ir. Frank Daems

Dir. Buz. Dev. NXP

BU Automotive/Telematics

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o NXP semiconductors

o ITS markets & services

o Technologies & IT functions

o New potential initiatives for automotive service standards
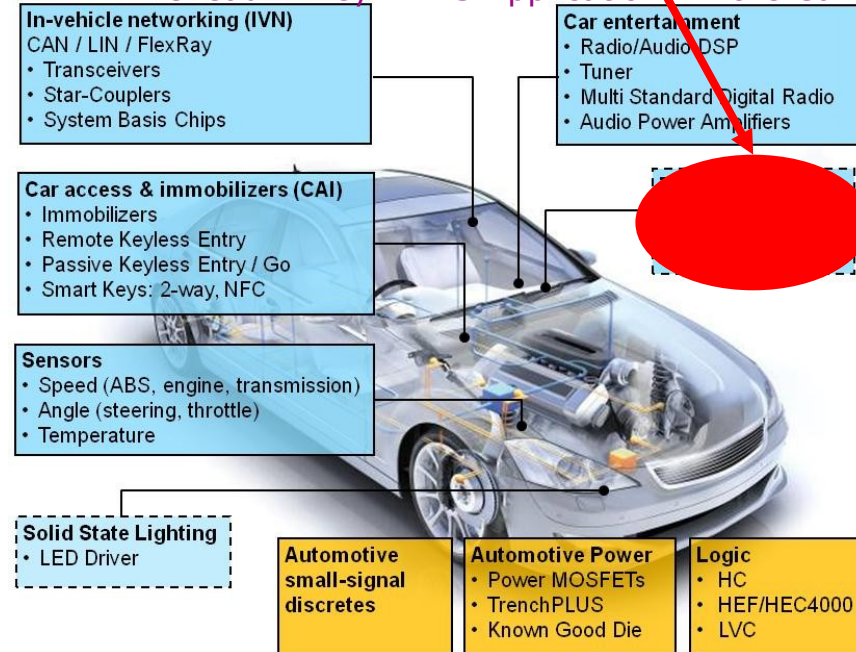
o Conclusion

NXP Semiconductors

NXP Semiconductors provides High Performance Mixed Signal and Standard Product solutions that leverage its leading RF, Analog, Power Management, Interface, Security and Digital Processing expertise

- **Headquarters**: Eindhoven, The Netherlands

- **Employee base:** approximately 28,000 employees working in more than 25 countries with research and development activities in Asia, Europe and the United States, and manufacturing facilities in Asia and Europe

- **Net sales**: $3.8 billion in 2009, over 62% of our sales are derived from the Asia Pacific region (incl. Japan)

