



## 자율협력주행과 커넥티드카를 위한 차량용 커넥티비티 추진전략

2021. 1. 28  
한국지능형교통체계협회  
KAMA

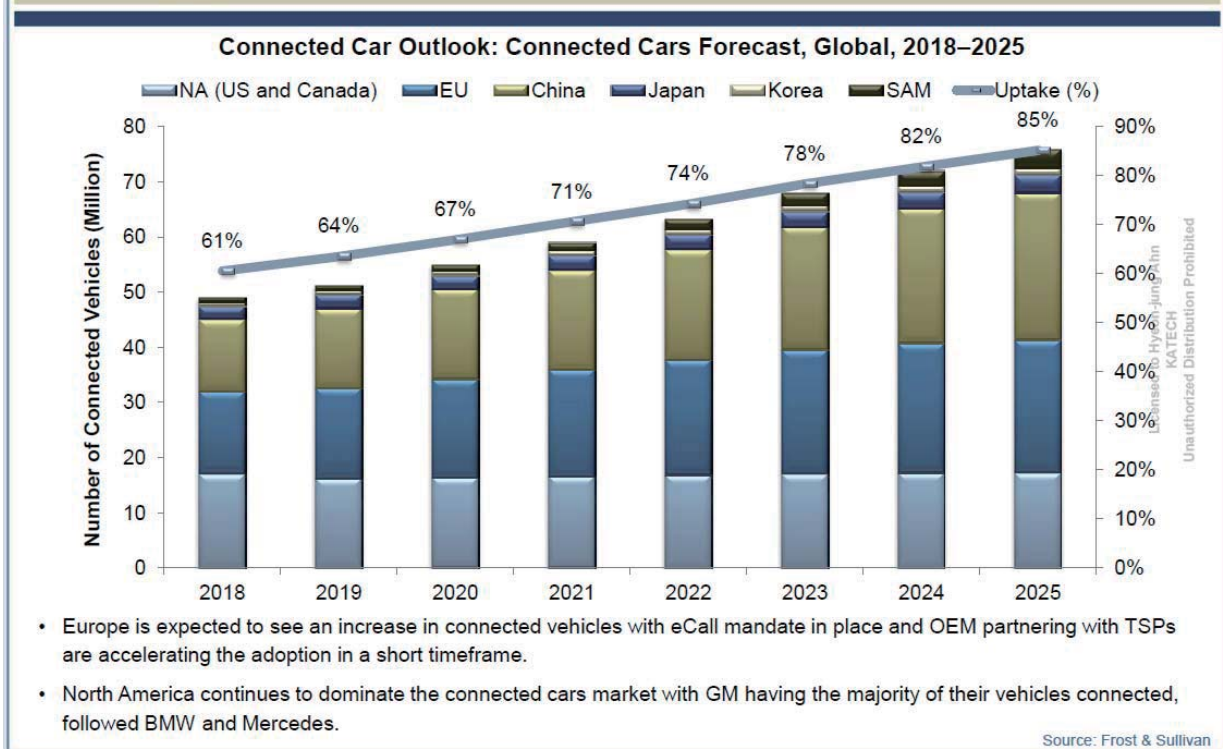
한국자동차연구원  
유시복

## 글로벌 커넥티드카 시장



### Region-wise Connected Cars Forecast

Changing preferences and consumers embracing new technology have driven growth in connected cars, even in emerging markets.



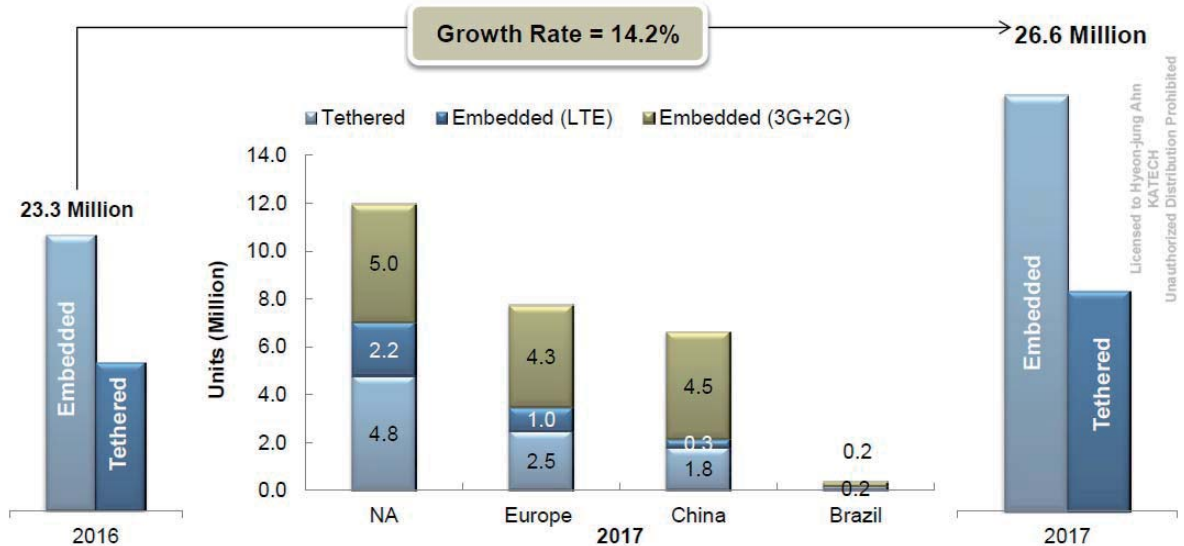


## Global Connected Cars Forecast 2016–2017

Dominated by the likes of Ford and GM, the recent addition of LTE by FCA Group makes North America the leader. LTE in Europe is catching up; the eCall mandate will push mass penetration of LTE-enabled telematics.

### Connected Car Outlook: New Cars Sold with Connectivity, Global, 2016 and 2017

Apart from infrastructure developments, adoption of LTE depends on OEMs, which eventually is driven by customer demand. US consumers are willing to pay for safety and security features. Also, the diversity in Europe makes it difficult for a standard rollout. Brazil is expected to slow down due to economic turmoil.



자료출처: Global Connected Car Market Outlook, 2017, Frost & Sullivan

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## Key Features Trends

**Marketplace**

E-commerce inside vehicles

**Features on-Demand**

OEMs are actively exploring new business models like FoD

**Vehicle-to-Everything (V2X)**

Updates on various V2X communications protocols

**In-Vehicle Payments**

An overview of payment types and eco-system

**Digital Assistants**

Recent developments, Alexa and evolution

**Automotive Biometrics**

Key application areas for Biometric technologies and players

Source: Frost & Sullivan

자료출처: Global Connected Car Market Outlook, 2019, Frost & Sullivan

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# 커넥티드카 트렌드 - Marketplace



## Trend 1—Marketplace

With in-vehicle payments being integrated by many OEMs, products and services can now be availed in the comfort of the car. Soon, more services that don't require owners to be inside the vehicle will be launched.

- According to a study by VISA, over **\$200 billion** in purchase initiations are happening during commutes. With **average commute times** of between 15 and 60 minutes, consumers are being drawn towards ecommerce.
- In automated driving scenarios, there is a high likelihood of in-car ads converting into the purchase of products and services, making this model scalable and promising.

