

Intelligent Transport Systems

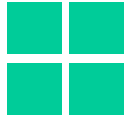
for Sustainable Mobility

- Achievement in the past 10 years
and integration for the future -**

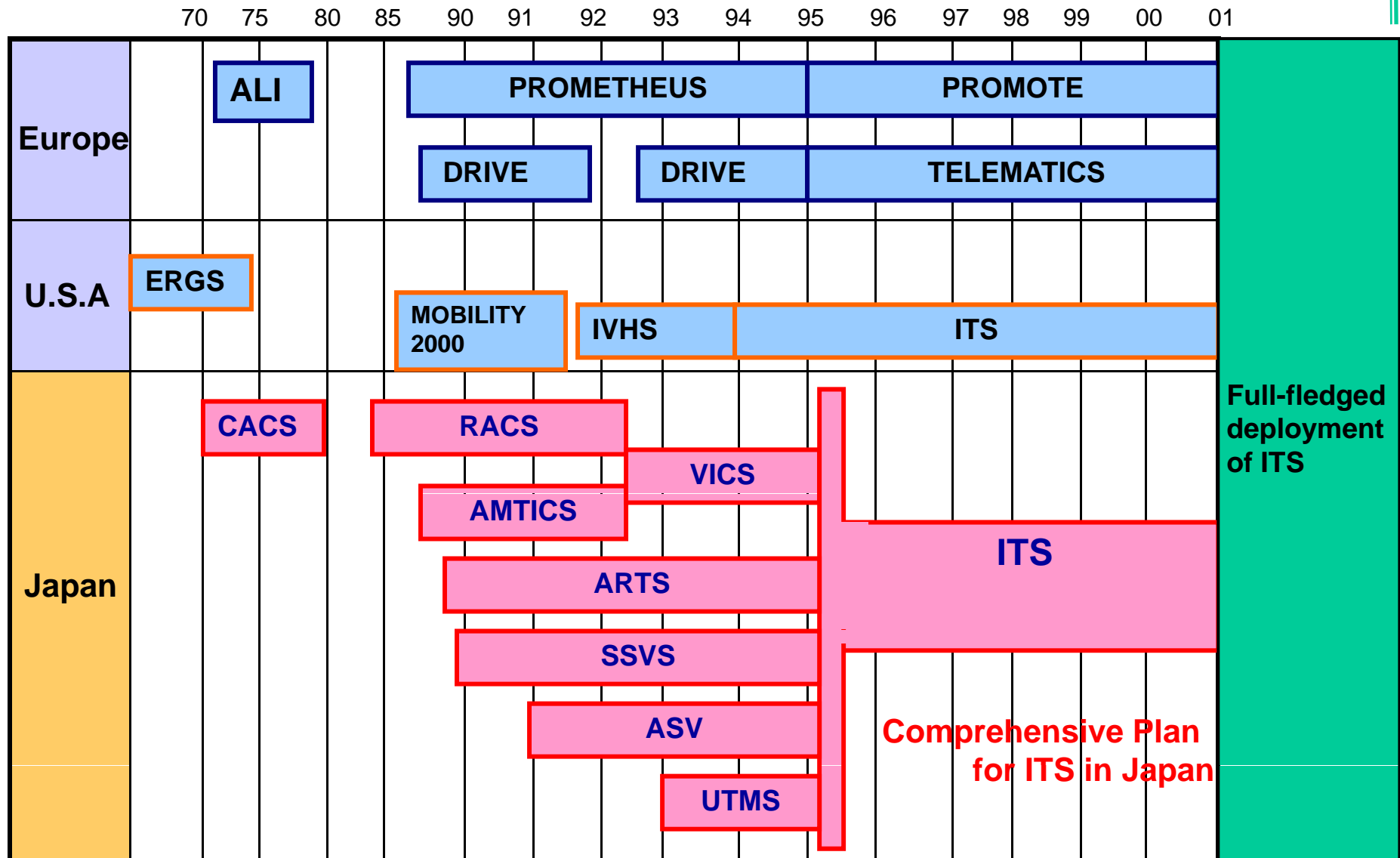
March 4, 2008

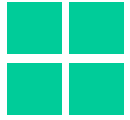
Hajime AMANO

**Chairman, Survey Committee
ITS Info-communications Forum**



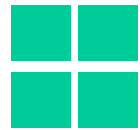
ITS Developments in Japan





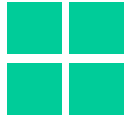
Topics

- 1. System Architecture
for the 1st Stage Implementation**
- 2. Target Oriented Plans
for the 2nd Stage Enhancement**
- 3. Activity of the ITS Info-communications Forum**



1. System Architecture

for the 1st Stage Implementation



Drafting National ITS Plan

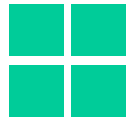
National Police Agency

Ministry of Posts and Telecommunications

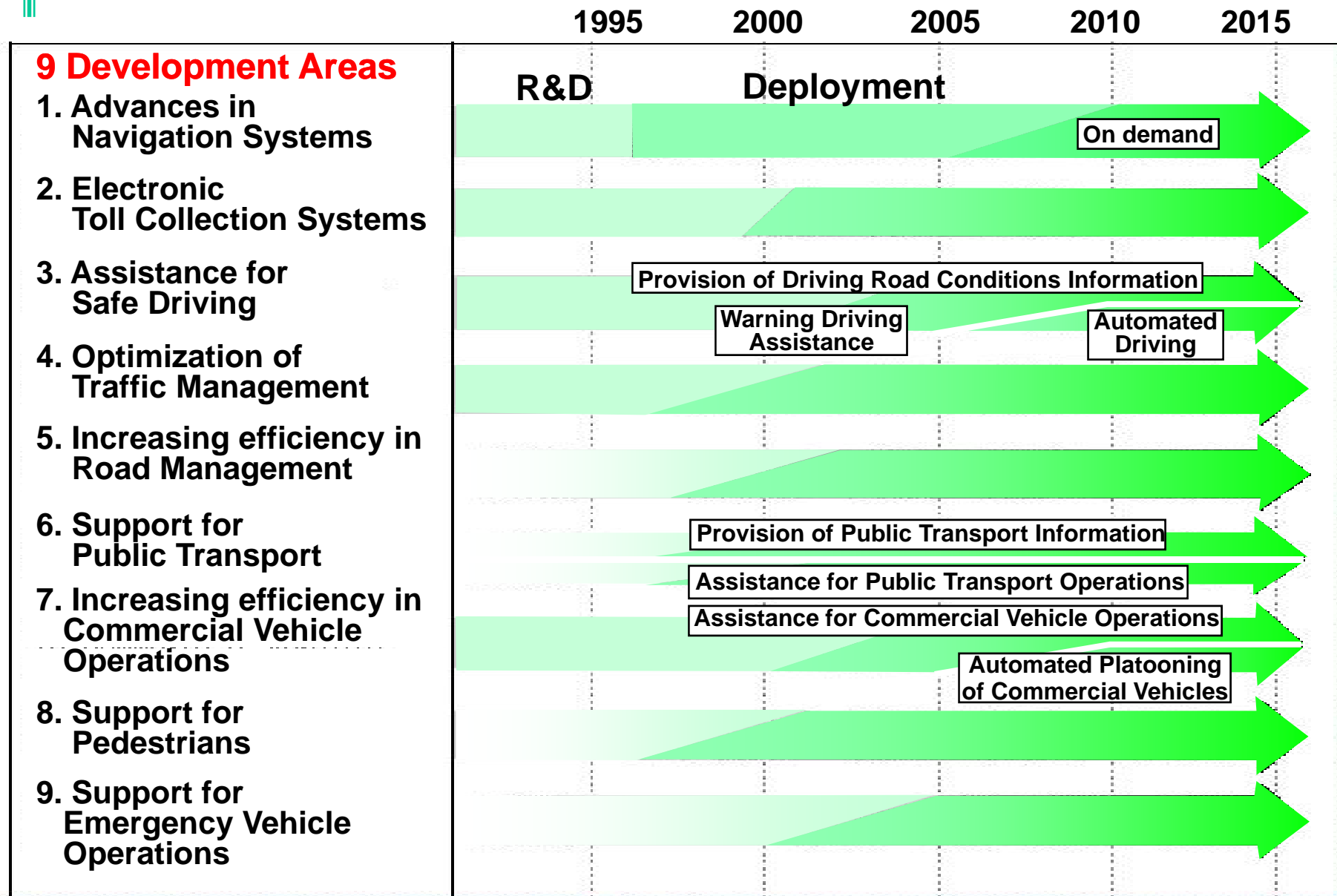
Ministry of International Trade and Industries