- **Customers**: Leading OEMs worldwide
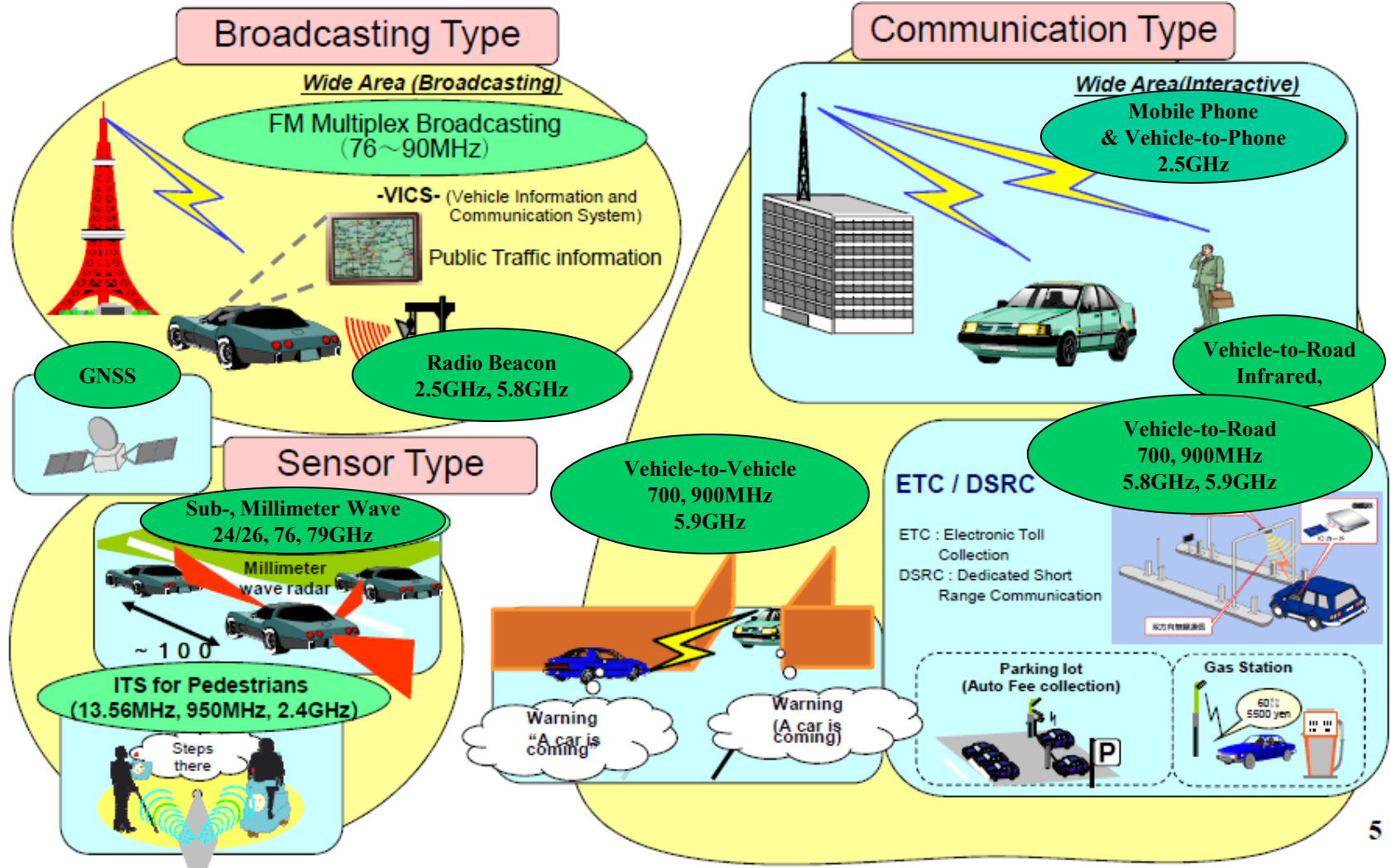
Automotive Product Portfolio
We lead in key HPMS Applications in the Car

In-vehicle networking (IVN)
CAN / LIN / FlexRay
• Transceivers
• Star-Couplers
• System Basis Chips

Car entertainment
• Radio/Audio DSP
• Tuner
• Multi Standard Digital Radio
• Audio Power Amplifiers

Car access & immobilizers (CAI)
• Immobilizers
• Remote Keyless Entry
• Passive Keyless Entry / Go
• Smart Keys: 2-way, NFC

Sensors
• Speed (ABS, engine, transmission)
• Angle (steering, throttle)
• Temperature

Solid State Lighting
• LED Driver

Automotive small-signal discretes

Automotive Power
• Power MOSFETs
• TrenchPLUS
• Known Good Die

Logic
• HC
• HEF/HEC4000
• LVC

What is Car ITS?

Broadcasting Type

Wide Area (Broadcasting)

FM Multiplex Broadcasting
(76~90MHz)

-VICS- (Vehicle Information and Communication System)

Public Traffic information

GNSS

Radio Beacon
2.5GHz, 5.8GHz

Sensor Type

Sub-, Millimeter Wave
24/26, 76, 79GHz

Millimeter wave radar

~100

ITS for Pedestrians
(13.56MHz, 950MHz, 2.4GHz)

Steps there

Communication Type

Wide Area(Interactive)

Mobile Phone
& Vehicle-to-Phone
2.5GHz

Vehicle-to-Road
Infrared,

Vehicle-to-Road
700, 900MHz
5.8GHz, 5.9GHz

Vehicle-to-Vehicle
700, 900MHz
5.9GHz

ETC / DSRC

ETC : Electronic Toll Collection
DSRC : Dedicated Short Range Communication

Parking lot
(Auto Fee collection)

Gas Station

Warning "A car is coming"

Warning (A car is coming)

5

Why Car ITS

- ▸ 50% less traffic fatalities
- ▸ 50% less traffic jams
- ▸ 10% less CO2 emissions
- ▸ 6B€ GNP improvement NL*

