

OSGi Alliance Community Event

The CVIS Project

Christer Larsson

cl@makewave.com

VP EMEA OSGi Alliance

CEO Makewave

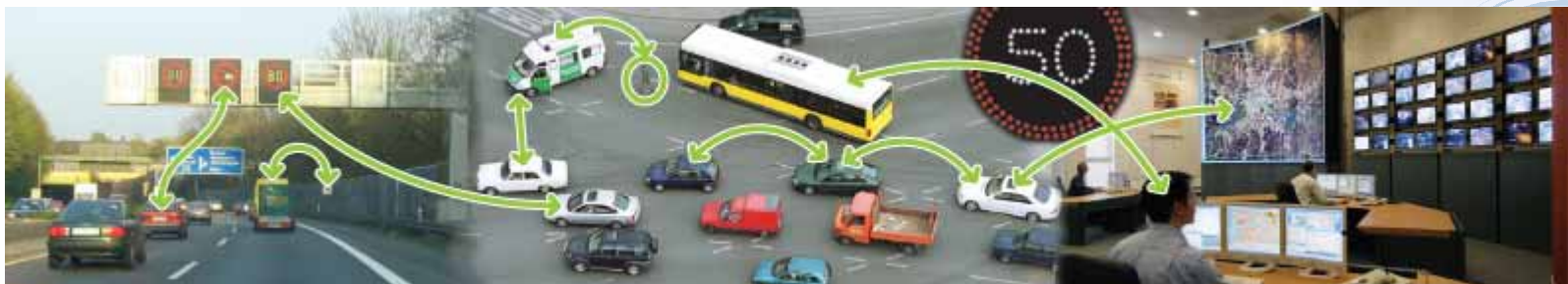
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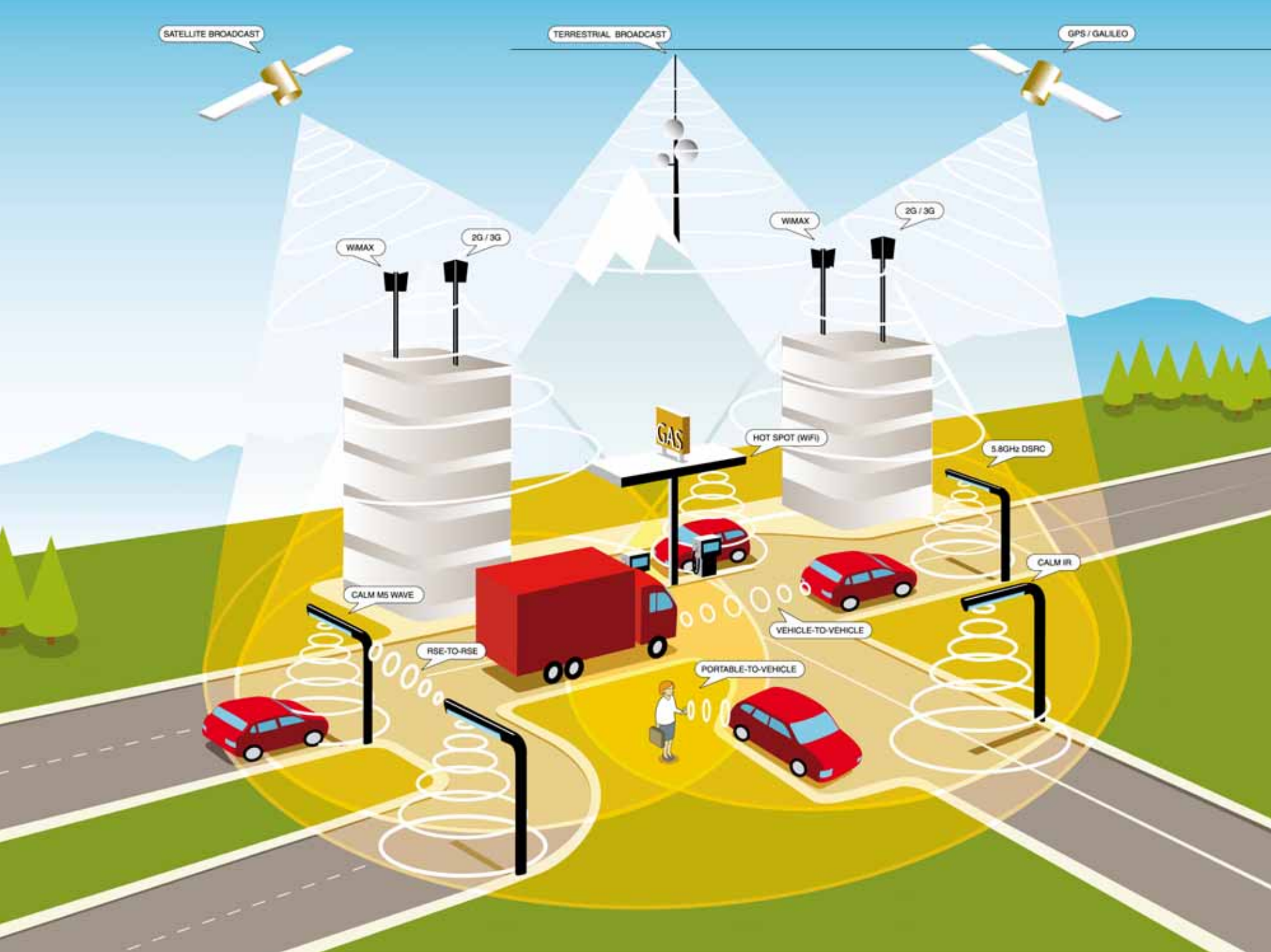


