# COMeSafety
# Specific Support Action

## Towards a Common
## European Communication Architecture
## for Cooperative Systems

## Current Status, Major Issues, Next Steps
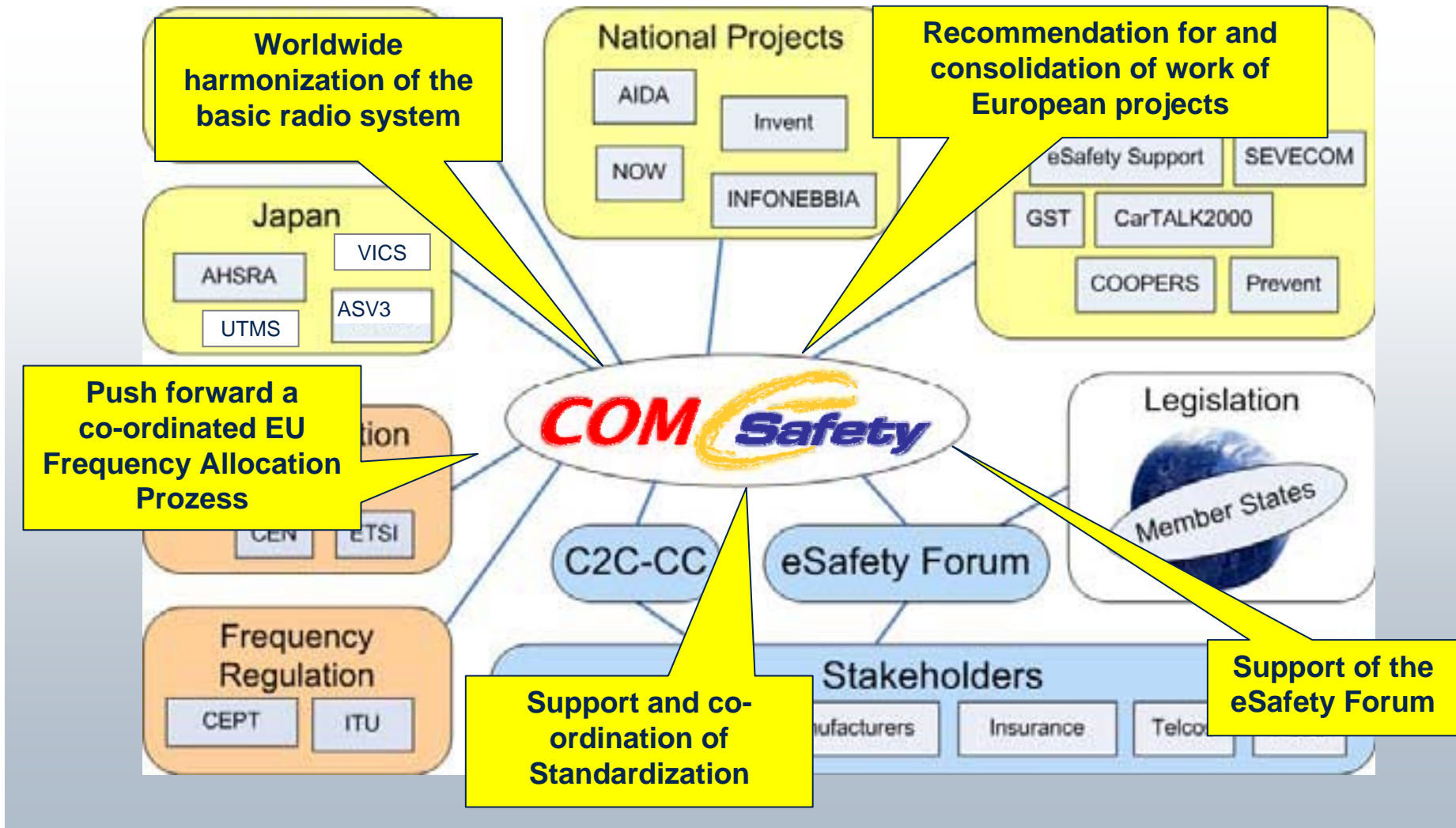
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**BMW Group Research and Technology**

**ITU Fully Networked Car Workshop, Geneva, Switzerland**

**7th of March 2007**

# Contents

- ## Motivation

- ## ONE common communication architecture ?

  - ### What for exactly ? Methodology ?