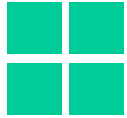
Ministry of Transportation

Ministry of Construction



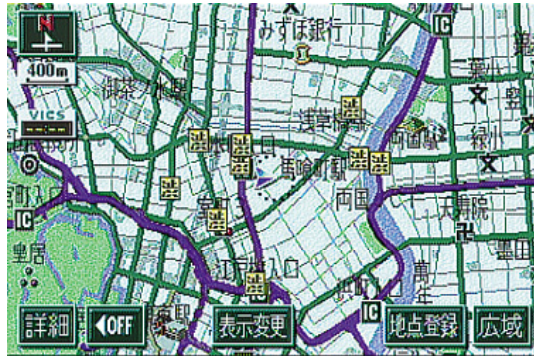
Comprehensive Plan for ITS in Japan





Area 1 and 2 Services

1. Advances in Navigation Systems



Dynamic Route Guidance

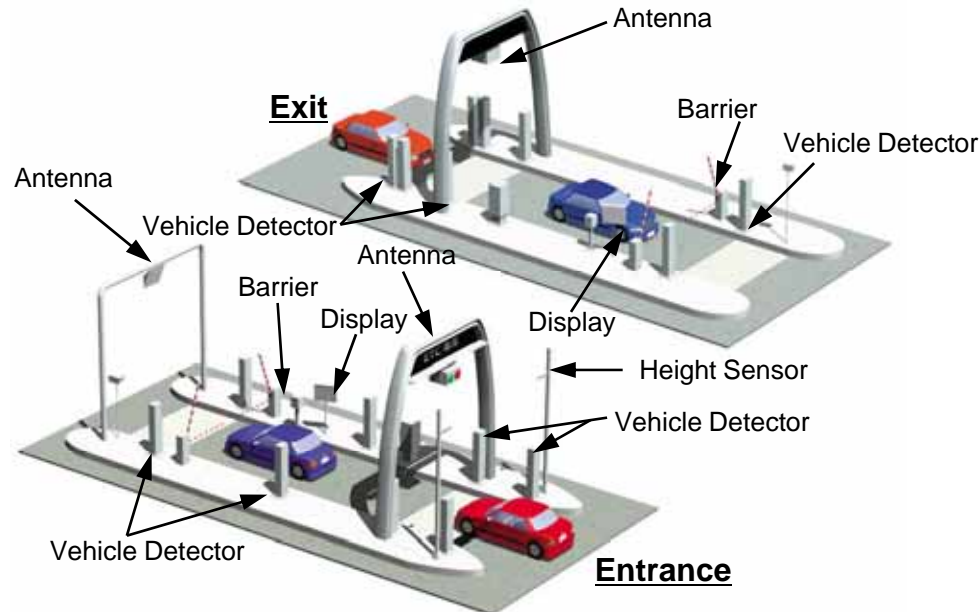


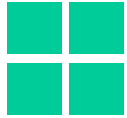
Traffic Information



Private Sector Services

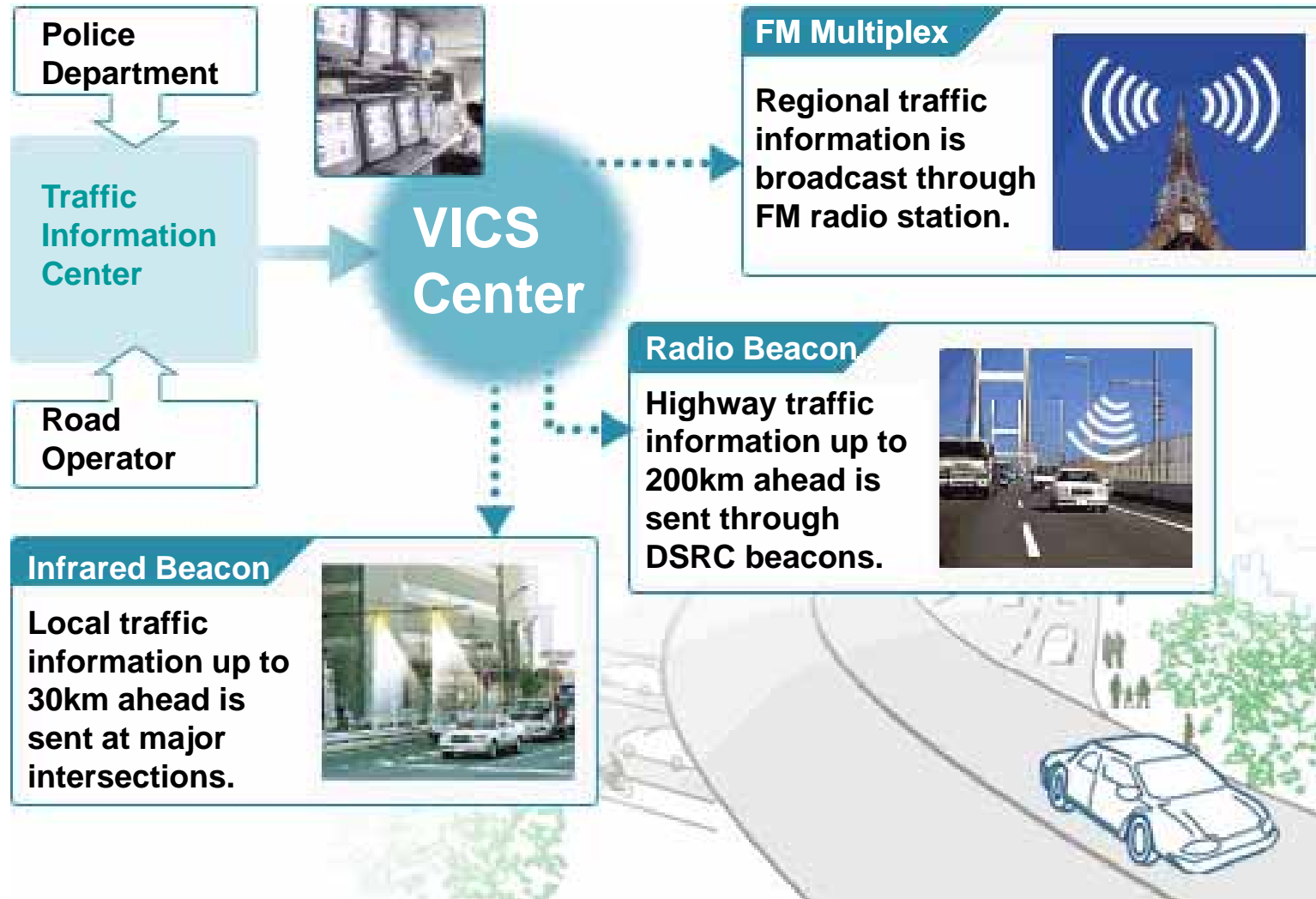
