

Vehicle-to-Vehicle Safety Communication Systems in JAPAN

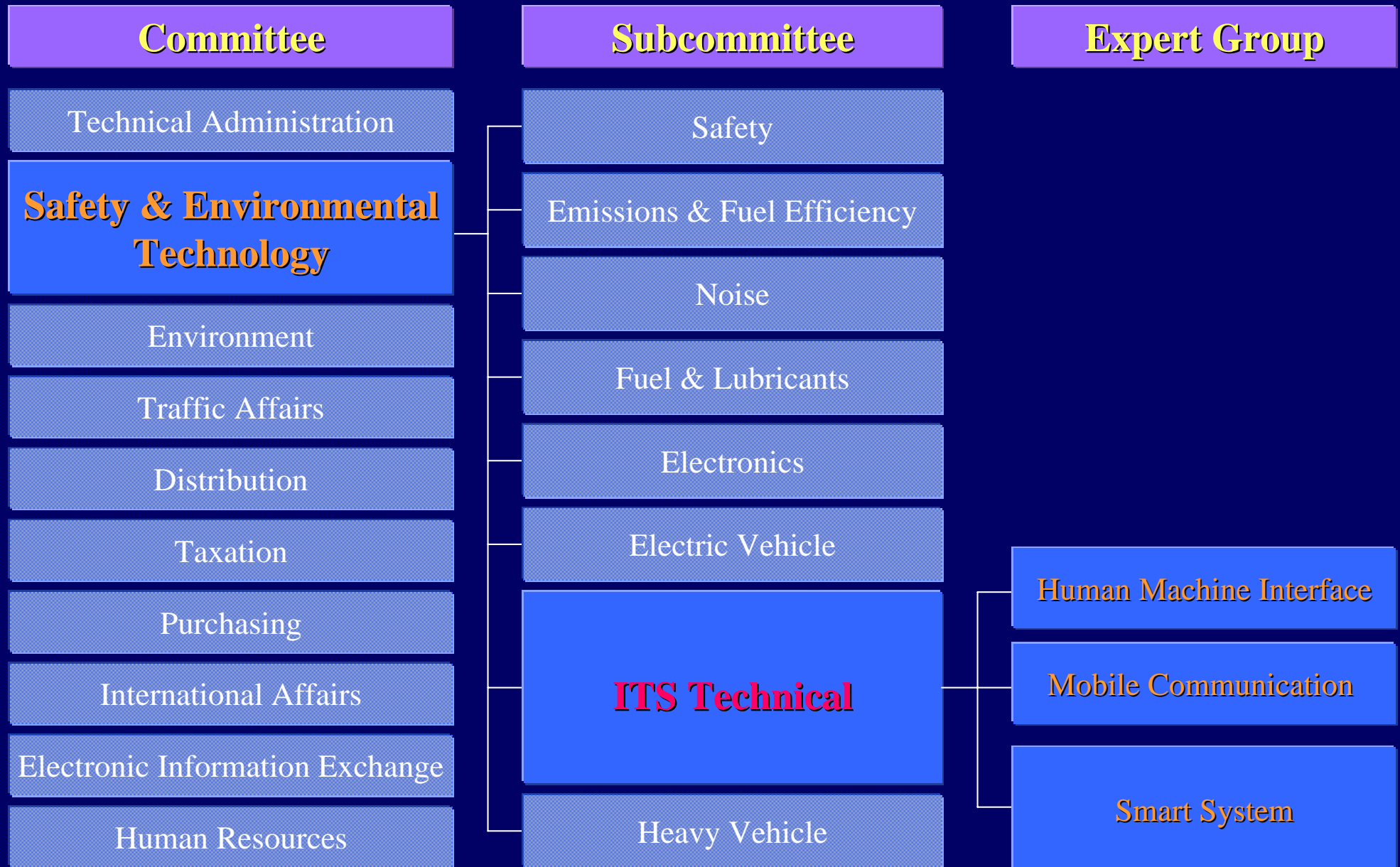
- Current Status and JAMA's Role -

