



The Networked Car: Boosting early IPv6 adoption

CVIS and GeoNet viewpoints

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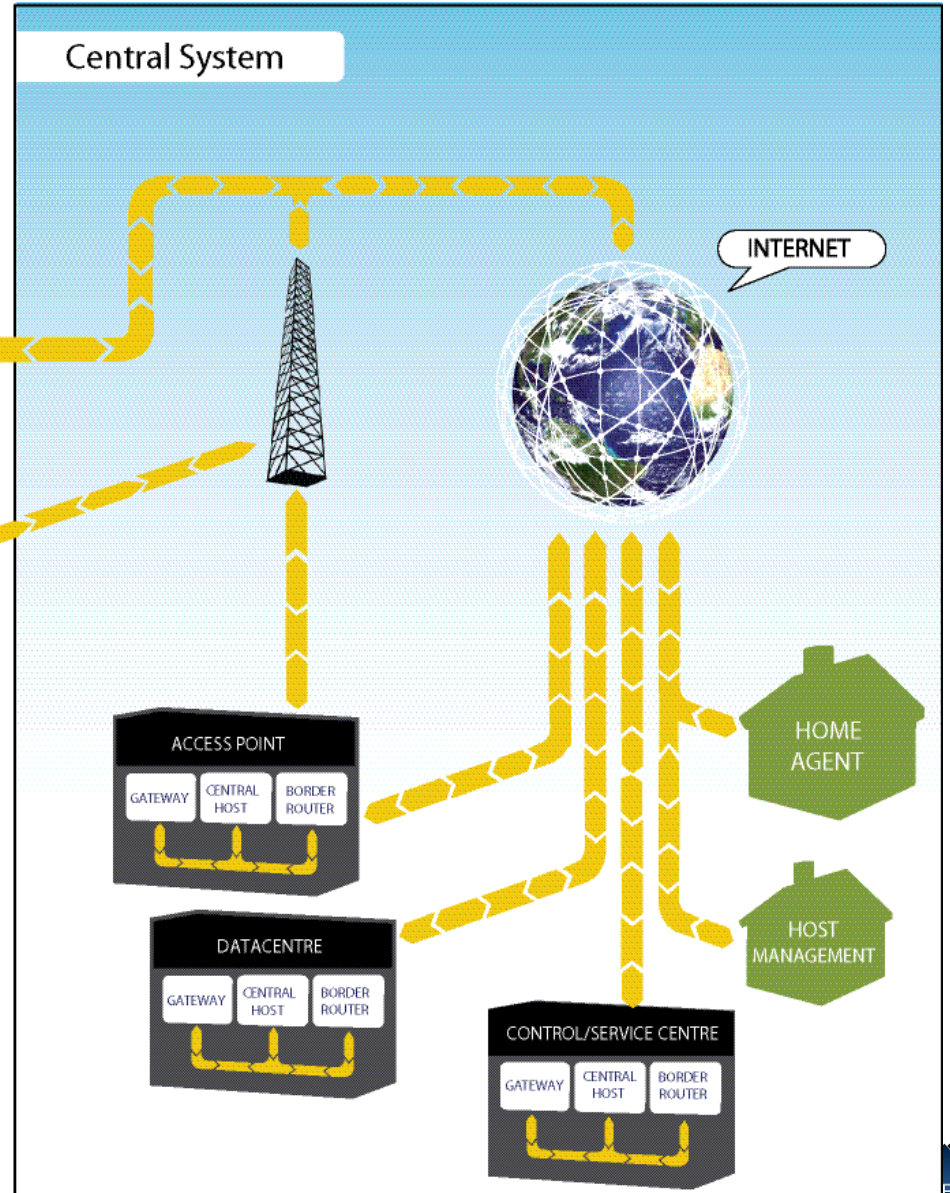
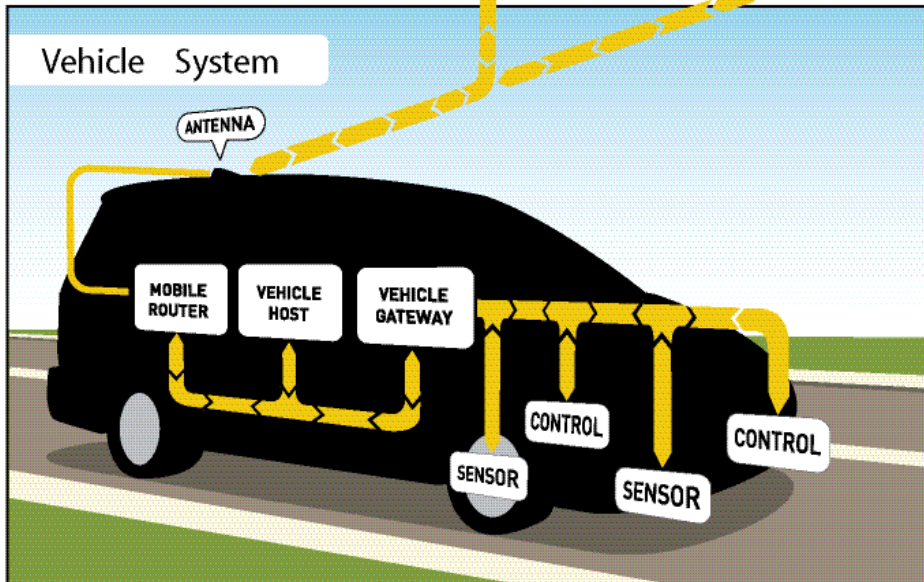
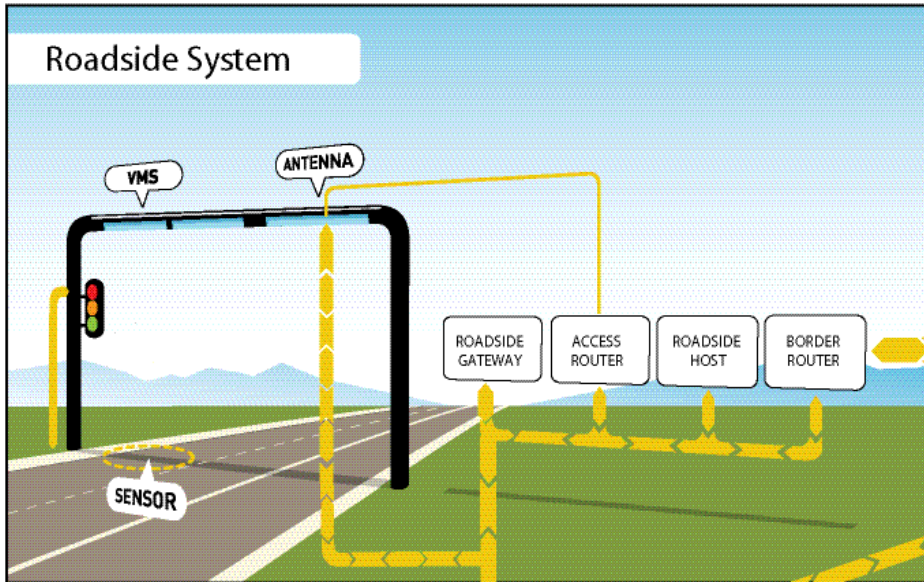
LARA (INRIA IMARA project-team & Ecoles des Mines Paris)

