Connected Vehicles

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SIP

Cabinet Office

1. SIP adus Phase 1 Activities' summary

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Outline of activities for connected vehicles

<table>
<tr><th></th><th>2014FY</th><th>2015FY</th><th>2016FY</th><th>2017FY</th><th>2018FY</th></tr>
<tr><td>V2V</td><td colspan="3" rowspan="2">Development of V2V,V2I Communication Technology Toward the Automated Driving Systems</td><td colspan="2" rowspan="2">Formulation of communication requirements for wireless communication for automated driving</td></tr>
<tr><td rowspan="3">V2I</td></tr>
<tr><td colspan="5">Establishment of Technology for Providing Traffic Signal Information Towards the Realization of Automated Driving</td></tr>
<tr><td colspan="4"></td><td>Providing dynamic information for Dynamic Map</td></tr>
<tr><td>V2P</td><td colspan="5">Development of Vehicle-to-pedestrian Communication Technology</td></tr>
<tr><td>V2N</td><td colspan="3"></td><td colspan="2">Utilization of Vehicle Probe Information</td></tr>
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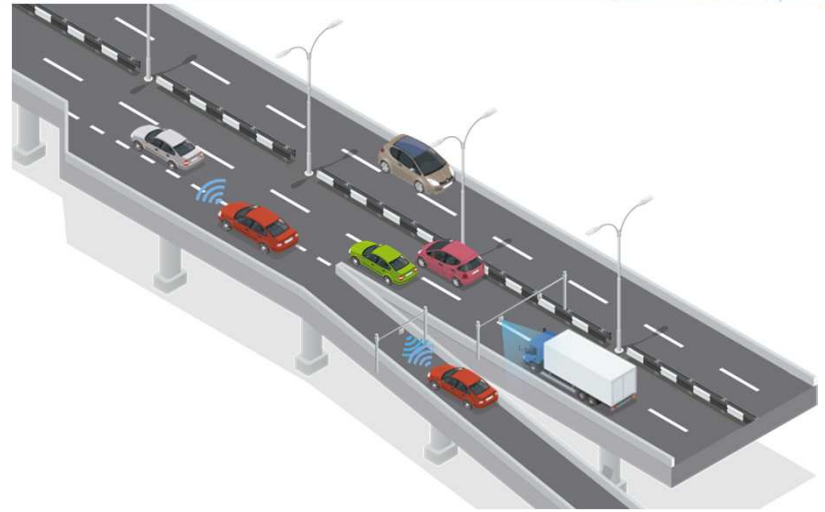
1. SIP adus Phase 1 Activities' summary

Development of V2V,V2I Communication Technology Toward the Automated Driving Systems



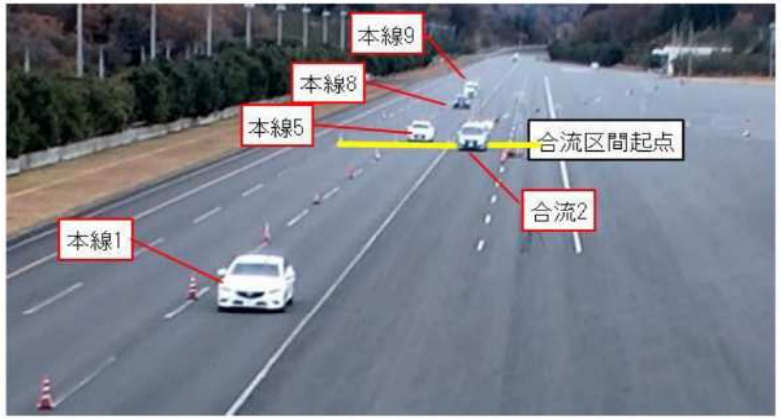
Aim

-Clarify performance capability of 700MHz Band ITS radio communication for automated vehicles

-Mutual communication by V2V, V2I for merging scenario on highway
-Exchange of vehicle position information at intersection in interference circumstance.

Results

-Communication capability on highway was confirmed with some protocol modification.
-The influence of communication interference was small at the intersection.
-Message sets and protocols for practical use is being studied.