The CVIS Project

Cooperative Vehicle Infrastructure Systems

- The CVIS Vision:
 - “Create a wireless network between vehicles & infrastructure”
 - “Increase efficiency & safety through vehicle-infrastructure cooperation”





SATELLITE BROADCAST

TERRESTRIAL BROADCAST

GPS / GALILEO

WIMAX

2G / 3G

WIMAX

2G / 3G

GAS

HOT SPOT (WIFI)

5.8GHz DSRC

CALM M5 WAVE

RSE-TO-RSE

VEHICLE-TO-VEHICLE

PORTABLE-TO-VEHICLE

CALM IR

Cooperative Systems Development



Coordinator: **ERTICO**

Total budget: € 41 Million

EC contribution: € 22 Million

Consortium: 60 partners - 12 countries

Core Technologies



Coordinator: **Fiat Research Centre**

Total budget: € 38 Million

EC contribution: € 20,5 Million

Consortium: 51 partners - 12 countries

Car-Makers View



Coordinator: **AustriaTech**

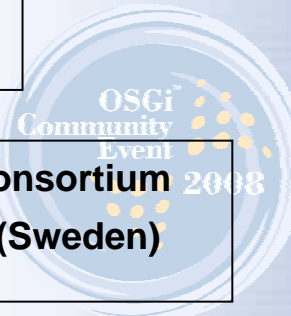
Total budget: € 16,8 Million

EC contribution: € 9,6 Million

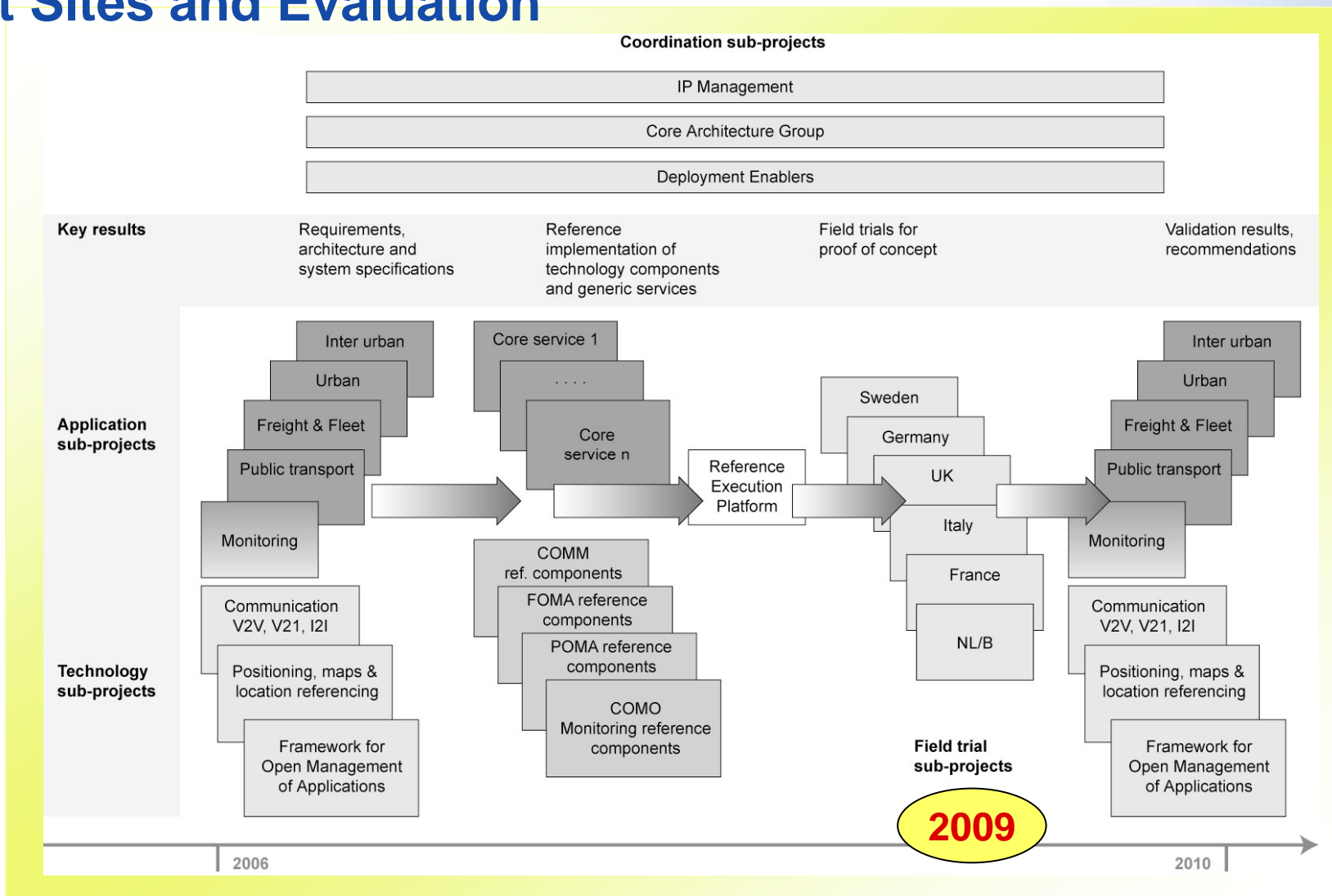
Consortium: 37 partners - 14 countries

Road-Operators View

Cooperation links to: **SISTER, SeVeCom, COMeSafety, Car-2-Car Communications Consortium (C2C-CC), Network on Wheels (NoW), INVENT, ACTIV (Germany), CVHS (UK), IVSS (Sweden)**



