Initiatives for a Automated Driving Society in MIC

ITS Promotion Office, Telecommunications Bureau
Ministry of Internal Affairs and Communications (MIC)
JAPAN

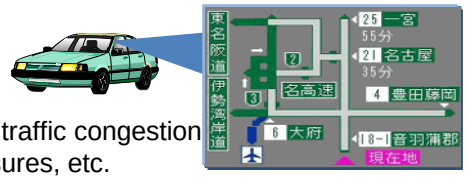
Increasingly Advanced ITS

Systems that are being used across the country

Services such as congestion information and fare settlement are provided.

Optical beacon | Radio beacon | FM multiplex broadcasting





Displays traffic congestion, road closures, etc.

VICS

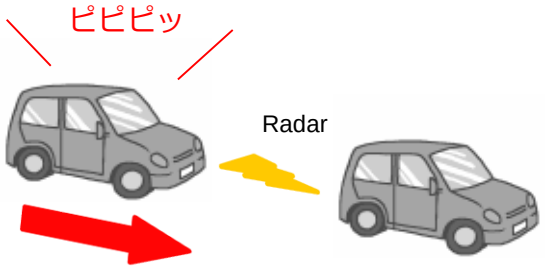
ETC

ETC2.0

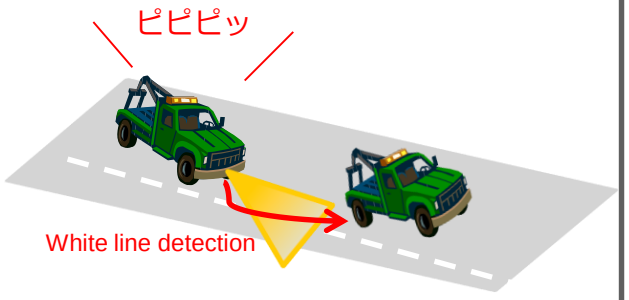
The system has been promoted by automakers in recent years

Autonomous ITS

The system uses on-board sensors such as cameras and radar to provide advanced driving assistance.



Collision Damage Reduction Brakes



Lane Departure Prevention System

For realizing the safest road transport system in the world

Autonomous + Cooperative

The system realizes advanced driving assistance and automatic driving through a combination of vehicle-to-vehicle communication, high-resolution radar, etc.