Masaki KAKIHARA

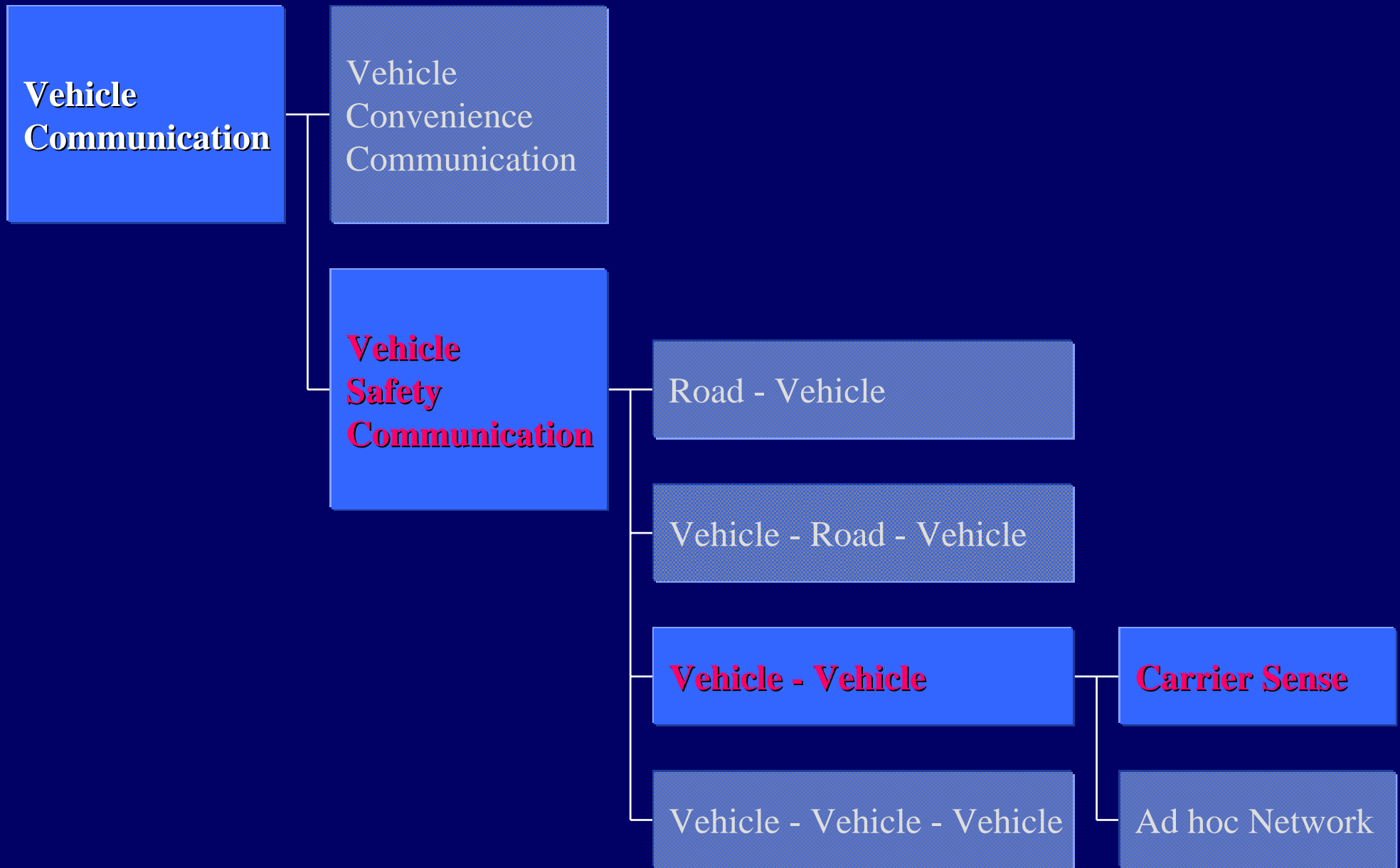
ITS Technical Subcommittee

Japan Automobile Manufacturers Association (JAMA)

