

Singapore Autonomous Vehicle Initiative (SAVI)



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Singapore Road Transport

5km/square km

Road Density

3,500km

Road Network



1 car/10 persons

Car Ownership



960,000

Total Vehicles Population

575,000 private cars



Source: LTA Publications & Research

Our Key Challenges



Increasing Travel Demand

Population increase, intensive development and change in lifestyle

Land Constraints

12% of total land used for road and land transport infrastructure



Shortage of Labour

Truck, lorry and bus drivers

Ageing Population

30% aged 65 and above by 2030



Our Key Strategies towards a Sustainable Transport Eco-System



Reduce Reliance on Private Transport

Promoting car sharing and mobility on demand



Increase Public Transport Usage

Promoting and Making public transport accessible and reliable



Encourage Cycling and Walking

For first-mile and last-mile travel



Sustainable Transport Eco-System

Value Propositions of Autonomous Vehicles



Increase productivity

Autonomous buses to tackle problem of labour shortage

Increase road safety

AVs enable ageing population to maintain freedom of mobility while ensuring safe driving



Optimise road capacity

AVs enable ageing population to maintain freedom of mobility while ensuring safe driving

Enabling new mobility concept in new towns

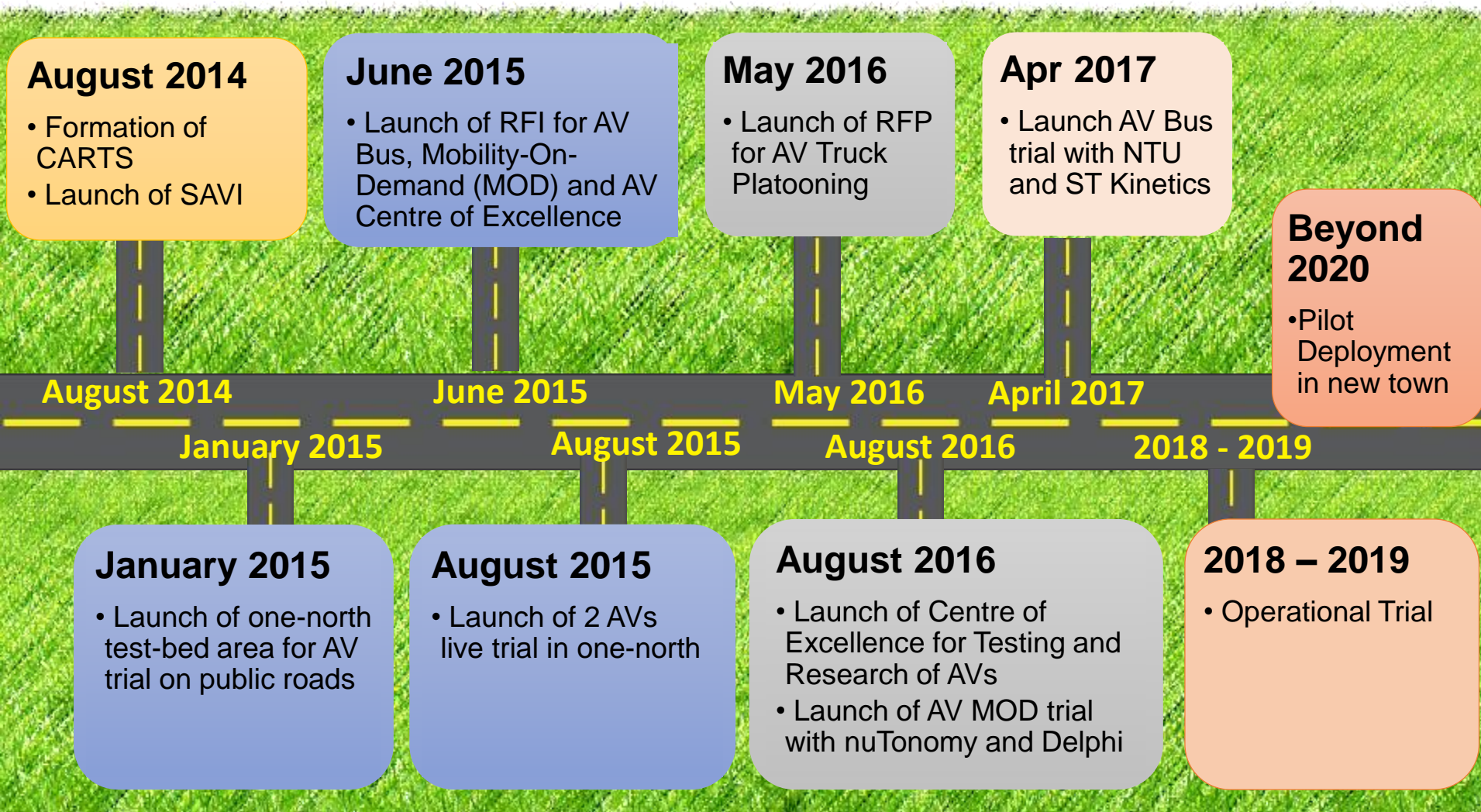
AV Mobility-On-Demand and AV vehicle-sharing schemes to complement walking and cycling in new towns