1. SIP adus Phase 1 Activities' summary

Establishment of Technology for Providing Traffic Signal Information Towards the Realization of Automated Driving

Aim

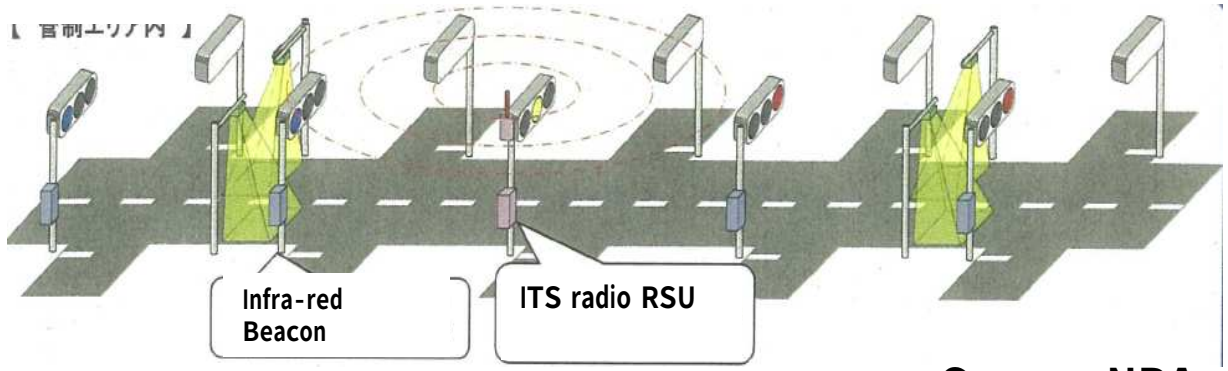
-Providing signal information at the intersection for connected and automated vehicles

-Improve accuracy by utilizing ITS radio communication in addition to optical beacons

-Adding radio communication provide extensive and real-time signal information.

Results

-Validated the improvement accuracy of signal information provision on public roads



Source: NPA

1. SIP adus Phase 1 Activities' summary

Development of Vehicle-to-pedestrian Communication Technology

Aim

-For reduction of pedestrian accidents

-Pedestrian's mobile device notifies pedestrians presence information to vehicles
-Notifies approaching vehicle information to pedestrians
-Pedestrian location accuracy improvement by GPS/GNSS/Dead Reckoning/Multi-pass rejection

Results

-The pedestrian mobile device for FOT was developed.
-Confirm pedestrian location accuracy at Odaiba
  -Accuracy is confirmed from 1.6 m to 5.9 m
-Risk determination technology was developed

1. SIP adus Phase 1 Activities' summary

Utilization of Vehicle Probe Information

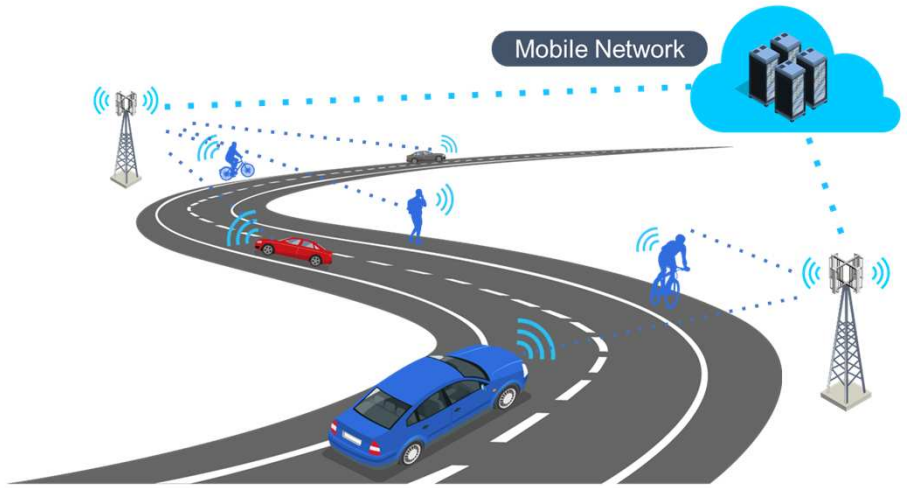
Aim

-Collect semi-dynamic, semi-static information with real-time and wide-area
-Obtaining traffic flow Information at lane level