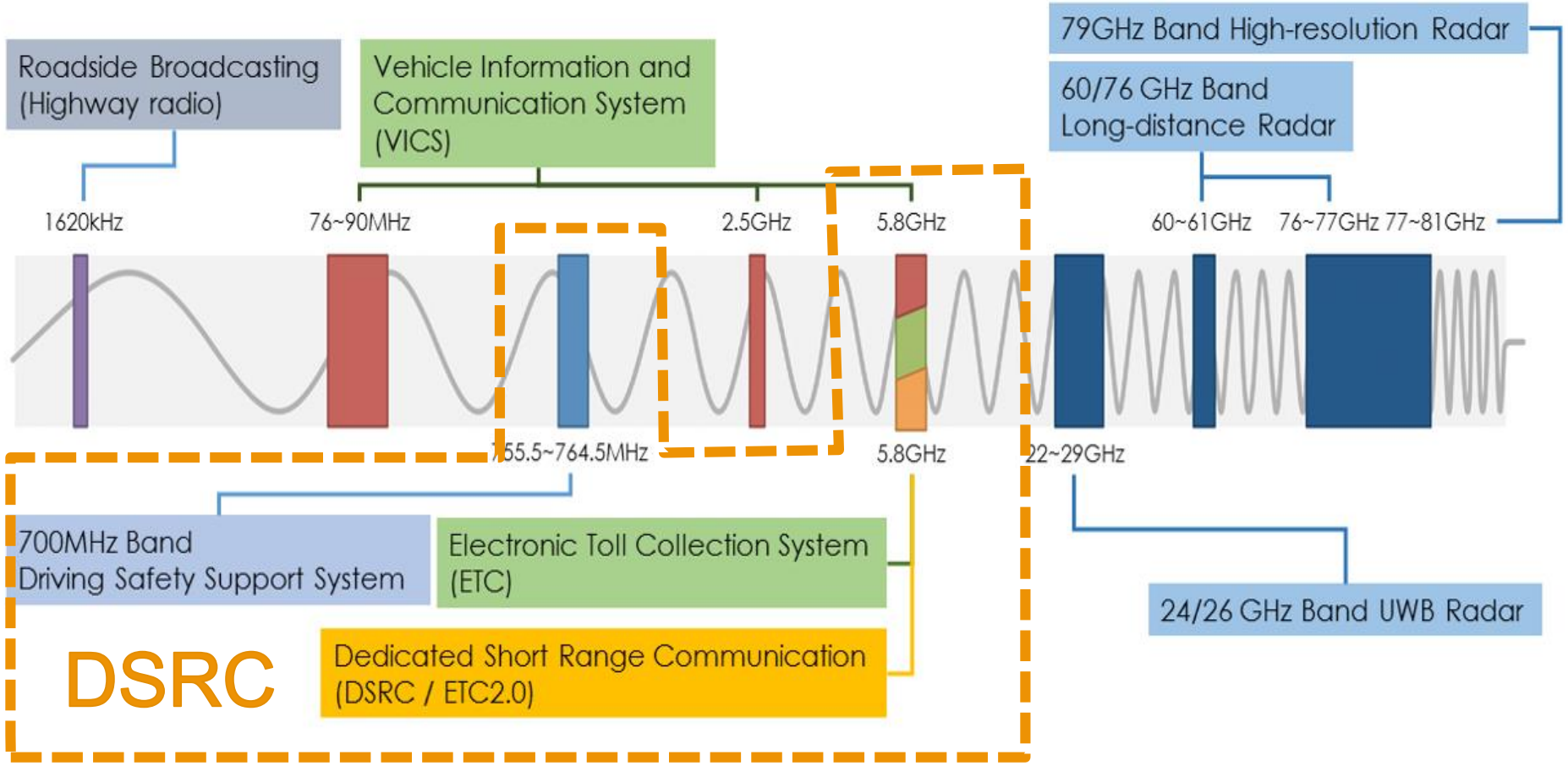
Connected Car

Automated Driving Systems

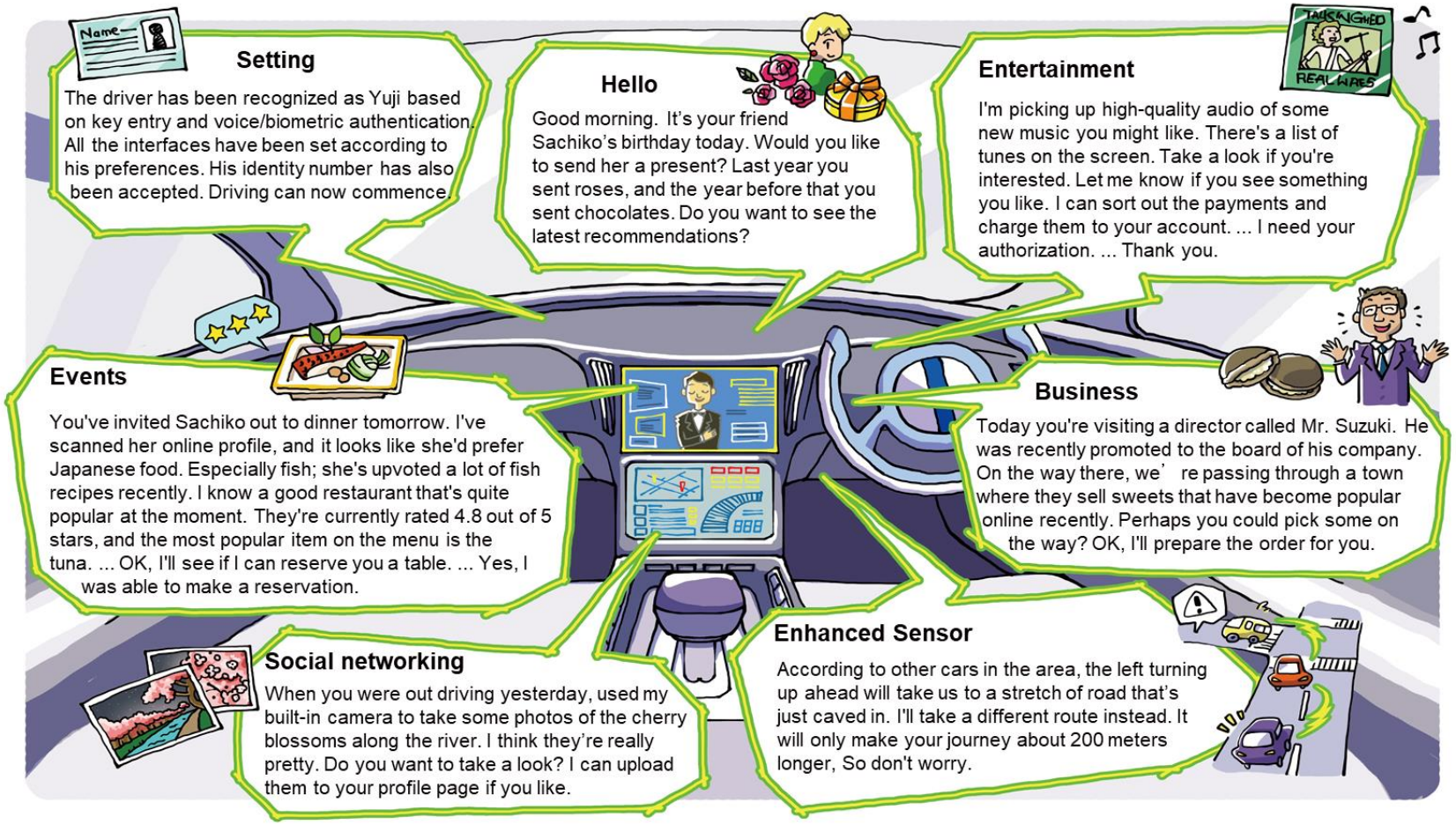
ITS in Japan and their Frequency Allocation

ETC is the Electronic Toll Collection System using **DSRC** in **5.8 GHz** band.

