What kind of terminal do vehicles need?

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Terminal & applications / services

- What kind of terminal do vehicles need?
- What is vehicle terminal?
  - ✓ A device with computing, storage, input/output and HMI interfaces
  - ✓ Integration of GNSS, such as GPS
  - ✓ Integration of communication module
  - ✓ Provision of services & applications for driver and passengers

Or, What kind of services and applications can be provided by terminal?

- ✓ Services of driving convenience
- ✓ Services of security monitoring
- ✓ Services of rescue and maintaining

……

Catalog

Characteristic of Telematics terminal / Information terminal

- Integrated with Telecommunication networks module（2G/3G/LTE)
- Provision of services and applications (based on TSP / TSSP)
  - ✓ Voice services / E-call
  - ✓ Location & Navigation
  - ✓ Infotainment services
  - ✓ Anti-theft and alarm
  - ✓ Remote diagnosis and rescue
  - ✓ ……
- Simple as it is, yet a great deal of vehicles Now in China have no such terminals.

Catalog

Characteristic of connected smartphone terminal

- Have or haven't cellular network communications module in terminal, but have display screen
- The typical mode is MirrorLink, one project of CAR CONNECTIVITY consortium to provide more infotaiment services as possible as smartphone can.
- Provision of services and applications (based on smartphone apps)

In principle, all the smartphone applications can be 'projected' onto the car's navigation screen and dashboard/steering-wheel buttons.

More details: *http://www.mirrorlink.com*

Advantages: no updating of terminal and more applications

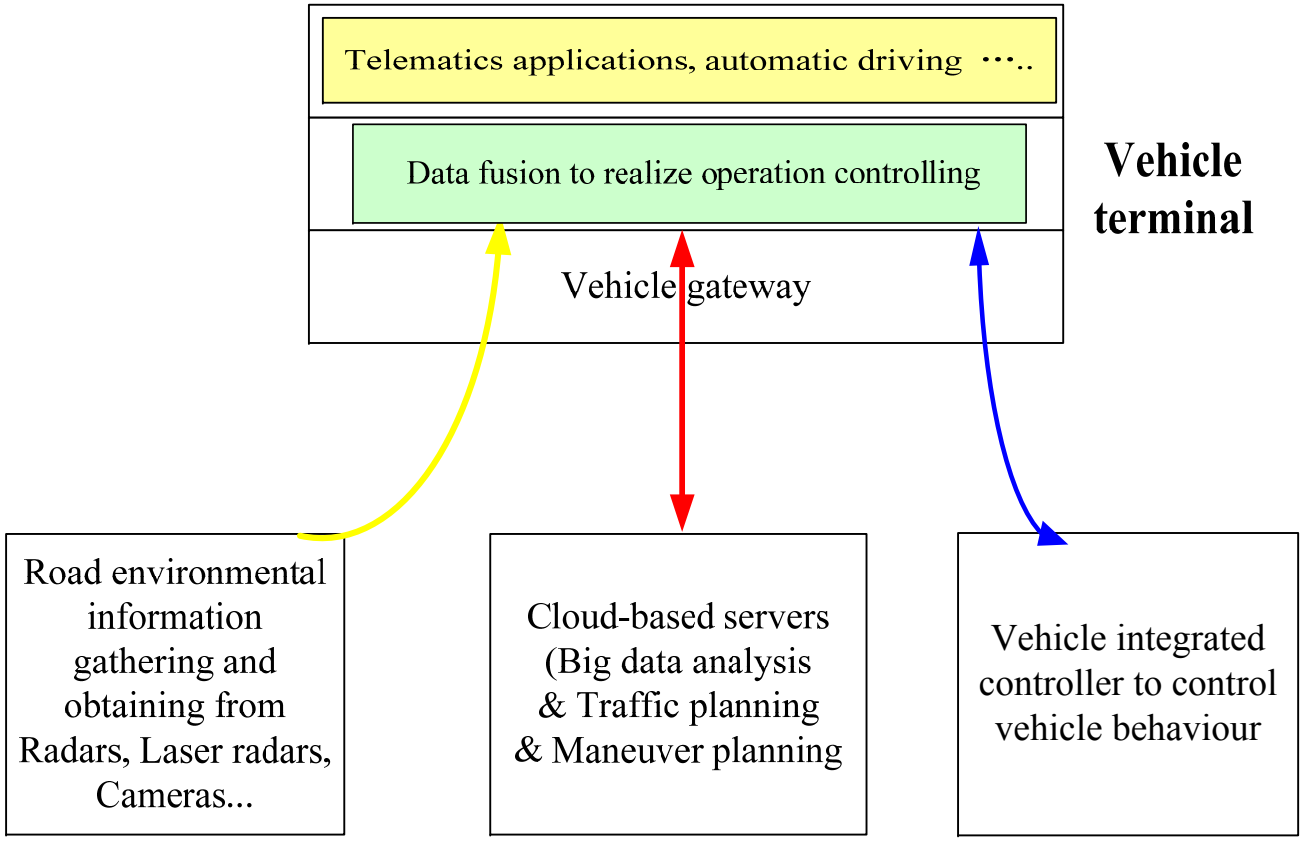
Disadvantages: complex cockpit arrangement and lack of Co-operative road safety.