<http://www.lara.prd.fr>

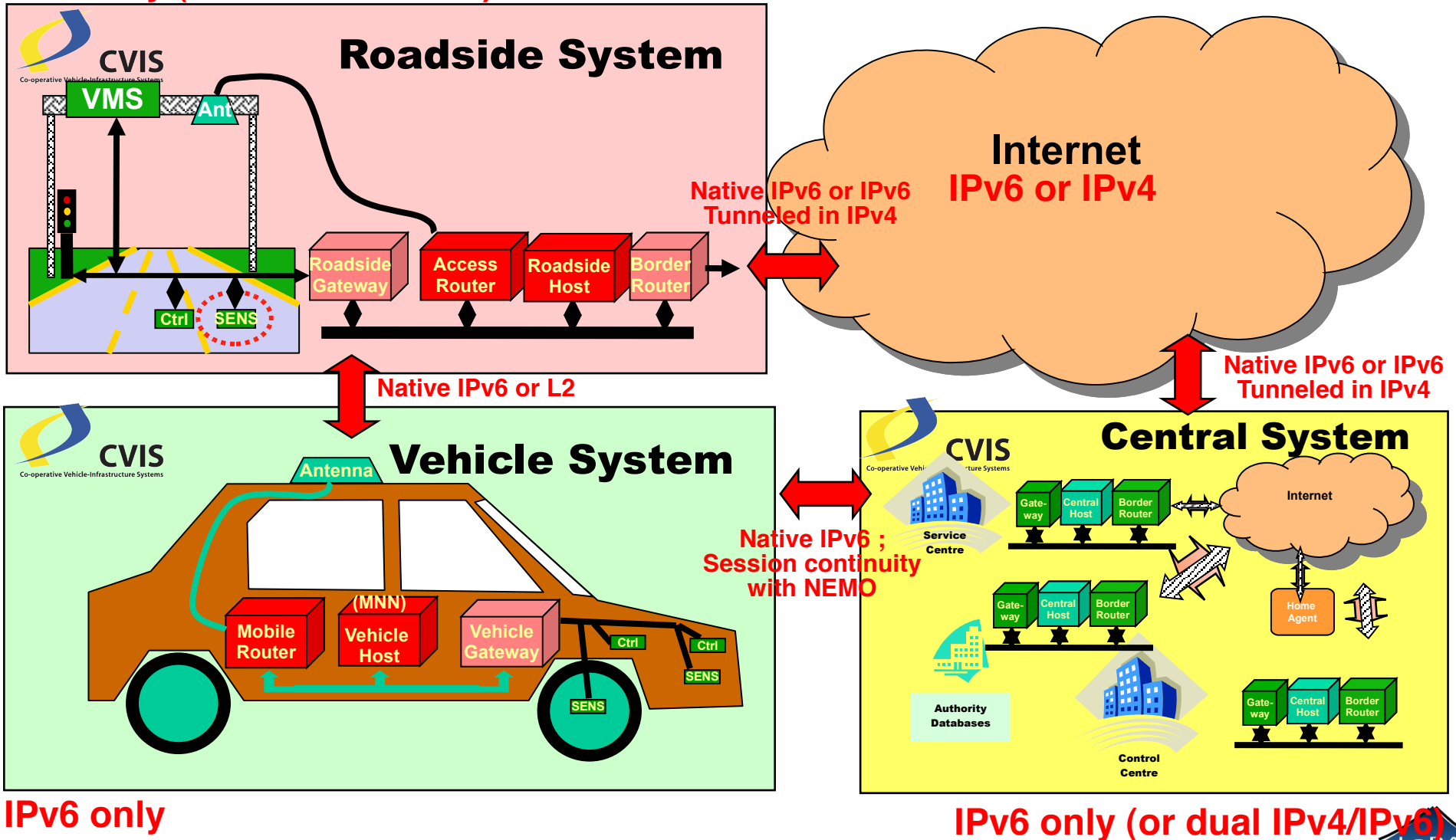
- ◆ Cooperative Vehicle-Infrastructure System
 - ◆ <http://www.cvisproject.org>
 - ◆ From Feb. 2006 till Feb. 2010
 - ◆ 61 partners / 12 countries / Total Budget: 41 Millions Euros

