Communications Policy and ITS in Japan

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Contents

- Development of Radio Systems and ITS in Japan

- Large-scale demonstration tests for DSSS

- New spectrum for ITS
Development of Radio Systems in Japan

Japan’s radio spectrum use has dramatically expanded, both in quality and quantity.

- **1950**
  - The public sector
  - Mobile: 4,195
  - Fixed: 552
  - Broadcast: 80
  - Others: 291
  - Total: 5,118 stations

- **1985**
  - The private sector
  - Mobile: 1.07 million
  - Fixed: 0.038 million
  - Broadcast: 0.024 million
  - Others: 2.68 million
  - Total: 3.81 million stations

- **2008**
  - The cellular phone to 3G
  - Mobile: 106 million
  - Fixed: 0.1 million
  - Broadcast: 0.024 million
  - Others: 2 million
  - Total: 108 million stations

- **In the Future**
  - Next-generation mobile communication
  - System, mobile, office, mobile home

- **Internet at anytime**
  - Wireless broadband

- **Safe and secure ITS**
  - Alternative system to cable broadband

- **Next-generation information appliances, home networks**
  - Mobile phones
  - e-mail
  - TV phones

- **Short-range radio communications**
  - Fixed microline

- **Japan’s radio spectrum use**
  - Total: 5,118 stations
  - Mobile: 4,195
  - Fixed: 552
  - Broadcast: 80
  - Others: 291
  - Total: 3.81 million stations
  - Mobile: 1.07 million
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  - Total: 108 million stations
Radiowave Media in ITS

Broadcasting Type

- **Wide Area (Broadcast)**
  - FM multiplex broadcasting
  - -VICS- (Vehicle Information and Communications System)
  - Public service providing traffic information

Sensor Type

- **In-vehicle millimeter wave radars (60, 76GHz)**
  - Cars ahead
  - Millimeter wave
  - Car on both sides

Communications between cars

- **Short Range**
  - Too close
  - Will change lanes

Communication Type

- **Wide Area (Interactive)**
  - Mobile Phone
    - -Telematics-
  - -VICS- (Vehicle Information and Communications System)

- **Short Range**
  - -DSRC- (Dedicated Short Range Communication)
  - -ETC- (Electronic Toll Collection)

Public service providing traffic information

- **ITS for the pedestrians using RFID, etc**
  - There is a step.

- **Parking lot control system**
  - Automated gate operations/vehicle guidance

- **Filling station**
  - 60 liters
  - 5,000 yen
What’s VICS?
A groundbreaking telecommunications system that sends out real-time traffic congestion information and traffic control information, edited and processed in the VICS Center, through various communications mediums. The information is displayed in text and graphics on car navigation systems and other onboard units. VICS information is provided 24 hours a day throughout the year.
What’s ETC?
The ETC system collects payment at toll roads without stopping the vehicle by using wireless communication between the tollbooth and the onboard unit.

Road-side Transmitter
OBU
IC Card
Tow-way Radiocommunication

Total Number of Shipped ETC OBUs

- November, 2007: 20 million
- December, 2005: 10 million

What is ETC?
The ETC system collects payment at toll roads without stopping the vehicle by using wireless communication between the tollbooth and the onboard unit.
New Services using DSRC System

Credit company
Post office/bank
Security/certification authority

Expressway Tollgate (ETC system)
The charge from XX Interchange is 3,000 yen.

Parking-lot control system
Automated gate operations/vehicle guidance
Contract No. 324 confirmed: 13/18.

Charging settlement system
Filling station
60 liters
5,500 yen.

AHS-i
Oncoming car approach information
AHS: Advanced Cruise-Assist Highway Systems
The oncoming car is approaching!!

VICS by DSRC
Latest traffic information was received.