JAMA Committee Organization



Review of Vehicle Safety Communication



Up to 2005 : Feasibility Study of 5.8GHz Band for V-to-V Communication

Up to 2005

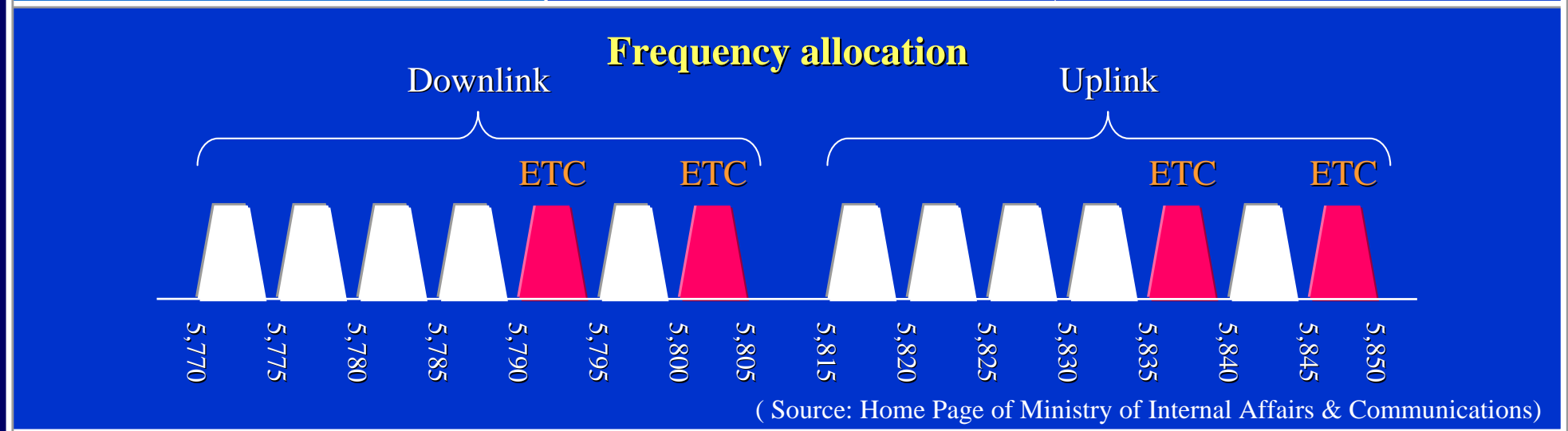
5.8GHz band already allocated for ITS (Road-Vehicle Communication)

- Being applied to ETC (ARIB STD-T55) 5.8GHz
- Studying V-to-V Communication based on DSRC (ARIB STD-T-75) ■

5.8GHz band already allocated for ITS (for Road-Vehicle communication systems)

- 2 up/down channels in service for ETC (ARIB STD-T55)
- Under study of Road-Vehicle communication services by DSRC (ARIB STD-T75)

Frequency band width	4.4MHz	
Modulation scheme	ASK (ETC) , QPSK	
Bit rate	1Mbps /ASK , 4Mbps / QPSK	
Maximum radiation power	Road side unit	On board equipment
	300mW	10mW



(Source: ASV Report)