Catalog

Characteristic of full-fledged vehicle terminal / smart vehicle terminal

- An open architecture to integrate most of the wireless communications module such as 2G/3G/LTE, LTE D2D, IEEE802.11p, DSRC, MM / IR, etc., and optionally connected wired with cameras, PCs or interacting with smartphones, Pads via Wi-Fi, etc., friendly HMI.
- Full-fledged vehicle terminal can support IP- and non-IP based services, such as all the Telematics services and safety, convenience and comfortable services.
- With the aid of road environment information and the traffic trip planning from cloud-based servers, the full-fledge terminal fuses all these information to operate integrated controller to control vehicle behaviour, then it becomes a smart terminal.

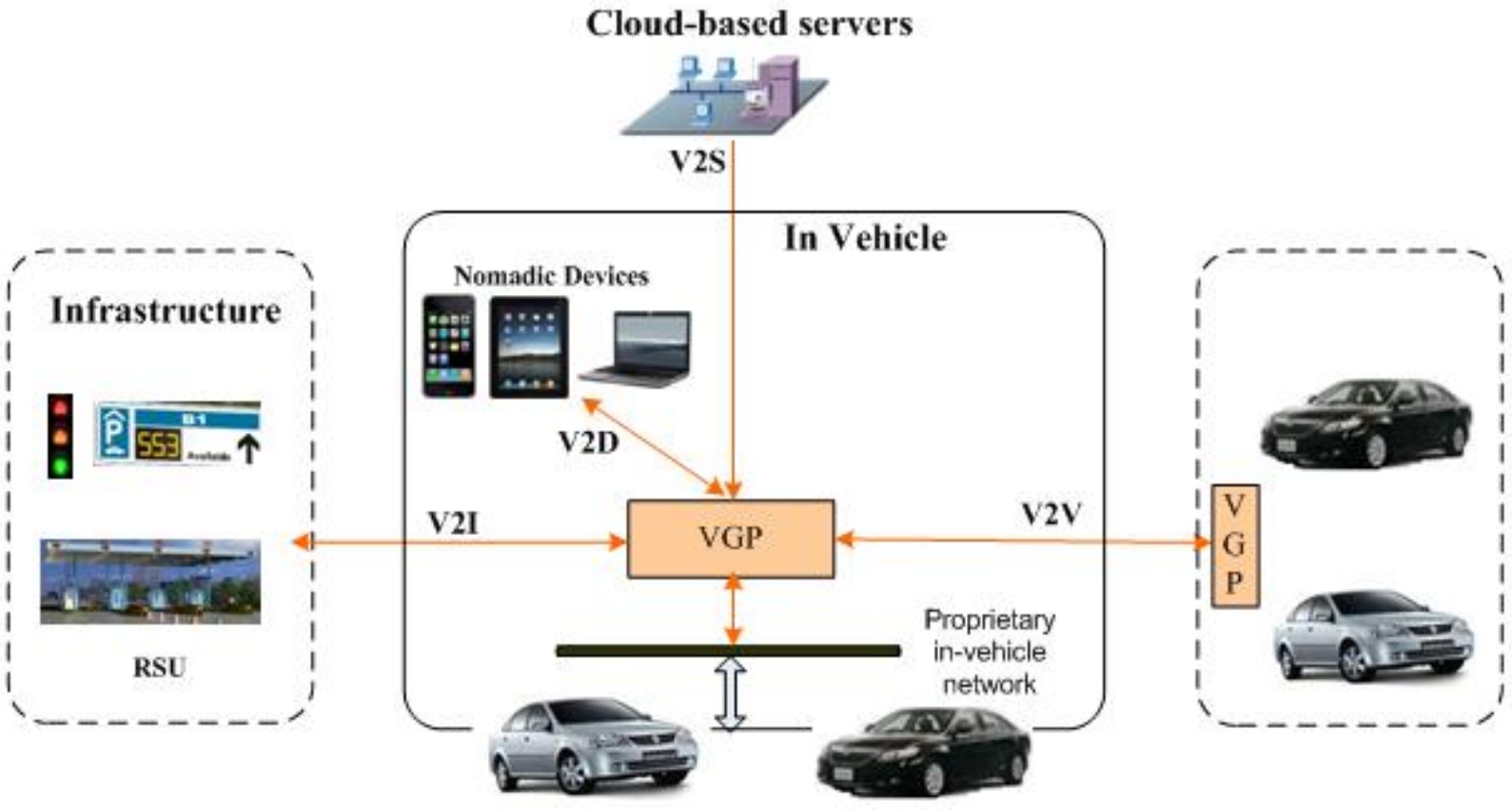
A smart vehicle terminal vision



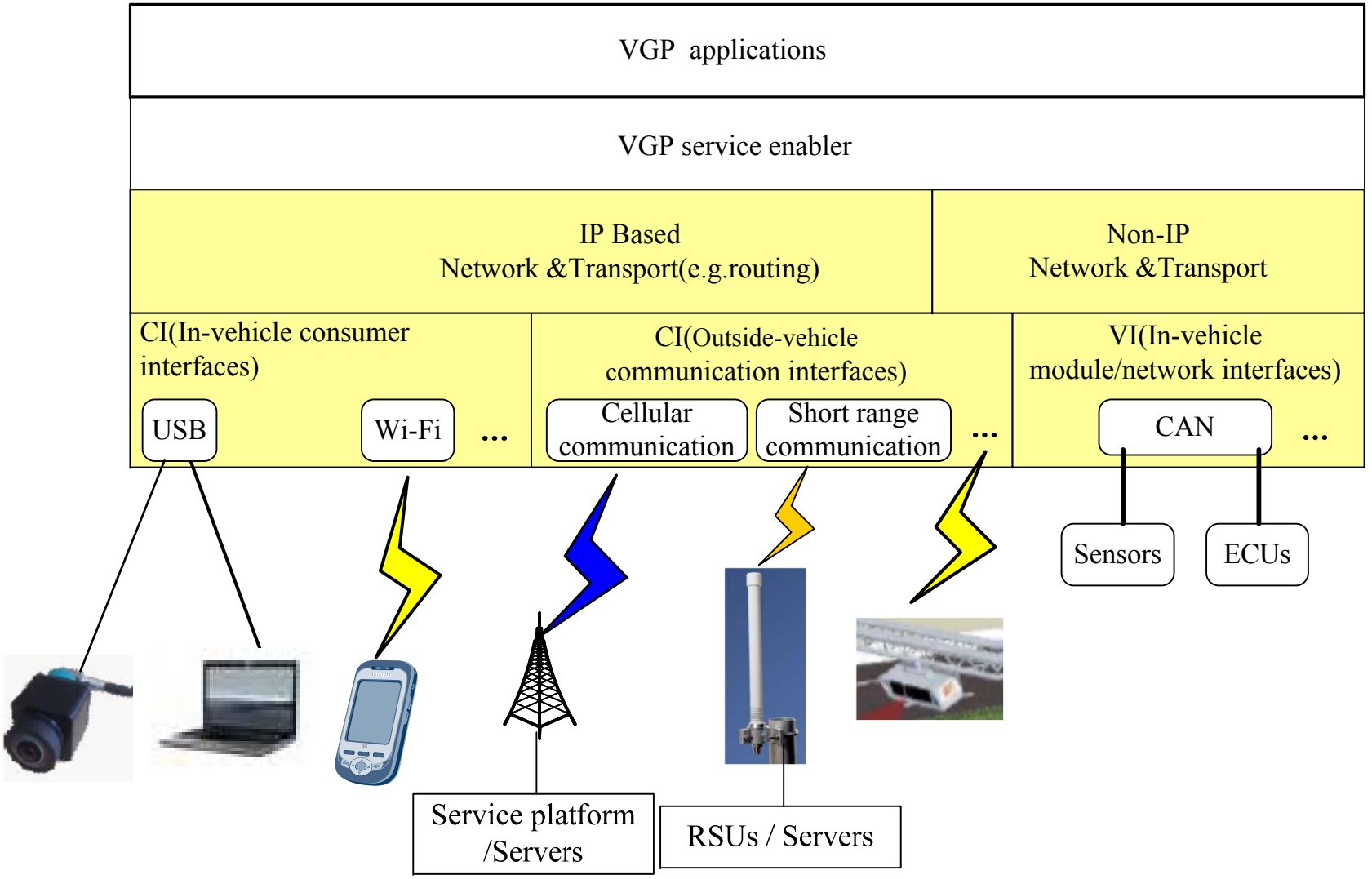
- ICT-enabled terminal helps to realize the automatic driving