### Types

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In-vehicle Marketplace

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Car access-based Marketplace

### Major use cases

- Fuel and parking
- Ordering and paying for food,
- Making restaurant reservations
- Booking hotels
- Navigation to user's destination
- Service offers from preferred dealerships
- Finding connected brands and valuable offers

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### Key Points—Driver Distraction

- Marketplace limits options to reduce driver distraction, for instance a Starbucks customer can order from the car while it is being driven, but with only a few choices, based on previous orders.
- Hyundai Blue Link and Genesis Connected Services are already integrated with Alexa and will be a USP for Marketplace implementation, as new Alexa skills for making transactions will reduce driver distraction in the future.

Source: Frost & Sullivan

자료출처: Global Connected Car Market Outlook, 2019, Frost & Sullivan

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# 커넥티드카 트렌드 – Features on Demand



## FoD Packages—Over 30 Potential Services

Dealership-based retrofit hardware and OTA/dealership-based service launches are expected. While Tesla currently offers one-time purchases, on-demand recurring purchases will be available in the longer term.

### Infotainment & Telematics

- In-vehicle Wi-Fi
- Media packages
- Productivity suite
- Concierge
- Smartphone Interfacing and entertainment apps
- Personal Digital Assistants
- Remote Diagnostics, Prognostics + On-demand Mechanic
- Gaming and entertainment

### ADAS and Autonomous

- Hill, Highway Assist
- Adaptive & Predictive Cruise Control
- Autonomous Valet Parking
- Auto Pilot
- Traffic Jam, Intersection Assist
- Severe Climate Package
- Driver/Chauffeur Monitoring
- Remote Vehicle Operation
- Platooning for Businesses

### Location Based Services

- Fuelling
- Tolling
- Parking
- Charging
- On demand repair and Mechanic
- Geo-fenced personalized POIs
- Mapping

### Mobility Services

- Journey Planning
- Last Mile travel options
- E-hailing
- Public Transportation schedules and ticket purchase
- Car Rental, sharing in OEM programs

### Powertrain Performance and Electric Vehicle

- Drive Mode Updates (sporty, dynamic, comfort, efficient etc.) based on
  - Steering
  - Suspension
  - Transmission
- Off-Road Package
- Acceleration/BHP
- Range Extension for electric vehicles
- Automatic/Manual Transmission
- Increasing Speed limits - Germany
- Supercharging

### Value Adds

- On-demand Insurance
- 2 Free feature upgrades every year

### Smart Interiors and Exteriors

- Personalized Interiors (Lighting, Perfume, HVAC)
- Projectors and on-demand screens/BYOD ports
- Skins for UI
- Seating – recline and movie mode
- Premium Audio
- Auto Climate adjustments – Lights, Wiper
- Panoramic roof
- Additional storage
- Boot deliveries

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Source: Frost & Sullivan

자료출처: Global Connected Car Market Outlook, 2019, Frost & Sullivan

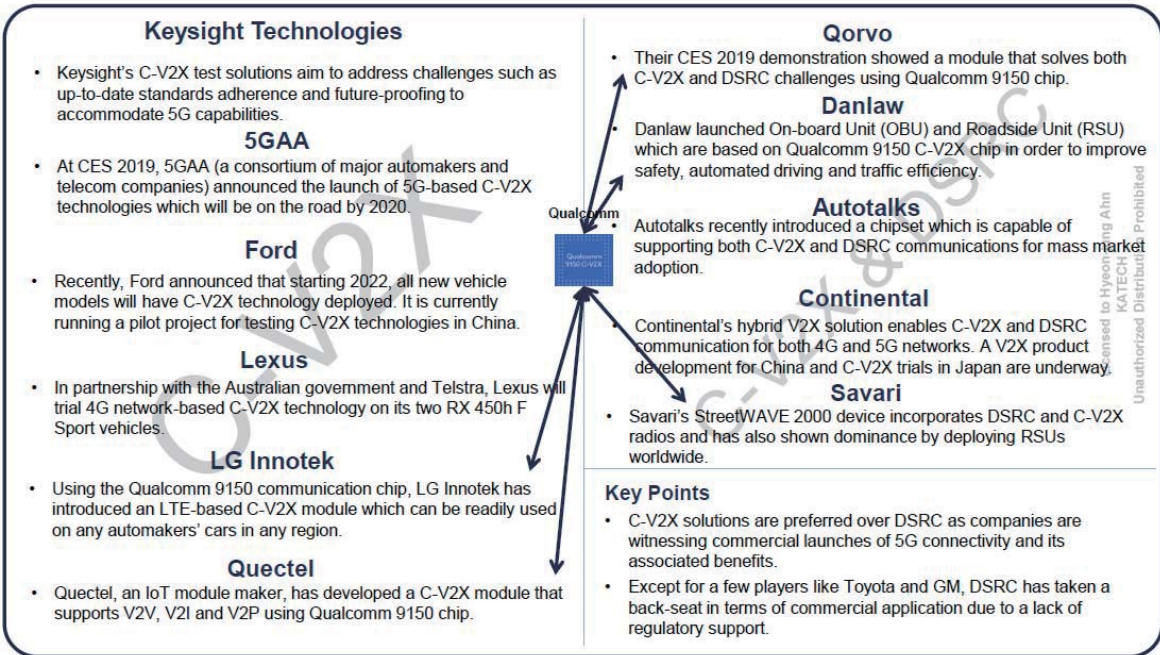
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## Trend 3—V2X: Cellular-V2X and DSRC Players

With the sheer number of partnerships and announcements, C-V2X adoption is more evident while more system integrators are expected to launch products which are both DSRC and C-V2X capable.



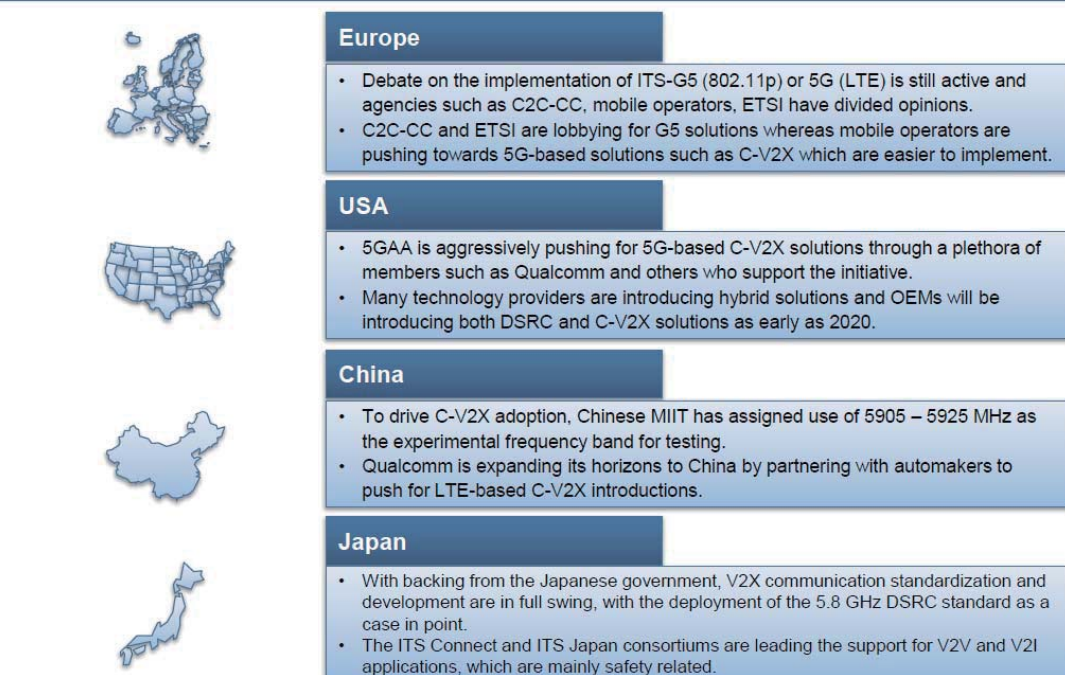
자료출처: Global Connected Car Market Outlook, 2019, Frost & Sullivan

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## V2X—Regional Updates

Most regions are in favor of C-V2X adoption and it is evident that the technology will see commercial launch in 2019 with cellular LTE-based network access, as 5G is not yet in full swing.