- ## Major issues

  - ### Convergence of CALM and C2C-CC architecture

  - ### How to define the harmonization process

  - ### Level of detail for the common architecture

- ## Conclusions and next steps

- ## Discussion

**Information Society**
Technologies



Worldwide harmonization of the basic radio system

National Projects
AIDA
Invent
NOW
INFONEBBIA

Recommendation for and consolidation of work of European projects

eSafety Support    SEVECOM
GST    CarTALK2000
COOPERS    Prevent

Japan
AHSRA
VICS
ASV3
UTMS

Push forward a co-ordinated EU Frequency Allocation Prozess

CEN    ETSI

Frequency Regulation
CEPT    ITU

COM Safety

C2C-CC    eSafety Forum

Legislation
Member States

Support and co-ordination of Standardization

Stakeholders
Manufacturers    Insurance    Telco

Support of the eSafety Forum

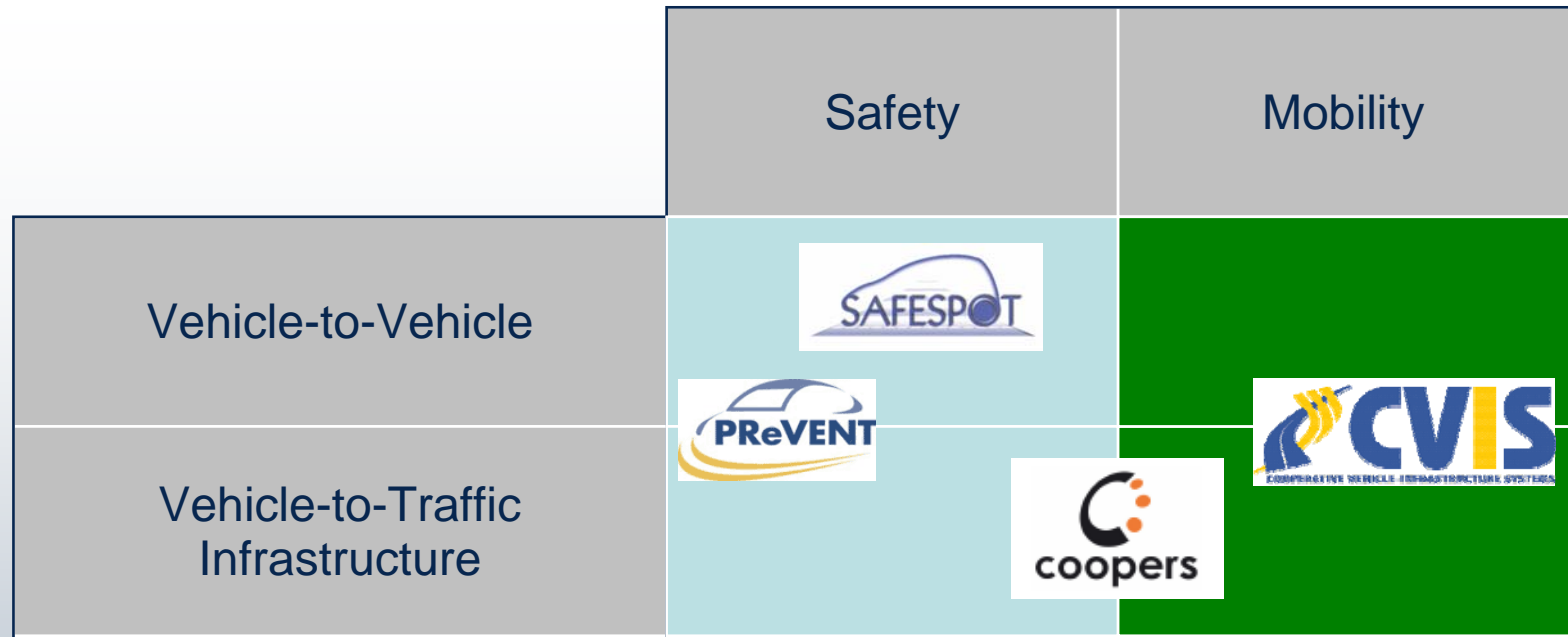## Numerous Systems and Standards are under Construction…



- A variety of EU and national projects elaborate
  - Protocol Architectures,
  - System Architectures,
  - High-Level Architectures .......

- Do we really need yet another Communication - Architecture ?