2. Electronic Toll Collection Systems

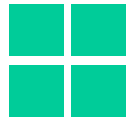




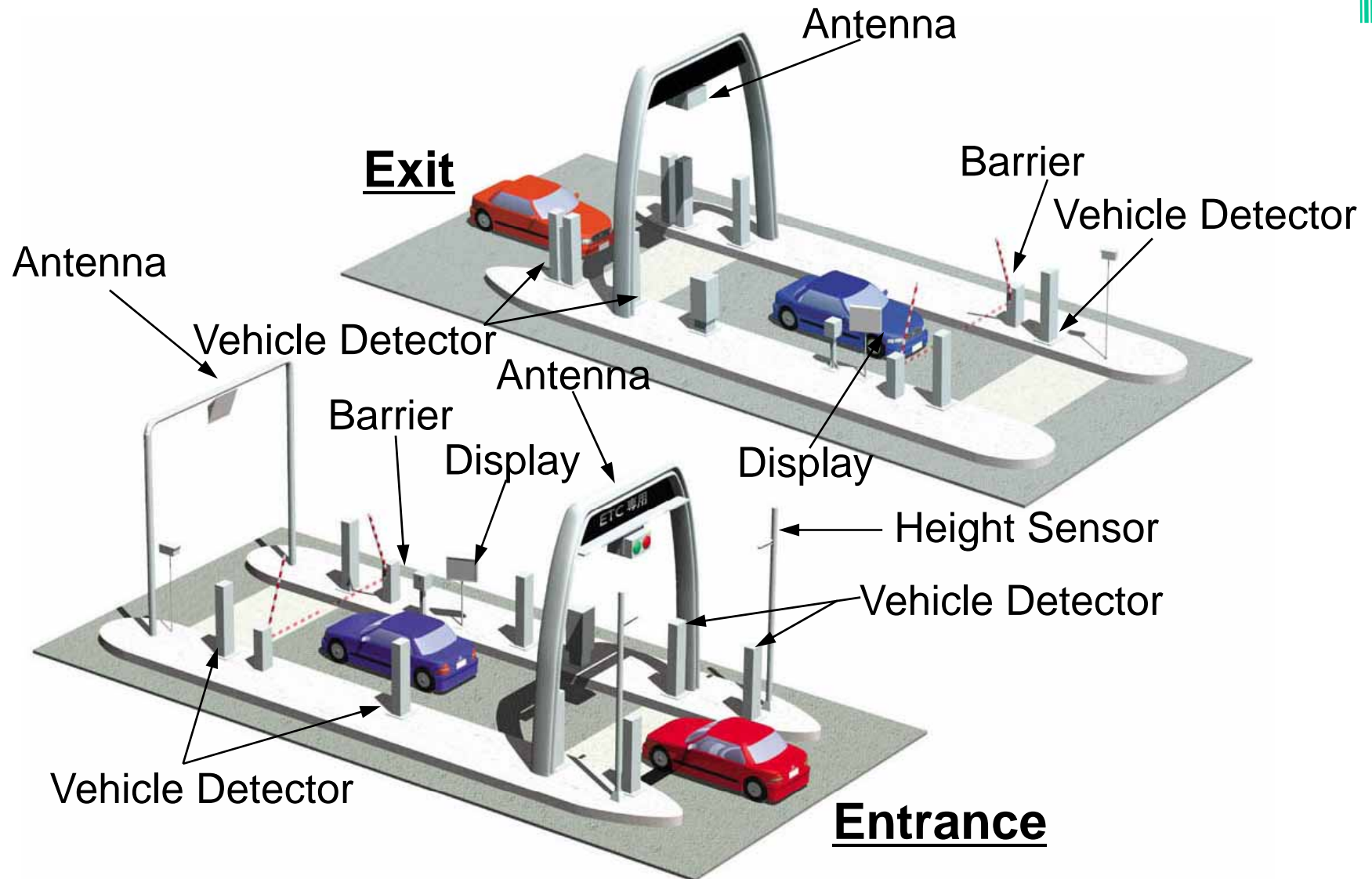
Success story: VICS

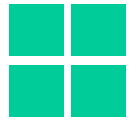
Vehicle Information and Communication System





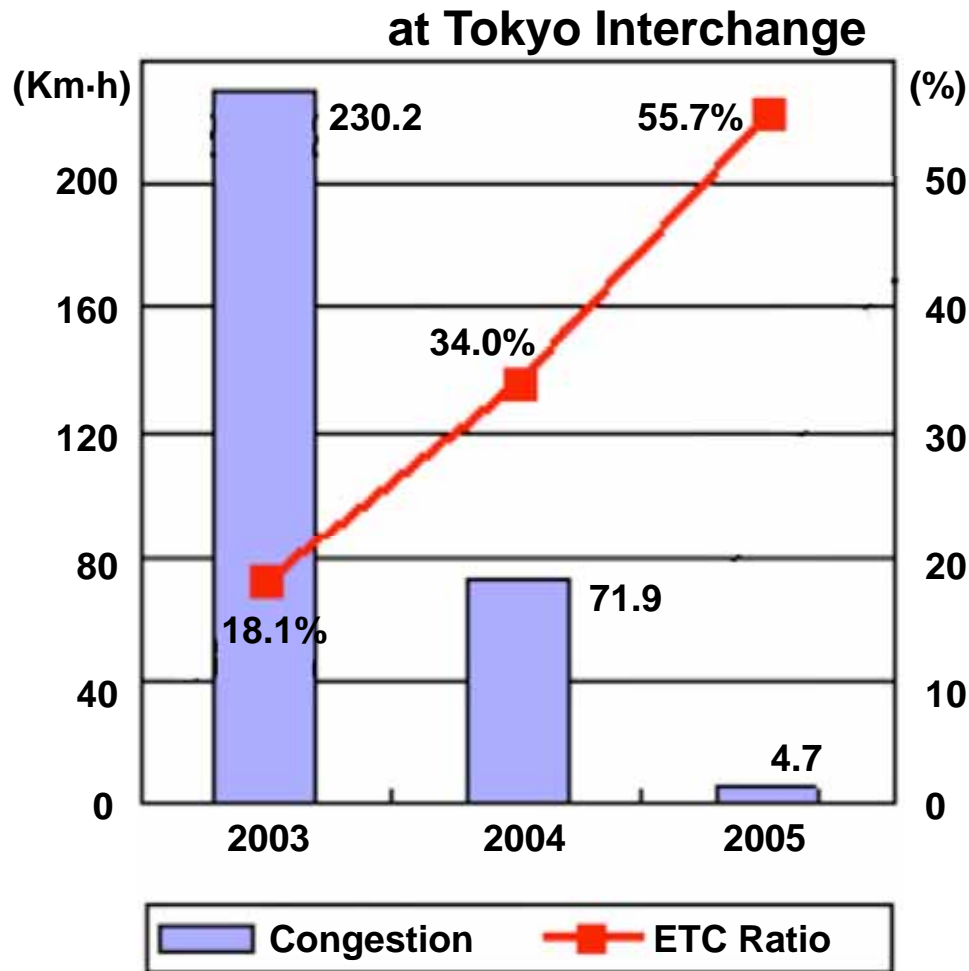
Success story: Electronic Toll Collection



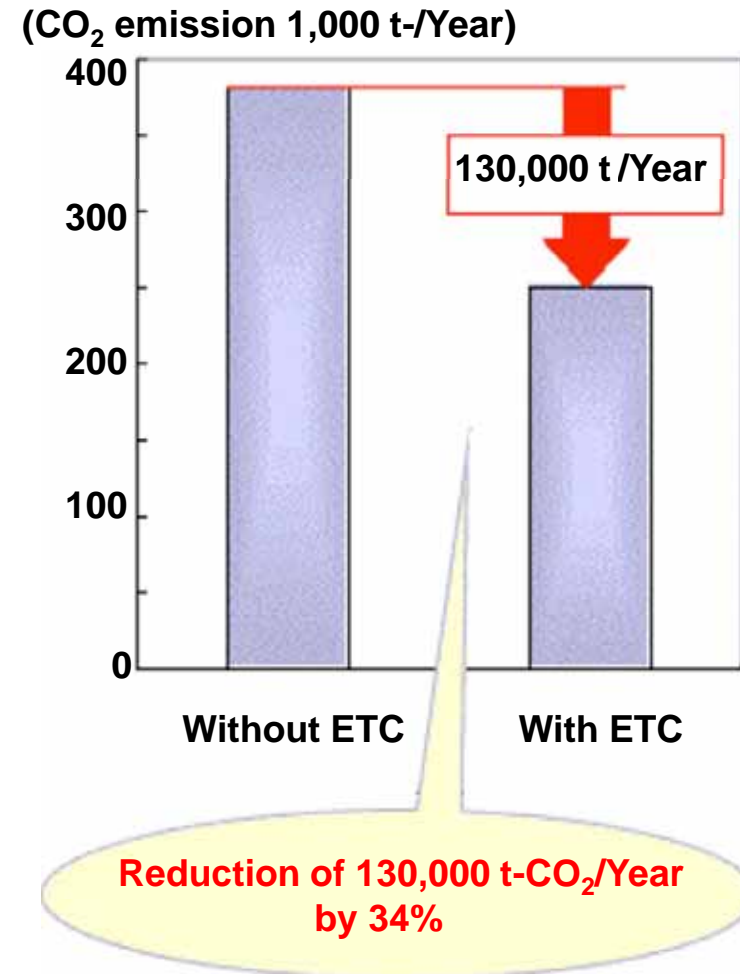


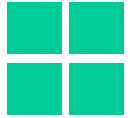
Social Benefit from Widespread Use of ETC