V-to-V systems prevent roughly 30% of ca. 9,000 traffic fatalities a year

Targeted accident types

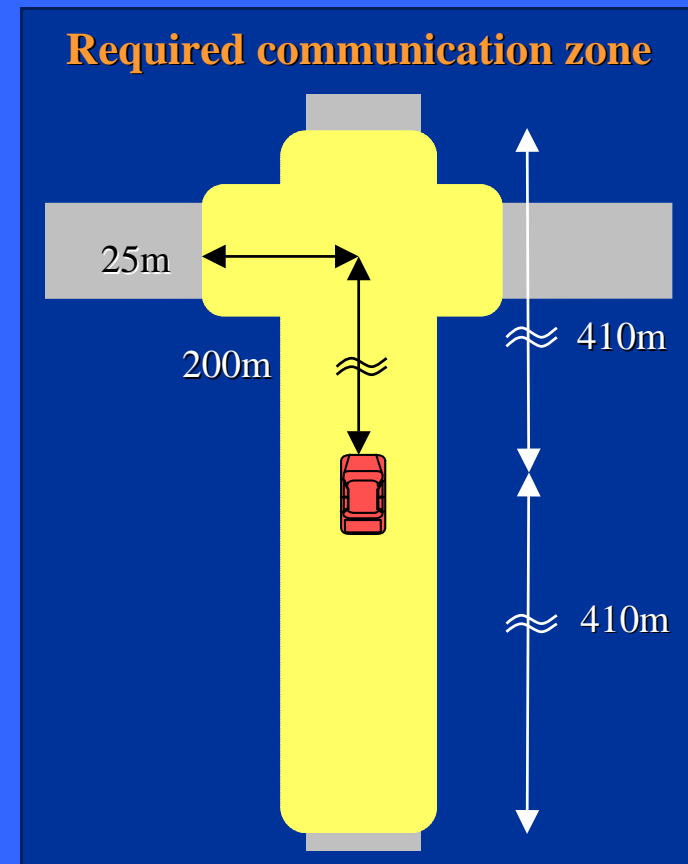
- Collisions when making a right turn
- Collisions at intersection corners
- Collisions with pedestrians
- Head-on collisions
- Rear-end collisions
- Collisions when making a left turn
- Collisions when changing lanes

Requirements for communication specifications

- Required communication zone: Shown on the right
- Vehicles present in the communication zone: 1,780 (max.)
- Required transmission speed: 20Mbps (band width 10MHz)

Verification test in Tomakomai (July to October 2005)

- **Confirmed efficiently help preventing accidents** (on the assumption that communication can be done)
- **Need to develop suitable communication media** (there was no media to cover the zone in the test)
(5.8GHz/10mW with repeaters was utilized as the surrogate method of V-to-V direct communication)



(Source: IVC Report)