Test Sites and Evaluation



CVIS Project Objectives

- Create pre-requisite conditions for widespread take-up of cooperative vehicle-infrastructure systems & services
 - open, standards-based communications/positioning/networking platform for both in-vehicle and RSU
 - use all suitable comms infrastructure (existing & new)
 - continuous (IP) connection V2V, V2I
 - harmonised core application/service software **OSGi**
 - range of attractive services - safety, efficiency, user **OSGi**
 - positive business case for authorities, operators, service providers, manufacturers - and for user **OSGi**
 - sustainable deployment road-map, no show-stoppers **OSGi**



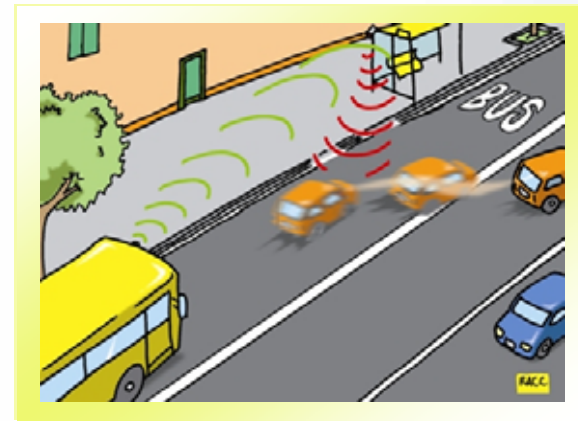
CVIS Applications



Cooperative Urban Applications

CURB focuses on the urban area, three applications can be distinguished:

- 1) **Traffic Control**
 - Priority Mechanism (e.g. emergency vehicles)
 - Intersection Speed Recommendations and Green Demands
- 2) **Traffic Management**
 - Strategic traffic management with dynamic routing services
- 3) **Public transport**
 - Interaction of private vehicles with PT (esp. lane sharing).



Cooperative Inter-Urban Applications

CINT focuses on the interurban environment, two applications can be distinguished:

- 1) **Co-operative Traveller Assistance (CTA)**
 - Provision of traffic information and rerouting advices to end users
 - Strategy planning and implementation for traffic managers and road operators
- 2) **Enhanced Driver Awareness (EDA)**
 - Provision of safety relevant traffic information to the end user



Cooperative Freight & Fleet Applications

CF&F is focussing on HGV and DGV transports, three application areas can be distinguished here:

1) **Dangerous Goods (DG) Application**

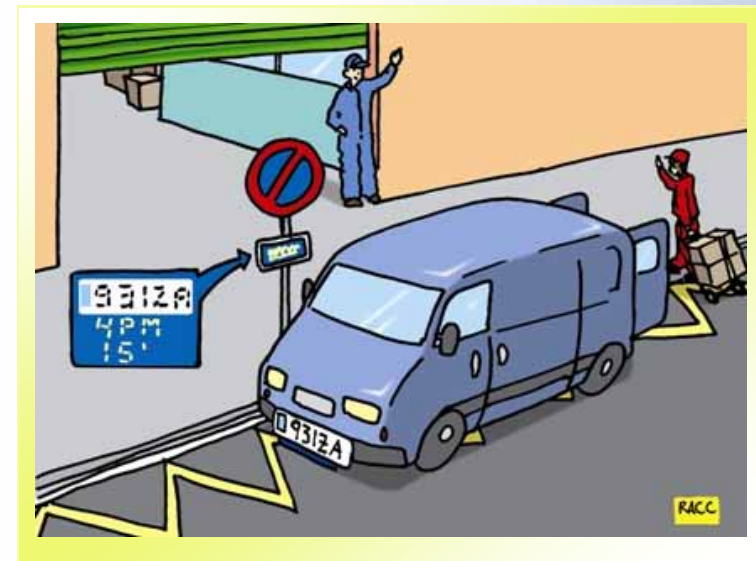
- Route guidance and network management for dangerous goods vehicles

2) **Parking Zone Application**

- Booking of urban parking zones and interurban resting areas

3) **Access Control Application**

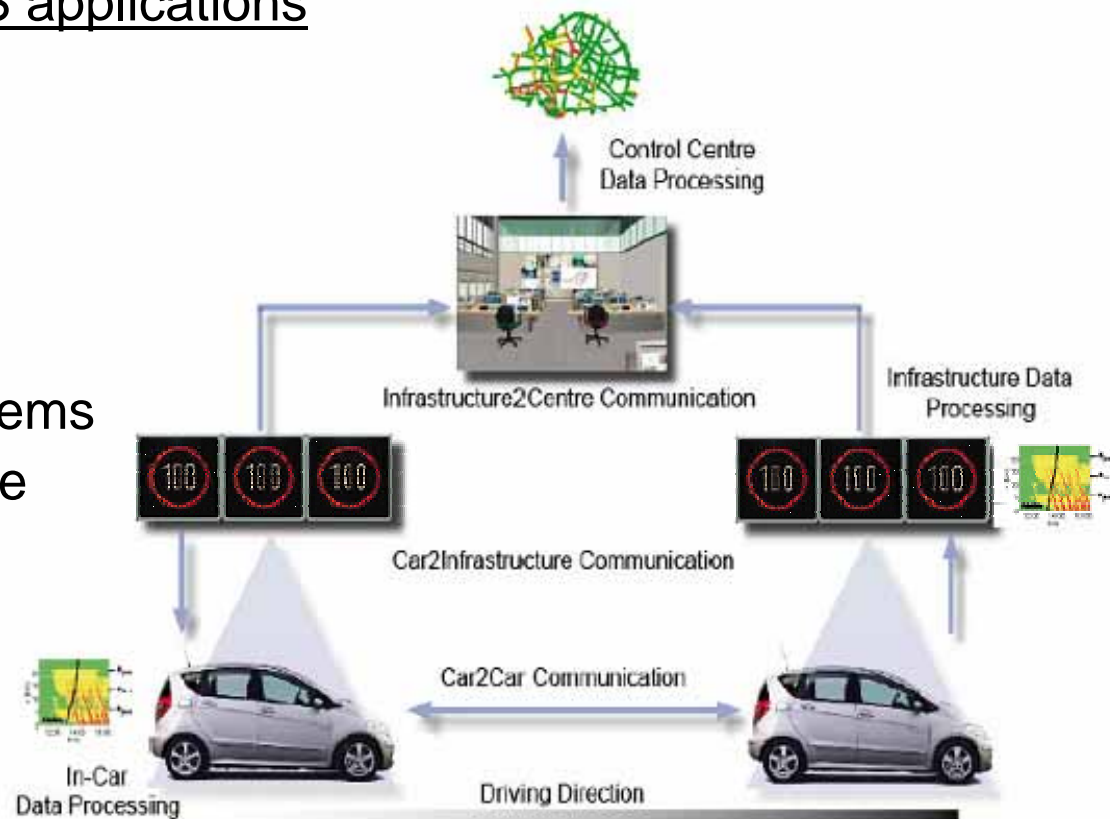
- Access Control for defined sensitive areas on basis of vehicle characteristics