Increase R&D Value-Add

Singapore is a Living Laboratory and is ideal for conducting test-bed for AV development and deployment

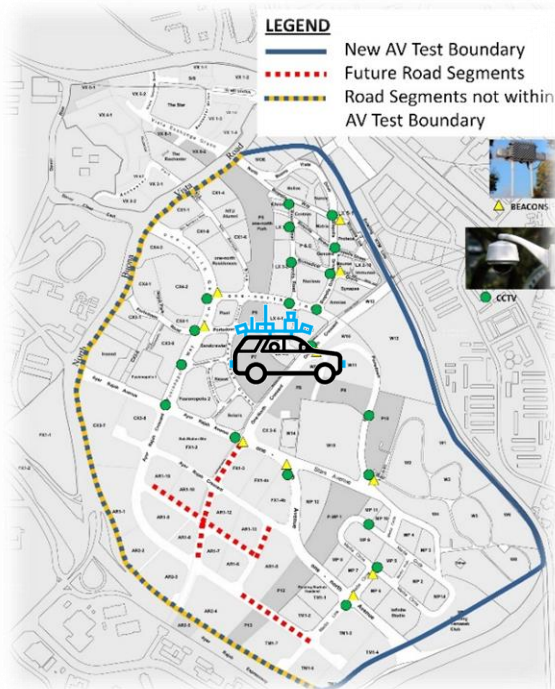
Roadmap and Progress of AV program in Singapore



AV and V2X Test-Bed @ one-north

one-north public route for AV testing

- 4 AVs granted approval



AV Performance Evaluation System

- Real-time AV Monitoring
- Scenario re-creation and Evaluation
- Information collection and dissemination



Dedicated Short Range Communications (DSRC) beacons

- Position augmentation
- V2I information dissemination



IEEE 1609 WAVE

SAE
INTERNATIONAL®
SAE J2735

Surveillance Cameras



- CCTV placed at strategic and critical locations
- Real time streaming of video feeds
- Video recording
- Enable remote monitoring

Autonomous Truck Platooning Trial



How truck platooning works

The driver in the first container truck leads the three driverless trucks, to which it is linked via wireless communications.



The vehicles can be coupled and decoupled to allow other road users to cross between the vehicles in the convoy.



Vehicle detection, anti-collision and lateral control technologies are incorporated for safety reasons.



During the second phase of the trial, expected to take place between January 2018 and December 2019, the trucks will be tested along a 10km stretch of West Coast Highway between the Brani and Pasir Panjang Terminals.

Sources: MOT and PSA
STRAITS TIMES GRAPHICS



Autonomous Bus Trial

R&D and trial on Autonomous bus for fixed and scheduled services for intra- and inter-town travel.