  Yes, because a comprehensive framework is needed to enable individually developed components to cooperate easily

|  | Safety | Mobility |
|---|---|---|
| Vehicle-to-Vehicle | SAFESPOT | |
| Vehicle-to-Traffic Infrastructure | PReVENT / coopers | CVIS |

Interoperability through standardized protocols, interfaces, data formats etc.
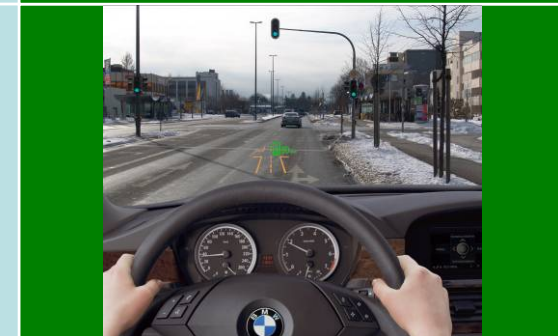
Enabled and facilitated by architectural framework.

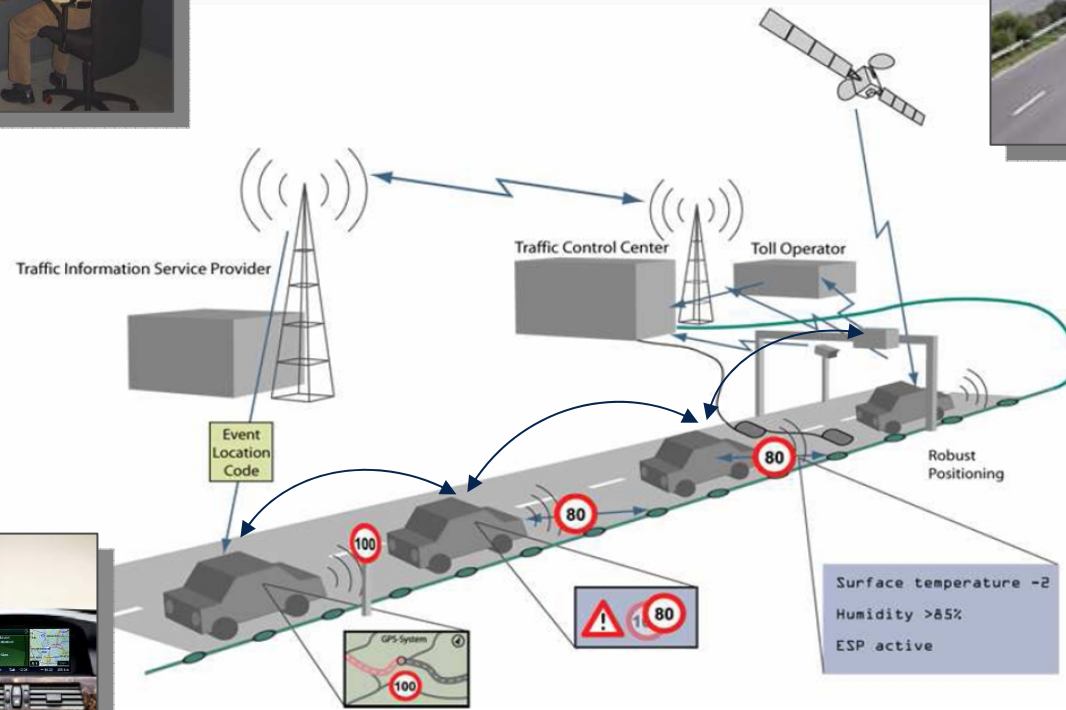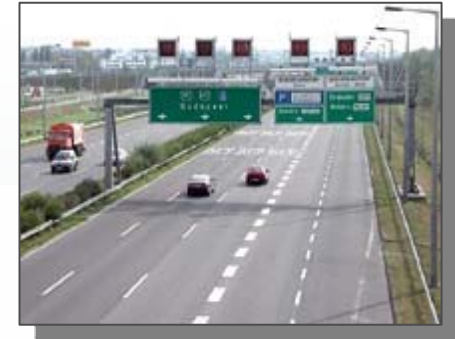# Communication Technologies for Safety and Mobility

| | Safety | Mobility |
|---|---|---|
| Vehicle-to-Vehicle |  |  |
| Vehicle-to-Traffic Infrastructure |  |  |

# Complex overall system



Source: COOPERS project

# Analyse overall system

- Who are the actors ? What are the components inside the actors ?

- What kind of data do they need to exchange ? At which quality ?

- What is the maximum tolerable delay ? Tolerable fault rates ?

- Which security and privacy requirements need to be addressed ?

