESELLSCHAFT

Alphabetical order. A total of 29 institutions

SIP

5

SIP Phase 2 FOT in Tokyo Waterfront area(FY19～)

Construction of a mechanism for dynamic info. utilization
using wireless communication

(Example)

- Demonstration by **narrow-range wireless communication (V2I *)** using a dedicated frequency band assigned to ITS applications in Japan to establish specifications for providing **signal informatio**
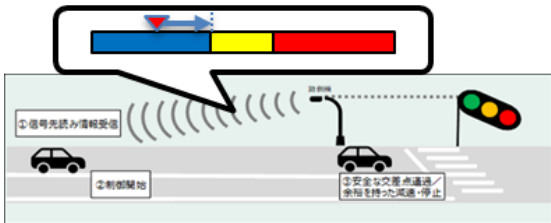
760MHz band

（Ex. Signal info. distribution)

V2I

Within 200-300m
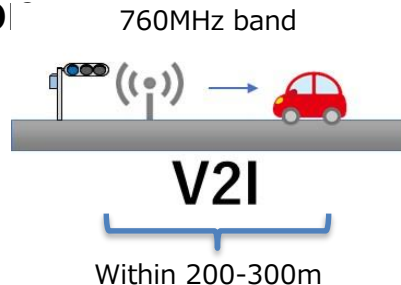
*V2I ： Vehicle to Infrastructure

6

Signal information provision

◆ **FOT of "Signal information provision" by communication (V2I)**

Narrow-range wireless communication equipment (V2I) installed at 33 intersection traffic lights in Odaiba

Distribution of signal light color & remaining seconds info.

Results

- Confirmed that signal recognition is possible in a stable manner even in **various environments** based on the signal light color info..
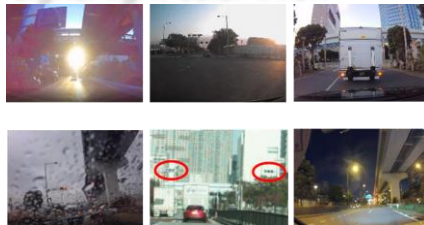
Outcome

- Confirmed on the specifications for signal info. distribution from the infrastructure that meet the requirements for autonomous driving.
- Confirmed the effectiveness of signal info. through communication for the safe and smooth social implementation of AD vehicles, it was also confirmed that infrastructure development was required on a regional basis for the implementation area.

In FY2021, SIP expand the efforts to distribute signal information by **V2N**, which is effective for infrastructure development on a regional basis.

Outline of 2021FY FOT

◆ **Utilize new traffic environment info. to expand the operation scene of AD vehicles in the Tokyo waterfront area**

● **Building a new info. generation and distribution FOT environment in the Tokyo waterfront area through a public network (V2N *) in anticipation of practical use**
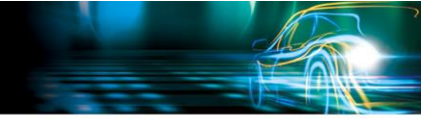
Ex.) Signal information provision

760MHz band

V2I

Within 200-300m

('19FY-'20FY FOT)

Cloud server   LTE

V2N

('21FY FOT)