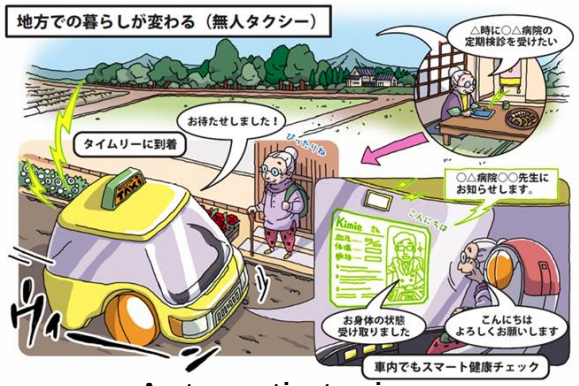
ITS Connect is the Driving Safety Support System using **DSRC** in **760 MHz** band.



Concept image : Connected Car



Driver Agents providing a comfortable experience



Automatic taxis

Shared vision of the vehicle in front

仏Valeo社のXtraVue (CEATEC 2018)

Promotion structure for ITS

The promotion of ITS is positioned as an important issue in each government's strategy.

The ministries and agencies are working together to promote ITS.

Information Technology Strategy Planning Office, Cabinet Secretariat

Planning and development of basic policies and general coordination

- Formulation of the public-private ITS concept and roadmap
- Formulation of Framework for Development of System Related to Automatic Driving

Science, Technology and Innovation, Cabinet Office

Research and development in the cooperative area

- Promotion of SIP (Strategic Innovation Promotion Program)

Local Initiatives Promotion Bureau, Cabinet Office

- The Special Zone Advisory Council

Japan Economic Revitalization Bureau, Cabinet Secretariat

- Future Investment Strategy 2018
- Public-Private Sector Council on Automatic Driving

National Police Agency

Ensuring traffic safety

Ministry of Justice

Criminal liability in an accident

Ministry of Internal Affairs and Communications

Improvement of the information and communication

Ministry of Economy, Trade and Industry

Promotion of the vehicle industry

Financial Services Agency

Supervision of insurance business, etc.