**Sensing**          **Communicating**          **Acting**

obstacle → Vehicle / RSU → Vehicle → **slow down**

**C2C-CC NET protocols**
**IEEE802.11p**

**road blocked** → Traffic Management → [ Translator ? ] → Vehicle → **change route**

**CALM**
**Broadcast**

# Map to existing infrastructure and technologies
## –> standardisation required ? research required?
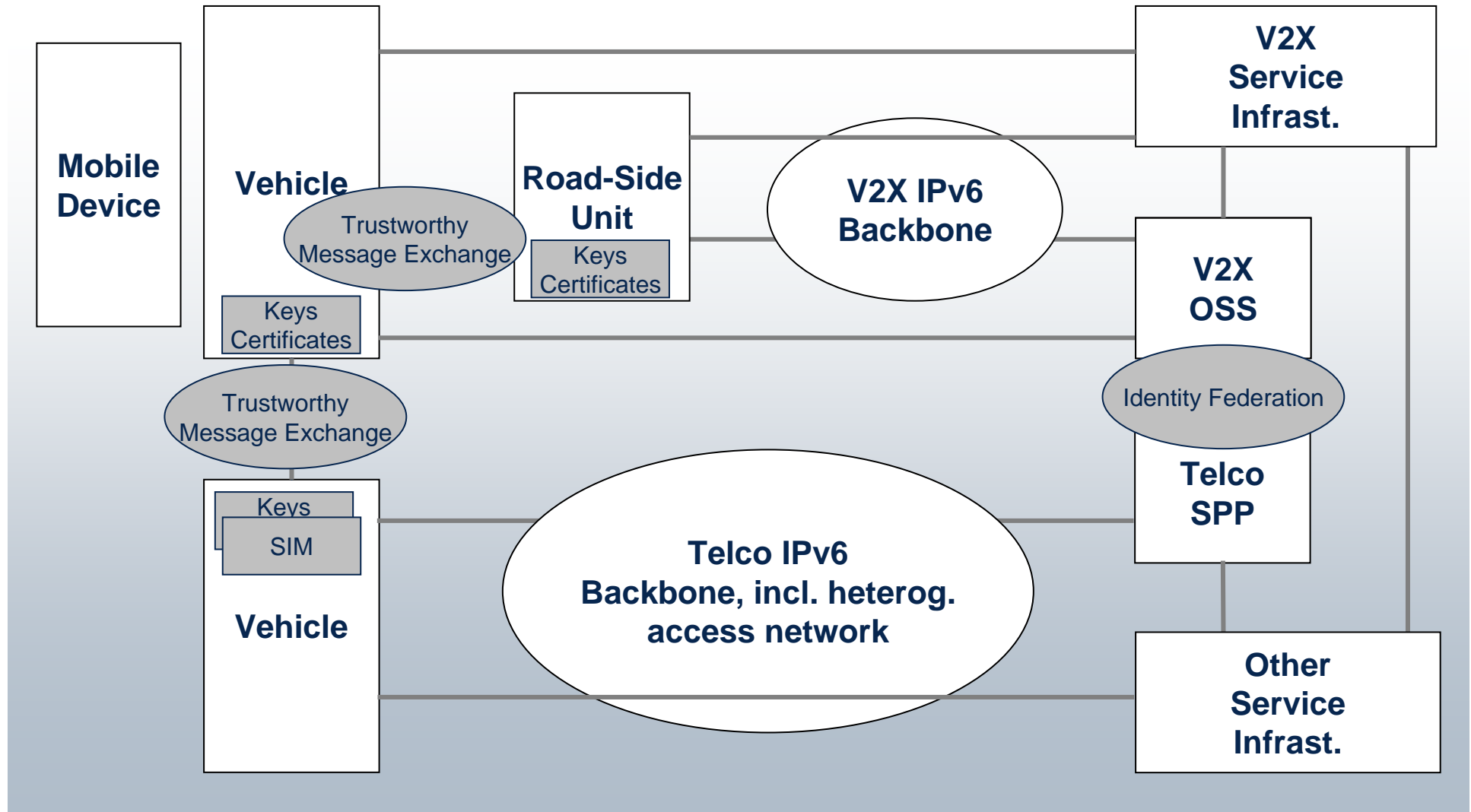
# Need for a Common Understanding of Architecture

- **High-level architectures look similar, many same components, but**
  - Components that look the same aren't necessarily the same
  - Terminology seems to be not coherent
- **It is often not obvious whether you can just simply "combine" or "map" certain components**
  - Assumptions sometimes not stated
  - Interfaces and behaviour unclear
  - More detail on "functionality" and supported applications needed
- **Projects necessarily focus on different requirements or different aspects of requirements**

