V2X communication for Cooperative Driving Automation

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Task force on V2X communication for Cooperative Driving Automation

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1. SIP adus Initiative

**ADS** (Automated Driving Systems)

Safe and secure mobility for all

- **FOTs** (Tokyo waterfront area etc.)
- **Technology**
  - Establishment of digital infrastructure
  - Unification of data format and interface
  - Safety assurance and cybersecurity etc.
- **Public acceptance**
- **International cooperation/Standardization**

SIP ; Strategic Innovation Promotion Program
adus; Automated driving system for universal service
2. Current status and challenges of Cooperative Driving Automation (CDA)

◆ Current status of ITS wireless communication in Japan
  • ETC / ETC2.0 (DSRC): Toll collection and Expressway information since 2000
  • ITS Connect (DSRC): Support for safe driving at general road intersections since 2015

◆ Challenges for realizing CDA
  • Can ITS communication, which has already been put into practical use, be used for CDA?
  • What kind of communication method is needed in the era of automated driving?
  • TF on V2X communication for CDA has been established in SIP since 2019
  • Started researching communication methods for CDA
Activities of TF on V2X Communication for CDA

- Define CDA
- Develop CDA use cases based on the definition

- Define communication requirements based on use cases
- Examination of applicability of existing ITS communication

- Technology verification for Communication methods (frequency / bandwidth) for CDA
- Proposal of communication method and the roadmap
SIP Cooperative Autonomous Driving Use Case 1st Edition

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4. SIP Use Case for CDA  1st Edition Overview

◆ Cooperative driving automation system definition

CDA system is that enables safer and smoother automated driving control based on the autonomous driving system, by obtaining the information not detected by the in-vehicle sensor, by providing the information possessed by the vehicles, and by communicating mutually by using V2I and V2V.

- Communication reliability cannot be guaranteed 100%
- Automated Driving control must be done by in-vehicle sensors
- Support on autonomous driving by communication
- Utilize communication to enable safer and smoother automated driving
Selected 25 feasible use cases

1. Obtaining the information not detected by the in-vehicle sensor (14)
2. Providing the information possessed by the vehicles (4)
3. Communicating mutually by using V2I and V2V (7)

Study communication method based on the use case

Communication requirements for CDA

Proposal for V2X communication method
5. V2X communication and Roadmap for CDA

Merging and lane change support

- Preliminary acceleration and deceleration support
- Main line gap aiming merge support
- Merging control by infrastructure
- Merging by negotiation between cars
- Negotiation between cars
- Traffic flow sensing by area
- Control request by infrastructure
- Traffic flow sensing by spot

Penetration of CDA

Free flow

SIP FOT in Tokyo

Complexity of traffic environment

Difficulty of communication

2020

20XX
6. Next step

- Define CDA
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Phase 1
- Done

Phase 2
- FY2020

Phase 3
- FY2021
6. Next step

Organization

TF on V2X communication for

Phase 1

CDA

- ITS-related ministries
- Academic experts
- Japan Automobile Manufacturers Association

Phase 2/Phase 3

National Institute for Land and Infrastructure Management
- UTMS Society of Japan
- Japan Electronics and Information Technology Industries Association
- ITS Info-communications Forum
- Society Automotive Engineers of Japan
7. Summary

- Started researching communication methods for CDA in SIP
- Completed the development of use cases to be the basis for the next research
- Use cases opened to the public
  
  (SIP homepage: https://www.sip-adus.go.jp/rd/rrdata/usecase.pdf)
- Started researching the definition of communication requirements based on use cases and the applicability to existing ITS communication.
- Consider a new communication method if it is not applicable to existing ITS wireless communication
- Provide the proposal of communication methods for CDA and roadmap until the end of FY2021
SIP-adus Workshop 2020

SIP-adus: Innovation of Automated Driving for Universal Services

**Objectives**
- Reports by industry and academia research partners on the achievements of SIP-adus projects in Japan.
- Presentations by global experts on recent global progress and the status of R&D themes focusing on automated driving and connected vehicles.

**Date**
- November 10: Status report meeting (Live)
- November 11 - 12: Online symposium (Recorded)

The meeting will be simultaneously delivered in both English and Japanese over the web. By registering, everyone from all over the world is welcome to all meetings.
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**European Region**
- **start at 9:30 (CET)**
- **start at 11:00 (CET)**

**US Region**
- **start at 11:30 (EST)**
- **start at 14:00 (EST)**

Registration:  https://en.sip-adus.go.jp/evt/workshop2020/
Thank you