- ◆ Objectives
 - ◆ Develop, trial & demonstrate
 - ◆ **Inter-operable architecture for vehicular communications**
 - ◆ **Novel applications for:**
 - ◆ Cooperative traffic and road network monitoring
 - ◆ Cooperative road & traffic network management & control
 - ◆ Cooperative logistics & fleet management
 - ◆ Cooperative public transport & intermodality

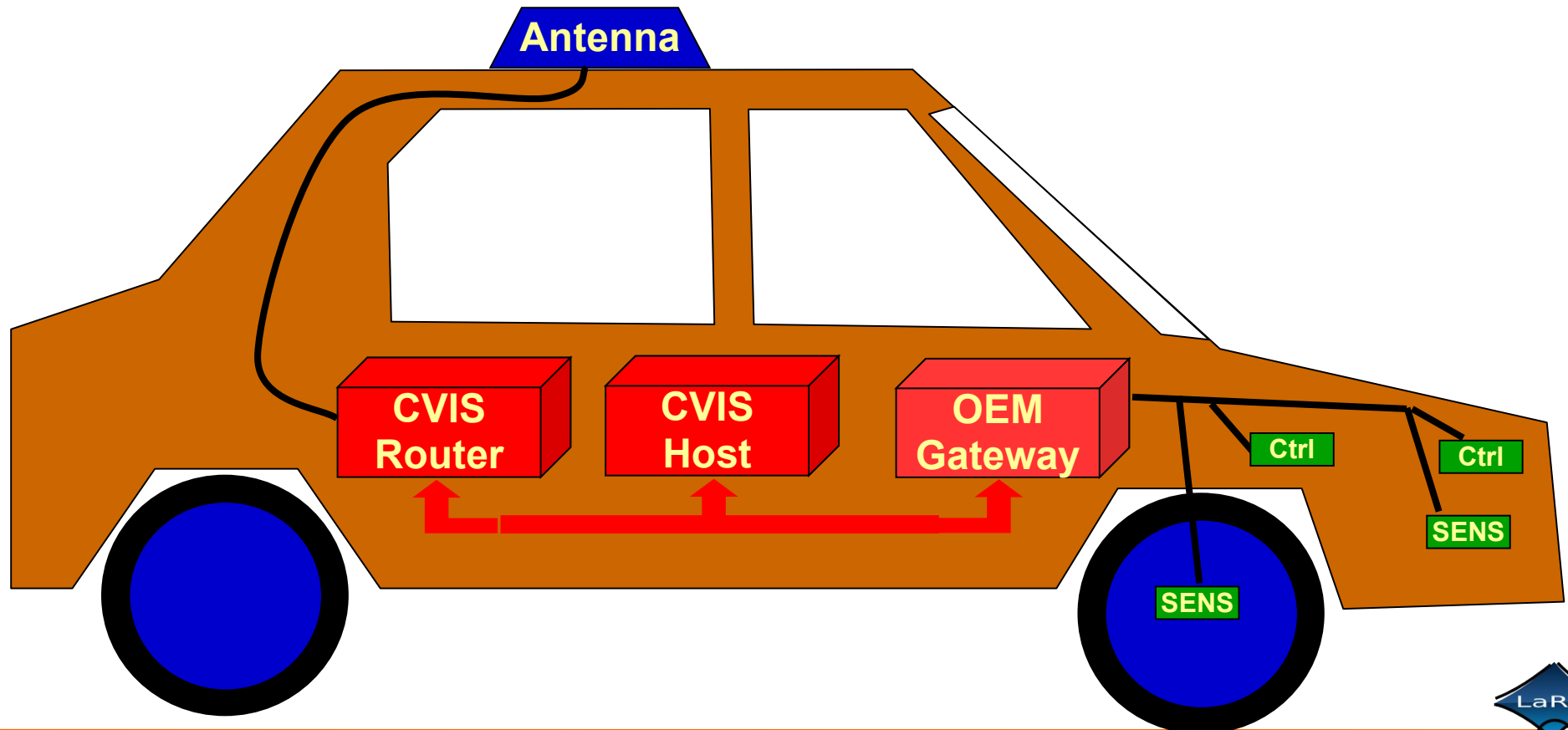
- ◆ Vision
 - ◆ Use and extend existing standards
 - ◆ Produce open design and software
 - ◆ Output intended to be reused by other EC projects