- **Need for a common view on types of communication**
- **Need to standardize common components/interfaces**
- **Need to provide guidance with respect to proper use of technologies**

- Definition of a "Baseline Architectural Framework" providing

  - a consolidated and agreed set of terms and definitions

  - consolidated communication requirements

  - descriptions of functional blocks

  - a set of different views

  - BUT: Not a specification ready to be used on implementation level

- Methodical aspects for "Baseline Architecture" work

  - Mixture of top down (scenario driven) and bottom up approach

  - Appropriate use of proven ITS FRAME methodology

  - Use of UML 2.0 for specific architectural descriptions

- Including both CALM and C2C-CC architectures

- Related research projects (e.g. SAFESPOT, COOPERS, CVIS) are expected to provide architectural concepts and functional blocks
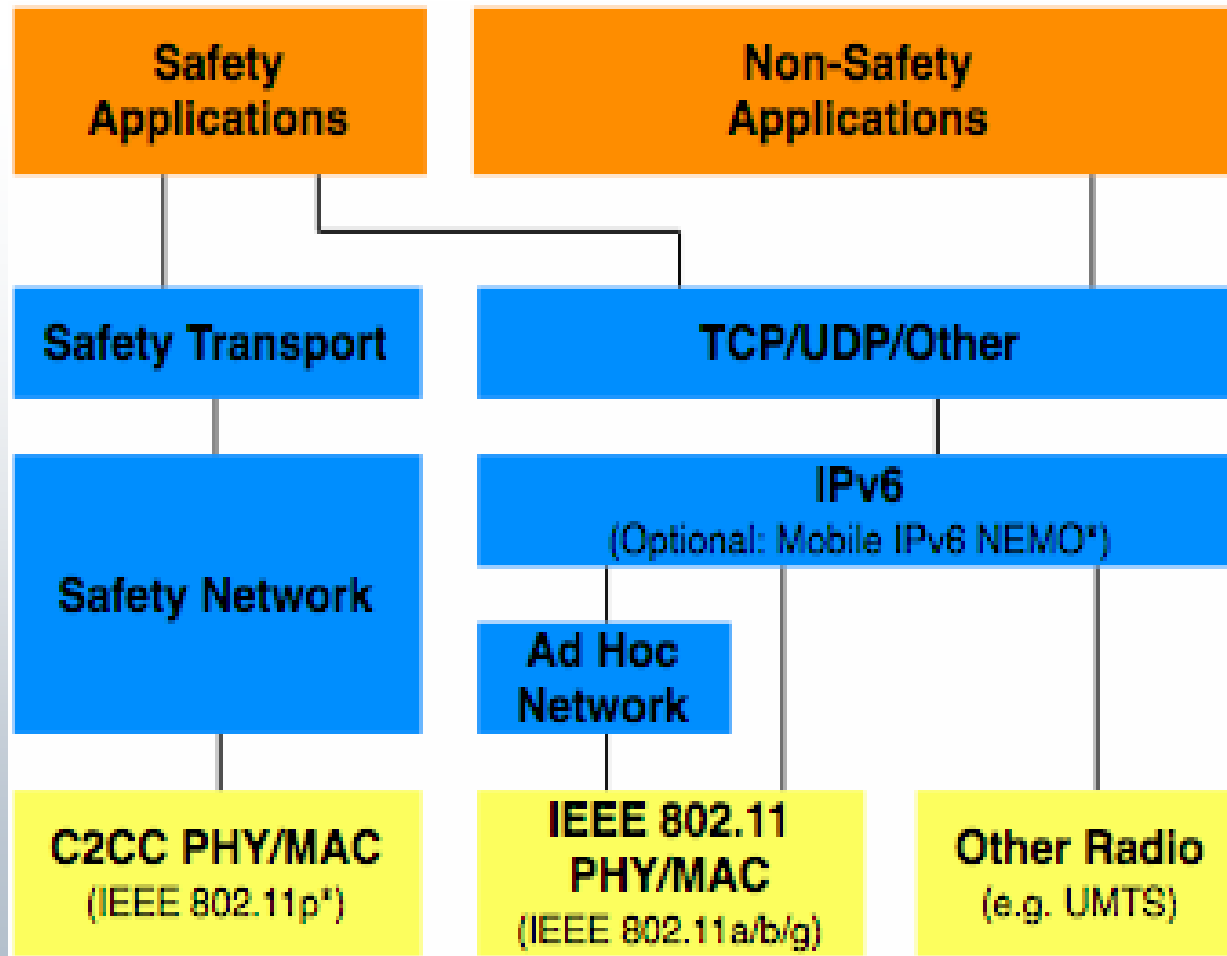
# Convergence of CALM and C2C-CC