Ministry of Land, Infrastructure and Transport

Road management

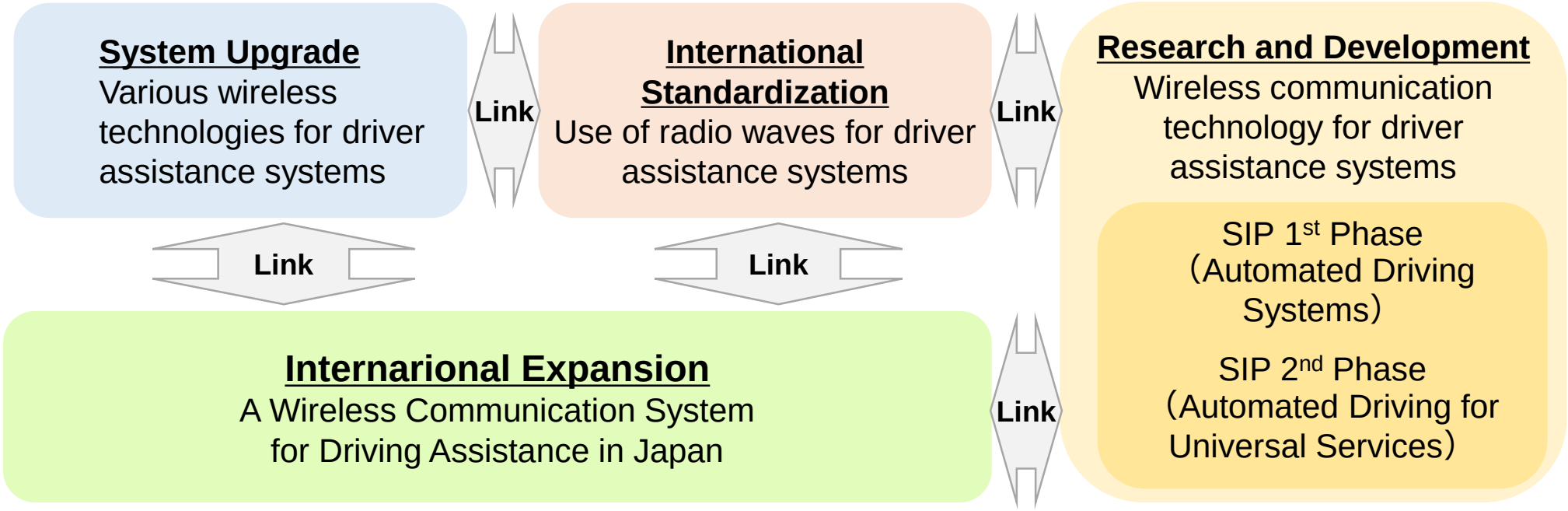
Ensuring vehicle safety

Compensation for damages in vehicle accidents

Outline of measures for driving support systems in MIC

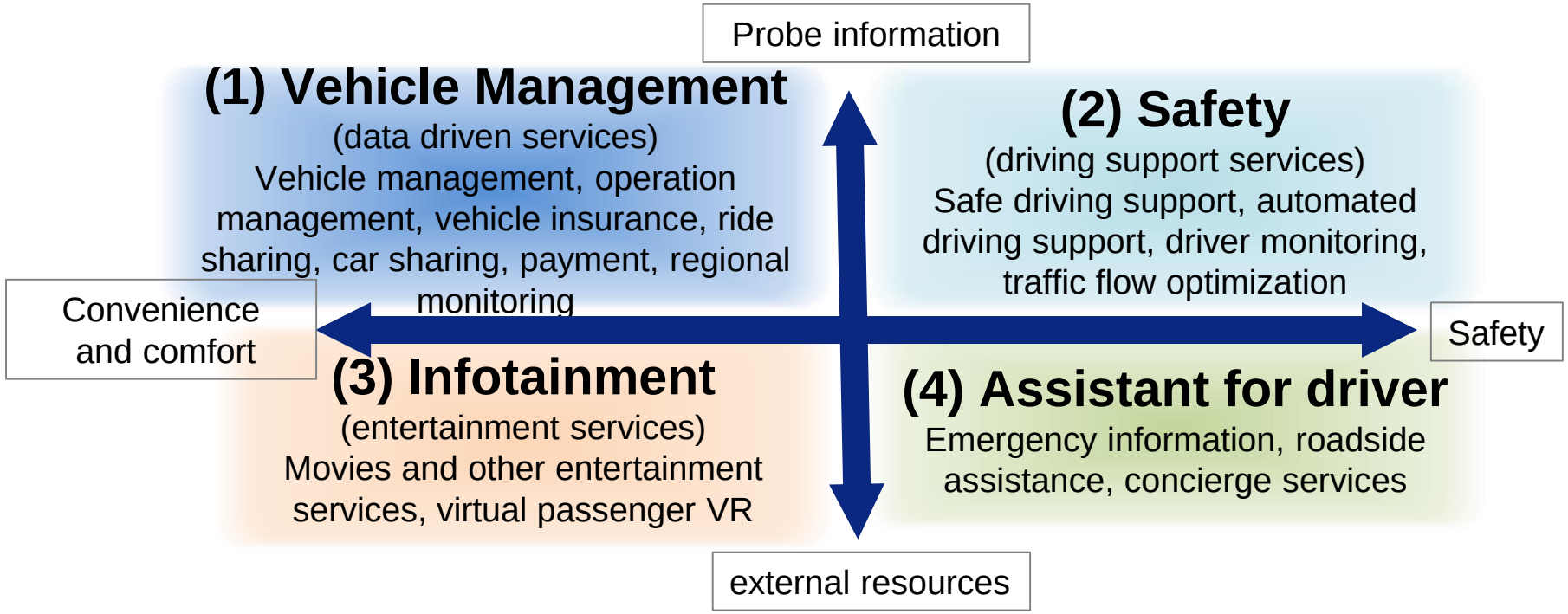
In coordination with the relevant ministries and agencies, the Ministry of Internal Affairs and Communications is promoting the following initiatives.

- System upgrade : Various wireless technologies for driver assistance systems
- International Standardization : Use of radio waves for driver assistance systems
- Research and Development : Wireless communication technology for driver assistance systems
- International expansion of the above wireless systems



