Connected Vehicle Technology Development in Singapore

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OUTLINE

- Singapore's Smart Mobility 2030
- Connected vehicle platform (ERP2)
- Example V2X Service – Junction Safety
- Standardization of DSRC for Singapore

SINGAPORE'S ITS VISION

Smart Mobility 2030

"Moving towards a more connected and interactive land transport community"

Land Transport Authority
We Keep Your World Moving

ITS Singapore

INNOVATING FOR SMART MOBILITY 2030

Land Transport Authority
We Keep Your World Moving

ITS Singapore

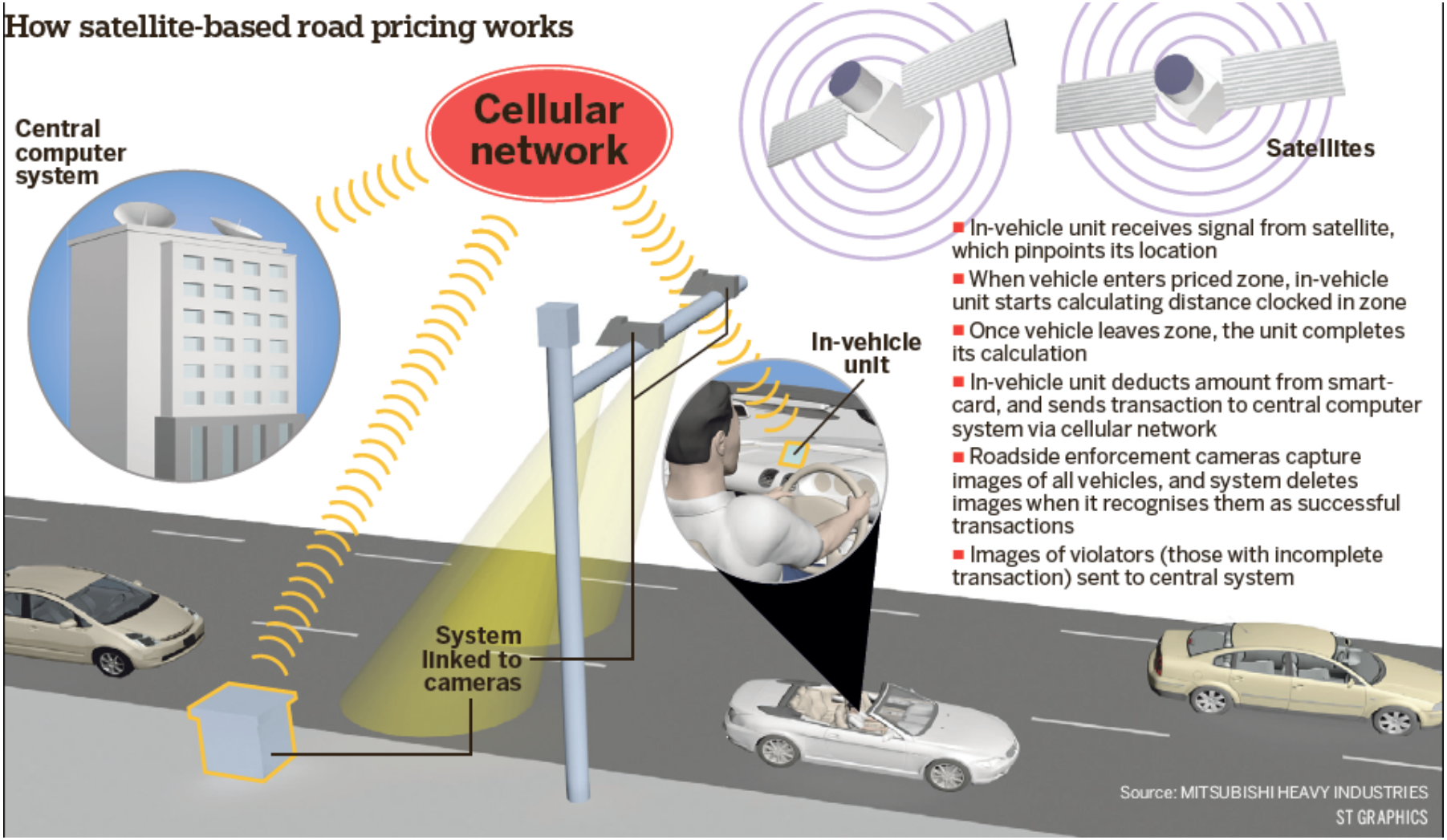
SMART MOBILITY 2030 - 4 FOCAL AREAS

"To outline key focal areas that will lay the foundation for initiatives and programmes to support and steer Singapore towards achieving its ITS vision"