- Transparent access to heterogeneous networks
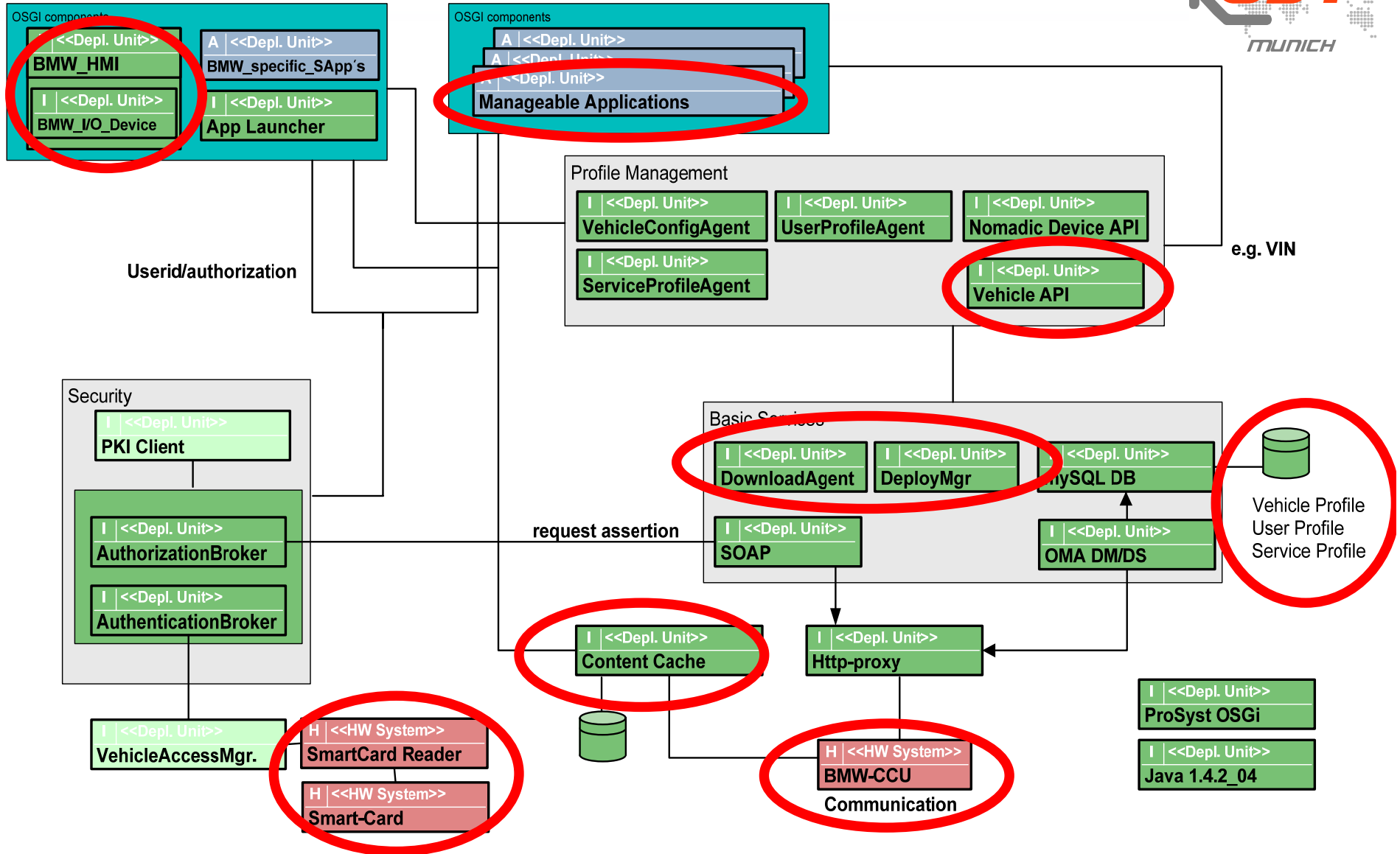- Focusing on short range technology

- One layer with full convergence?

- Response times / QoS - Can all QoS reqs be fulfilled ?

- What will IPv6 be used for ?