Reduction of congestion

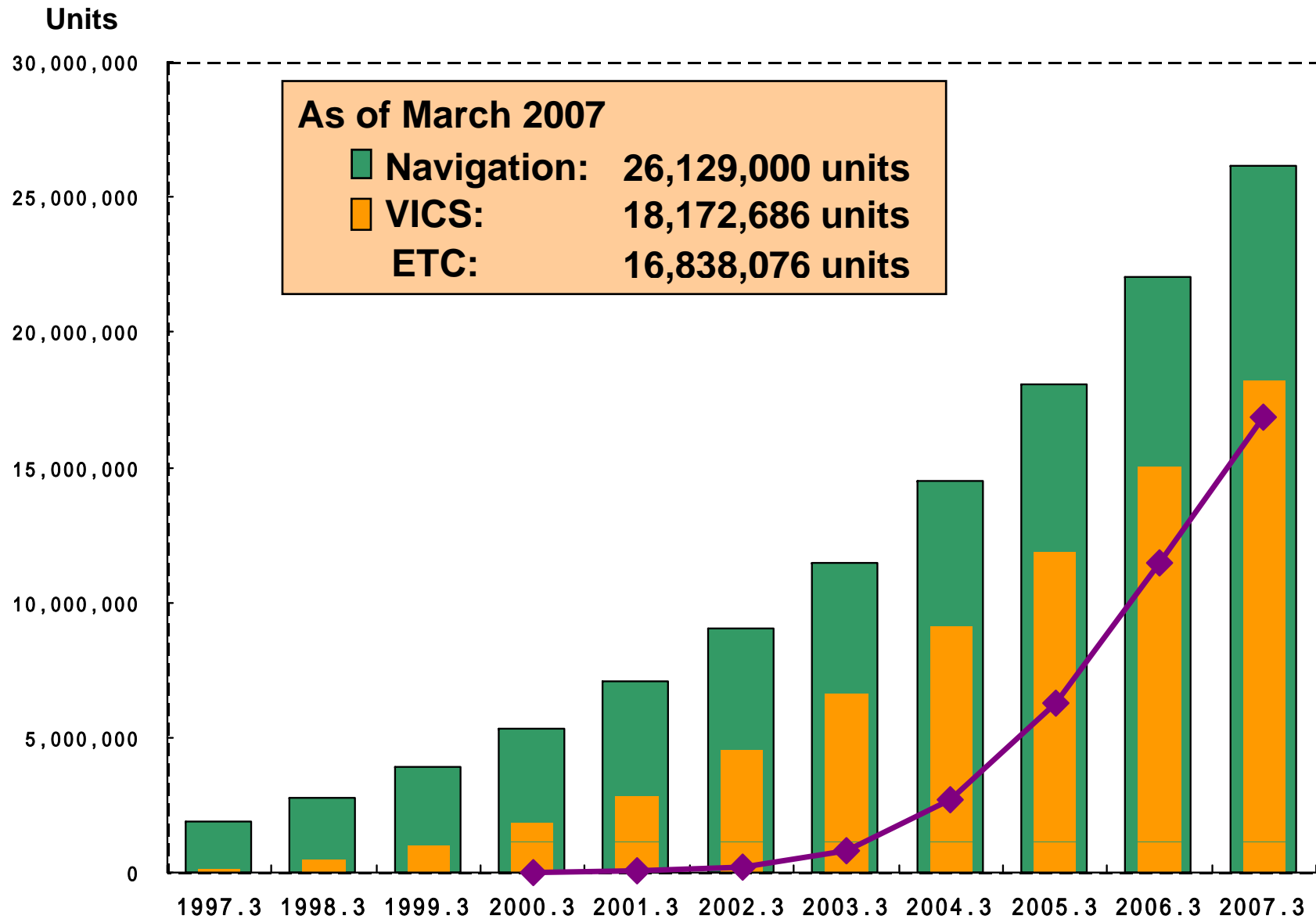


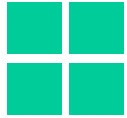
Reduction of CO₂





Penetration of VICS On-board Equipment





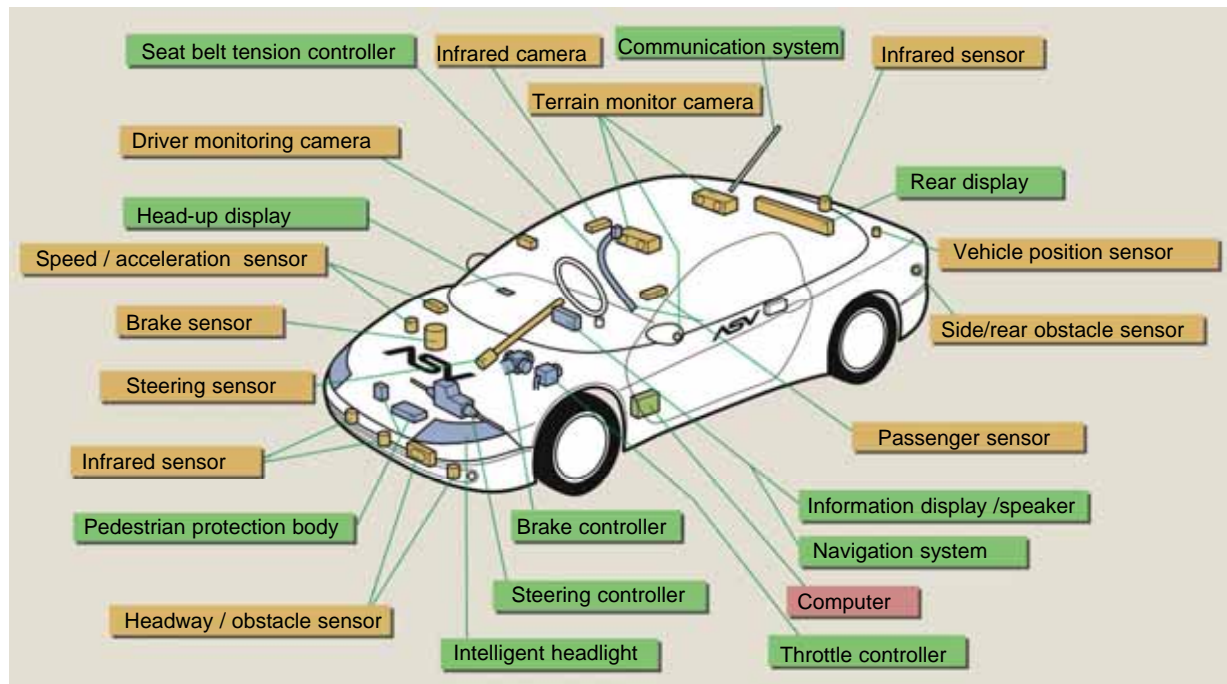
Area 3 Services

3. Assistance for Safe Driving

Information provision

Driving assistance

Automated driving



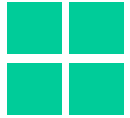
Advanced Safety Vehicle



Vehicle Infrastructure Communication



Automated Platoon



Area 4 Services

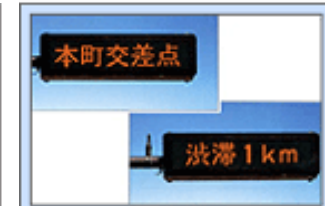
4. Optimization of Traffic Management



World's largest Traffic Control Center at Metropolitan Police Department in Tokyo