Land Transport Authority
We Keep Your World Moving

ITS Singapore

CONNECTED VEHICLE PLATFORM – ERP2



CARTS & Singapore Autonomous Vehicle Initiative (SAVI)

Committee on Autonomous Road Transport (CARTS)
Chaired by PS/MOT
Comprising public & private sector members
Staffed by MOT Futures

WG1 on Visioning AV Deployment in SG
Chaired by DS(L&C)/MOT and DS/MND

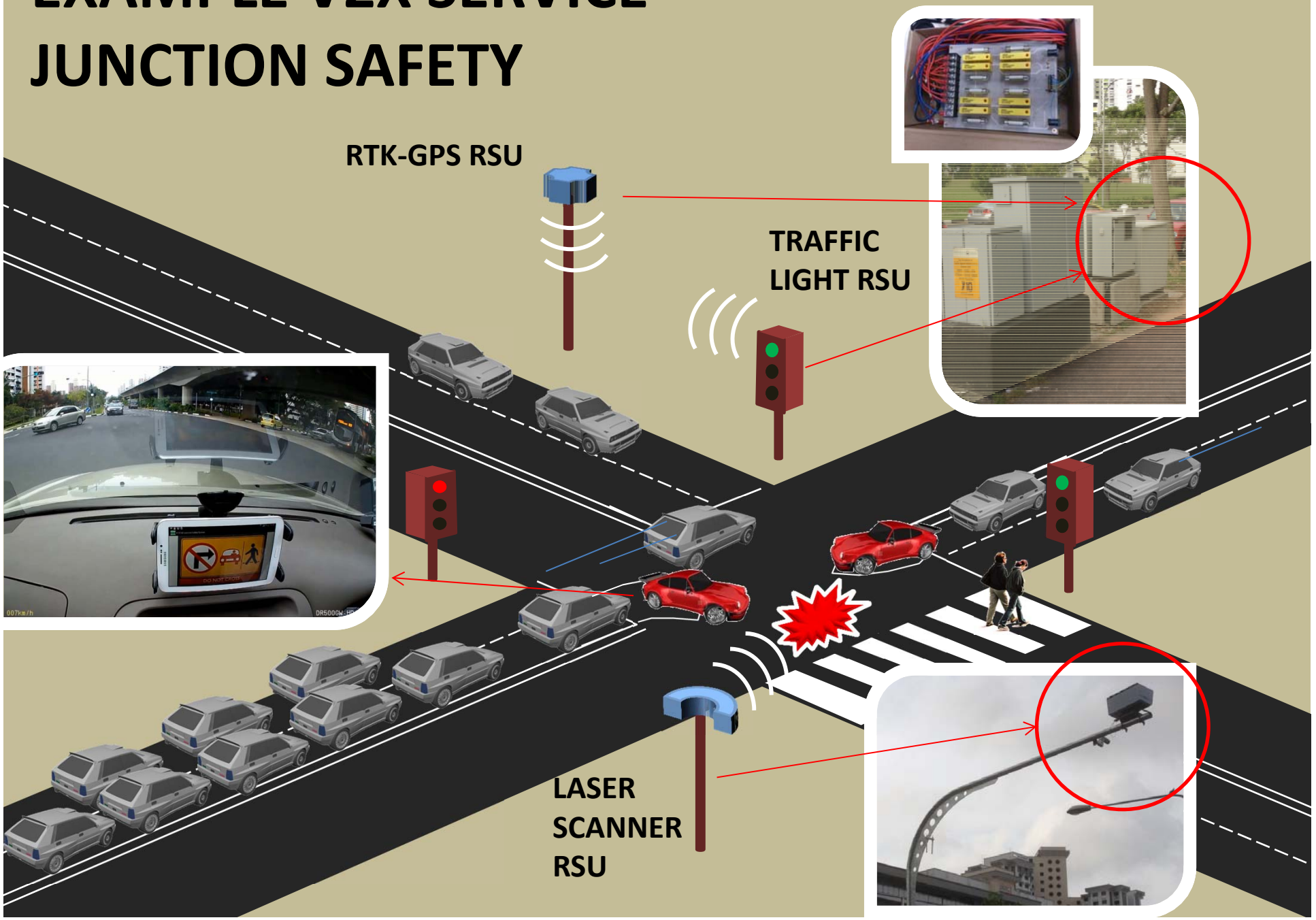
WG2 on Regulations & Implementation
Chaired by CE/LTA