자료출처: Global Connected Car Market Outlook, 2019, Frost & Sullivan

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# 자율주행차와 통신



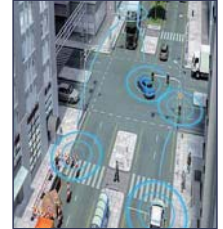
## ● 커넥티드 자율주행의 필요성

- ① 가시권/비가시권 자율주행정보 획득, 신뢰성 있는 광역 정보
- ② 기존 센서들과 상호보완적 데이터 융합에 따른 객체 인식을 향상
- ③ 자율주행차 탑승자를 위한 편의 및 안전 서비스 제공
- ④ 자동차/인터넷/통신/인프라 등 연계산업 파급효과 확대

	분류	내용
안전 (지연 시간 중요)	원거리 인지 공유	<ul style="list-style-type: none"> <li>도로변 센서, 주변차량의 인식정보 공유</li> </ul>
	C-ITS	<ul style="list-style-type: none"> <li>V2V기반- 전방 충돌위험 자동제동* 등</li> <li>* 작은 데이터를 반드시 시간 내(예: 10ms)로 전송</li> <li>V2I기반- 전방 결빙구간 경고 등</li> <li>V2P기반- 교차로 안전 제동 등</li> </ul>
편의 (전송 속도 중요)	인포테인먼트	<ul style="list-style-type: none"> <li>모바일 오피스*, 모바일 인터넷, 원격 차량관리</li> <li>* 영상, 인터넷 등 대용량 데이터를 빠르게 전송</li> </ul>
	자율주행 서비스 지원	<ul style="list-style-type: none"> <li>자동 맵 갱신, 원격 자율주행 SW 업데이트 등</li> <li>원격 차량조작, 무인 택배, 보험, 발렛파킹 등</li> </ul>



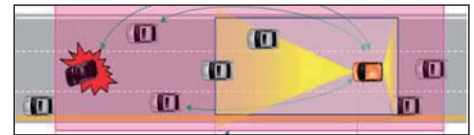
자율차 자동 맵 갱신



V2V 기반 전방 충돌 자동제동



자율차 모바일 오피스



센서범위를 넘어서는 거리의 교통안전

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# 자율주행차와 통신 – 통신방식



## ▣ 국내외 V2X 표준 기술

	WAVE	4G (Cellular-V2X)	5G-V2X	CALM (복합 통신방식)
표준 기구	IEEE	3GPP	3GPP	ISO
주도 업계	<ul style="list-style-type: none"> <li>교통/자동차</li> <li>미국(DOT, NHTSA)</li> </ul>	<ul style="list-style-type: none"> <li>이동통신 (퀄컴 중심, 화웨이(중) 가세)</li> </ul>	<ul style="list-style-type: none"> <li>이동통신(퀄컴)</li> </ul>	<ul style="list-style-type: none"> <li>교통/자동차</li> <li>유럽(CEN, ETSI)</li> </ul>
특징	<ul style="list-style-type: none"> <li>V2X 통신에 특화</li> <li>무료 (공공 인프라)</li> <li>V↔V 직접통신 가능 (단말기간 직접통신)</li> </ul>	<ul style="list-style-type: none"> <li>기존 LTE V2X 지원</li> <li>유료 (이통사 인프라)</li> <li>V↔V 직접통신 불가 (반드시 이통망 경유)</li> </ul>	<ul style="list-style-type: none"> <li>C-V2X기술적용 예상</li> <li>유료 (이통사 인프라)</li> <li>V↔V 직접통신(IoT) (사물간 직접통신)</li> </ul>	<ul style="list-style-type: none"> <li>다양한 무선통신 호환 (통신방식 달라도 같은 서비스 가능)</li> </ul>
기술	<ul style="list-style-type: none"> <li>저속 근거리</li> <li>- 최대속도 75Mbps</li> <li>- 최대지연 10ms</li> </ul>	<ul style="list-style-type: none"> <li>전국 서비스</li> <li>- 최대속도 1Gbps</li> <li>- 최대지연 30ms</li> </ul>	<ul style="list-style-type: none"> <li>초고속 전국 서비스</li> <li>- 최대속도 20Gbps</li> <li>- 최대지연 5ms(예정)</li> </ul>	<ul style="list-style-type: none"> <li>다양한 물리적 규격 포함</li> </ul>
서비스	안전	<ul style="list-style-type: none"> <li>안전 서비스에 특화</li> </ul>	<ul style="list-style-type: none"> <li>긴급 경고/제어 부적합</li> </ul>	<ul style="list-style-type: none"> <li>긴급 경고/제어도 가능</li> </ul>
	편의	<ul style="list-style-type: none"> <li>간단한 내용전송</li> </ul>	<ul style="list-style-type: none"> <li>인포테인먼트 가능</li> </ul>	<ul style="list-style-type: none"> <li>4차산업혁명 서비스 전반 가능</li> </ul>

- WAVE: 차량 안전 서비스에 특화된 저속, 저지연, 무료 기술이며, 인프라 설치 필요
- 4G: 고속이나 이동통신 네트워크 기지 경유로 지연시간 길어, 긴급 경고/제동 부적합
- 5G: IoT(사물간통신)로 고속, 저지연이나, 차량용 표준 준비 미비

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## V2X Communication Protocols

C-V2X is more promising than DSRC technology. Trials have been successful and cellular companies will make most of this opportunity regardless of which technology is introduced first.

V2X Market: V2X Communication Protocol, Global, 2019																															
	C-V2X	DSRC	Hybrid (C-V2X & DSRC)																												
What?	<p>Cellular based V2X solution, relies on network access in the 4G/LTE/5G spectrum to communicate with various entities.</p>	<p>V2X (mainly V2V and V2I) applications, relying on IEEE 802.11p Wi-Fi communication, to interface with all the devices.</p>	<p>Solutions and applications that rely on a mixed use of both C-V2X and DSRC communication.</p>																												
Who?	<table><thead><tr><th>OEMs</th><th>Suppliers</th></tr></thead><tbody><tr><td>Audi</td><td>Qualcomm</td></tr><tr><td>BMW Group</td><td>Quectel</td></tr><tr><td>Ford</td><td>Keysight Technologies</td></tr><tr><td>Geely</td><td>LG Innotek</td></tr><tr><td>Honda</td><td></td></tr><tr><td>Lexus</td><td></td></tr><tr><td>Mercedes Benz</td><td></td></tr><tr><td>PSA Group</td><td></td></tr></tbody></table>	OEMs	Suppliers	Audi	Qualcomm	BMW Group	Quectel	Ford	Keysight Technologies	Geely	LG Innotek	Honda		Lexus		Mercedes Benz		PSA Group		<table><thead><tr><th>OEMs</th><th>Suppliers</th></tr></thead><tbody><tr><td>GM</td><td>Qualcomm</td></tr><tr><td>JLR</td><td>Savari</td></tr><tr><td>Toyota</td><td></td></tr><tr><td>Volkswagen</td><td></td></tr></tbody></table>	OEMs	Suppliers	GM	Qualcomm	JLR	Savari	Toyota		Volkswagen		Technology providers, such as <b>Auto Talks</b> , <b>Qorvo</b> etc. are some of the front runners to introduce modules. OEMs in this space are unknown.
OEMs	Suppliers																														
Audi	Qualcomm																														
BMW Group	Quectel																														
Ford	Keysight Technologies																														
Geely	LG Innotek																														
Honda																															
Lexus																															
Mercedes Benz																															
PSA Group																															
OEMs	Suppliers																														
GM	Qualcomm																														
JLR	Savari																														
Toyota																															
Volkswagen																															
When?	Ready for deployments in 2019-20. Push from regulatory bodies required for successful implementation.	Gained much prominence after successful trials and will be deployed as early as 2019.	As of 2019, Technology companies are already introducing hybrid chips and deployments will follow respective timelines.																												