Character information board



Small (character) information board



Preset message board



Variable message board



Formulated information board



Roadside radio transmitter



Parking guidance system



Variable road sign

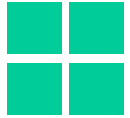


Personal traffic information service



Small (travel time) information board

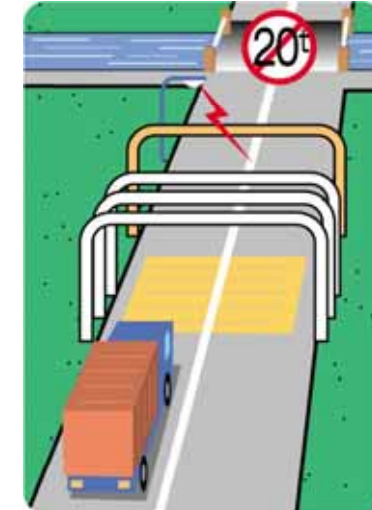
source: UTMS



Area 5 and 6 Services

5. Increasing efficiency in Road Management

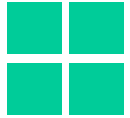
- Road maintenance
- Management of special vehicle
- Construction work related information management



6. Support for Public Transport

- Operation schedule and status information provision
- Operation management





Area 7 and 8 Services

7. Increasing efficiency in Commercial Vehicle Operations

Pickup / delivery Management

Automated operation

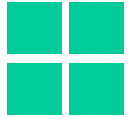


8. Support for Pedestrians

Route guidance

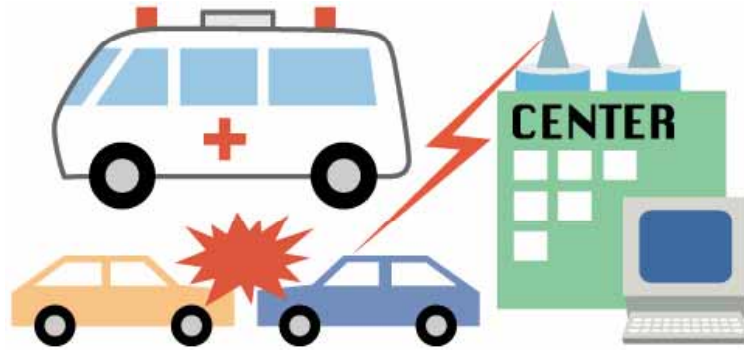
Safety/security management





Area 9 Services

9. Emergency Vehicle Operations



Emergency Call

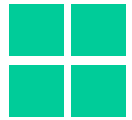


Priority Signal Control



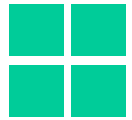
Dispatching Rescue Helicopter





ITS World Congress Aichi-Nagoya 2004





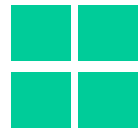
ITS World Congress Aichi-Nagoya 2004

Exhibition:



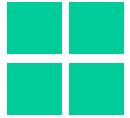
Trying out ITS features:





2. Target Oriented Plans

for the 2nd Stage Enhancement



Japan ITS Promotional Conference

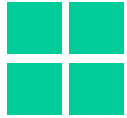
Future Directions in the Deployment of ITS

1. Improving the safety of road traffic

- 1) The intelligent automobile
- 2) Enhancement of infrastructure
- 3) Vehicle-to-vehicle and road-to-vehicle cooperation
- 4) Supporting the safety of pedestrians, bicyclists, and motorcyclists
- 5) Enhancement of first-aid and rescue of traffic accident victims

2. Ensuring smoother traffic and reducing environmental burdens

- 1) Optimization of traffic demand
- 2) Advanced road traffic management systems
- 3) Advanced parking systems
- 4) The increase in efficiency of freight distribution



Japan ITS Promotional Conference

Future Directions in the Deployment of ITS

3. Improving convenience to individuals

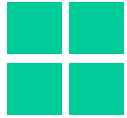
- 1) Raising the quality of road traffic information provided and promoting its active use
- 2) Advanced application of ITS content
- 3) Improving convenience to the elderly and disabled

4. Stimulating regional economic activity

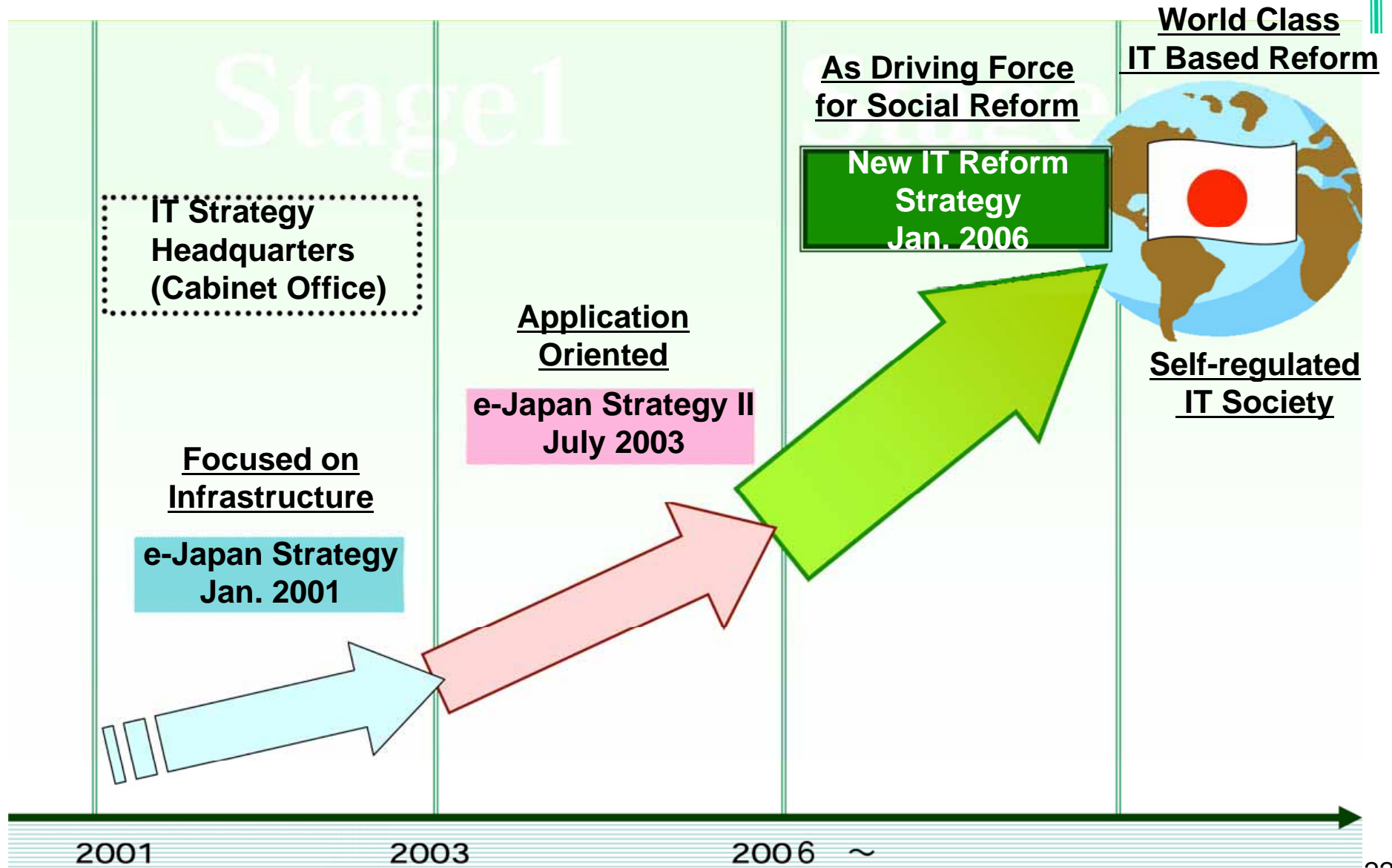
- 1) Improving access between regions and expressways
- 2) Raising the convenience of inter-modal transportation using public transport

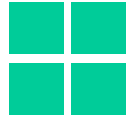
5. Preparation of a common platform and promotion of international standards and global technical regulations

- 1) Construction of an ITS platform
- 2) Promotion of international standards and global technical regulations