Regulations Sub-group

Technology Sub-group (SAVI)

Source: MOT & LTA

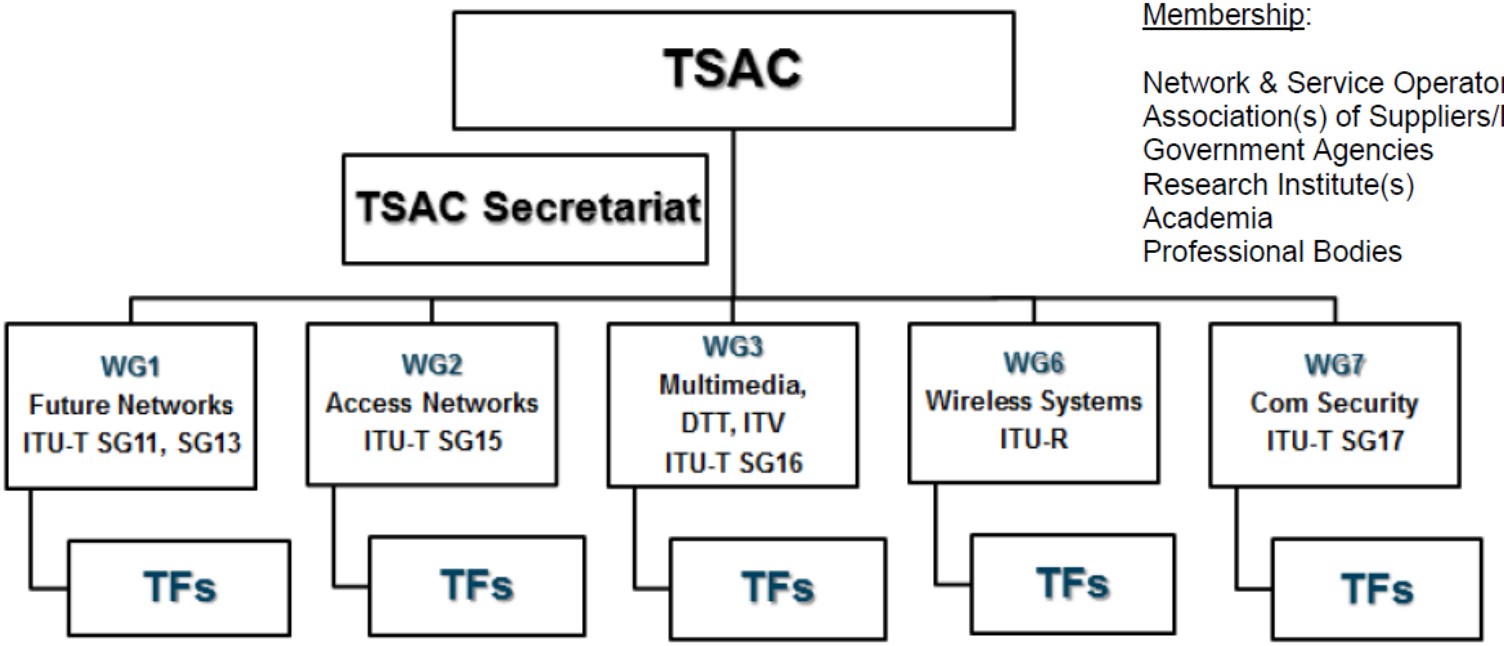
EXAMPLE V2X SERVICE – JUNCTION SAFETY



DEMO OF JUNCTION SAFETY SYSTEM

DSRC STANDARDISATION WORKS IN SINGAPORE

TSAC Organisational Structure



Membership:

Network & Service Operators
Association(s) of Suppliers/Manufacturers
Government Agencies
Research Institute(s)
Academia
Professional Bodies

Note:

TSAC	Telecommunications Standards Advisory Committee - ***Advisory on standards setting for telecommunications layer***
WG	TSAC Working Group
TFs	Task Force(s)

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Roles of TSAC Members

The TSAC is chaired by IDA

- Moderator for telecommunications standards setting
- Ensure alignment with IDA's objectives

The TSAC members contributes to standardisation efforts

- Provide advice and strategic direction for coordinated planning in standards development
- Act from a neutral and central position to ensure that views are reasonably balanced, given due consideration, and that decisions are taken through a consensus building approach
- Foster internationalisation of standard effort and formation of liaisons at the TSAC WG level

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Work Carried Out in DSRC (ITS) Standard(s) in TSAC

To set the Dedicated Short Range Communications ("DSRC") standards (around the 5.9 GHz) for ITS in Singapore

- DSRC standards being developed and adopted in various parts of the world (US, Europe, Japan, etc.)
- Different standards adopted
- Large scale trials in US and Europe in the 5.9 GHz band
- Started since July 2014

TF members (close to 40 members)

- Government Agencies such as **LTA, IDA, SPF**
- Research Institutions such as **I²R A-STAR, NTU, Keio-NUS, Nanyang Polytechnic**
- Suppliers/Manufacturers such as **Continental Automotive Singapore, Toyota Tsusho Asia Pacific, Delphi DENSO International, IBM, Kapsch TrafficCom, Mitsubishi Heavy Industries, Rohde & Schwarz, NXP Semiconductors**
- System Integrators such as **ST Electronics (Info-Comm Systems), Watchdata Technologies, NCS**

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SCOPE & PURPOSE OF DSRC (ITS) TASK FORCE

- Purpose
  - Set the DSRC standards (around the 5.9 GHz) for ITS in Singapore

- Scope
  - To recommend
    - Channel power settings (spectrum mask, power limits, etc.) for the allocated ITS bands
    - Channel usage (by application class, by entities, etc.)
    - Baseline DSRC standards to adopt (from Service to PHY)
    - Possible changes to components/protocol stack of the baseline standards to suit Singapore's needs
    - Best practices for transceiver configuration (single radio, dual radio, etc.)
    - Conformance test for adoption

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USE CASES

- Localisation
- Electronic Parking Management
- Traffic Signal Control Management
- Traffic Information
- Safety Applications
- Emergency Applications
- Kiosk Related Services
- Other Applications and Services