Statistic year 2006:
43.000 fatalities (EU 27)

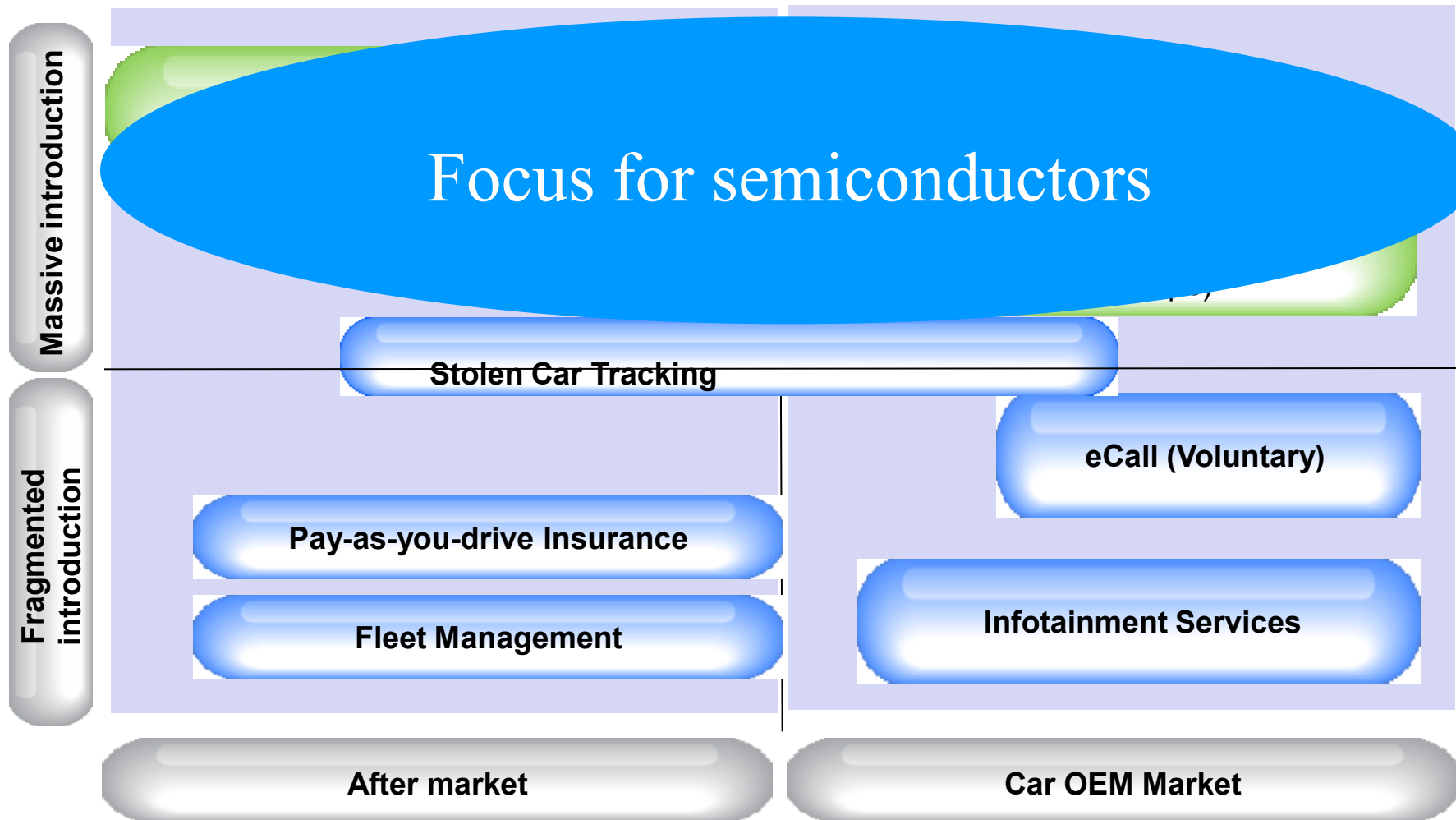Evolution of fatalities, accidents and injured
EU