Purpose

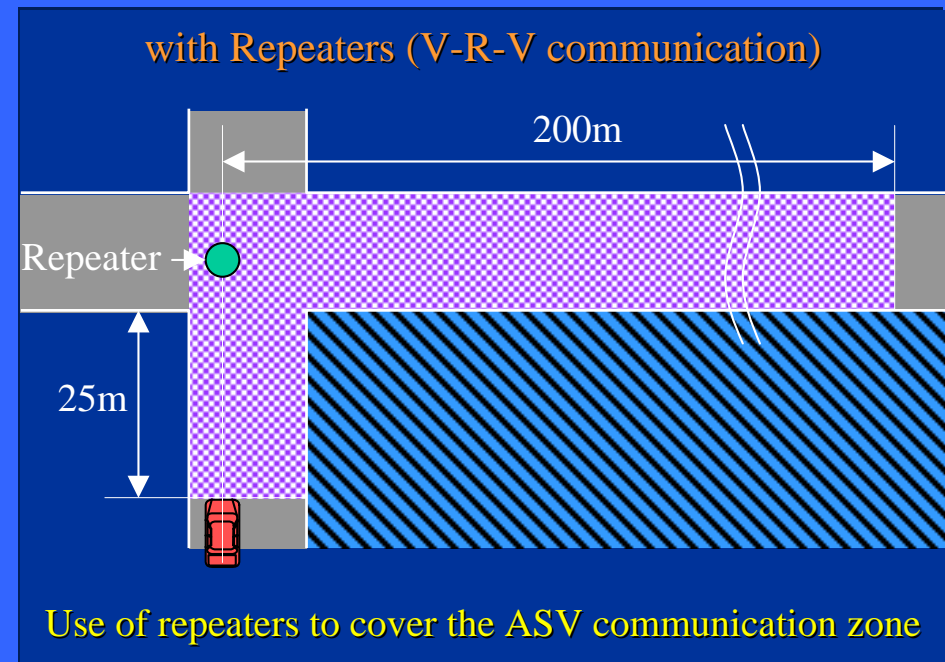
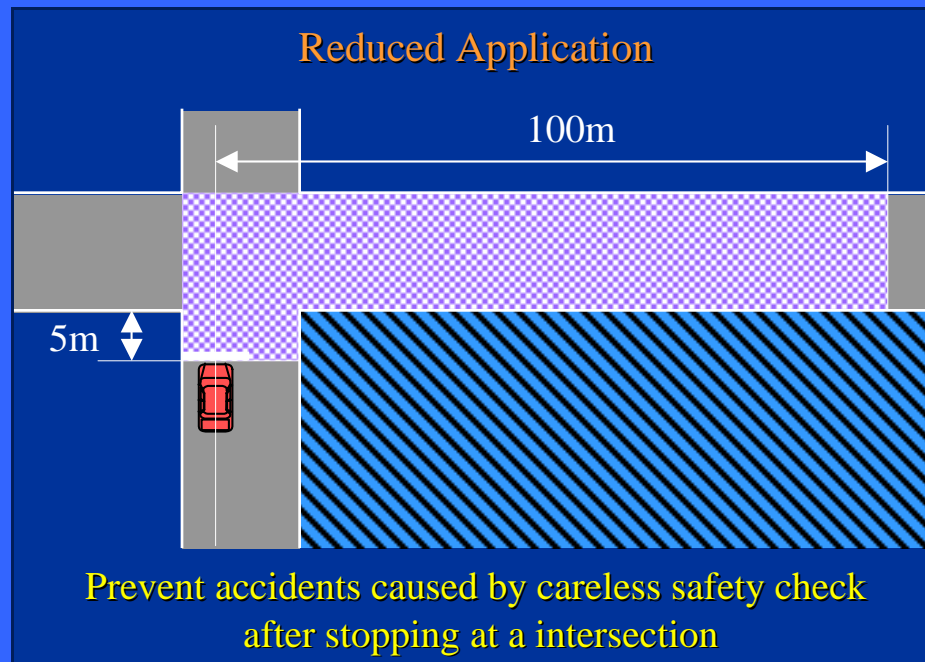
- Standardization of V-to-V communication technologies on the basis of R&D trends in the world

Task

- Feasibility study of 5.8GHz band V-to-V communication systems based on the ARIB STD-T75

Current status

- Difficult to satisfy the ASV requirements due to T75 restrictions and large corner loss of 5.8GHz
- Studies on V-to-V direct com. (reduced application) and with repeaters (V-R-V com.) are underway



2005/5 : JAMA Proposal on the Suitable Frequency for V-to-V Communication

Up to 2005

5.8GHz band already allocated for ITS (Road-Vehicle Communication)

- Being applied to ETC (ARIB STD-T55)
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5.8GHz



2005.5

JAMA proposal to
WBB-SG

700MHz - 6GHz suitable for V-to-V safety communication

700MHz

6GHz



2005

V-to-V Communication in the Study Group for Wireless Broadband Promotion

“Radio Policy Vision” (July 2003 Telecommunication Council Report)

“Guideline for Spectrum Reallocation” (October 2003 MIC)

Urgent need to specify details of concrete measures to promote wireless broadband

Study of developments in both domestic and international wireless broadband services

Identification of future wireless broadband usage and market

Study Group for Wireless Broadband Promotion

(November 2004)