Key: 5.9 GHz frequency range is dedicated for all V2X applications.

Source: Frost & Sullivan

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Key: 5.9 GHz frequency range is dedicated for all V2X applications.

Source: Frost & Sullivan

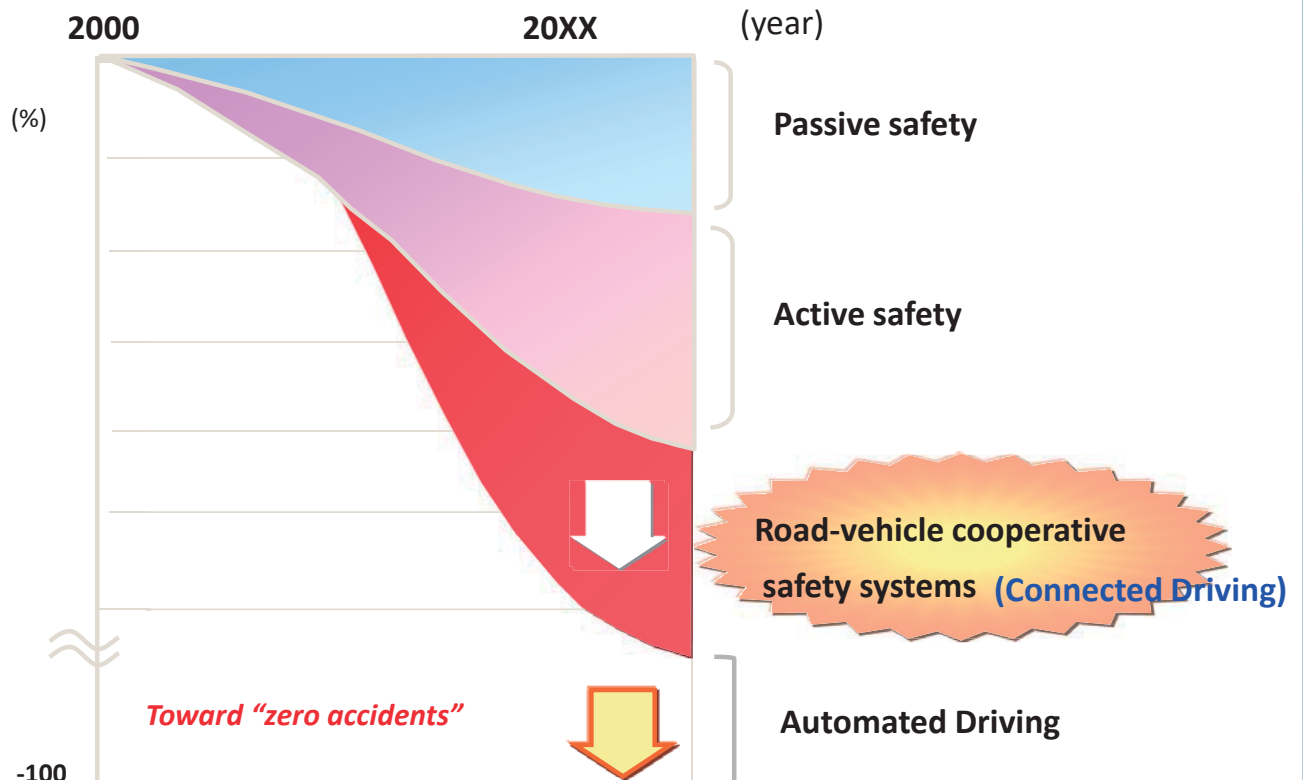
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## 커넥티드 자율주행의 필요성 [안전]



Reference: Data of an automotive maker, ISO TC204 WG14 Convenior

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# 커넥티드 자율주행(안전)과 데이터 크기



## 미국 : VSC 계열 프로젝트

VSC : Vehicle Safety Communication



### o V2V/V2I 안전 서비스 정의, 개발, 평가

VSC (2002-2004)	통신에 의해 이용가능해지고 향상된 차량 안전 서비스들을 평가 (BMW, Daimlerchrysler, Ford, GM, Nissan, Toyota, VW)
EEBL (2005-2006)	EEBL(Emergency Electronic Brake Light) 서비스 개발 및 평가 (BMW, Daimlerchrysler, Ford, GM, Nissan, Toyota)
VSC 2 (2006-2009)	1) CICAS-V(Cooperative Intersection Collision Avoidance System) project 2) VSC-A(Vehicle Safety Communications-Application) project (DOT, Daimlerchrysler, Ford, GM, Honda, Toyota)

### o 34종의 서비스 연구, V2V 4종 V2I 4종 개발

서비스 연구/개발	34종의 서비스 연구, V2V 4종 V2I 4종 개발
연구 결과	1) 메시지 패킷 사이즈 : 200~500 Byte (8종 서비스) 2) 최대 통신 거리 : 50~300 m (8종 서비스) 3) Latency : 100 ms - 6종 20 ms - 2종 4) Pre-Crash Sensing은 point-to-point 쌍방향, 7종은 단방향 주기적 Broadcasting

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# Cooperative Safety 서비스(사례)



## 미국 : VSC 34종 서비스

V2V 15 Services
Approaching Emergency Vehicle Warning
Blind Spot Warning
Cooperative Adaptive Cruise Control
Cooperative Collision Warning
Cooperative Forward Collision Warning
Cooperative Vehicle-Highway Automation System
Emergency Electronic Brake Lights
Highway Merge Assistant
Lane Change Warning
Post-Crash Warning
Pre-Crash Sensing
Vehicle-Based Road Condition Warning
Vehicle-to-Vehicle Road Feature Notification
Visibility Enhancer
Wrong Way Driver Warning

V2I 19 Services
Blind Merge Warning
Curve Speed Warning
Emergency Vehicle Signal Preemption
Highway/Rail Collision Warning
Intersection Collision Warning
In Vehicle Amber Alert
In-Vehicle Signage
Just-In-Time Repair Notification
Left Turn Assistant
Low Bridge Warning
Low Parking Structure Warning
Pedestrian Crossing Information at Intersection
Road Condition Warning
Safety Recall Notice
SOS Services
Stop Sign Movement Assistance
Stop Sign Violation Warning
Traffic Signal Violation Warning
Work Zone Warning