*V2N: Vehicle to Network

● **Participants**

AISAN TECHNOLOGY CO.,LTD.　BMW　MINI　BOSCH Invented for life　中部大学

Continental　DAIHATSU　Field.auto

HONDA　金沢大学 KANAZAWA　mazda　名城大学 MEIJO UNIVERSITY

名古屋大学 NAGOYA UNIVERSITY　NISSAN MOTOR CORPORATION　SAIKO 埼工大　損保ジャパン SOMPO

SUBARU　SUZUKI　Tier IV Intelligent Vehicle　TOYOTA

Valeo　veoneer　VOLKSWAGEN AKTIENGESELLSCHAFT

Alphabetical order. A total of 22 institutions
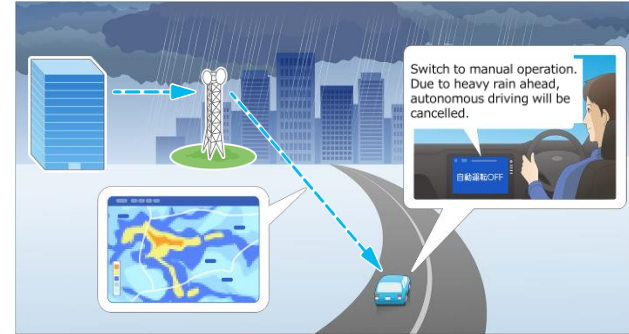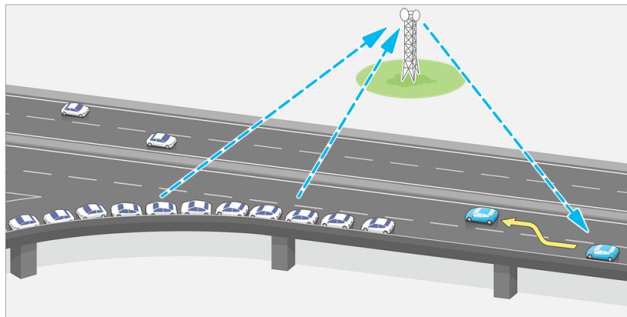
- **Driving support and autonomous driving on general roads using signal info. on a regional basis**
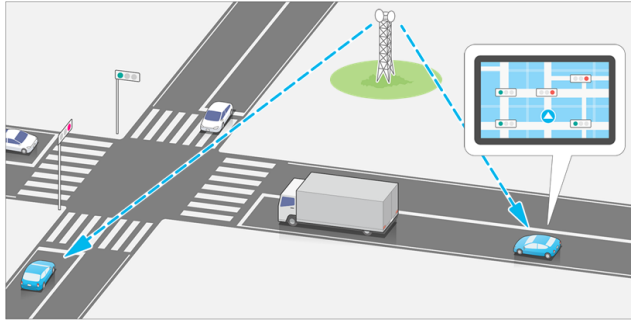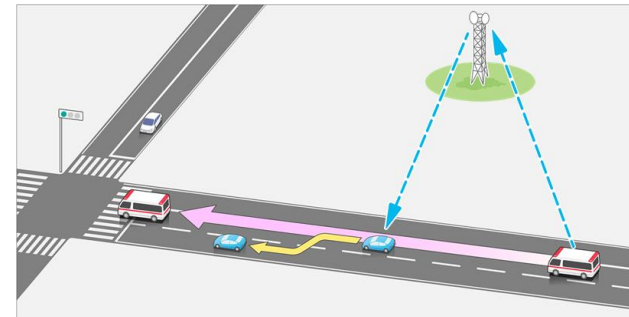

- **Predict early guerrilla rainstorms**
  （Avoidance route, manual operation switching）

- **Smooth lane change by forecasting traffic lanes**

- **Warning and avoidance of approaching emergency vehicles**
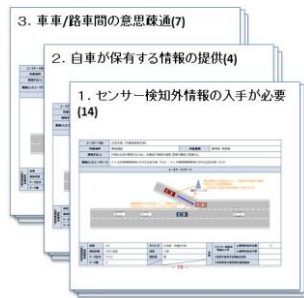

9

Wireless communication method roadmap

Collaboration activities with the automobile industry, academia, government, and ICT industry

◆Organizing use cases for autonomous driving and formulating a roadmap for information and wireless communication technology.
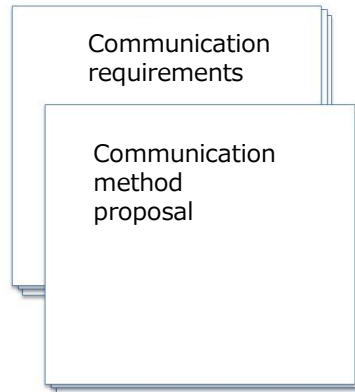
【Phase 1】