Energy Research Institute @ NTU



*MOU signing between LTA and ERI@N on
19 Oct 2016*



*MOU signing between LTA and ST Kinetics on
10 April 2017*

Launch of Centre of Excellence for Testing & Research of AVs-NTU (CETRAN)

Launched on 1 August 2016

Vision:

To be a leading AV Knowledge and Research Centre

Mission:

- To establish national AV testing and certification standards through R&D efforts and to contribute to international developments
- To build AV R&D testing capabilities in Singapore



CETRAN launched event

CETRAN Partners:



Launch of Centre of Excellence for Testing & Research of AVs-NTU (CETRAN)

An enclosed test circuit located at CleanTech Park is currently being developed to support all the dedicated AV testing and certification activities as well as other ITS testing.



Targeted to complete
by end 2017

Artist impression



Other On-going AV Initiatives in Singapore



NAVYA trial at Nanyang Technological University (NTU)



Auto-Rider at Gardens by the Bay

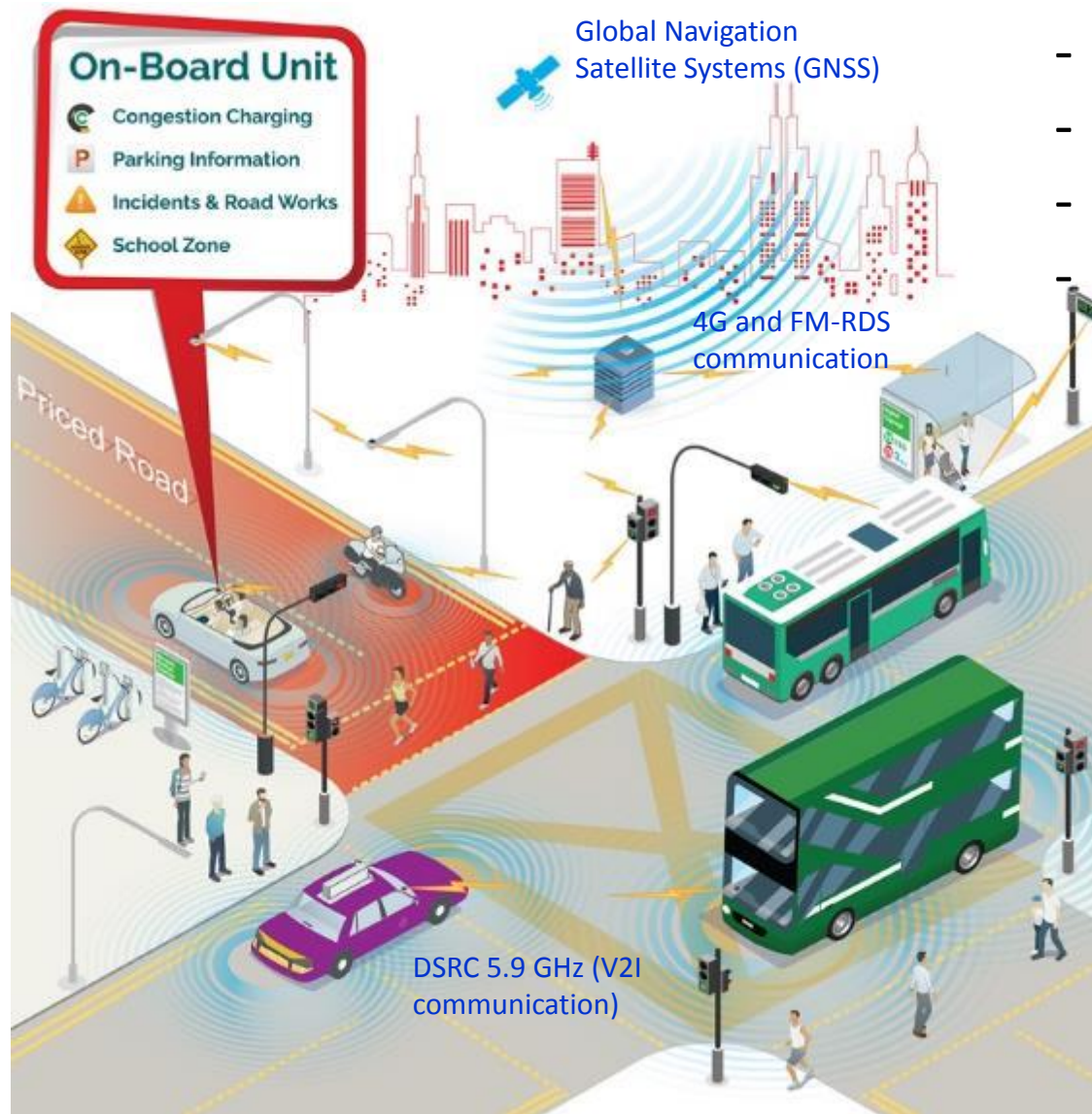


Upcoming AV Mobility-on-Demand trial on Sentosa island

V2X Initiatives in Singapore