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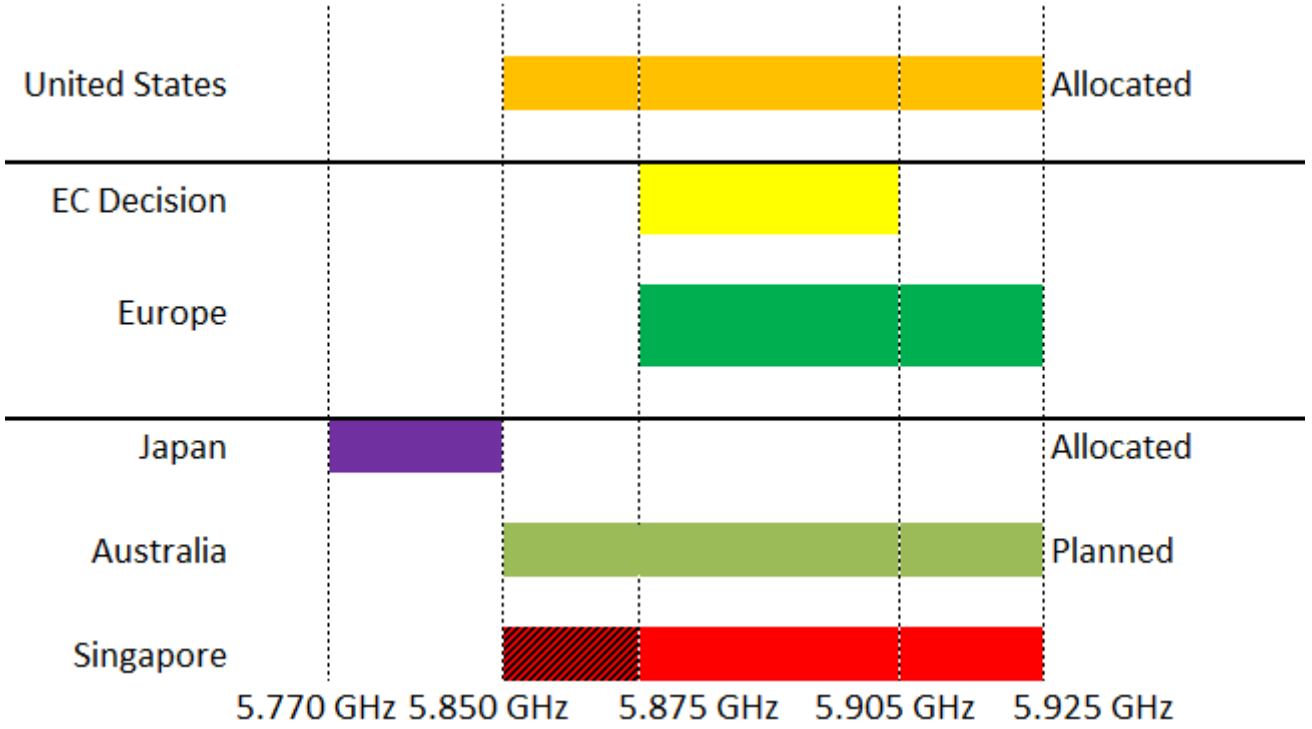
DSRC Standard(s) Considerations (1/5)

- Frequency band(s) for DSRC
- Sharing with 5 GHz ISM band(s)



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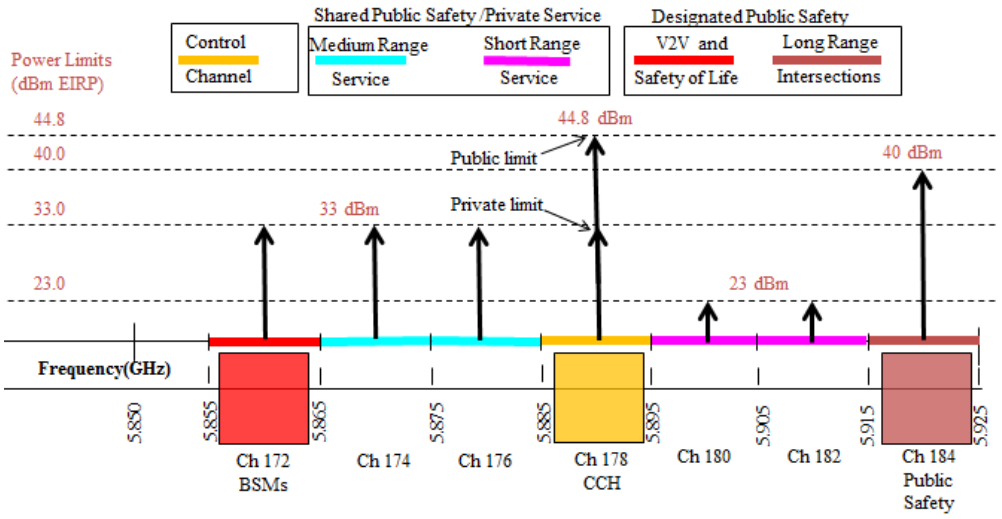
DSRC Standard(s) Considerations (2/5)