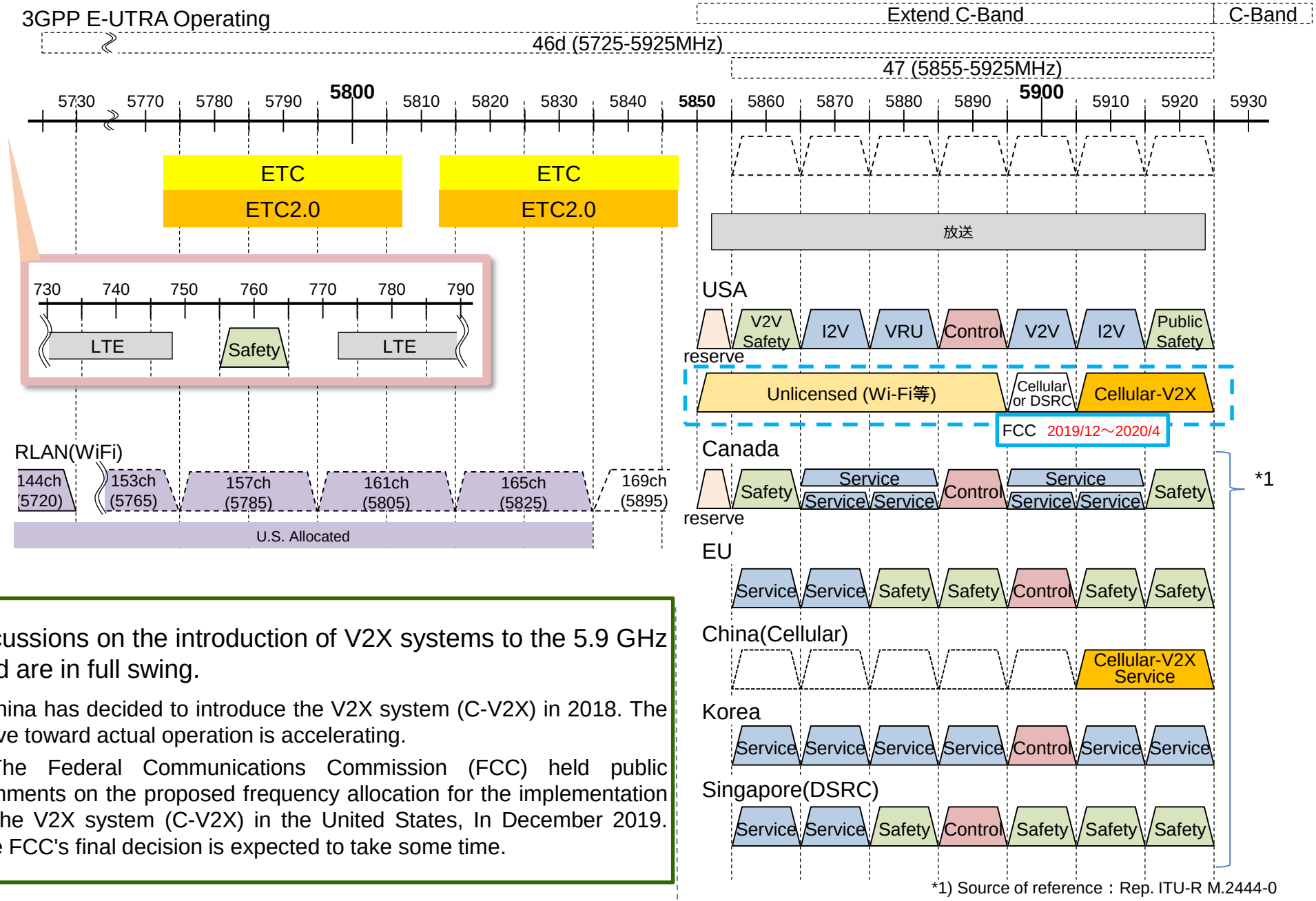
High speed/ hot-spot communication (e.g. DSRC, Millimeter-wave)

Highly reliable/ direct communication (e.g. DSRC)



Wide area communication (LTE, 5G, etc.)

The international frequency status in ITS



■ Discussions on the introduction of V2X systems to the 5.9 GHz band are in full swing.

- China has decided to introduce the V2X system (C-V2X) in 2018. The move toward actual operation is accelerating.
- The Federal Communications Commission (FCC) held public comments on the proposed frequency allocation for the implementation of the V2X system (C-V2X) in the United States, In December 2019. The FCC's final decision is expected to take some time.

*1) Source of reference：Rep. ITU-R M.2444-0

○Chapter 3 Priority Initiatives Ⅲ Initiatives for a Self-Driving Society

Based on the progress and importance of automatic driving systems (including safe driving support), a study is being carried out, **which will finish by the end of FY 2021, into the technical conditions for frequency sharing with needed existing wireless systems, for example when introducing V2X communications, and with consideration for existing wireless systems on frequency bands being studied internationally (5.9 GHz band)**, in addition to the existing ITS frequency bands (760 MHz band, etc.).