-Gathering information by the prove car

Result

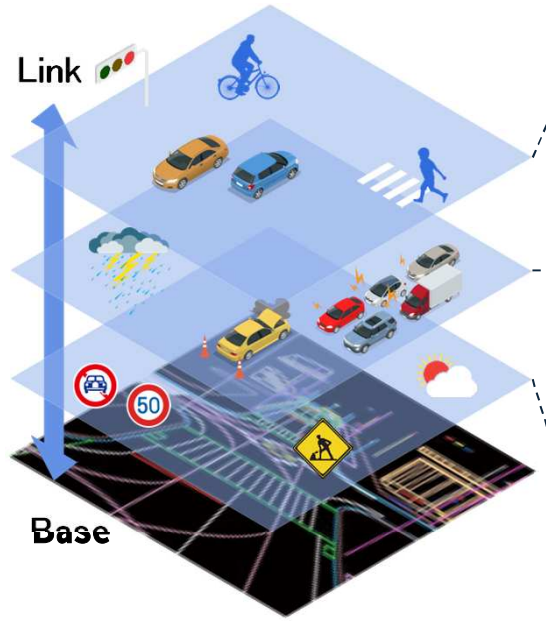
-Construction of probe cars information collection server
-Linking to dynamic map



1. SIP adus Phase 1 Activities' summary

Providing dynamic information for Dynamic Map

Verification of data distribution and linking Dynamic data to Dynamic map



Dynamic Map

Traffic signal

Traffic flow

Traffic regulation

Dynamic Data

700MHz DSRC

Mobile Communication

5.8GHz DSRC

2. SIP adus Phase 2 Activities' plan

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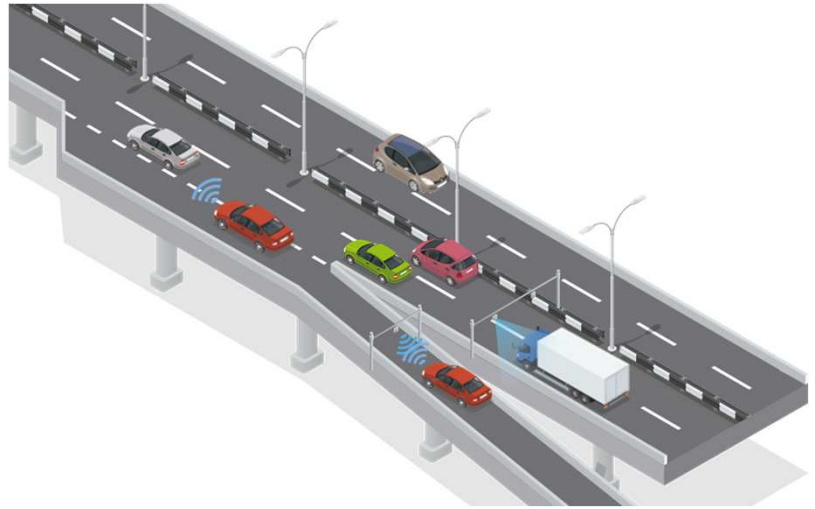
Development of an environment for FOT based on SIP phase 1 results

Outline

1. To support for merging on highway by V2I

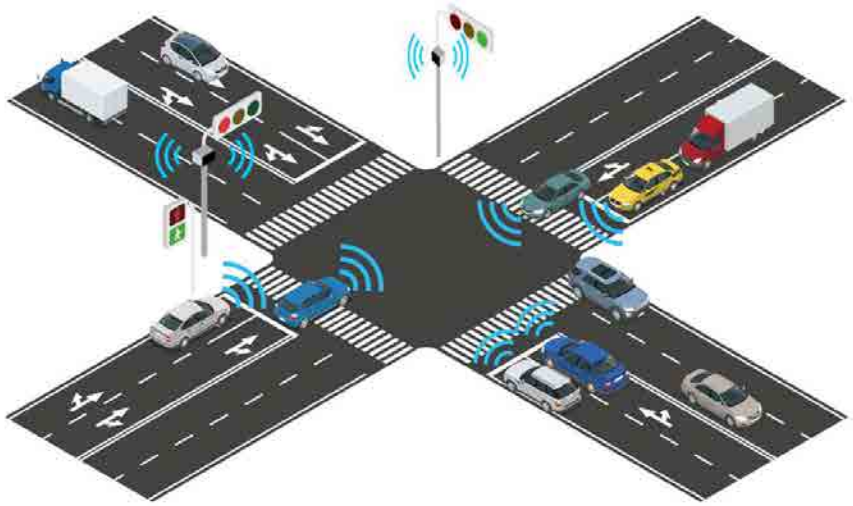
-The necessary information for merging on the main lane is acquired by the road side sensor and sent to the merging vehicle