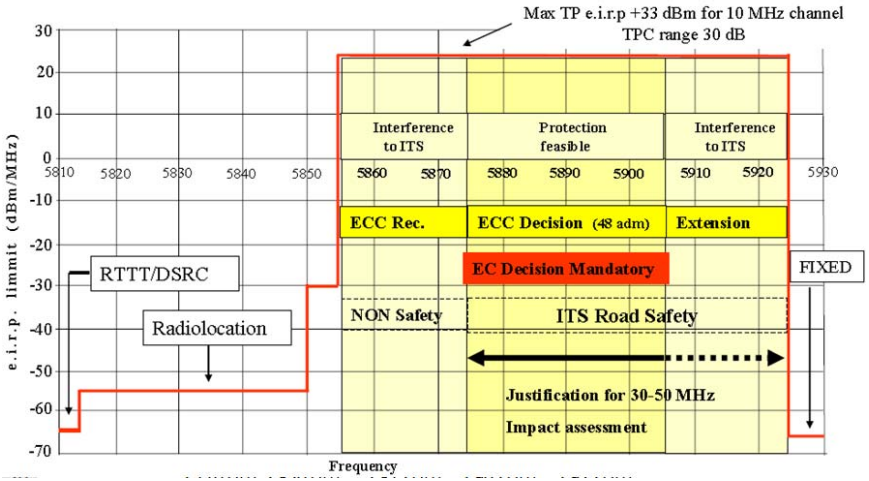
- Emission mask, power limit(s)

United States



Source: Jim Lansford (CSR Technology), John Kenney (Toyota ITC)

Europe



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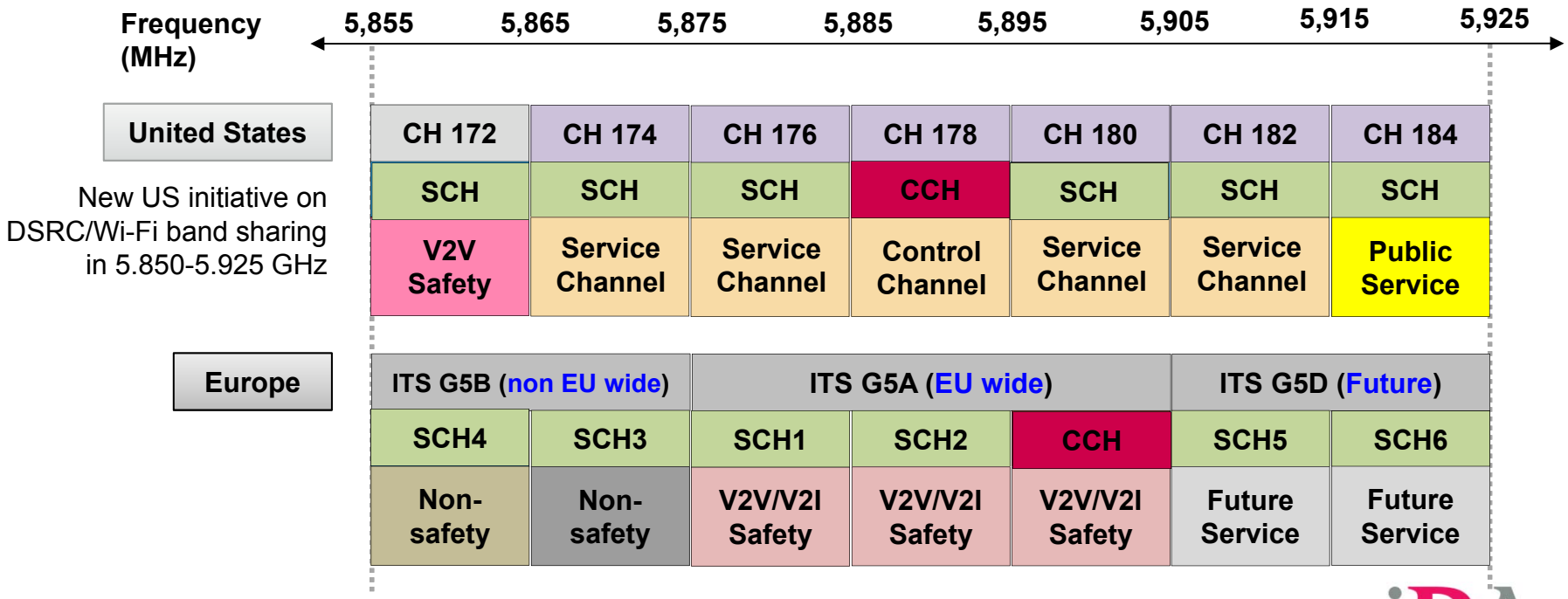
DSRC Standard(s) Considerations (3/5)