JAMA Proposal

700MHz - 6GHz
for V-to-V safety
communication systems

Identification of challenges in wireless
Broadband promotion
Examination of promotion measures

Implementation of
a ubiquitous network society

Final Report (December 2005)

Proposed frequency band for V-to-V safety communication systems : VHF/UHF band

(source : WBB-SG Report)

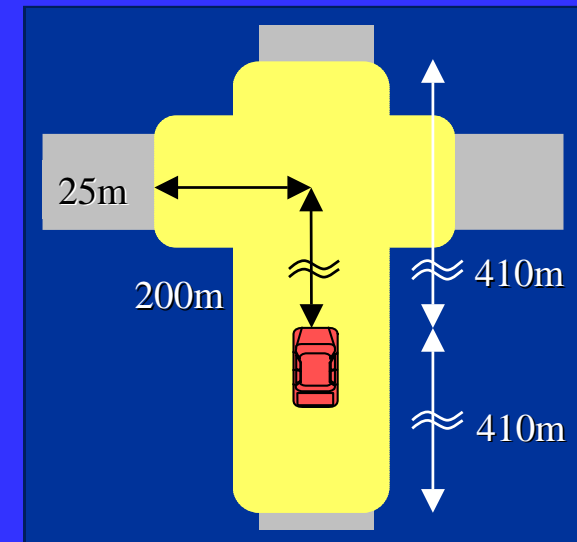
Suitable frequency for V-to-V Communication : 700MHz - 6GHz



Results of ASV Study

✧ Suitable frequency band : 200MHz - 2GHz

- Required communication zone as shown in yellow
 - 410m forward, 410m rearward
 - 200m (line of sight) + 25m (non line of sight)
- Radiation power less than 1W



Notes by JAMA

- ✧ 200-700MHz omitted due to limitations in antenna composition
- ✧ 5.8GHz included as it is already allocated for Road-to-Vehicle communication

2006 : JAMA Proposal on the Suitable Frequency for V-to-V in V/U Bands

Up to 2005 **5.8GHz band already allocated for ITS (Road-Vehicle Communication)**

- Being applied to ETC (ARIB STD-T55)
- Studying V-to-V Communication use of DSRC (ARIB STD-T-75)

5.8GHz




2005.5 **700MHz - 6GHz suitable for V-to-V safety communication**

JAMA proposal to WBB-SG


700MHz 6GHz




2006.4 **710 – 770MHz suitable for V-to-V in VHF/UHF band**

JAMA proposal to VHF/UHF-WG

700MHz 6GHz



90M	108M	170M	222M	710M	770M
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Committee for Effective Radio Wave Use

Study for use of VHF/UHF bands after termination of ground analog TV broadcast
90-108MHz, 170-222MHz, 710-770MHz

Working Group for Effective Use of VHF/UHF Bands

(August 2006)

JAMA Proposal

710 - 770 MHz
for V-to-V safety
communication systems

164 Proposals
(11 Proposals for ITS)

Final Report to the Committee for Effective Radio Wave Use (June 2007)

Proposal for Frequency Allocation of VHF/UHF band

(Source: Documents of VHF/UHF-WG)