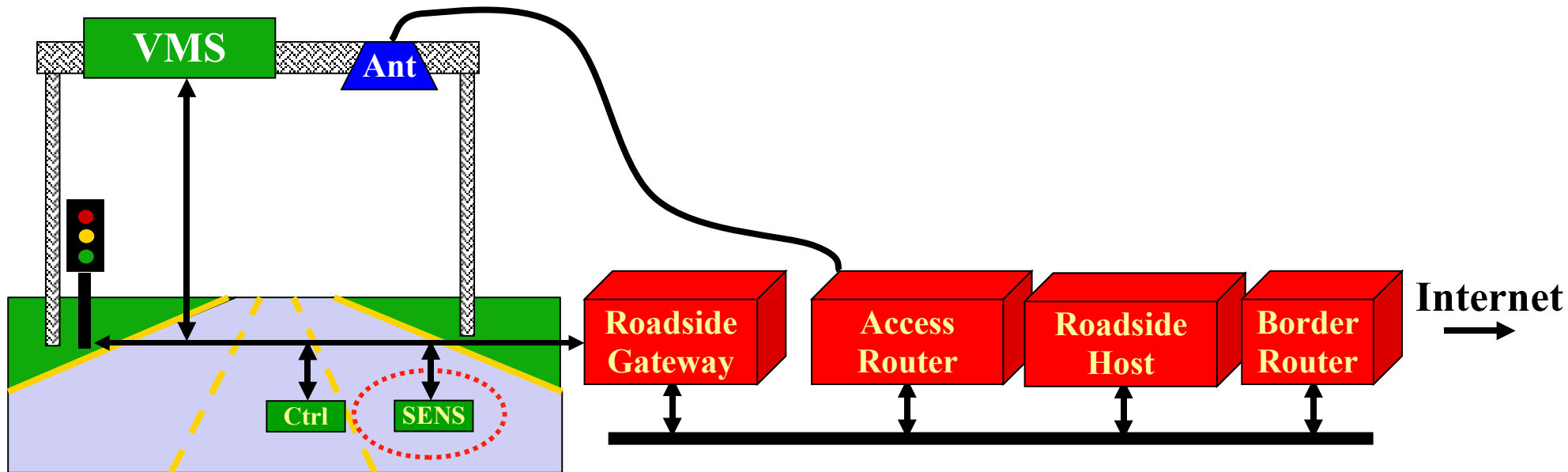
IPv6 only (or dual IPv4/IPv6)