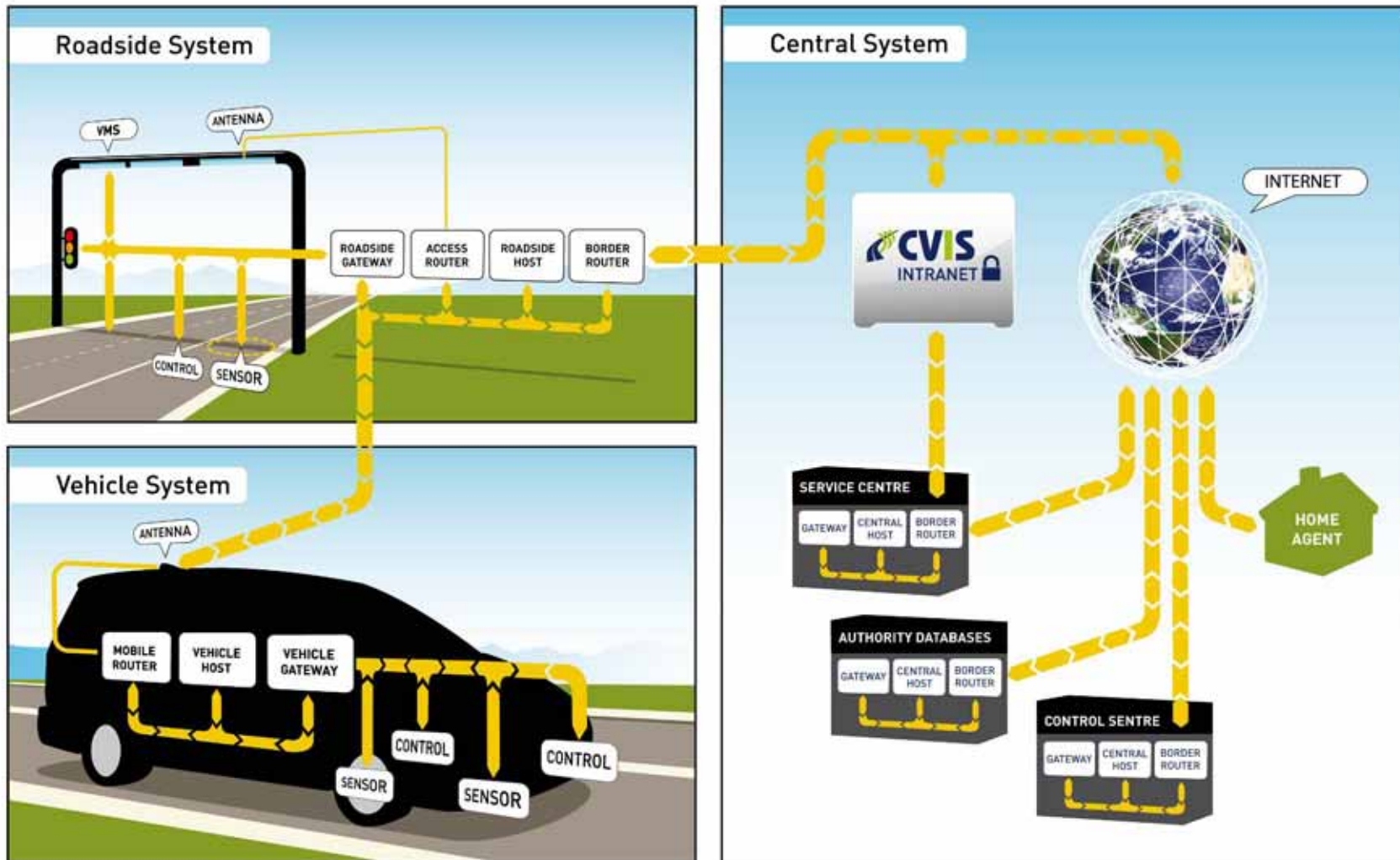
Cooperative Monitoring

COMO provides merged traffic data on basis of mobile (XFCD/EFCD) and stationary (e.g. loops) detectors for all CVIS applications