In addition, based on the results of these studies, **a conclusion will be reached within FY 2022 regarding frequency allocation policy, such as frequency sharing and migration/reorganization when introducing V2X communications in the same frequency band, etc.**

○Chapter 4 Reorganization Policy for Each Frequency Range Ⅶ 5.85～23.6GHz Band

⑤ Commercial Broadcasting Radio Stations and Fixed-Satellite Services［5.9GHz 帯］

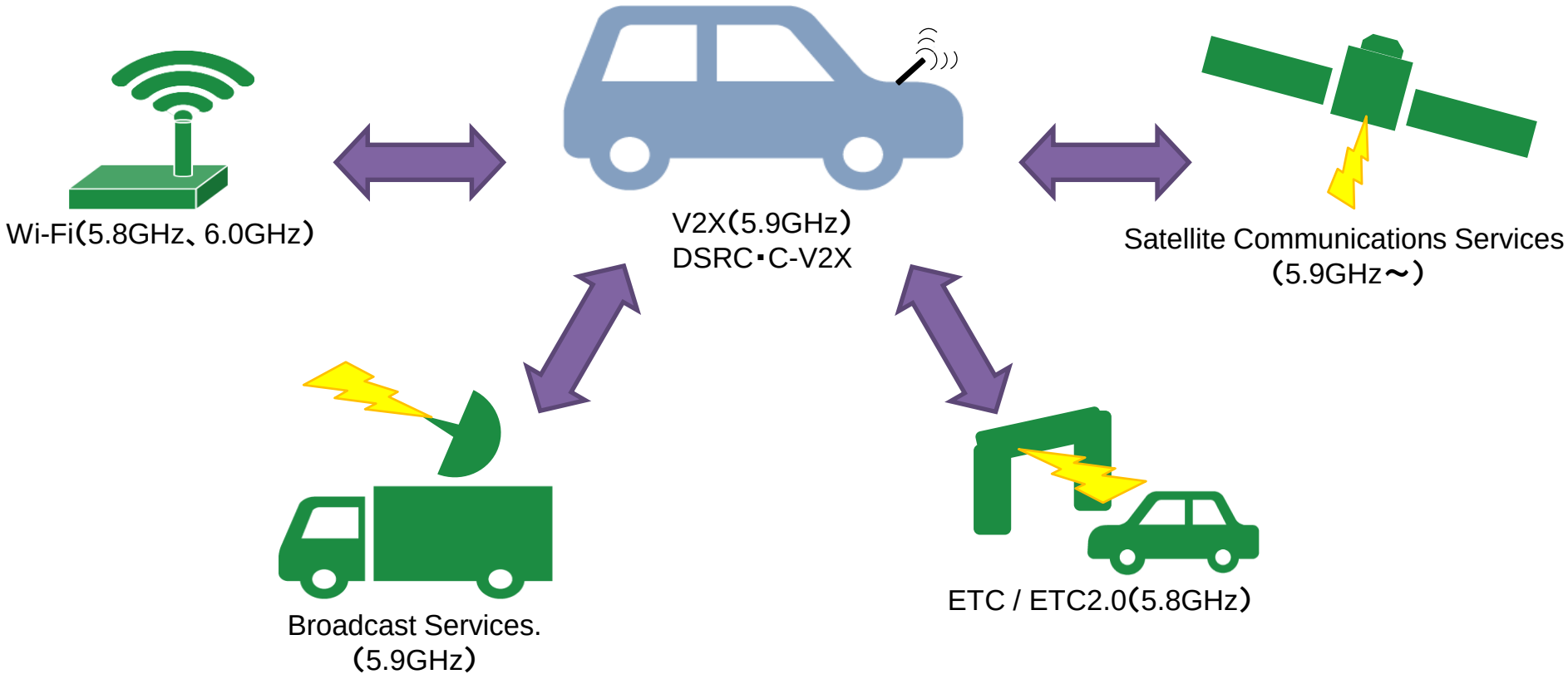
Based on the progress and importance of automatic driving systems (including safe driving support), a study is being carried out, which **will finish by the end of FY 2021, into the technical conditions for frequency sharing with needed existing wireless systems, for example when introducing V2X communications,** and with consideration for existing wireless systems on frequency bands being studied internationally (5.9 GHz band), in addition to the existing ITS frequency bands (760 MHz band, etc.,).

In addition, based on the results of these studies, **in cases where V2X communications are to be introduced on the same frequency band, there is a goal to allocate frequencies to V2X in FY 2023 after the necessary frequency bandwidth has been secured by migrating existing wireless systems, etc.**

Technical study of 5.9 GHz band for V2X communication system（FY2020-2021）

In order to cope with the rapid increase in traffic in the future, we have been conducting technical study for the introduction of the V2X system in the 5.9 GHz band since FY2020.

A technical study is conducted on the possibility of sharing with existing radio systems.



Technical study of communication requirements for automatic driving (SIP：FY2019 - 2021)

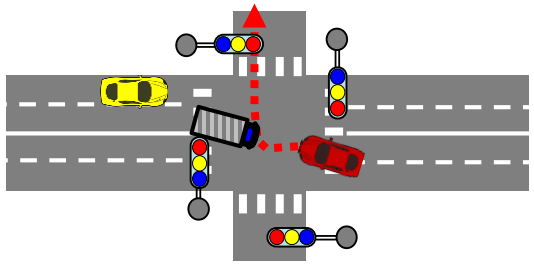
○ The use cases for V2X communication were studied in FY2019, and 25 use cases have been developed.