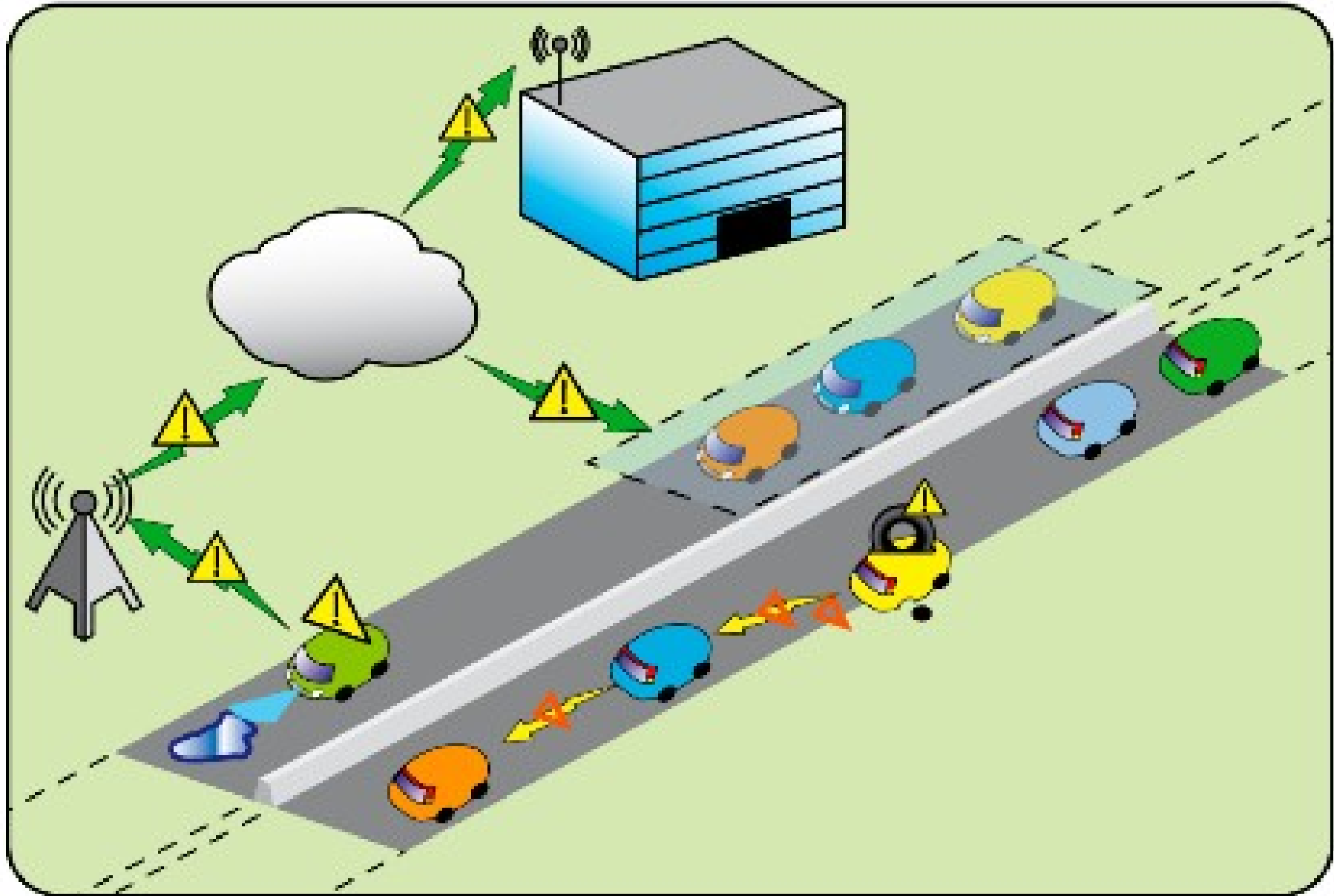


- ◆ In-vehicle **IPv6 subnet**
 - ◆ **CVIS Router**: Mobile Router maintaining Internet Access through several physical interfaces
 - ◆ **CVIS Host**: run dedicated ITS applications
 - ◆ **OEM Gateway**: between IPv6 and CAN