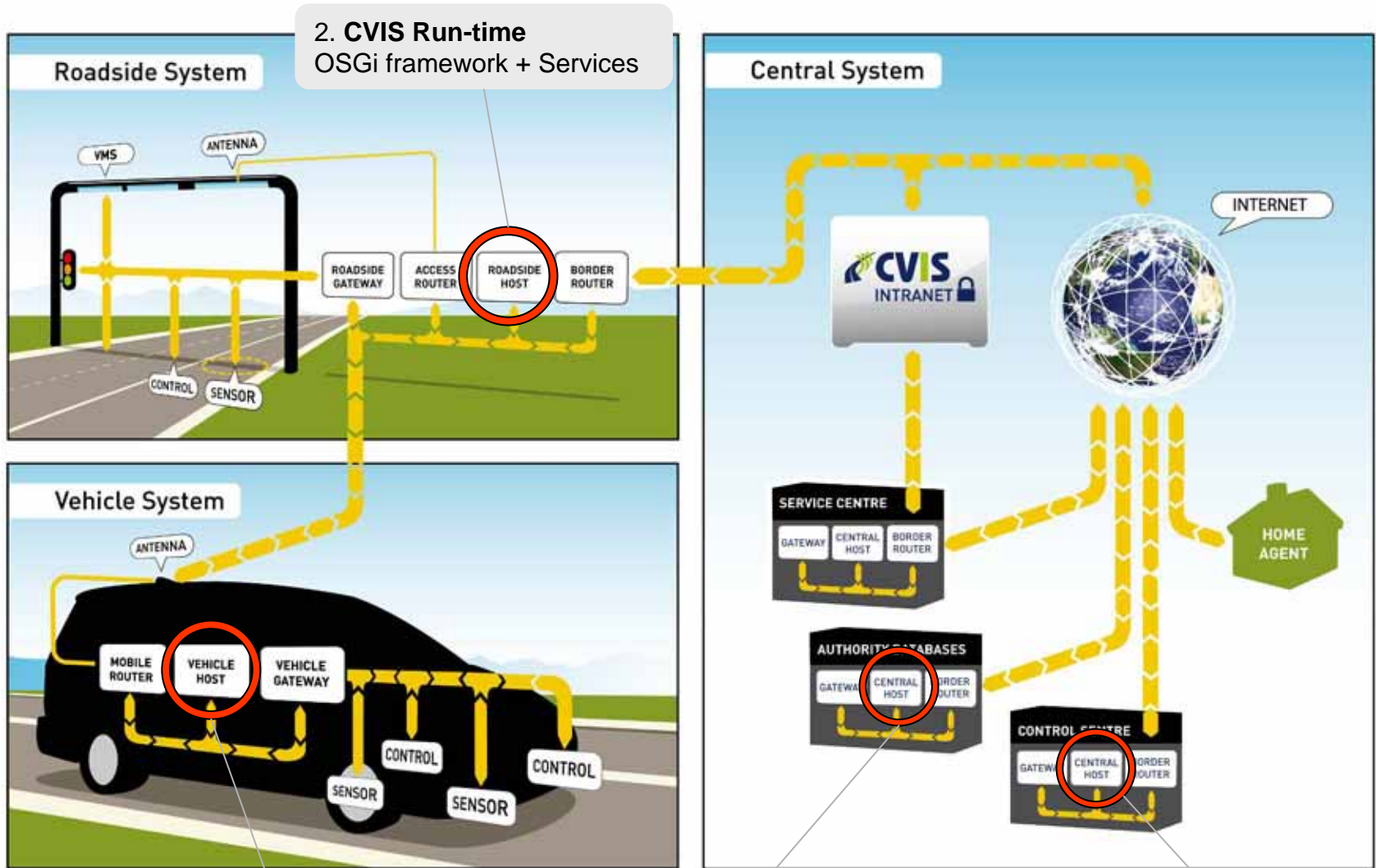
- Network monitoring
- Incident and hazard detection
- Virtual loop detection for traffic control systems
- Local/area traffic state