○ In 25 use cases, we will study the technical requirements for DSRC in the 760 MHz band and V2X communication in the 5.9 GHz band. Then, we will formulated a draft roadmap for the information and communication technologies necessary to realize a highly automated society.(FY2020-)

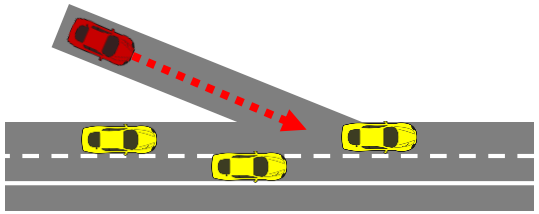
■ We will study the technical requirements for communication for use cases that utilize communication for automated driving.
■ Using desktop studies and simulations, we will evaluate whether the existing 760 MHz ITS can be adapted to 25 use cases.
■ We will formulate a draft roadmap to determine the timing of wireless communication technology based on the time of implementation of automated driving cars and other factors.

Example of Use Case

Turning right



Joining the main road on the highway



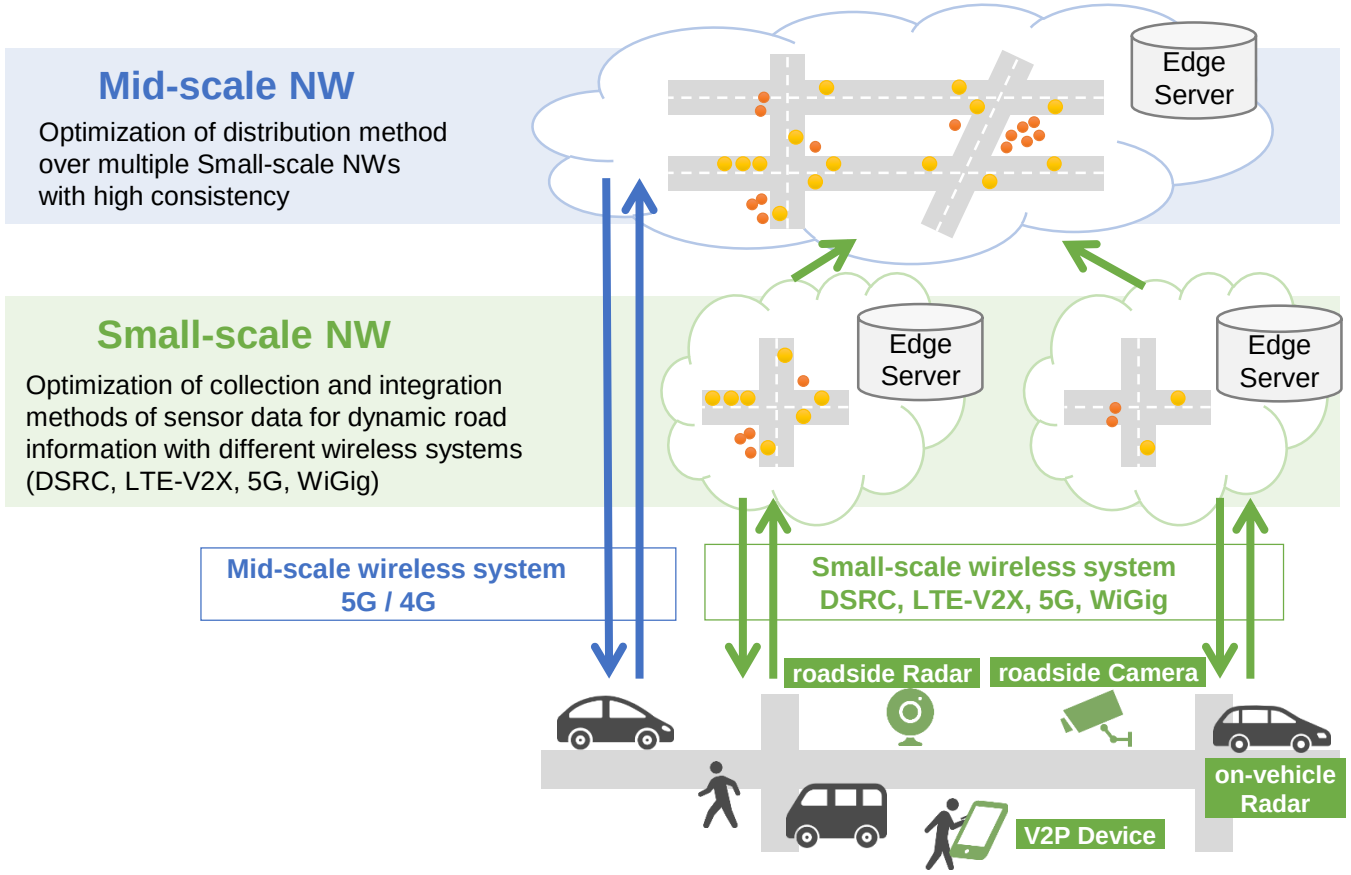
Example of a roadmap

			20XX 展開期	20XX 成熟期		
合流支援			予備加減速支援 / 本線隙間狙い支援 / ロードマップ例 / 本線車協調支援 / 車どうし調停			
技術要件	車車/路車		路車	路車		
	情報項目/情報量		合流地点到達予測時刻	合流地点到達予測時刻		
			本線平均車速	本線現在車速		
通信要件	遅延		XXms	XXms		
	データ量		XXbps	XXbps		
	連送		X回/100ms	X回/100ms		
	パケット到達率		XX%	XX%		
	到達距離		XXm	XXm		
通信方式	狭域通信	ARIBT75				
		ARIBT109				
	広域通信	LTE				
		5G				
	周波数		XXX	XXX		
	帯域		YY	YY		

In addition to the technical study of 5.9 GHz band for V2X communication system, we will technically evaluate the possibility of introducing V2X communication to the 5.9 GHz band.