Channel Usage:

- Base line 1 radio or 2 radio concept
- Contention mitigation technique(s) in control channel
- Number of control channels
- Identification of control channel/ vehicle-to-vehicle channel



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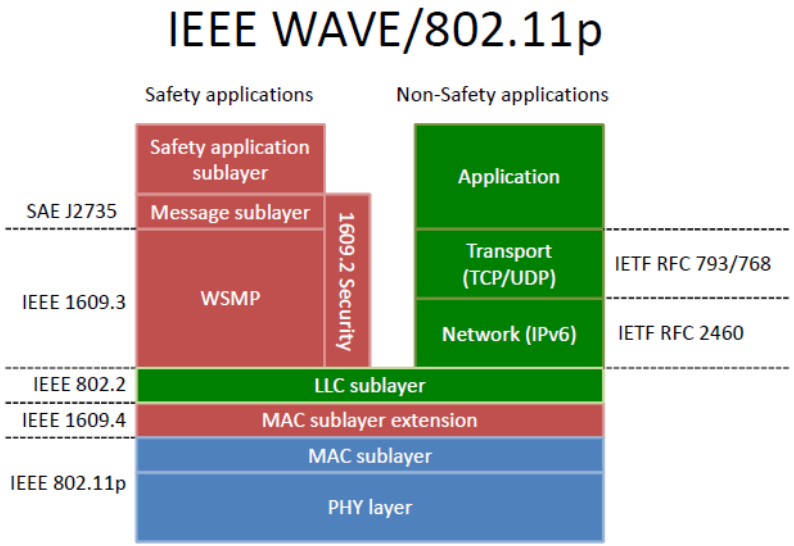
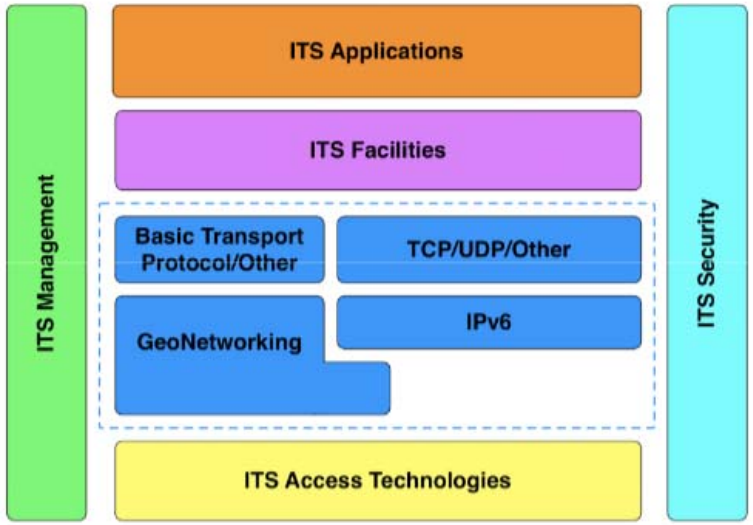
DSRC Standard(s) Considerations (4/5)

The ITS DSRC standards has not been harmonised globally

- Harmonisation efforts among various regions and ITU are still on-going
  - Option 1: US
  - Option 2: Europe
  - Option 3: Both