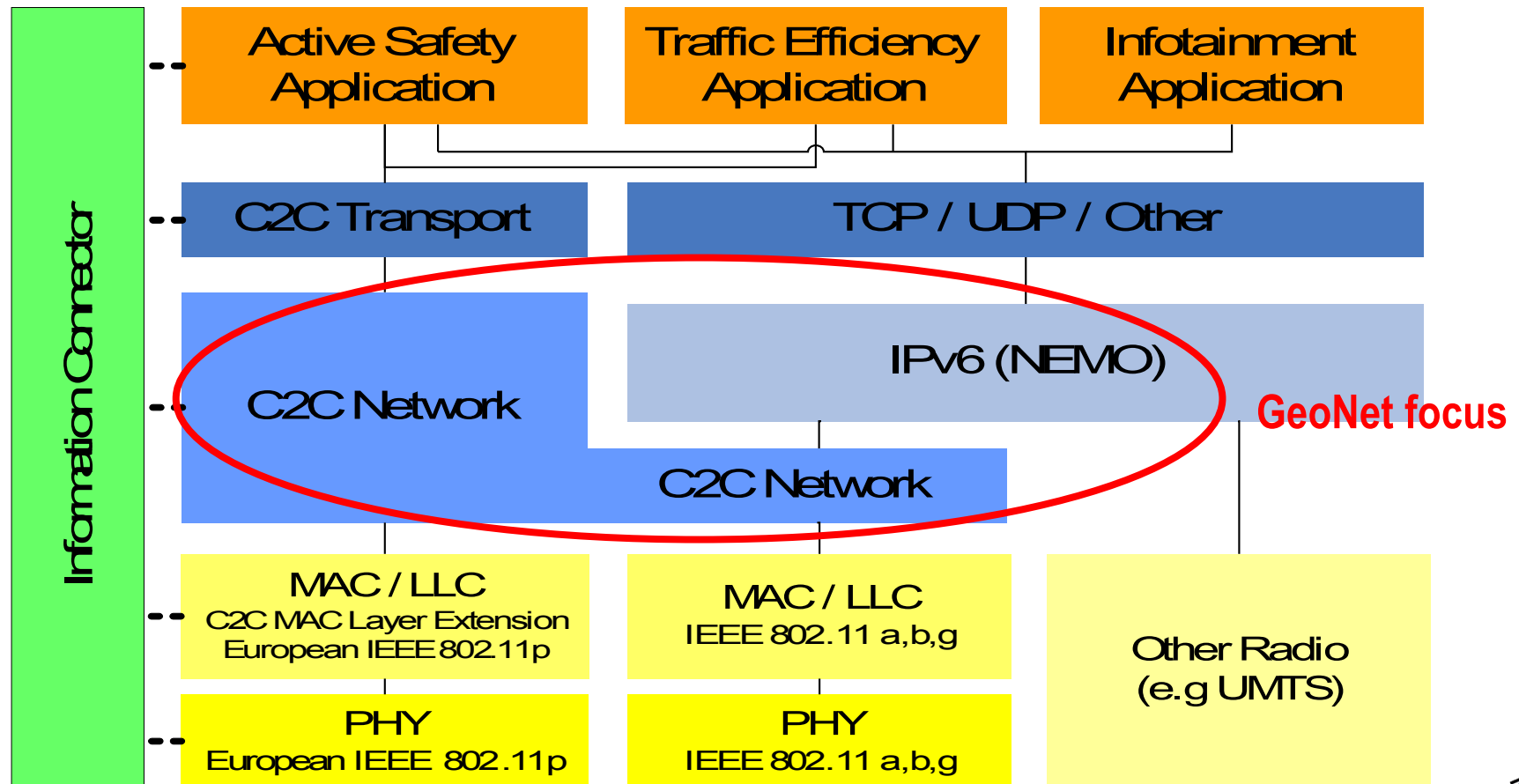


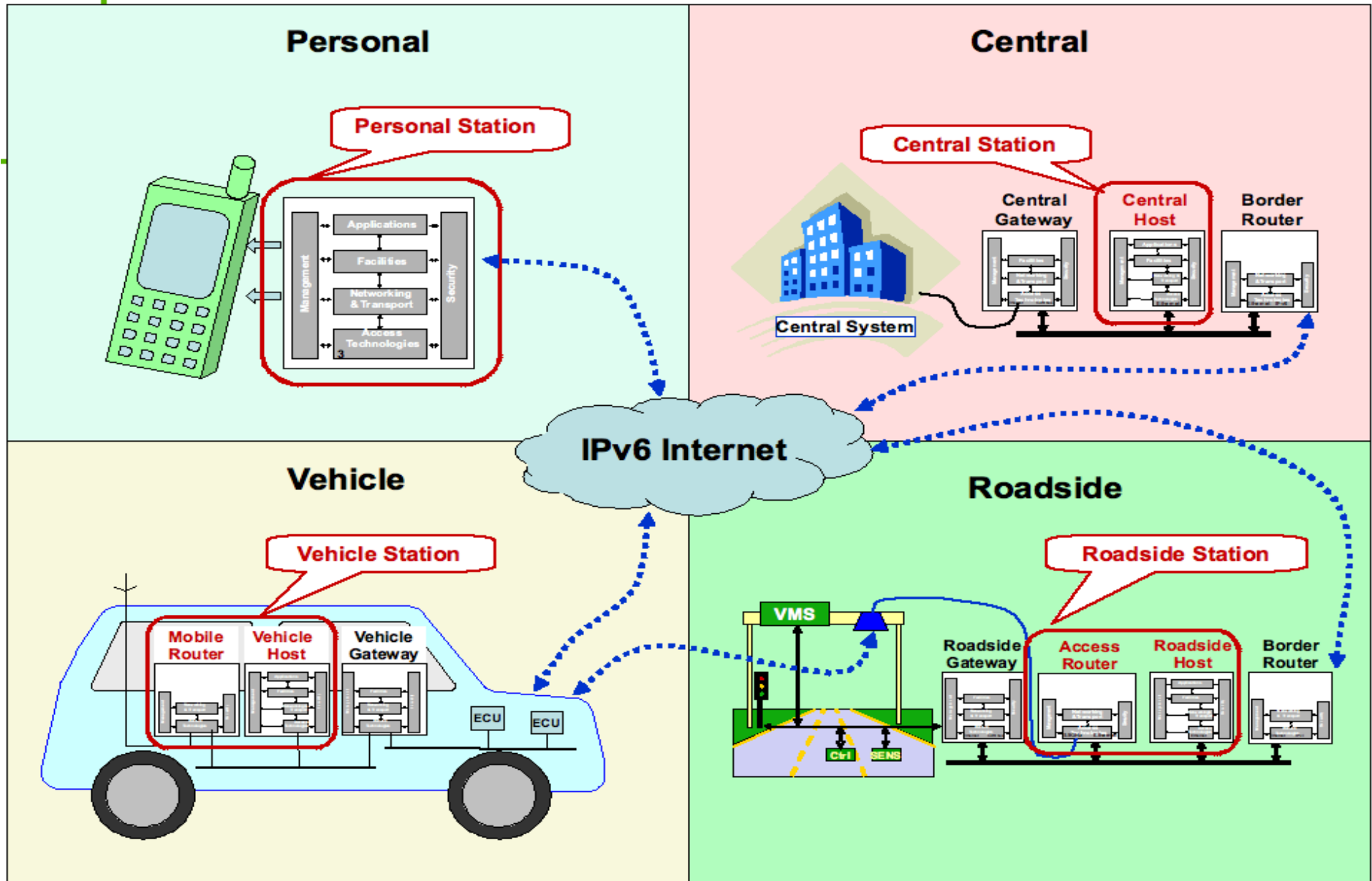
- ◆ Roadside IPv6 subnet
 - ◆ Roadside Host: Provides services to the vehicle
 - ◆ Access Router: Relays services to the vehicle
 - ◆ Border Router: Provides Internet access to the roadside
 - ◆ Roadside Gateway: between IPv6 and legacy roadside devices