Smale-scall NW and Mid-scale NW information processing（SIP:FY2019-2020）

- Develop and organize dynamic traffic information.
- Optimize the information process with multi-scaled network through the combination of V2I/V2P/V2N technology and roadside sensing technologies.



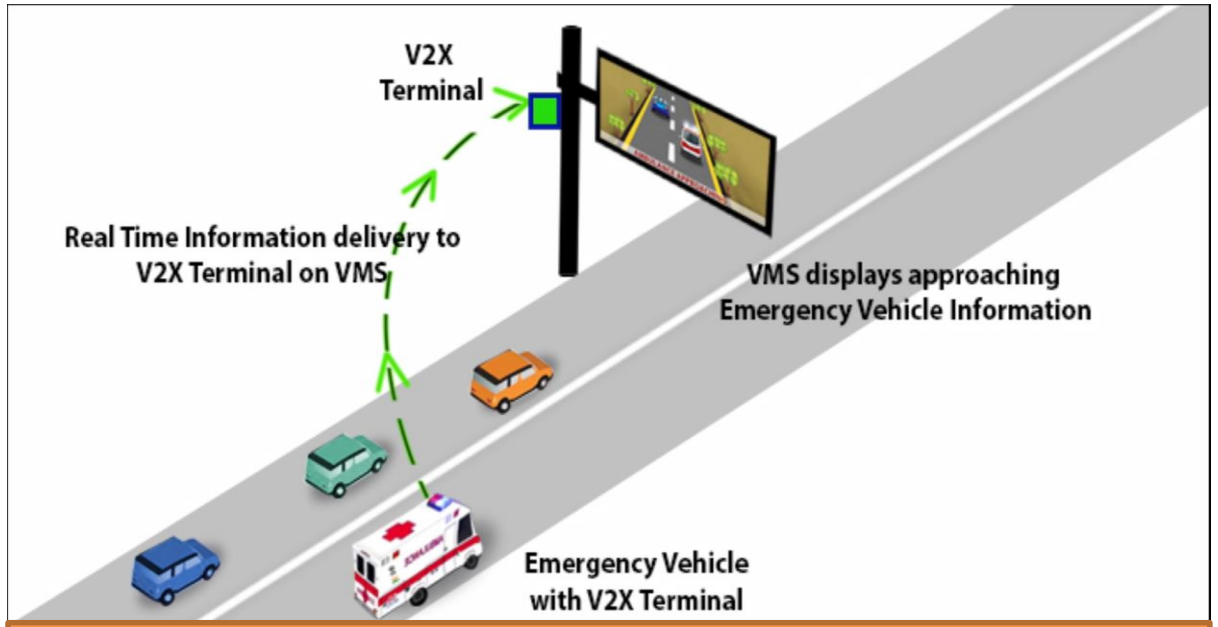
Optimization of processing methods for dynamic road information by introducing multi-scale network architecture (Mid-/Small-scale NW); Collection, Integration and Distribution.

Overseas Expansion（FY2018～）

We are verifying of Japan's V2X system in India, the Philippines, and Taiwan.
Based on the results, we will also promote the introduction of these systems at the site.

Demonstration in India

【Location】Ahmedabad, Gujarat, India 【Date and time】2020/1/17
【Background】Traffic congestion on the roads to the hospital is causing delays in the Emergency Vehicle.
【Content】Information on approaching emergency vehicles will be displayed on an electronic bulletin board to encourage nearby vehicles to change lanes.



System to prevent delays in the arrival of ambulances and other vehicles due to traffic congestion

Demonstration in Ahmedabad

Inspection of the demonstration by the commissioner of Ahmedabad

Thankyou for listening.