Scenario of VG/VGP

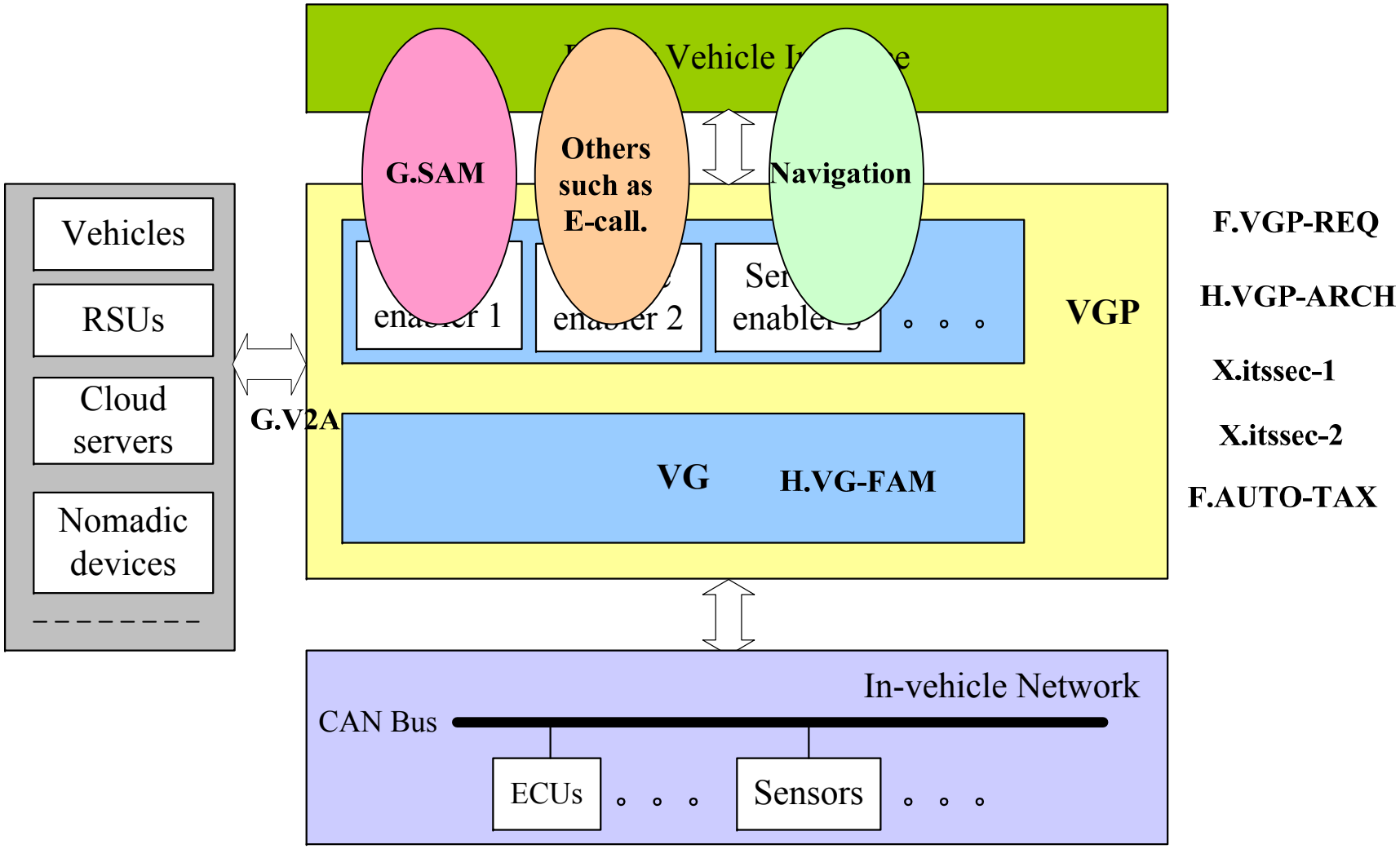
Different services use different communications, e.g. location services using GNSS, information service based on HTTP/SMTP protocol using 2G/3G/LTE, streaming and real time services using 802.11p, LTE D2D, ETC service using DSRC, security services such as anti-collision using the MM wave and IR, etc