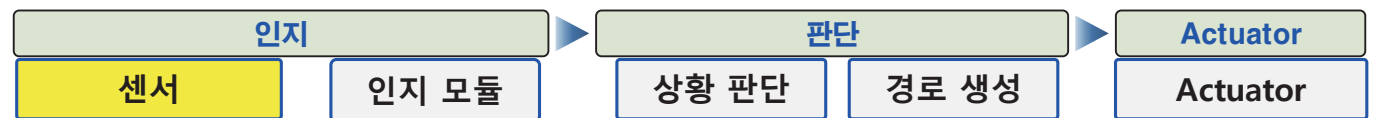
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## SAE J2735 Defined Messages

ID	Messages	Typical Use	Status
0	Reserved	N/A	
1	MSG_A_la_Carte	V2X	
2	MSG_BasicSafetyMessage (BSM)	V2V	Used by USDOT program & other ITS industry research
3	MSG_CommonSafetyRequest	V2?	
4	MSG_EmergencyVehicleAlert		
5	MSG_IntersectionCollisionAvoidance	V2X	
6	MSG_Map	I2V	Based on USDOT previous project. Used by various demo/research program
7	MSG_NMEA_Corrections	I2V	
8	MSG_ProbeDataManagement	I2V	Used by VII Proof of Concept (PoC) project
9	MSG_ProbeVehicleData	V2I	Used by VII PoC project
10	MSG_RoadSideAlert		
11	MSG_RTCM_Corrections	I2V	Based on USDOT previous project. Used by various demo/research program
12	MSG_SignalPhaseAndTiming	I2V	Based on USDOT previous project. Used by various demo/research program
13	MSG_SignalRequestMessage	V2I	
14	MSG_SignalStatusMessage	I2V	
15	MSG_TravelerInformation Message	I2V	Used by VII PoC & will be used in Model Deployment (Curve Speed Warning)

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## 자율주행차 주변상황인식 센서



	분류	장단점
레이더	<b>장거리 레이더</b> (77GHz, 최대 250m/18°)	<ul style="list-style-type: none"> <li>원리: 전파를 발사하고, 대상체에서 반사된 전파의 도달시간을 측정하여 거리를 계산</li> <li>장점: 거리 정확도 우수, 날씨와 조명 영향 없음</li> <li>단점: 각도 정확도 낮음, 형상인식 불가</li> </ul>
	<b>중단거리 레이더</b> (24/79GHz, 60m/110°)	
카메라	<b>전방 카메라</b> (최대 150m, 45°)	<ul style="list-style-type: none"> <li>원리: 빛을 전기신호로 변환하여 픽셀단위로 인식</li> <li>장점: 저가 양산 가능, 차선, 차량, 보행자, 신호등, 표지판 등 형상인식 가능, 각도 정확도 우수</li> <li>단점: 날씨 및 조명 영향 받음, 거리 정확도 낮음</li> </ul>
	<b>측후방 카메라</b> (최대 80m/90°)	
	<b>AVM</b> (최대 40m/150°) * Around View Monitoring	
라이다	<b>회전식 라이다</b> (최대 120m, 360°)	<ul style="list-style-type: none"> <li>원리: 레이저를 발사하고, 반사된 신호로 거리 측정</li> <li>장점: 높은 거리/각도 정확도, 물체형상 인식 가능</li> <li>단점: 높은 가격(양산성 낮음), 레이저 반사율 영향 (검은색 등)</li> </ul>
	<b>Solid State라이다</b> (최대 150m, 30°)	

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# 센서와 전송 데이터의 양



✓ 자율주행차는 데이터가 많아서 반드시 5G가 필요 하다던데요?

\* 다른 센서의 출력 데이터는CAN에 실을 수 있을 정도의 크기임



✓ 센서 Raw 데이터를 전송하게 될까요? 인식 처리된 데이터만 고려하면 그렇게 크지 않은데요?

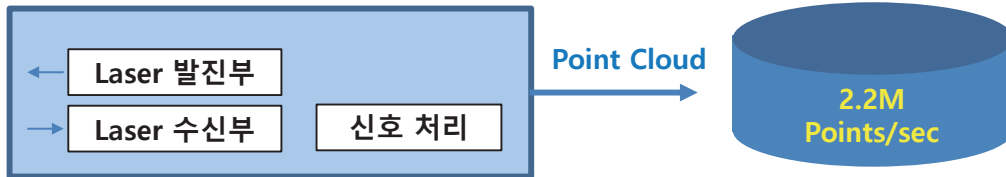
- ✓ Point cloud 출력
- ✓ 물체인식정보 출력

→ ~2.2MP/sec  
→ about 5k bytes/sec

## Point cloud를 전송하는 경우



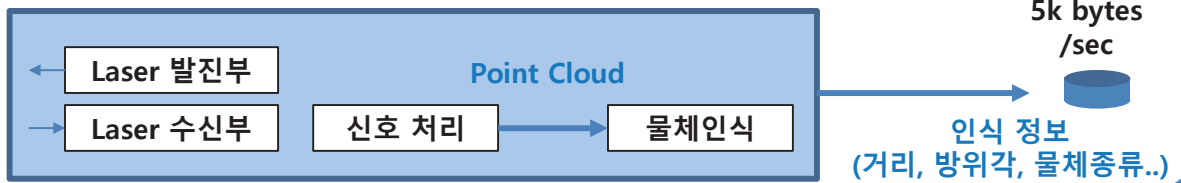
Velodyne HDL-64



## 처리된 인식정보만 전송하는 경우



ibeo SCALA



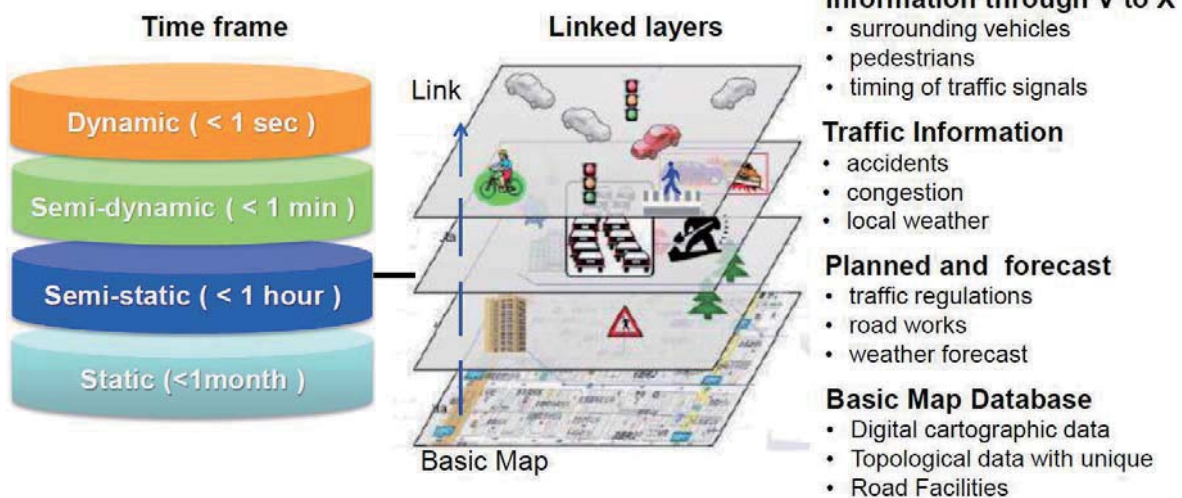
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# LDM과 전송 데이터의 양