  - CALM grants direct access for WAVE short message service
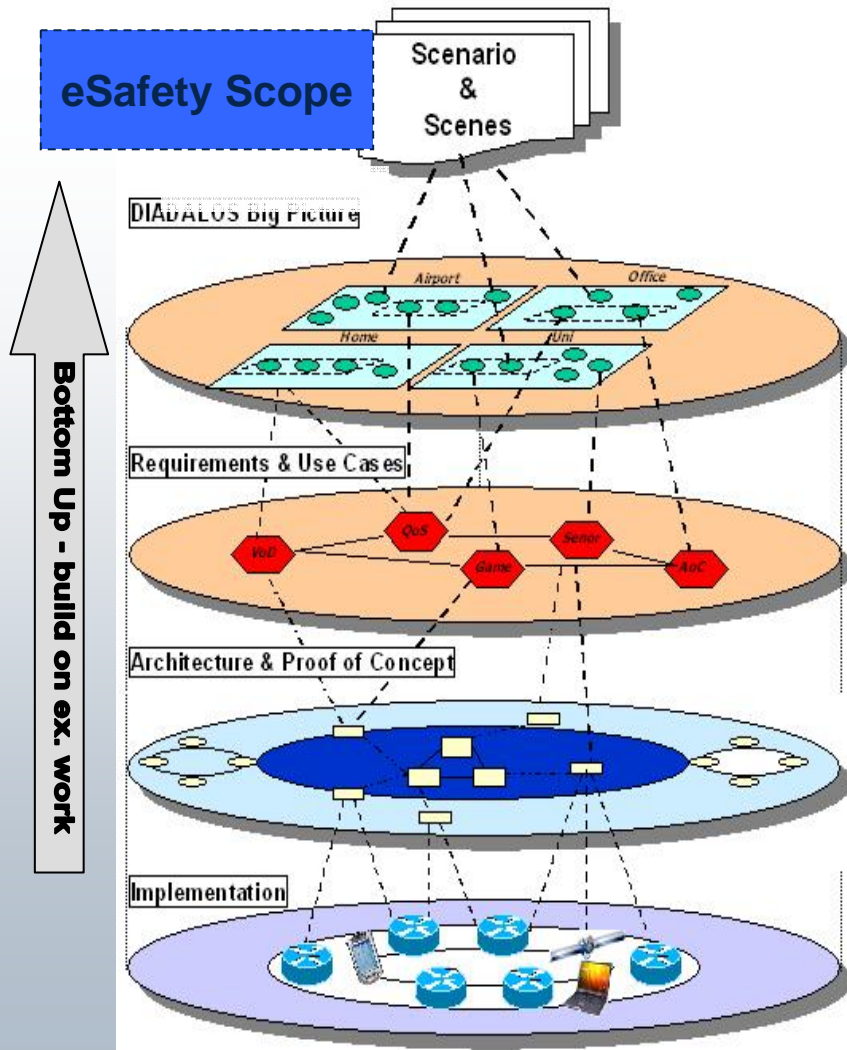
  - C2C-CC may propose geo-based communication solutions to IETF

Source: C2C-CC (A. Festag)

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Experiences from the past:
WILLWARN and GST: Architectural Integration