40.000

Target 2020
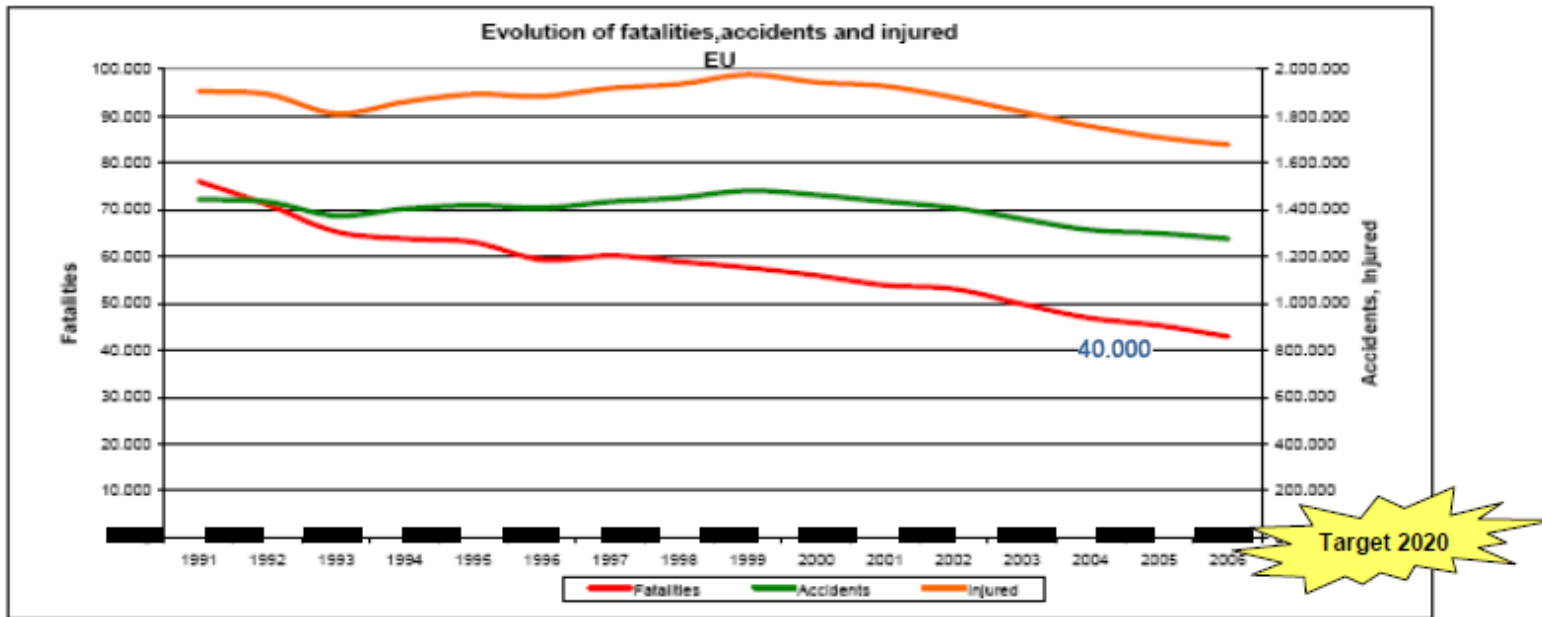
Source : CARE (EU road accidents database) or national publications