## Dynamic Map

Hierarchical structure of digital 'Map' layered by time frame



동적 객체 맵



정적 공간 맵

# 커넥티드카와 의무장착

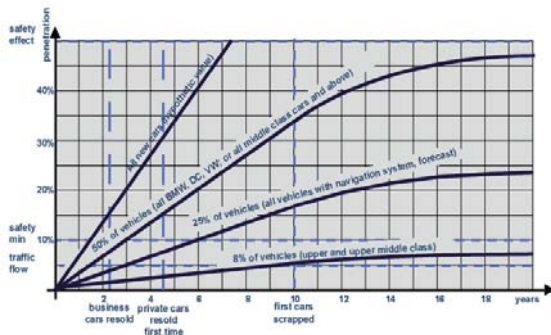
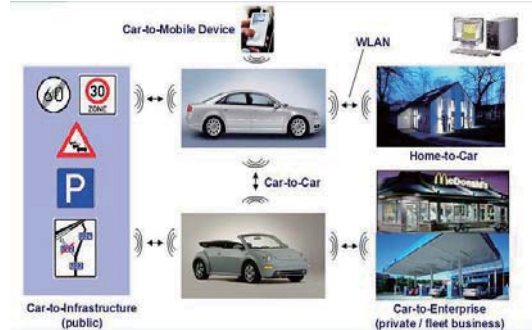
## 유럽 : C2C-CC 프로젝트

C2C-CC : Car to Car Communication Consortium



### o V2V/V2I I/F 및 프로토콜 표준화

C2C-CC (2006-2011) 유럽 산업 표준화 개발 및 확립  
차량 상호간의 운용을 보장  
서비스 개발 및 시연  
유럽 무료 주파수 밴드 할당



### o 보급율에 따른 서비스 가능성

보급율과 서비스

C2C 커뮤니케이션을 이용하여

- 교통 정보를 공유하기 위해 5% 이상
- 최소한의 안전 경보를 위해 10% 이상
- 능동안전 기능을 위해 90% 이상

의 시장보급이 확보되어야 함

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# 미국의 커넥티드 자율주행

## Connected Automation for Greatest Benefits

### Autonomous Vehicle

Operates in isolation from other vehicles using internal sensors

### Connected Vehicle

Communicates with nearby vehicles and infrastructure

### Connected Automated Vehicle

Leverages autonomous and connected vehicle capabilities



U.S. Department of Transportation  
ITS Joint Program Office

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자료출처: U.S. DOT Automation Program, Kevin Dopart,  
ITS Joint Program Office, OST-R, U.S. DOT, July 23, 2015

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# 미국의 커넥티드 자율주행 마일스톤(2015)

## Connected Vehicle Milestones

- August 2014: NHTSA ANPRM on vehicle-to-vehicle communications
- May 2015: Secretary Foxx V2V announces V2V rulemaking acceleration
- Summer 2015: FHWA V2I guidance document
- Fall 2015: First wave of CV Pilots to begin
- End of 2015: V2V NPRM interagency review
- New cars with connected vehicle technology are expected to be available by 2017.

### 현재 상황

V2X 통신모듈을 승용차 및 소형트럭(passenger cars and light truck vehicles)에 의무장착하는 법안을 공시('14년 49 CFR Part 571 법안에 FMVSS No. 150 제시)  
⇒ 트럼프 행정부에서 정책 변경으로 중단 중임



U.S. Department of Transportation  
ITS Joint Program Office

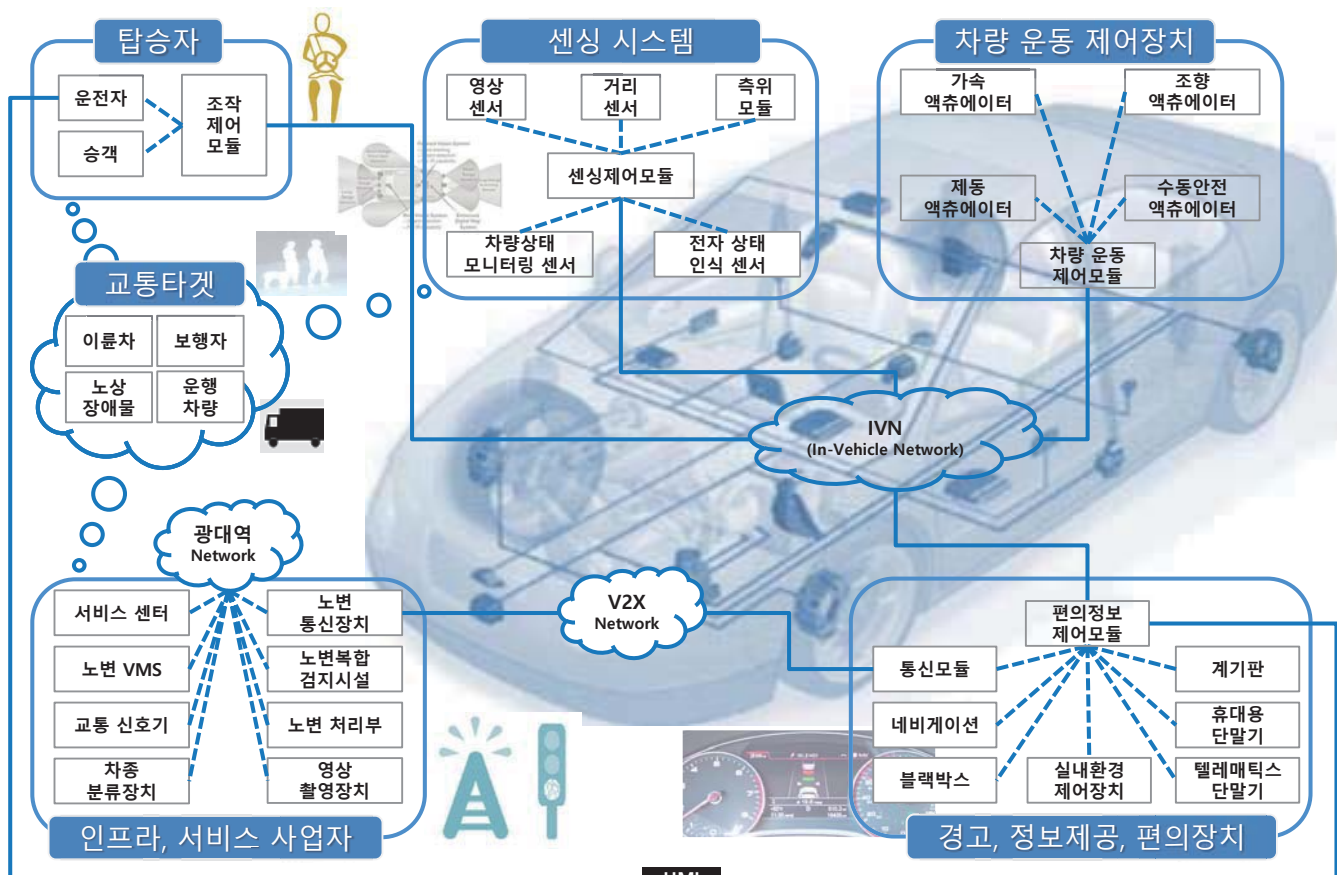
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자료출처: U.S. DOT Automation Program, Kevin Dopart,  
ITS Joint Program Office, OST-R, U.S. DOT, July 23, 2015