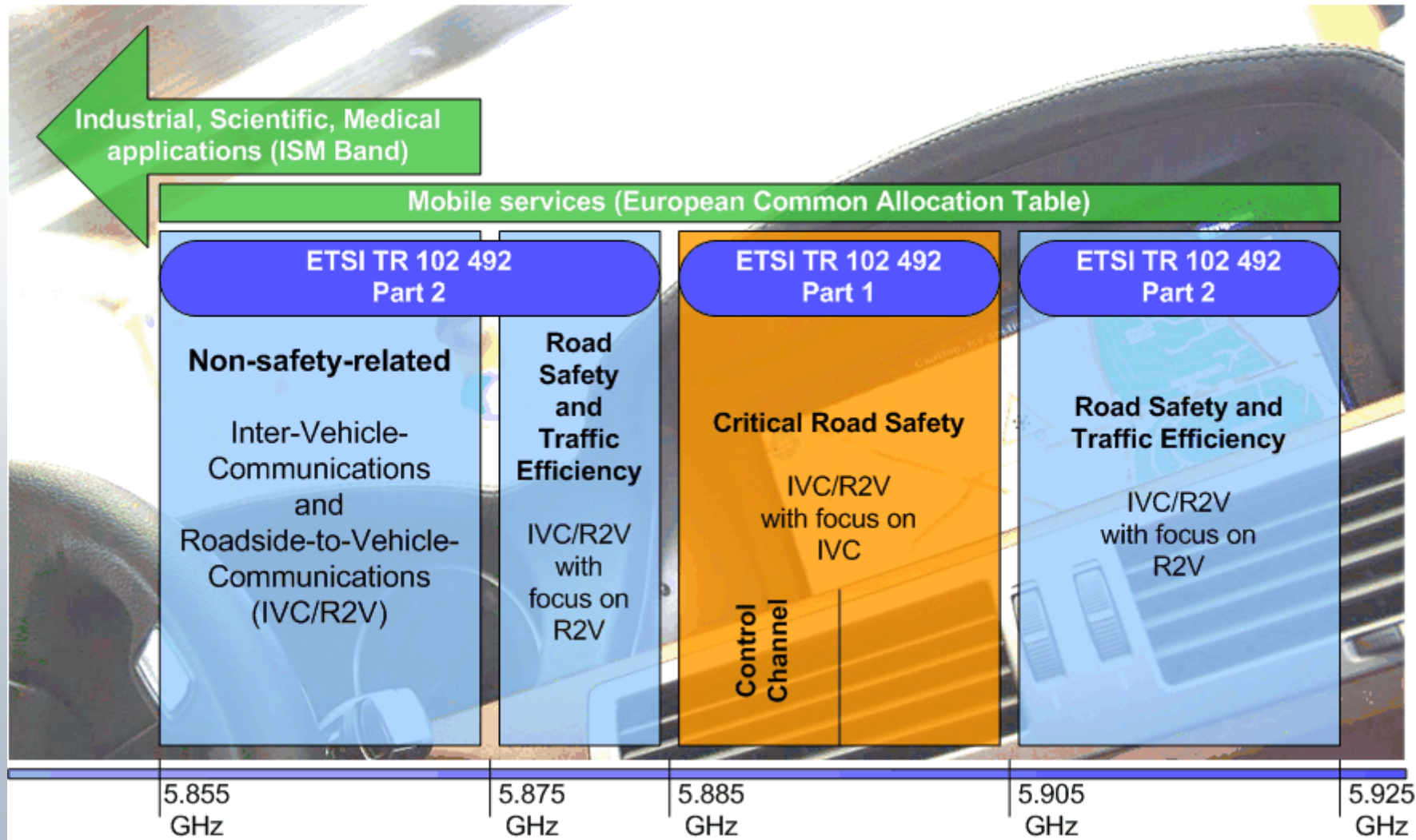Information Society Technologies

GST
munich

OSGI components
I | <<Depl. Unit>>
BMW_HMI
A | <<Depl. Unit>>
BMW_specific_SApp´s
I | <<Depl. Unit>>
BMW_I/O_Device
I | <<Depl. Unit>>
App Launcher

OSGI components
A | <<Depl. Unit>>
A | <<Depl. Unit>>
A | <<Depl. Unit>>
Manageable Applications

Profile Management
I | <<Depl. Unit>>
VehicleConfigAgent
I | <<Depl. Unit>>
UserProfileAgent
I | <<Depl. Unit>>
Nomadic Device API
I | <<Depl. Unit>>
ServiceProfileAgent
I | <<Depl. Unit>>
Vehicle API

e.g. VIN

Userid/authorization

Security
I | <<Depl. Unit>>
PKI Client
I | <<Depl. Unit>>
AuthorizationBroker
I | <<Depl. Unit>>
AuthenticationBroker

Basic Services
I | <<Depl. Unit>>
DownloadAgent
I | <<Depl. Unit>>
DeployMgr
I | <<Depl. Unit>>
mySQL DB
I | <<Depl. Unit>>
SOAP
I | <<Depl. Unit>>
OMA DM/DS

Vehicle Profile
User Profile
Service Profile

request assertion

I | <<Depl. Unit>>
Content Cache
I | <<Depl. Unit>>
Http-proxy

I | <<Depl. Unit>>
ProSyst OSGi
I | <<Depl. Unit>>
Java 1.4.2_04

I | <<Depl. Unit>>
VehicleAccessMgr.
H | <<HW System>>
SmartCard Reader
H | <<HW System>>
Smart-Card

H | <<HW System>>
BMW-CCU
Communication

eSafety Scope

Bottom Up - build on ex. work

Walk Through - Drill Down

A lot of existing work

- **Top-down approach:**
  - Application classes for cooperative systems
  - Requirements consolidation
  - Entities, interfaces
  - Data flow

- **Bottom-up approach:**
  - Interoperability for testing
  - Preparation of FOT

# Frequency Allocation

"Safety enhancing networks will be everywhere."

7th of March 2007

ITU Workshop on the fully networked Car Geneva

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