Information Technology Strategic Plan





New IT Reform Strategy

Structural reform of healthcare through IT

An environmentally-friendly society that utilizes IT

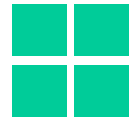
The world's leading safe and secure society

The world's safest road traffic environment

The world's most convenient and efficient e-Government

Enhanced business competitiveness through establishment of management by utilizing IT

Prosperous lifestyles throughout people's lifetimes



Public-Private Coordination for Traffic Safety

2006

**Coordination
Committee**

Government

National Police Agency

Ministry of Internal Affairs and Communications

Ministry of Economy, Trade, and Industries

Ministry of Land, Infrastructure and Transport
(Road Bureau, Road Transport Bureau)

Industry

Japan Business Federation

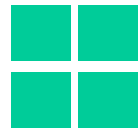
ITS Japan
Automobile manufacturers
Electronic Equipment Manufacturers

2008

Large Scale Field Evaluation Test

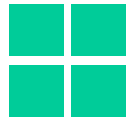
2010

Nationwide Implementation



3. Activity of

The ITS Info-communications Forum



Organization of the ITS Info-communications Forum

General Assembly Chairman: Dr. Shoichiro TOYODA

Steering Committee Chairman: Prof. Mitsutoshi HATORI

R&D Committee

Chairman: Prof. Hironao KAWASHIMA

Ubiquitous ITS Platform Expert Group

Roadside Communications System Expert Group

Inter-Vehicle Communications System Expert Group

3G Telematics Expert Group

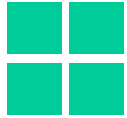
ITS Broadcasting System Expert Group

Survey Committee

Chairman: Mr. Hajime AMANO

Planning and Survey Expert Group

Public Relations Expert Group



DSRC Standards in Japan

Inquiry No.76 (ETC) **Oct. 1994**

Report on Inquiry No.76 (ETC) **Mar. 1997**

ETC standard

Nov. 1997

ARIB STD-T55

Report on Inquiry No.111 (DSRC) **Oct. 2000**

DSRC standard

Sep. 2001

ARIB STD-T75

- Higher Data Rate
- More Channels
- Multi-Purpose

ASL standard

May. 2004

ARIB STD-T88

- Addition of capabilities of IP communications, etc.

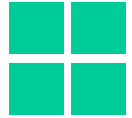
B-API guidelines

Nov. 2005

ITS FORUM RC-004

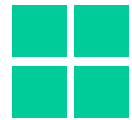
- Addition of Basic API for Multi-Service Operation

ETC	Electronic Toll Collection
DSRC	Dedicated Short Range Communication
ASL	Application Sub-Layer
B-API	Basic Application Interfaces
ARIB	Association of Radio Industries and Businesses

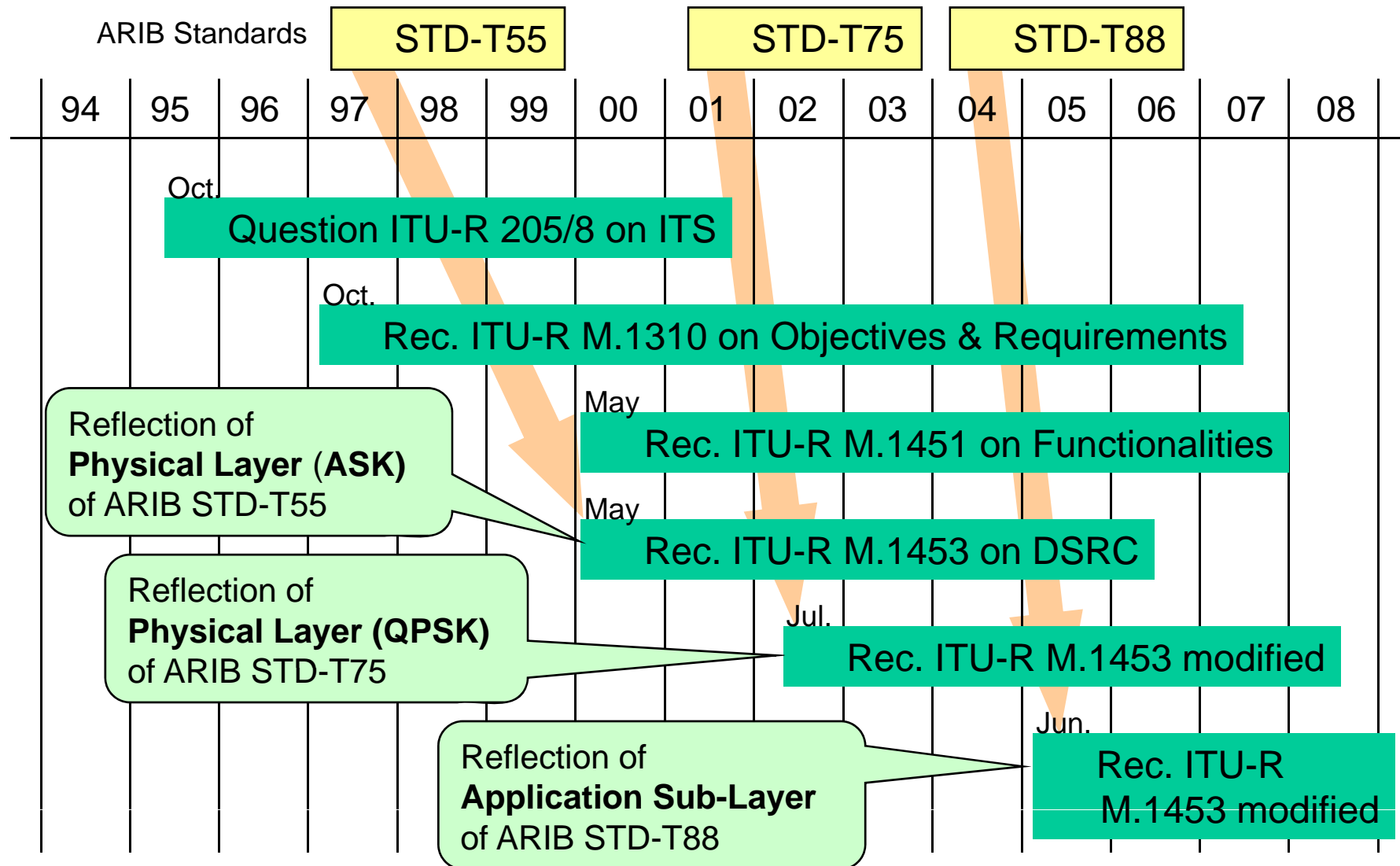


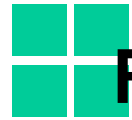
Contribution to International Standards

Recommendation ITU-R M.1453	ITS – Dedicated Short Range Communications at 5.8GHz
ISO 15628	Application Layer for Dedicated Short Range Communication – DSRC Layer 7
ISO/CD 24103	ITS – Communication Air Interface, Long and Medium Range (CALM) – Media Adaptation Interface Layer (MAIL)