CVIS Top Level Architecture



CVIS Top Level Architecture



1. CVIS Run-time OSGi framework + Services

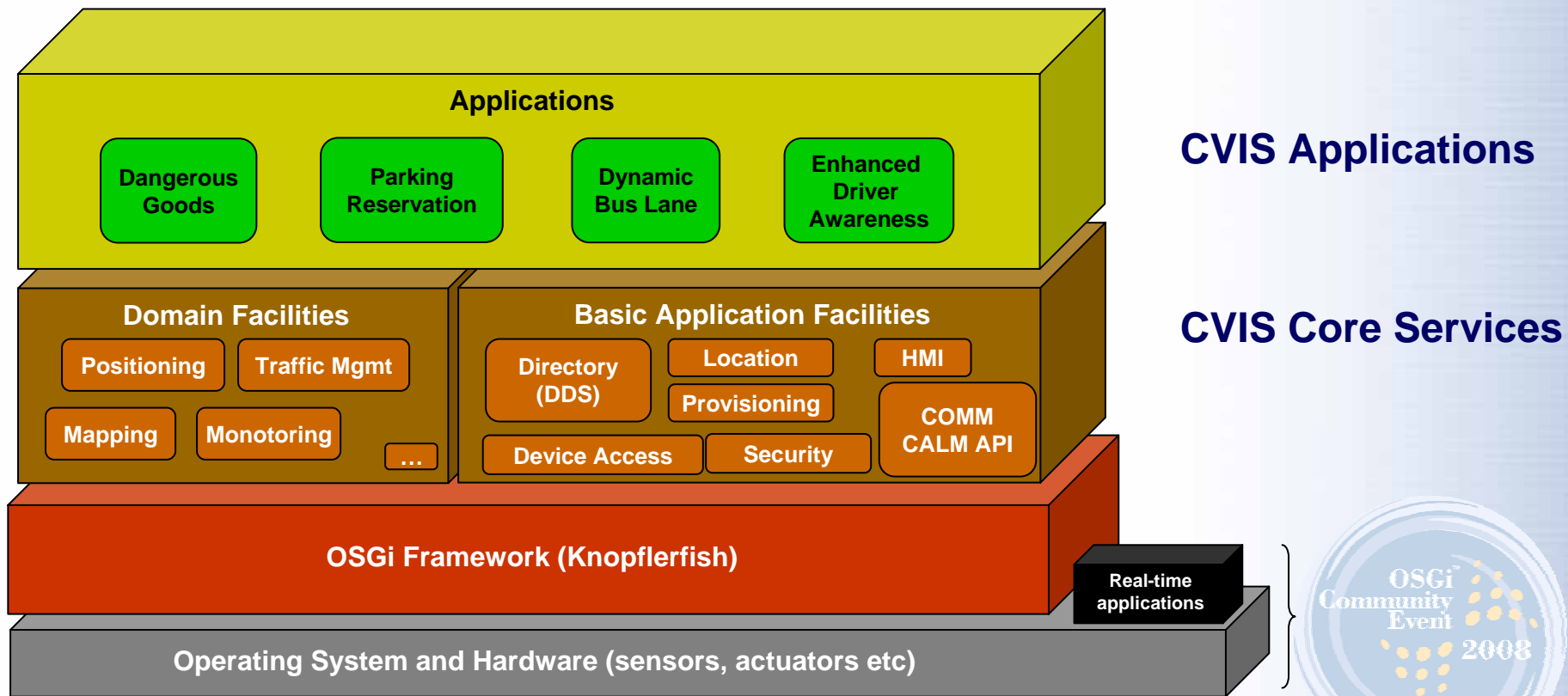
4. CVIS Security Security functions

3. CVIS Management Centre OSGi Deployment & Provisioning

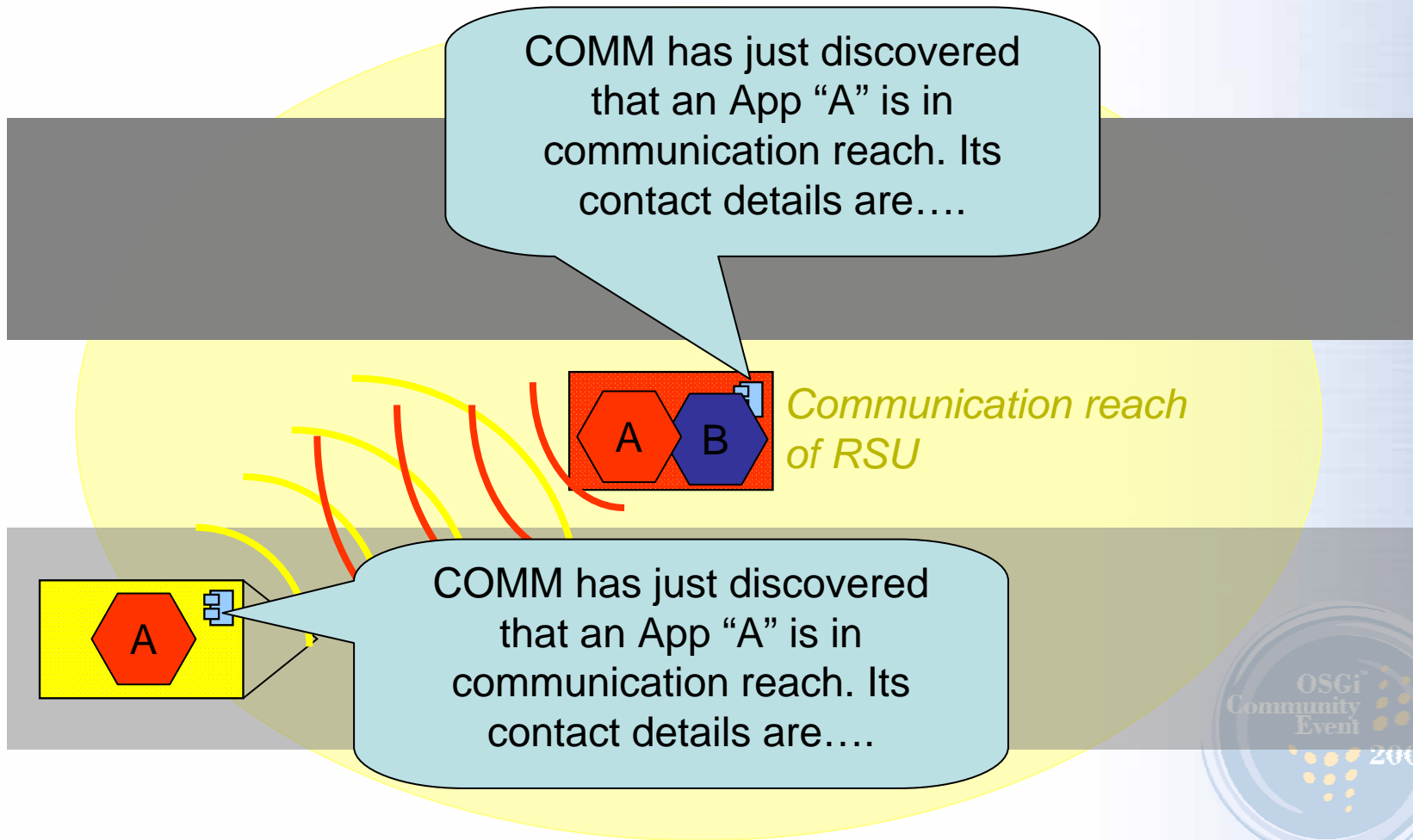
CVIS Application Run-time Environment

- It is OSGi based thereby:
 - Harmonized, capable of hosting a range of attractive services, can enable positive business cases for all stake-holders, with a sustainable deployment road-map.
- The CVIS core technologies partners are jointly adding
 - CVIS Core Services
 - CVIS Domain Facilites
- This creates the right environment for CVIS Application Development
- Communication is key, CALM (DSRC + WAN, IPv6)