-Providing information on ETC gate operation status



2. To support passing through Intersection by signal information provision

-Signal color status, phase timing etc are provided by communication

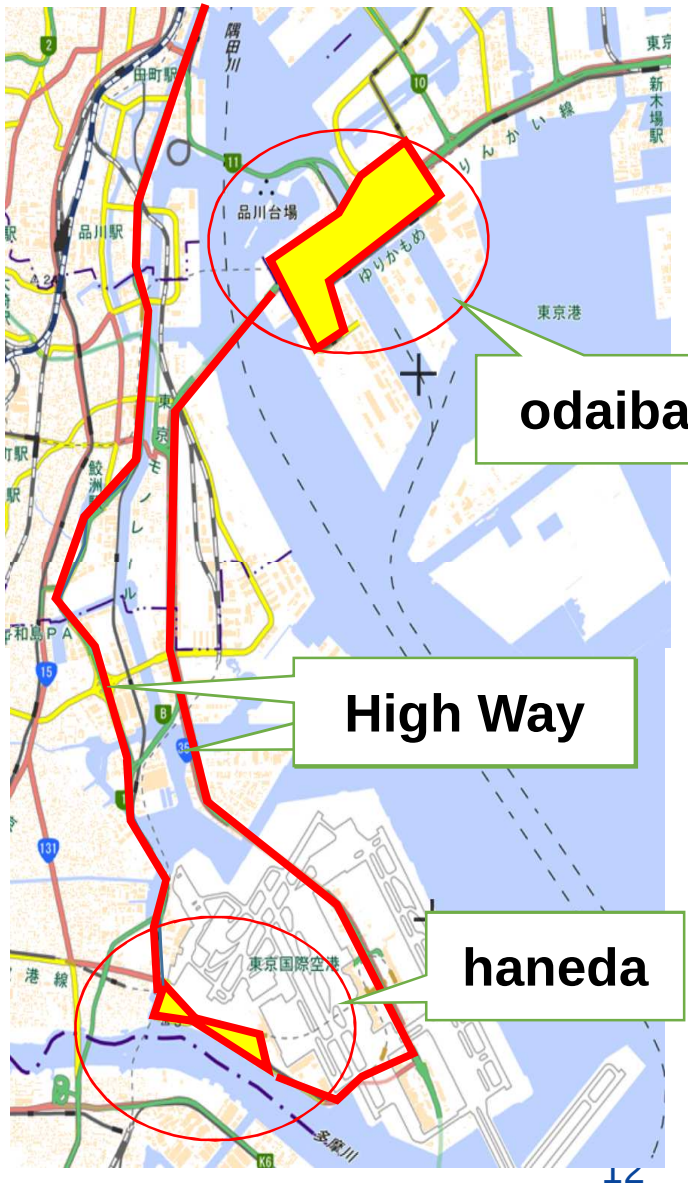


2. SIP adus Phase 2 Activities' plan

Development for FOT Environment in Tokyo waterfront City

Traffic Signal Information
-Seaside Sub-City Center (odaiba)
-Haneda

Merging Support Information
ETC Gate Status Information
-High Way



Source: GSI

2. SIP adus Phase 2 Activities' plan

JAMA is planning FOT and demonstration at Olympic and Paralympic in 2020

Odaiba
Tokyo Waterfront City

Demonstration of level 4 automated driving on ordinary roads

High Way
Haneda to Odaiba

Automated driving demonstration on highway

Haneda

Demonstration of level 2-4 on automated driving bus and owner car

Source: JAMA

Summary

- The basic communication technology of V2V, V2I, V2P and V2N for automated driving has been developed on SIP Phase 1 .
- Capability of existing ITS communication technology to automated driving has been clarified.
- The effectiveness of several applications using communication technologies was confirmed.
- To clarify the issues of communication technology for applying to automated driving FOT will be conducted in SIP Phase 2
- FOT environment provide signal information provision, merging support on highway, and ETC gate operation status information in the Tokyo waterfront Odaiba, highway, Haneda area.


SIP-adus
Workshop
2018
Thank you