Functional architecture model of vehicle gateway



Standards ongoing related with VGP in ITU-T



Acronym	Title
F.VGP-REQ	Service requirements and use cases of VGP
H.VGP-ARCH	Architecture and functional entities of Vehicle Gateway Platform
H.VG-FAM	Functional architecture model of vehicle gateway platforms
G.V2A	Communications interface between external applications and a Vehicle Gateway Platform
F.AUTO-TAX	Taxonomy for ICT-enabled motor vehicle automated driving systems
X.itssec-1	Software update capability for ITS communications devices
X.itssec-2	Security Guidelines for V2X Communication Systems
G.SAM	Mechanisms for managing the situational awareness of drivers

Relation of VG/VGP with Terminal

- **Vehicle Gateway (VG)** is a device(s) in a vehicle that enables real-time two-way communications between an object in the vehicle and another object which may be physically located either inside the vehicle or outside the vehicle (e.g. roadside station, cloud-based server, etc.). It provides standardized interfaces and protocols, communications across heterogeneous networks, optimized network selection based on application needs and network QoS, arbitration and integration of network communications, security, and switching network connections to maintain service continuity.
- **Vehicle Gateway Platform (VGP):** VGP is the collection of ICT hardware and software in a vehicle operating as an open platform to provide an integrated runtime environment for delivering the communications services of a VG. It may also provide higher layer communications services such as interaction with the driver through the Driver-Vehicle Interface and so on.

So, VGP is a conceptual terminal, a kind of functional architecture with maximum communication capabilities of a vehicle terminal. Vehicle terminal is an example execution of VGP.

Automatic driving & intelligent vehicle

- ‘Automated driving system’, ‘Vehicle terminal’, ‘Intelligent vehicle’
- ‘Smart terminal’ acts as a ‘Brain’. From the point of SAE J3016, the Level of automated driving system maybe judged by the intelligence of vehicle terminal.
- Without the help of ICT technology, the traditional automatic driving using GNSS and a variety of cameras, radar technology to identify traffic signs and anti-collision, is a primary ‘individual behavior’. As more and more vehicles with powerful functions appear, their behavior will be a kind of ‘society behavior’. Each vehicle should not only understand the traffic environment information, but also understands the purposes of concerned traffic participants, such as pedestrians, motorcycles and bicycles. It is required that each vehicle not only can ‘see’ and ‘hear’ nearby the road environment and traffic information, but also can ‘see’ and ‘talk’ each other the distance traffic information. ICT-enabled terminals will help them to comply with the rule of ‘vehicle society’, to make a trip planning earlier, and behave itself as a ‘civilized’ vehicle so to satisfy the hope of ‘human society’ .

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Thank you for your attention !