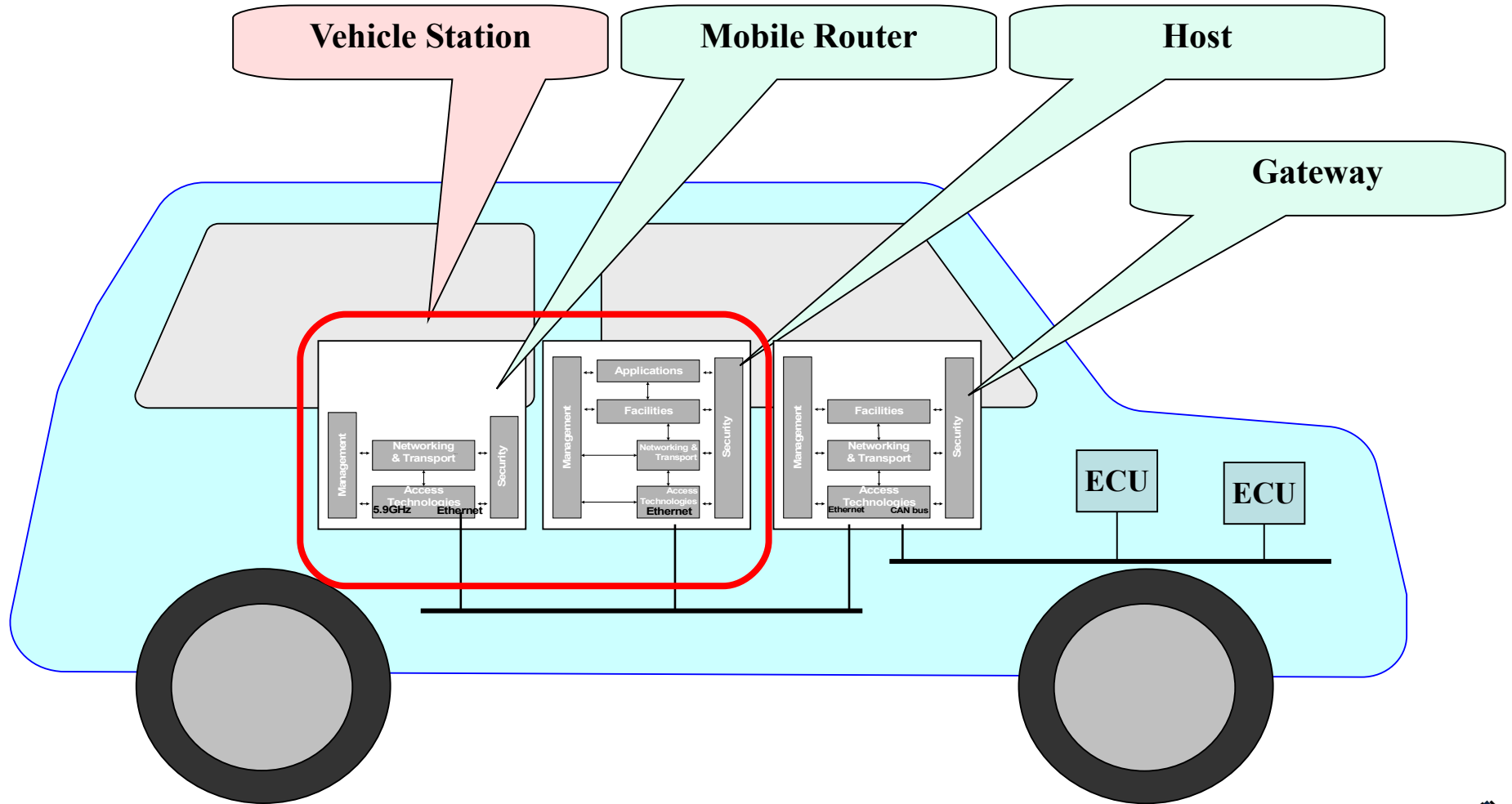




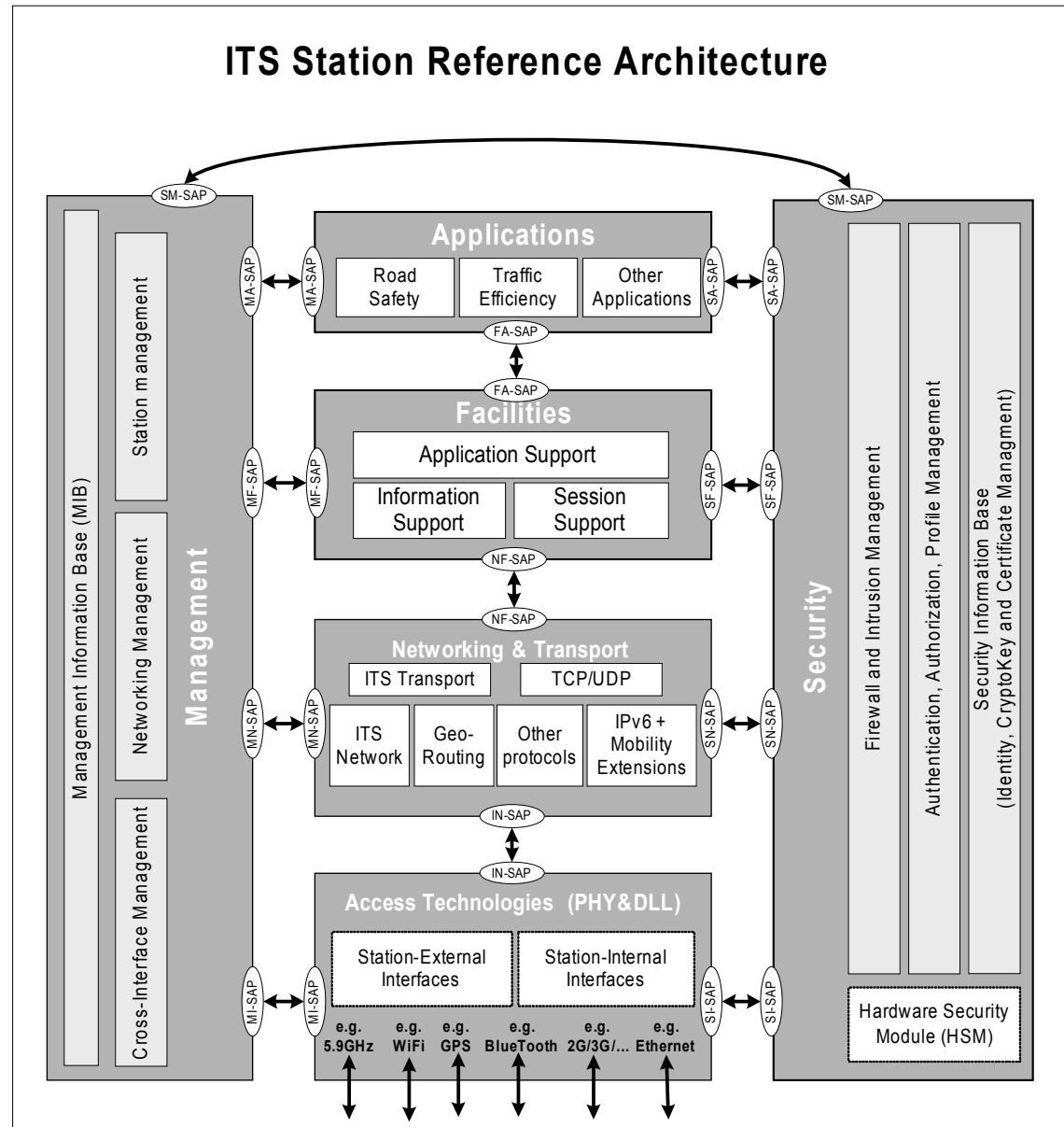
- ◆ <http://www.geonet-project.eu/>
- ◆ Design the concepts linking geographic addressing and routing with IPv6 mobility mechanisms
 - ◆ Combination of IPv6 (IETF) and C2C-CC standards







- ◆ Proposed European ITS Communication Architecture
- ◆ Joint development:
 - ◆ ETSI TC ITS
 - ◆ COMeSafety+ R&D projects



Conclusions

- ◆ IPv6 is the recommended version for ITS
 - ◆ Not an option for wide development of IP-based ITS applications
 - ◆ Scale to millions of vehicles, each requiring several IP addresses
 - ◆ ensures interoperability between V2V and V2I architectures
 - ◆ ensures interoperability between dedicated ITS applications and other Internet usages
 - ◆ will save costs and boost innovation
- ◆ IPv6 part of all architectures
 - ◆ ISO TC204 WG16 ([CALM](#))
 - ◆ [C2C-CC](#)'s IPv6 adaptation layer (FP7 [GeoNet](#))
 - ◆ [COMeSafety](#): European ITS Communication Architecture
 - ◆ [ETSI](#) TC ITS
 - ◆ WAVE
- ◆ Concept currently under validation
 - ◆ [CVIS](#): proof of concept of CALM
 - ◆ [GeoNet](#): combination of IPv6 with C2C-CC architecture

Conclusions: Lessons learned from CVIS

- ◆ Fact: ITS architectures will be based on IPv6
 - ◆ COMeSafety / ISO CALM / ETSI
 - ◆ Like it or not, all ITS systems to be reachable on the Internet must be compliant with IPv6
- ◆ ITS community mostly agree that IP means IPv6 (i.e. when IP applies)
- ◆ ITS community still lack understanding on what is IPv6 and training of their engineers
 - ◆ how to get trained on IPv6
 - ◆ where to get IPv6 access from
 - ◆ how to adapt IPv6 standards to ITS needs (e.g. geonetworking, addressing, security)
- ◆ Hands-on experience of the ITS sector largely not sufficient

- ◆ ISO TC 204 WG 16 (CALM): <http://www.calm.hu>
- ◆ CVIS: <http://www.cvisproject.org>
- ◆ COMeSafety: <http://www.comesafety.org>
- ◆ GeoNet: <http://www.geonet-project.eu/>
- ◆ IPv6 for ITS portal: <http://lara.inria.fr/ipv6/> (ongoing work)