United States



Europe

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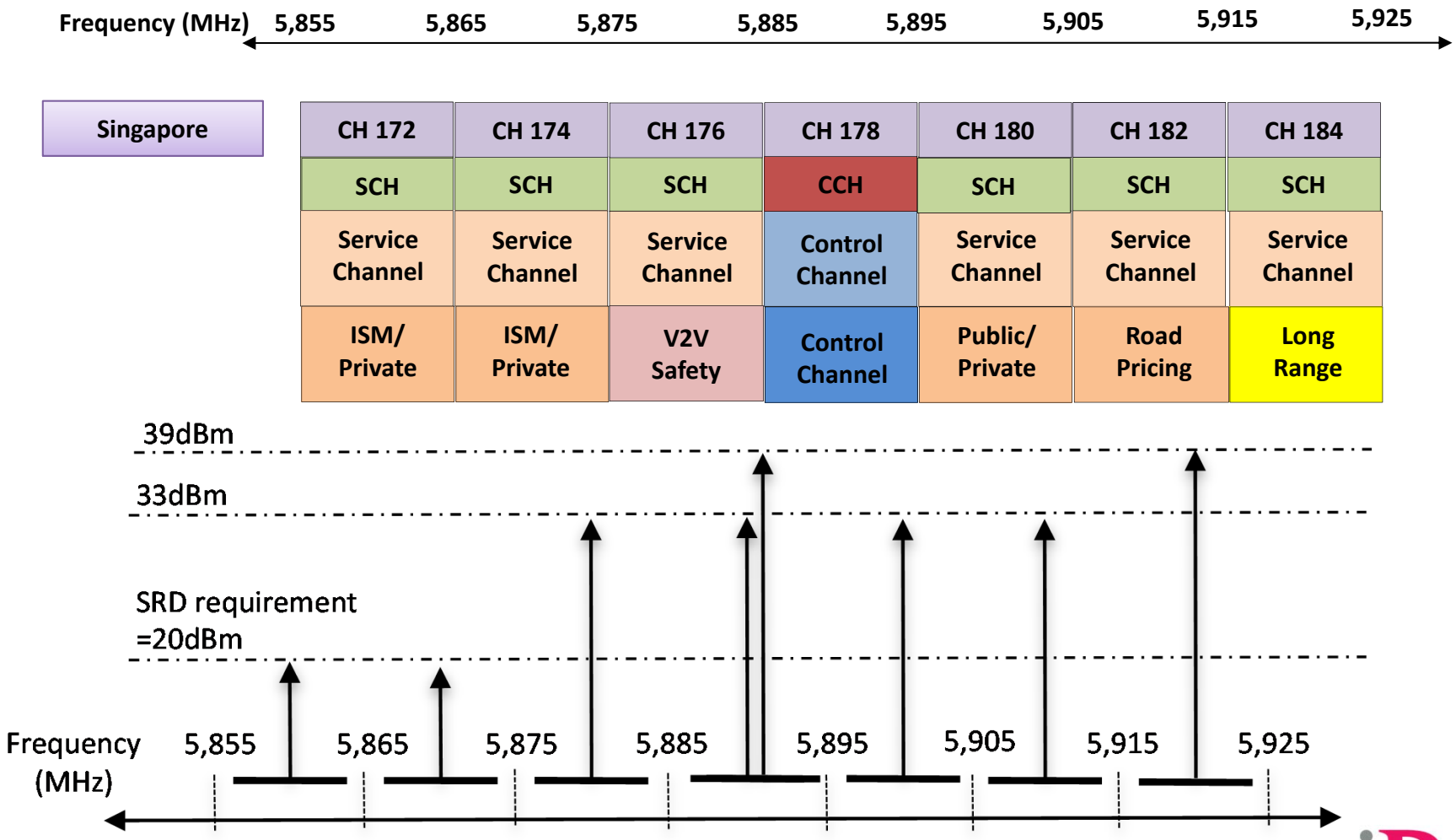
DSRC Standard(s) Considerations (5/5)

- Spectrum allocation and power limit



DSRC Spectrum Power Limit

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Summary

Singapore will be one of the earlier adopters of V2X technology in the world

ITS DSRC standards in the 5.9GHz band is the enabler for future ITS deployments in Singapore

- Next Gen ERP system, Traffic Management, Autonomous Vehicle, etc.

IDA will continue to support the local industry for ITS implementation in Singapore

IDA intends to contribute to ITU-T's standardisation work for ITS

- Traffic management
- Road safety

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THANK YOU