Formulation of use cases for infrastructure-coordinated autonomous driving
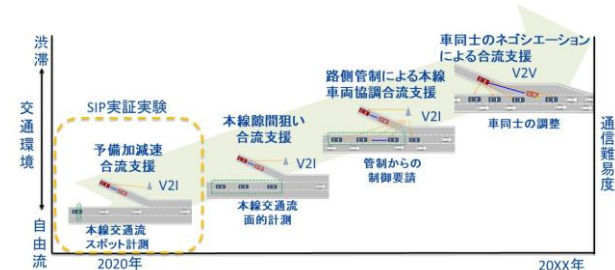

（25 Use cases formulated）

【Phase 2】

Definition of communication requirements based on use cases

Communication requirements

Communication method proposal
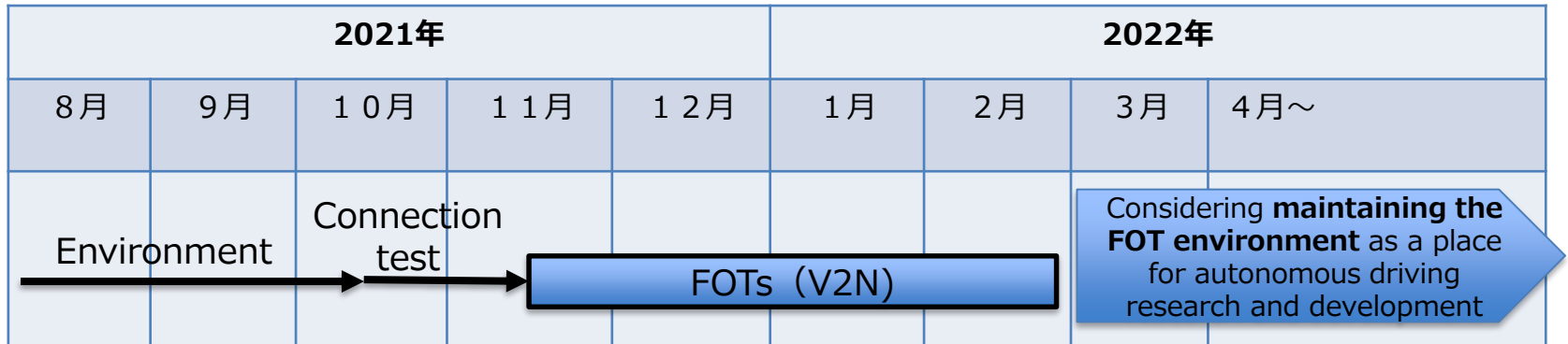
【Phase 3】

Formulation of roadmap and proposal of communication method

（ex.) Roadmap for merging support

Summary

◆ SIP confirmed the effectiveness of **signal info. distribution by V2I** and decided the specifications of signal info. distribution from the infrastructure that meet the requirements for autonomous driving.

◆ In FY2021, SIP will work on a new FOT using **V2N** with the aim of putting into practical use the expansion of the dynamic traffic environment info. utilization scene.

◆ Through industry-academia-government collaboration, SIP is also working to formulate **a roadmap for communication technology**.

- **Schedule**   (Detailed schedule is being adjusted for each delivery info.)

2021年					2022年			
８月	９月	１０月	１１月	１２月	１月	２月	３月	４月〜
Environment		Connection test		FOTs（V2N）			Considering **maintaining the FOT environment** as a place for autonomous driving research and development	

- **Official Site of FOTs :** https://www.sip-adus.go.jp/fot/

◆ Virtual conference due to COVID-19

◆ Plenary session :Nov. 9th-10th,2021

◆ Breakout workshop for experts' discussion

◆ On-demand streaming (～Jan. 5th, 2022)

【Session theme】
- Opening session/Regional activities
- Impact assessment
- Service and business implementation/FOTs
- Human factors
- Dynamic map
- Connected vehicles
- Safety assurance
- Cybersecurity
- Japanese government

SIP-adus Workshop 2021

Event summary is available from following website.
https://en.sip-adus.go.jp/evt/workshop2021/

SIP-adus Workshop 2022 : Oct. 11th-12th, 2022.
(Planning to be held in **Kyoto** as an in-person event)

Thank you