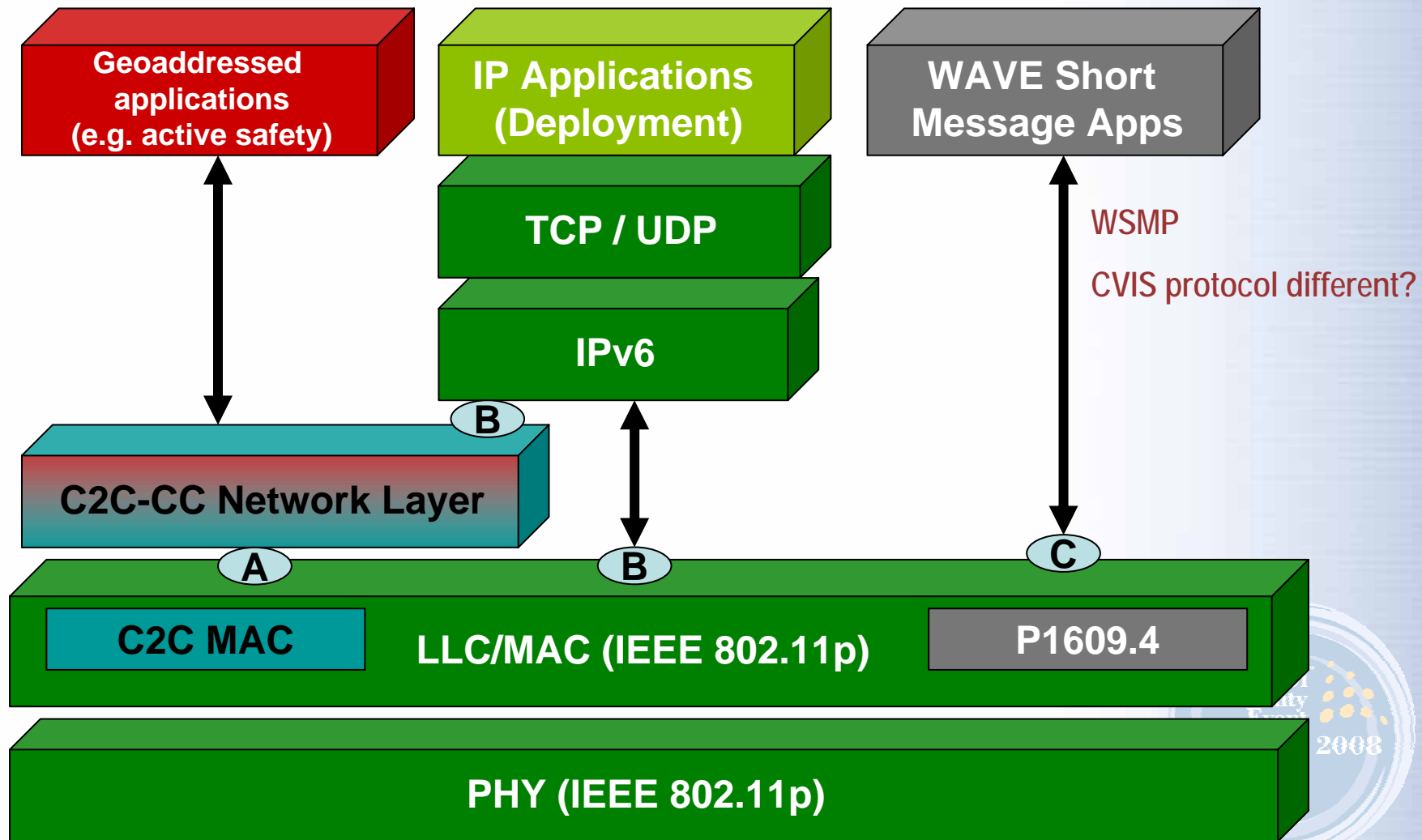
The CVIS Application Run-time Environment



Communication Services (CALM)



CALM M5: C2C-CC & WAVE



Communication Services (CALM)

- CALM Connection Service
 - services for setting up communication channels between CVIS hosts, either using WAN (3G), or P2P (CALM)
 - Stream or Datagram, extends org.osgi.service.connection
- CALM Data Broadcast Service
 - services for broadcasting data using CALM Fast
 - Uses EventAdmin to distribute CALM events locally
- CALM Service Advertisement:
 - announcing & establishing P2P connections using broadcast.
 - E.g. “Hello, I’m here you can reach me at: calm://123:80”
- ALL communication is using IPv6 !



Deployment & Provisioning

- Service Deployment
 - which facilitates making a service available in a CVIS system via a host management centre.
- Service Provisioning
 - which facilitates life cycle management of OSGi based applications using remote software download mechanisms. Limited support of native management may also be supported.
 - Based on the results on the GST project
 - OMA-DM, MEG



Distributed Directory Service

- Discovery function
 - Yellow Pages for a CVIS system
- Allows applications to search for other applications
 - Search based on criteria
 - Applications in an area
 - Applications in vehicles carrying (a particular class of) dangerous goods;
 - Applications in roadside systems in a particular area;
 - Applications in roadside systems along a particular road segment.