Next-Gen Electronic Road Pricing System



- More equitable
- Greater Flexibility
- More Driving Conveniences
- Value-added Services



V2I Cooperative ITS Applications

Enhancing Junction Safety Through V2X

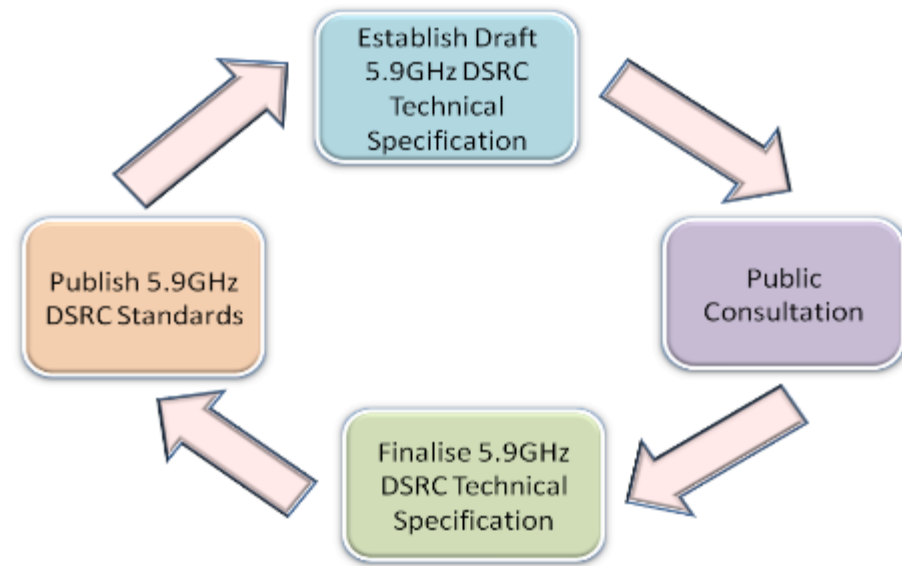


Vehicle Priority at Traffic Junctions



Our 5.9GHz DSRC Standardisation Efforts

- A **taskforce** comprising government agencies, Industry players and Academic Institutions was formed in **2014** to establish and adopt the 5.9GHz DSRC standards for ITS in Singapore.
- **Technical Standard** for Dedicated Short-Range Communications (DSRC) in Intelligent Transport Systems (ITS) was released on **1 Oct 2016**
- <http://www.imda.gov.sg>



Looking Ahead

- AVs provide opportunities to support a sustainable transportation eco-system within Singapore
- The convergence of Autonomous Vehicles (AVs) and Connected Vehicles (CVs) is likely to influence and change the way V2X technologies are deployed.
- Appropriate standards is key to catalyze and support the implementation of V2X technologies in future ITS applications





21 - 25 October 2019

Thank You!!

See you at 26th ITS World Congress 2019