Suitable frequency for V-to-V Communication in VHF/UHF band : 710 – 770MHz



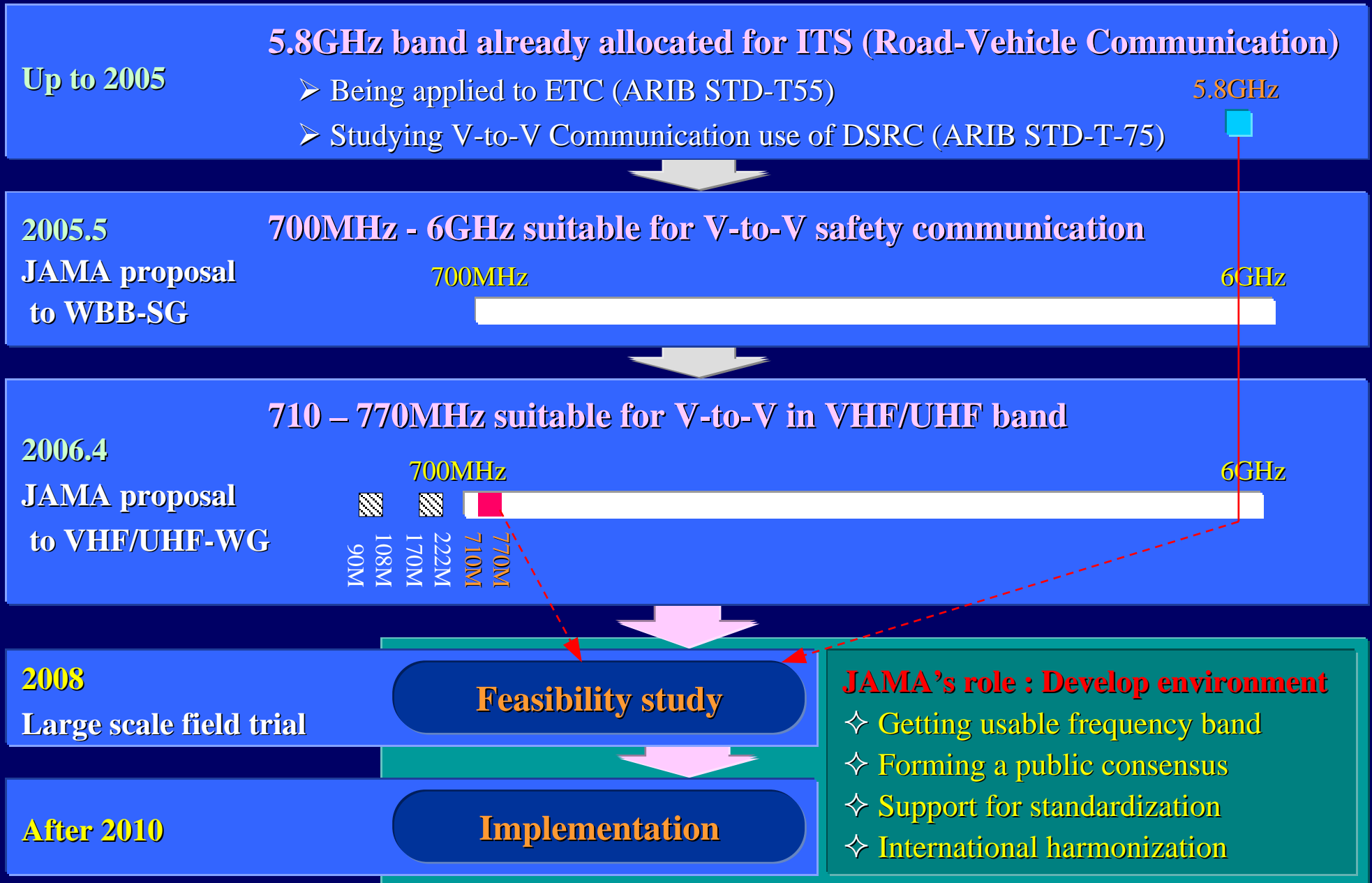
Frequency bands opened for use

- ✧ Use of VHF/UHF bands after termination of ground analog TV broadcast (July 2011)
- ✧ Publicly offered frequency bands : 90-108MHz, 170-222MHz, 710-770MHz

Reasons for JAMA proposal

- ✧ Proposed to the WBB-SG the use of a 700MHz-6GHz band for V-to-V communication
- ✧ Of the three offered bands, 710-770MHz is included in the JAMA proposal to the WBB-SG

JAMA Role in Vehicle to Vehicle Safety Communication System Promotion



Toward to the Implementation of Vehicle to Vehicle Safety Communication Systems