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## 자율주행의 주요 Actors

\* 출처: 자율차 표준화 로드맵



# 한국의 자율주행자동차 - 국토교통부



## ▶ MLIT : Development of Advanced Infra Systems for Automated Driving (C-AHS)

- LDM based on precise digital map
- Seamless V2X communication Module
- Real-time road traffic information collection systems
- Improvement of road structure for precise positioning and sensor perception improvement
- Road structure construction manual for autonomous vehicle driving

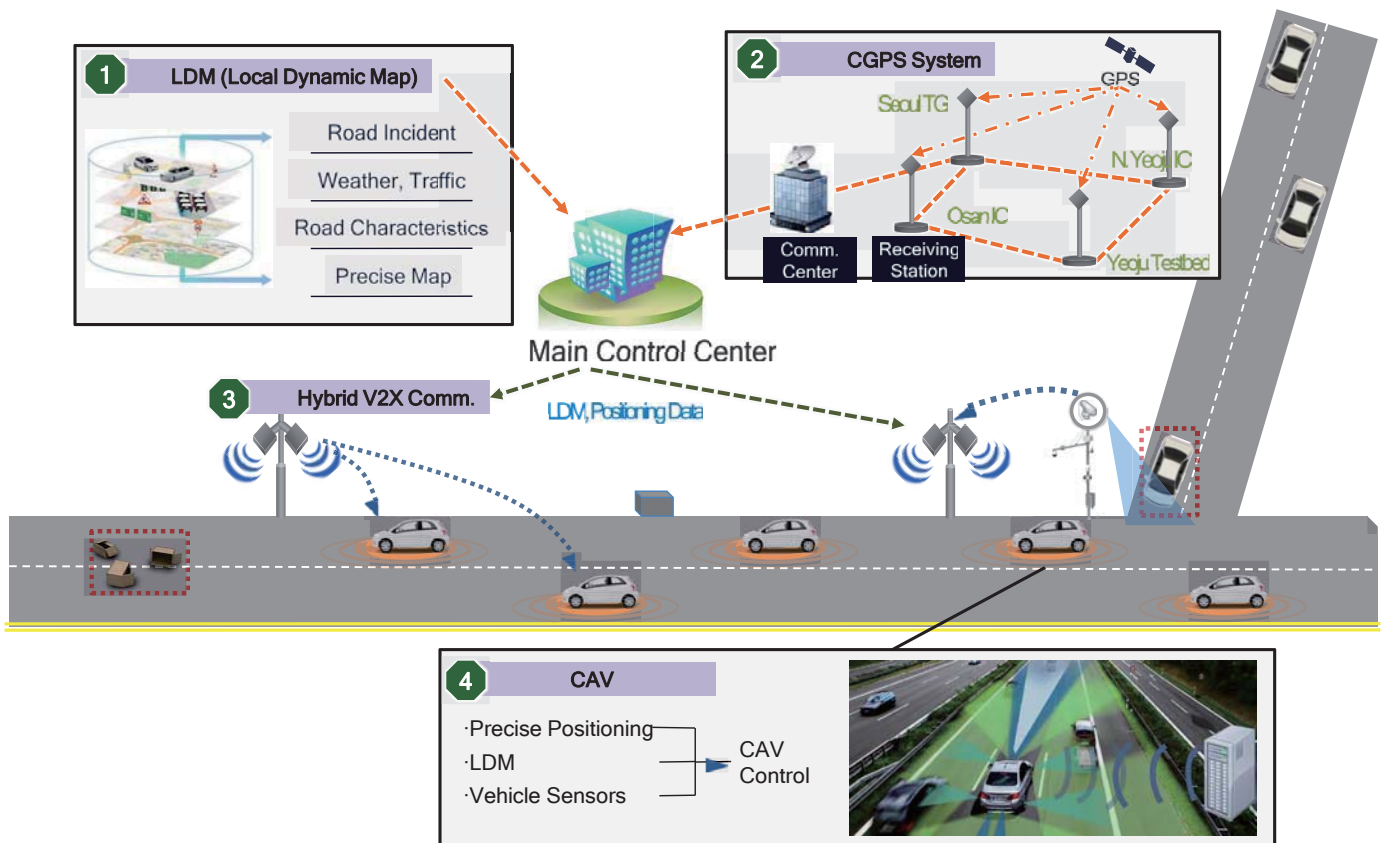
- Budget : \$27.5 Million (including private funding)
- 5 years (2015~2020)
- 2 demonstrations in public interstate highway (4 cars)

\* MLIT : MLIT Ministry of Land, Infrastructure, Transport and Tourism



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# 한국의 자율주행자동차 - 국토교통부, 자율협력주행



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# 한국의 자율주행자동차 - 대형버스용 자율주행 부품

## 1세부: 대형버스용 자율주행 부품 개발



## 3세부: 실도로 검증용 운영 & 실증기술 개발



## 2세부: 대형버스 자율주행 시스템 개발



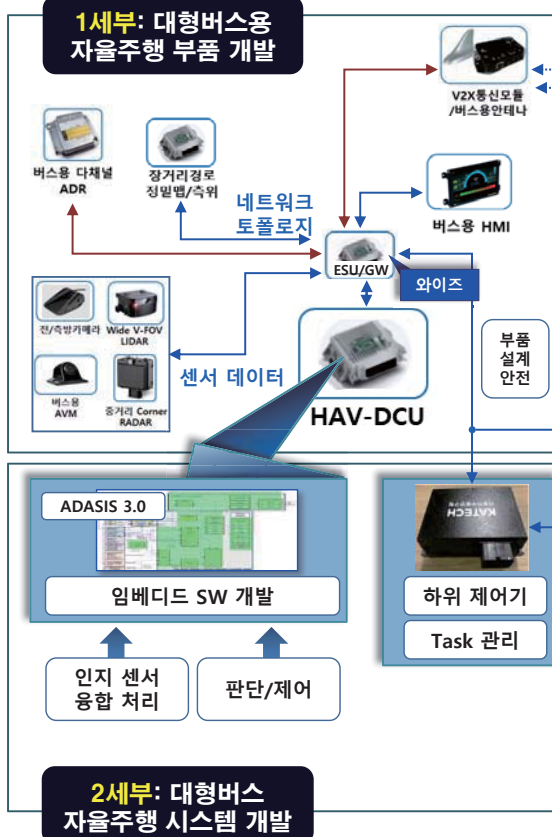
총괄: 대형버스용 자율주행 부품 · 시스템 개발 및 시범운영 과제 총괄



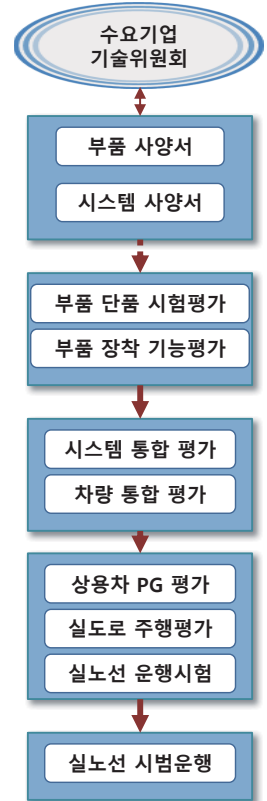
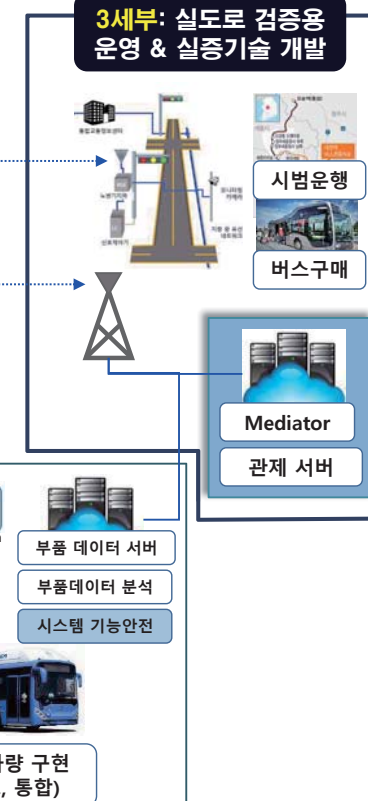
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# 자율주행 기술개발 - 대형버스용 자율주행 부품