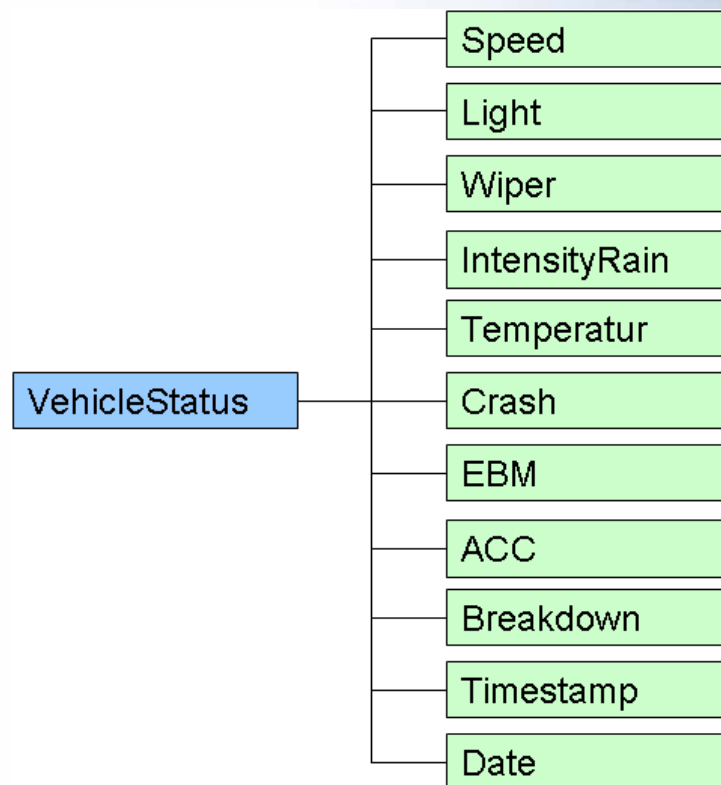
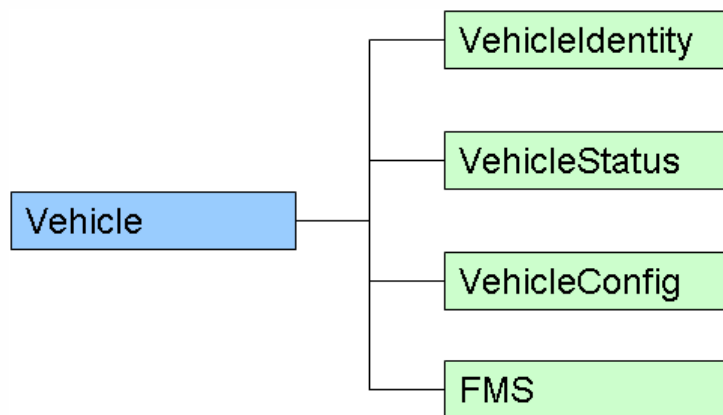
Security

- Security for CVIS Applications
- Built on GST Security model
 - End-user authentication, authorization. incl. distributed authorization and single sign on and federated identities.
 - Secure communications between a terminal and a back-office service



Local Device Tree (LDT)

- Service to get access to sensor related status information like speed, GPS position, etc.
- The vehicle LDT is organized in a tree structure



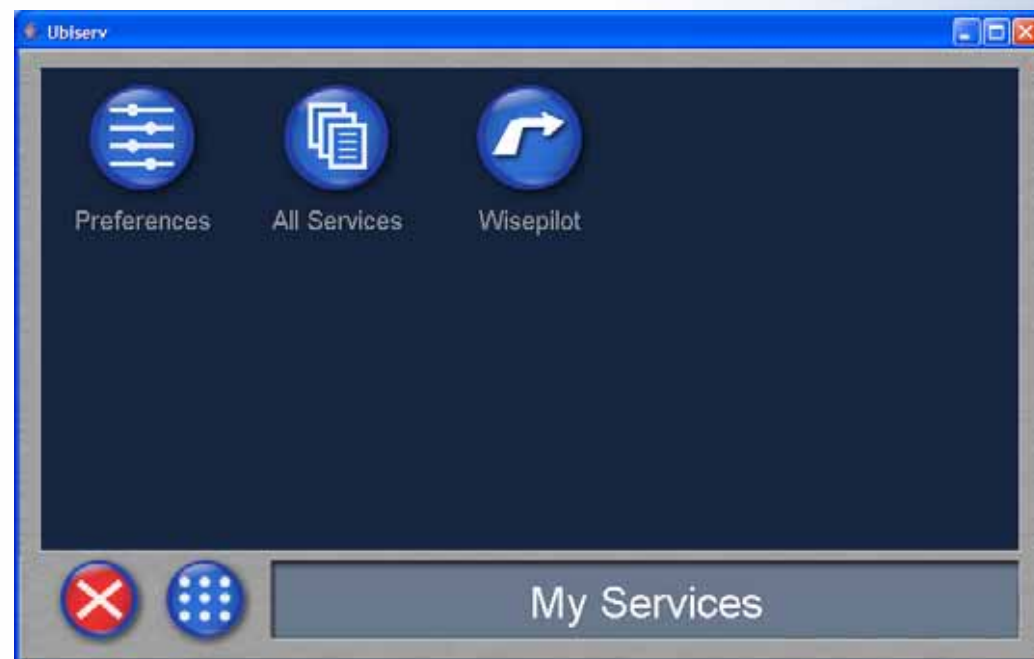
Location API

- Provides access to Location related functions
- Based on JSR-179:
 - Location API for J2ME
- OSGi-fied
 - Turned into a service, c.f. Connection API



HMI / Application Manager

- The Application manager is included as a useful tool for building application HMI:s
- Uses the Whiteboard pattern.
- Applications registers an ApplicationView and gets called upon the AM, e.g. `hasFocus()`.



Summary

- The CVIS project is defining an architecture for cooperative vehicle infrastructure systems.
- P2P Communication between vehicles and road-side equipment is central
- CVIS is using OSGi as one of its key technologies



Thank you for your attention