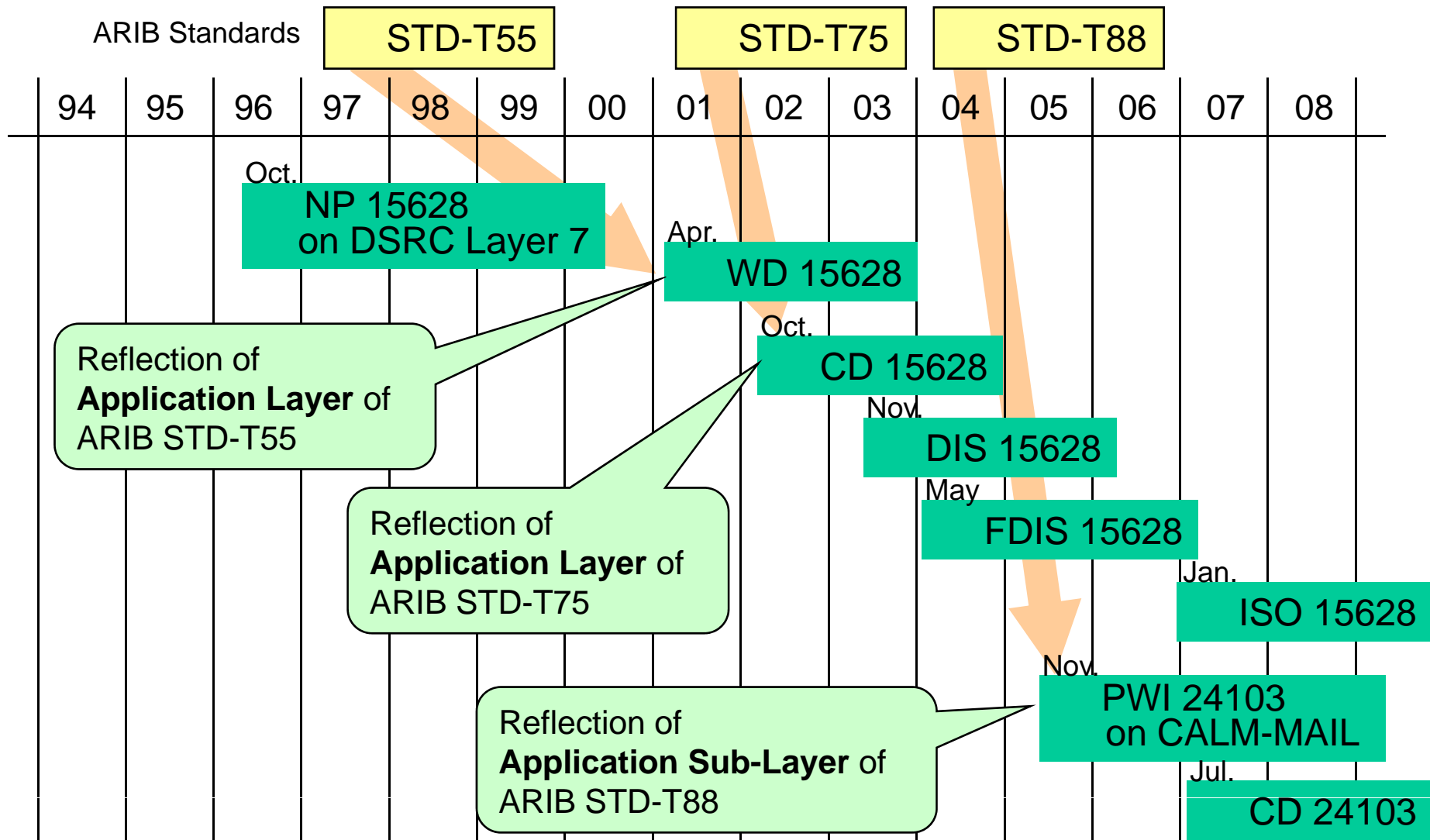


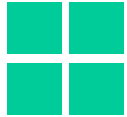
Reflection of ARIB Standards to ITU-R Recs.





Reflection of ARIB Standards to ISO Standards





Recommendation ITU-R M.1453-2

Based on ARIB STD-T75 , STD-T88

Rec. ITU-R M.1453-2 1

RECOMMENDATION ITU-R M.1453-2
Intelligent transport systems – dedicated short range communications at 5.8 GHz
 (Question ITU-R 205/8)
 (2000-2002-2005)

Scope

This Recommendation outlines the technologies and characteristics for dedicated short range communications (DSRC) in the 5.8 GHz band. This Recommendation includes an active (transceiver) method and a backscatter (transponder) method as DSRC technologies available for intelligent transport systems (ITS). This Recommendation further includes a DSRC-application sub-layer (DSRC-ASL) which allows for multiple DSRC applications and IP-based (Internet protocol) network applications. The technical and operational characteristics of both methods and the DSRC-ASL are described.

The ITU Radiocommunication Assembly,
considering

- that intelligent transport systems (ITS) may significantly contribute to the improvement of public safety;
- that international standards would facilitate worldwide applications of ITS and provide for economies of scale in bringing ITS equipment and services to the public;
- that early international harmonization of ITS would have several benefits;
- that worldwide compatibility of ITS may be dependent on common radio spectrum allocations;
- that the International Organization for Standardization (ISO) has work under way on standardizing ITS (non-radio aspects) in ISO/TC204 which will contribute to the efforts in ITU-R;
- that administrations are operating short-range devices in the 5.8 GHz band in accordance with Recommendation ITU-R SM.1538 – Technical and operating parameters and spectrum requirements for short-range radiocommunication devices.

recognizing

- that the European Telecommunications Standards Institute (ETSI) has adopted the following standards on Road Transport and Traffic Telematics (RTTT):
 - ES 200 674-1 “Electromagnetic Compatibility and Radio Spectrum Matters (ERM); Road Transport and Traffic Telematics (RTTT); Part 1: Technical characteristics and test methods for High Data Rate (HDR) data transmission equipment operating in the 5.8 GHz Industrial, Scientific and Medical (ISM) band”;
 - ES 200 674-2 “Electromagnetic Compatibility and Radio Spectrum Matters (ERM); Road Transport and Traffic Telematics (RTTT); Part 1: Technical characteristics and test methods for Low Data Rate (LDR) data transmission equipment operating in the 5.8 GHz Industrial, Scientific and Medical (ISM) band”;

Rec. ITU-R M.1453-2

Electromagnetic Compatibility and Radio Spectrum Matters (ERM); Road Transport and Traffic Telematics (RTTT); Technical characteristics and test methods for Communication (DSRC) transmission equipment (500 kbit/s to 5.8 GHz Industrial, Scientific and Medical (ISM) band”;

5.8 GHz and 5 805-5 815 MHz (on a national basis) are identified for

organizations, such as the Asia-Pacific Telecommunications Council (APTC), have approved a proposal on a draft standard on “Dedicated Short Range Communications (DSRC) Equipment Operating in the 5.8 GHz band”.

5 805-5 815 MHz, is also used by other radio systems and services in the 5.8 GHz band.

Technical characteristics of DSRC described in Annex 1 and DSRC application sub-layer (ASL) should be adopted for the delivery of ITS DSRC applications in the 5.8 GHz frequency band;

and consider adoption of either active (transceiver) or backscatter (transponder) method for DSRC implementation;

and should further consider the implementation of the DSRC-ASL sub-layer to deliver multiple DSRC and IP-based applications.

Annex 1

Technical characteristics of DSRC operating in the 5.8 GHz frequency band

Technical characteristics and test methods for DSRC transmission equipment (500 kbit/s to 5.8 GHz Industrial, Scientific and Medical (ISM) band). This Recommendation includes an active (transceiver) method and a backscatter (transponder) method as DSRC technologies available for intelligent transport systems (ITS). The technical and operational characteristics of both methods and the DSRC-ASL are described.

communications system for vehicles that travel on roads. DSRC applications include electronic toll collection, parking management, vehicle-to-vehicle signaling, traffic information, management of public

Rec. ITU-R M.1453-2

TABLE 2
Characteristics of backscatter (transponder) method

Item	Technical characteristic	
	Medium data rate	High data rate
Frequencies	5.8 GHz band for downlink	5.8 GHz band for downlink
Frequencies (channel)	1.5 MHz/2 MHz (uplink)	10.7 MHz (uplink)
Channel spacing	5 MHz	10 MHz
Occupied bandwidth	Less than 5 MHz/channel	Less than 10 MHz/channel
Modulation method	ASK (downlink carrier) PSK (uplink sub-carrier)	ASK (downlink carrier) PSK (uplink sub-carrier)
Transmission speed (bit/s)	500 kbit/s (downlink) 250 kbit/s (uplink)	1 Mbit/s (downlink) 1 Mbit/s (uplink)
Frequency	FMO (downlink) NRZI (uplink)	
Transponder type	Transponder type	Transponder type
Power spectral density (e.i.r.p. ⁽¹⁾)	≤ +33 dBm (downlink) ≤ -24 dBm (uplink; single sideband)	≤ +39 dBm (downlink) ≤ -14 dBm (uplink; single sideband)

Recommendation 70-03 specifies values of 2 W e.i.r.p. for active and 8 W e.i.r.p. for passive

Annex 2

Technical and operational characteristics of DSRC application sub-layer in 5.8 GHz frequency band

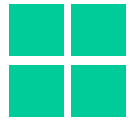
Scope

This Recommendation outlines the technologies and characteristics for the DSRC-ASL. The DSRC-ASL sub-layer provides additional communication functions to DSRC upper layer protocol stacks for multiple applications, especially IP network applications, in the 5.8 GHz frequency band.