## 1세부: 대형버스용 자율주행 부품 개발



## 3세부: 실도로 검증용 운영 & 실증기술 개발

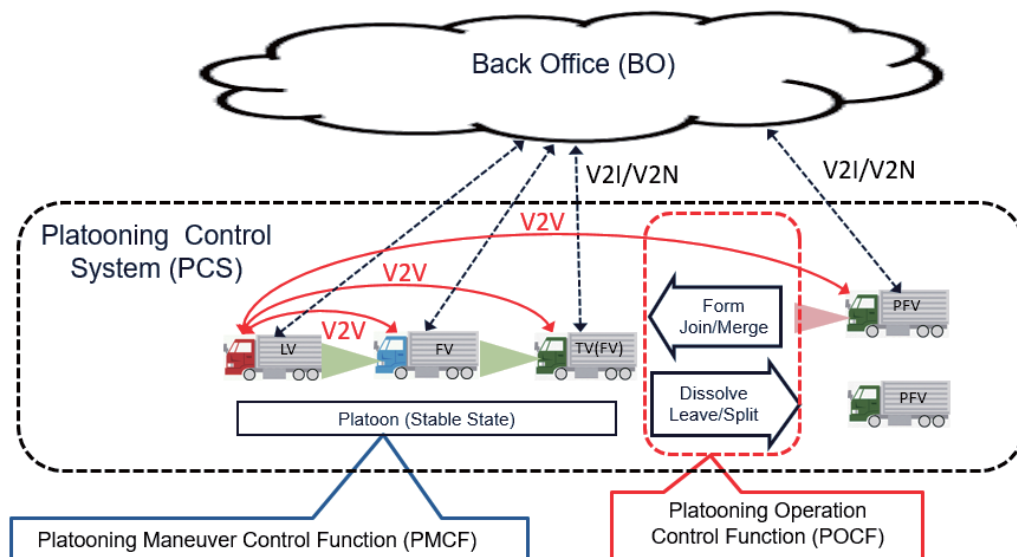


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# Truck Platooning Systems



## Overall Architecture of Platooning System (Figure 1)



V2I: Vehicle to (from) Infrastructure  
V2N: Vehicle to (from) Network

▶ ACC or CC(or Manual) status    ▶ CACC status

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# Truck Platooning Systems

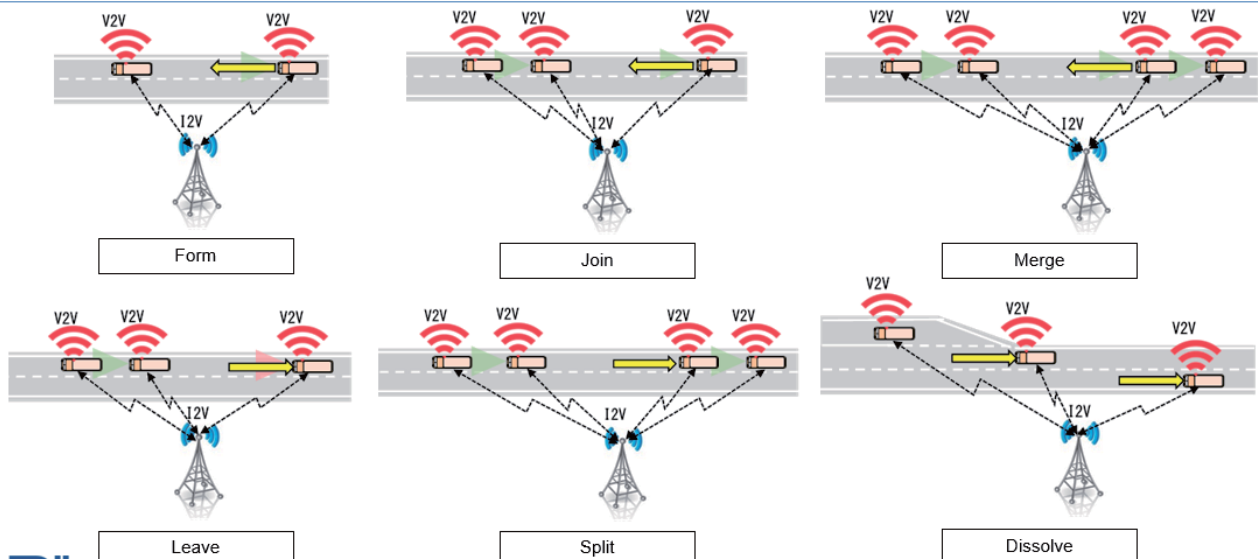


## Platooning Control System (2/2)

Platooning Operation Control Function (POCF)

V2V is mandate and I2V is optional

Control function to relate the modes and transitions from Form to Dissolve of Platoon



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### ✓ 커넥티드카/커넥티드 자율주행 보급의 걸림돌

- ① 통신방식 단일 규격/표준화 논의 없음 ⇒ 리스크로 인해 산업투자 저해
- ② 부처별 상이한 추진안 ⇒ 산업계에 혼란, 무책임한 중소기업 희망고문
- ③ 의무장착 등 획기적인 보급방안 없음 ⇒ 효과적인 서비스 발생 불가

### ✓ (이동통신 업계) 과기정통부와 이통업계는 5G가 필수로 주장. 그러나 자동차 산업계는 자동차용 5G 표준 및 기술이 미성숙임을 지적. 막대한 민간의 구축비용과 이용자에게 전가되는 통신요금 등 난제가 있음

### ✓ (교통/인프라 업계) 국토교통부와 WAVE 중소기업들은 통신 Delay 등 기술적 성숙도가 높은 WAVE 방식을 고수. 강력한 이통사들의 로비를 받는 5G가 국제적으로 대세로 떠오름에 따라, 그간 간헐적인 중소규모 시범사업으로 연명하던 WAVE 업계는 종말의 위기에 봉착

### ✓ (전국 C-ITS 인프라 구축 6조) 국토부는 뉴딜정책의 일환으로 전국에 C-ITS 인프라 구축 선언. 그러나 통신방식 단말기 보급정책은 포함되지 않음 ⇒ 국토부 내에서도 인프라 구축은 도로국, 단말기 보급은 자동차국이 담당, 별건으로 진행 중이며 추진주체가 불분명함

\* 통신방식은 WAVE/5G 병행 등으로 결정(미래차 발전전략 '19) 되었으나 구체적 방안 발표되지 않음



# Thank you