Cargo physical distribution (PD) management system
Distribution center
IC card
Telematics Services

Private sector services started in 1997 in Japan

Automobile Service Applications (Over 1,500,000 units in service today)

Brand Names of Telematics Service

“G-BOOK ALPHA” - “G－BOOK mX” ⇒ TOYOTA, MAZDA, SUBARU, DAIHATSU

“CARWINGS” ⇒ NISSAN

“InterNAVI PremiumClub” ⇒ HONDA

- navigate through optimal driving route for road traffic information of probe communication etc
# Millimeter Wave Car Radar

## [Type of Sensor]

<table>
<thead>
<tr>
<th>Object Sensor</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supersonic sensor</td>
<td>Small-scale and low cost, but, easy to receive surrounding noise. Short distance.</td>
</tr>
<tr>
<td>Laser sensor</td>
<td>High precision, high functionality possible. Weak against poor weather conditions (especially fog).</td>
</tr>
<tr>
<td>Millimeter radar</td>
<td>High precision, high functionality. Can be used in all weather. Used both in short and long (1~100m)</td>
</tr>
<tr>
<td>Image sensor</td>
<td>High precision, high functionality possible. Complex image processing technology required. Weak against bad weather (particularly fog and rain).</td>
</tr>
</tbody>
</table>

### Additional bands
- **24GHz**: (Being discussed in the Telecommunications Council)
- **60GHz**: Enacted in Since 1995
- **76GHz**: Most commonly used Since 1997
- **Additional bands (ex. 79GHz)**: (R&D to High Resolution Millimeter Rader System for ITS)

![Millimeter Wave Car Radar](image-url)
Outline

1. Develop broadband radar using high spectrum band (79MHz band)
   It is difficult to identify objects precisely by current radar system (60/76GHz radar) because current millimeter radar uses wider pulse (uses 100-200 MHz bandwidth)

2. Investigate methods to avoid interference with millimeter radar systems itself

Schedule 2007-2009 (3 year project)
The world’s safest road traffic environment  
- Reducing traffic fatalities to 5,000 or below -

〔Targets〕
Reduce the number of traffic fatalities and serious injuries by deploying Cooperative Driving Safety Support Systems.

〔Policies〕
Based on the results of the above investigations, conduct large-scale verification testing of Driving Safety Support Systems through collaboration between the public and private sectors on the selected regional public roads while maintaining harmony with local traffic patterns, investigate the best form of effective service systems, and make quantitative assessments of the contribution to reductions in traffic accidents by FY 2008.
The New IT Reform Strategy stipulated that form a joint committee from the public and private sectors in early 2006 investigate the form of effective services/systems.

In April 2006 the ITS Promotion Council and Working group was established with the Cabinet Secretariat (IT Policy Office) as the coordinator and its members are now examining large-scale demonstration tests.

Members
4 ITS-related agencies/ministries (NPA, MIC, METI, MLIT), Cabinet Secretariat, Nippon Keidanren (Japan Business Federation), ITS Japan,

3. Driving Safety Support System Platform

Driving safety support systems can be categorized into the following three systems:

(1) Road-to-vehicle communication systems

(2) Vehicle-to-vehicle communication systems

(3) Intercommunication systems between pedestrians, roads, and vehicles
Investigations and verifications for the practical use of driving safety support telecommunication systems (2007–2009 [scheduled])

Overview: In actual environments, verify the effectiveness of a number of radio spectrum media in vehicle-to-vehicle communication systems and road-to-vehicle communication systems that support safe driving.

Contribute to pre-testing in FY2007 and large-scale demonstration tests in FY2008

Case 1: Rear-end collisions

Case 2: Collisions with oncoming vehicles
Digital Devidend and ITS

After digitization

- **90~108MHz** (1~3ch)
  - Analog TV Broadcasting

- **170~222MHz** (4~12ch)
  - Analog TV Broadcasting

- **470~770MHz** (13~62ch)
  - Analog TV Broadcasting
  - Digital TV Broadcasting

Digital TV Broadcasting (13~52ch)

Telecommunications Council Report (June 27, 2007)

- **90~108MHz**
  - Self-owned communications (to preserve security and safety)

- **170~222MHz**
  - Broadcasting (multi-media mobile broadcasting etc.)

- **710~770MHz**
  - ITS
  - Telecommunications (cellular phones etc.)
Aiming to facilitate effective use of spectrum for ITS as well as to clarify the requirements for radio systems used in driving safety support systems, including the vision for vehicle-to-vehicle communications, MIC establishes the Study Group on Advancement of ITS Radio Systems.