This Recommendation is applicable to both the active (transceiver) method and the backscatter (transponder) method as DSRC technologies available for ITS. The technical and operational characteristics of the DSRC-ASL are described in Annex 1.

Introduction

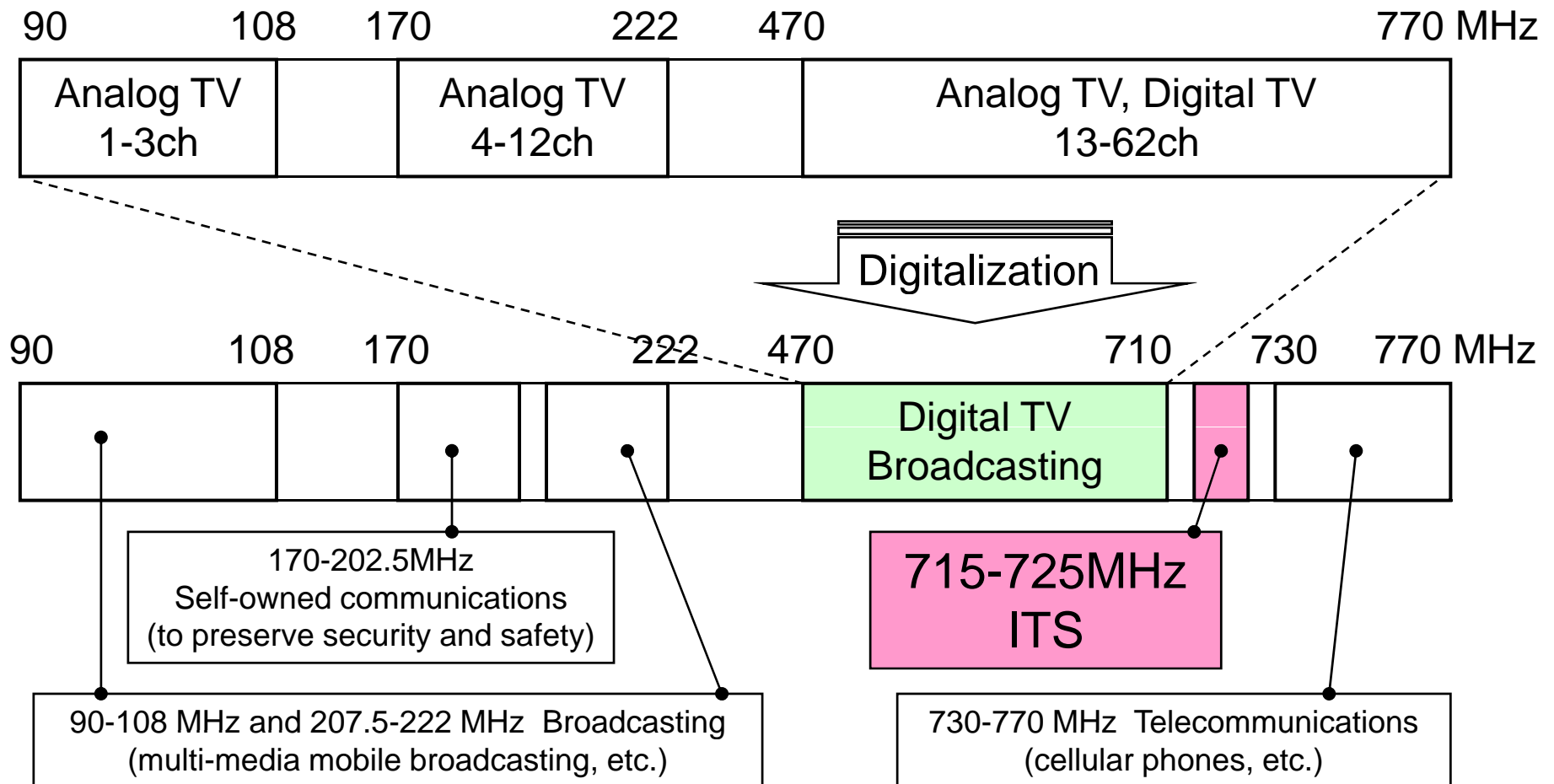
Recommendation ITU-R M.1453 – Transport information and control systems – Dedicated short range communications at 5.8 GHz, was approved at the Radiocommunication Assembly (RA) 2000. In 2002, the RA approved a revision of the Recommendation as Recommendation ITU-R M.1453-1. Since then, the name of TICS has been changed to ITS.

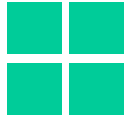


New Spectrum Use after July 24, 2011

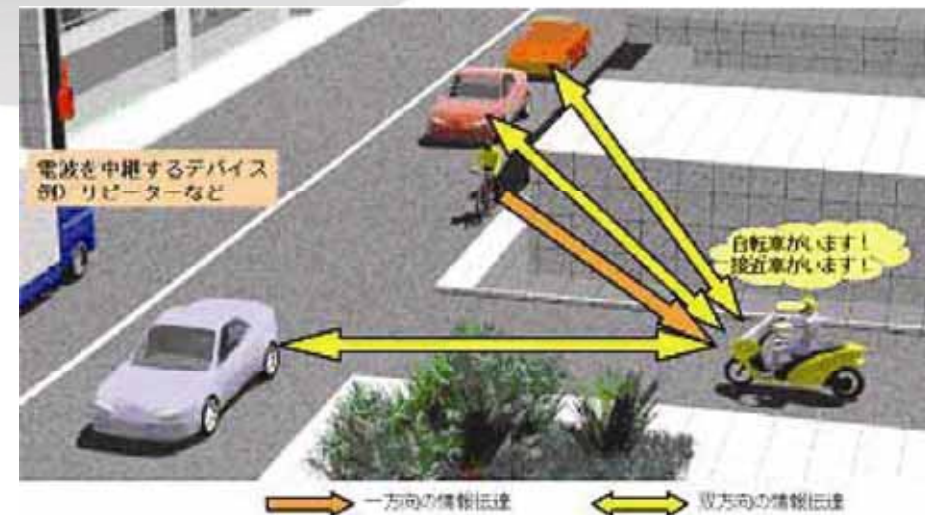
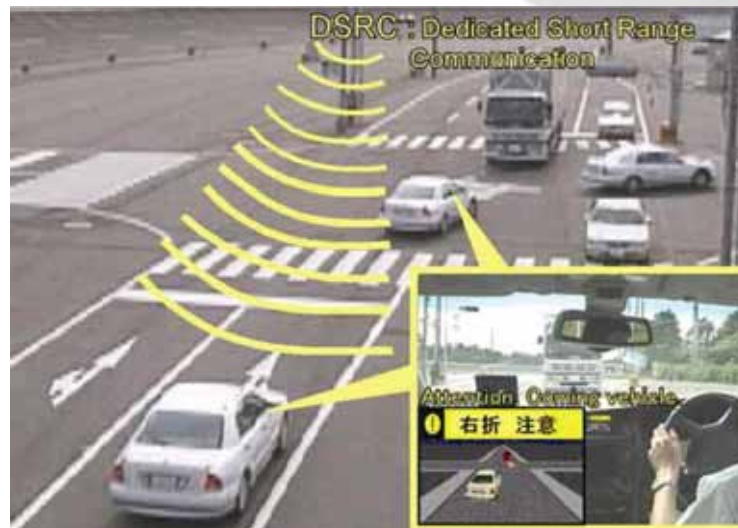
New Spectrum Use after completion of digitalization of terrestrial TV broadcasting

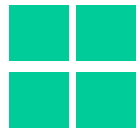
(Source: Telecommunications Council Report, June 27, 2007)





ASV: Advanced Safety Vehicle





Conclusion

ITS for Sustainable Mobility

which will pave the way to

Sustainable Development of the Society