**Purpose**
- To formulate the vision for vehicle-to-vehicle communications
- To clarify the requirements for radio systems used in driving safety support systems

**Study Items**
1. Vision of usage for ITS radio systems for driving safety support systems
2. Radio system functions desired for vehicle-to-vehicle communications and requirements for the system
3. Issues and strategies toward the realization of vehicle-to-vehicle communications

**Study Group Members**
Academic experts, Automakers, Electrical manufacturers, Related organizations, users, ITS-related agencies/ministries (NPA, METI, MLT)

**Study Period**
The study group held its first meeting in October 2008, and compile a report by around May 2009.
Establishment of Ubiquitous Special Zones

**Purpose**
Developing new ICT services responding to the global market needs.

**Period**
Three-year period from FY2008 through FY2010.

**Outline**
Implementing comprehensive projects by making the most of two limited resources: available frequency bands and the government budget (¥2 billion in FY2008).

**Location**
Minister adopted 28 projects.

**Total proposals received: 188**

**Survey on the possible locations and available frequency bands**
(June to Aug 2007)

**Announcing available frequency bands and inviting project proposals**
(Sep to Oct 2007)

**Encouraging relevant ministries/agencies and other countries**
(Nov 2007 and onWard)

**Assessing the proposals**
(Nov to Dec 2007)

**Establishing “ubiquitous special zones”**

**Based on the proposals, encourage the following:**
- Relevant ministries/agencies’ efforts to develop the environment
- Cooperation with other countries (e.g. “sister ubiquitous special zones”)

**Assess and check the proposals as to the following points**
- Categorization of the target projects
- Target areas
- Availability of radio waves

**Establish special zones based on the assessment**
Determine and announce the following to establish “ubiquitous special zones”:
- (1) Target areas
- (2) Project details
- (3) Frequencies (when radio waves are used)

**Budget request for FY2008: ¥2 billion**

- 28 projects selected
  - 11 with funding
  - 17 without funding
Conduct development and demonstration experiments of the world’s most advanced ICT services in “ubiquitous special zone” to establish “new models” that can be globally launched under the initiative of Japan.
Out of a total of 28 ubiquitous special zone projects, 8 are ITS projects.

**1 project with funding**

<table>
<thead>
<tr>
<th>Project</th>
<th>Region</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verifying car navigation system supporting comfortable drive for tour drivers</td>
<td>Uruma City, Okinawa Prefecture</td>
<td>700 MHz band 5.8 GHz band</td>
</tr>
</tbody>
</table>

**7 projects without funding**

<table>
<thead>
<tr>
<th>Project</th>
<th>Targeted Project</th>
<th>Region</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safe driving supporting system by vehicle-to-vehicle communications</td>
<td>Denso Corporation, Abashiri City</td>
<td>Abashiri City</td>
<td>700 MHz band 5.8 GHz band</td>
</tr>
<tr>
<td>Infrastructure cooperation safe driving supporting system by road-to-vehicle and vehicle-to-vehicle communications</td>
<td>Toyota Motors and 8 other companies</td>
<td>Tsukuba City, Yokosuka City</td>
<td>700 MHz band 5.8 GHz band</td>
</tr>
<tr>
<td>Infrastructure cooperation safe driving supporting system by road-to-vehicle and vehicle-to-vehicle communications</td>
<td>Toyota Motors and 8 other companies</td>
<td>Toyota City, Nagakute Town</td>
<td>5.8 GHz band</td>
</tr>
<tr>
<td>Infrastructure cooperation safe driving supporting system by road-to-vehicle and vehicle-to-vehicle communications</td>
<td>Fujitsu, Toyota Motors, Toyota InfoTechnology Center</td>
<td>Kisarazu City</td>
<td>700 MHz band</td>
</tr>
<tr>
<td>Verifying frequency utilization technology for vehicle-to-vehicle communication</td>
<td>Oki Electric, Toyota Central R&amp;D Labs, NICT</td>
<td>Tsukuba City, Yokosuka City</td>
<td>700 MHz band 5.8 GHz band</td>
</tr>
<tr>
<td>Server type of drive assist service with mobile WiMAX</td>
<td>Mazda</td>
<td>Hiroshima City</td>
<td>Frequencies for mobile phones, 2.4 GHz band, 2.5 GHz band</td>
</tr>
<tr>
<td>Car electronic service</td>
<td>Kitakyushu-shi</td>
<td>Kitakyushu City</td>
<td>700 MHz band 5.8 GHz band</td>
</tr>
</tbody>
</table>

To sharing information among relevant players, MIC hold liaison meeting of ITS Projects for Ubiquitous Special Zones
Thank you!

Ministry of Internal Affairs and Communications

http://www.soumu.go.jp/