European Commission / Directorate General Energy and Transport

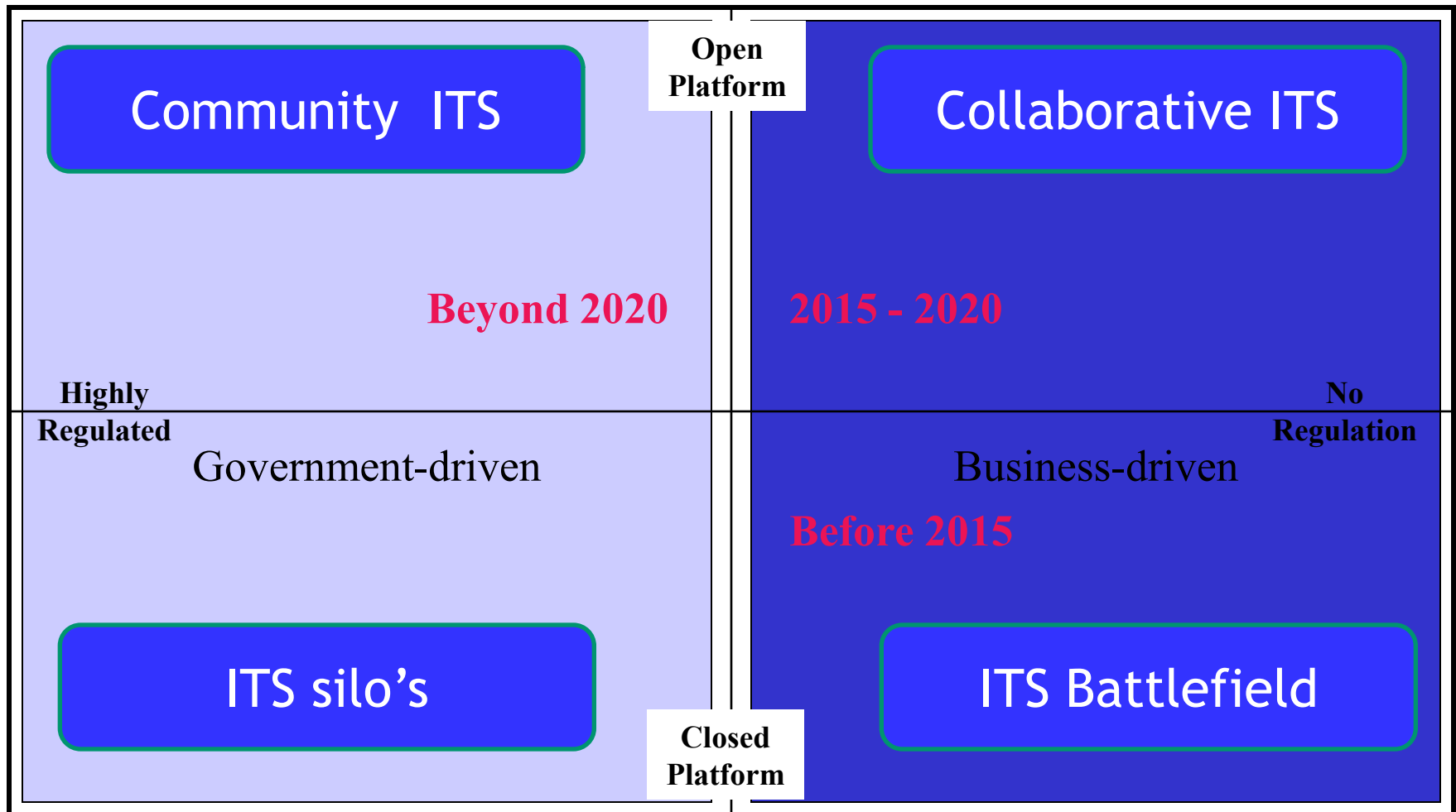* TNO report 2010

Focus for semiconductors

Stolen Car Tracking

eCall (Voluntary)

Pay-as-you-drive Insurance

Fleet Management

Infotainment Services

Massive introduction

Fragmented introduction

After market

Car OEM Market

Stakeholders & Timeline CarITS

Open Platform

Community ITS	Collaborative ITS
Beyond 2020	**2015 - 2020**

Highly Regulated — Government-driven | Business-driven — **No Regulation**

Before 2015

ITS silo's	ITS Battlefield

Closed Platform

ISO   IEC.   ITU International Telecommunication Union

Services Roadmap Car ITS

Open Platform

Traffic Flow / Cooperative Safety

- Green Zones
- Truck-height checks
- Car as a Sensor
- Parking Assist
- Cooperative Forward Collision Warning
- Contextual Speed Limits
- Cooperative Cruise Control
- Pay as you Drive Insurance

Commercial / Safety

- 3rd-party Applications
- Eco Vehicle / Eco Assist
- Car Sharing
- Traffic Sign Recognition
- Wrong Way Driving Warning
- Emergency Vehicle Warning
- Green light Speed Advisory
- Vulnerable Road User Warning`

Highly Regulated

No Regulation

- E-Call
- (GNSS-based) electronic Road tolling

- Point of Interest Notification
- Stationary / Slow Vehicle Warning
- Private E-Call
- Stolen Vehicle Tracking
- Over the Air Download
- Real-time Traffic Information
- Remote Diagnostics
- Fleet Management

Value-Add / Safety

Closed Platform

ATOP volume applications

Ref: SPITS project
The Fully Networked Car
Geneva, 2-3 March 2011

ISO   IEC   ITU International Telecommunication Union
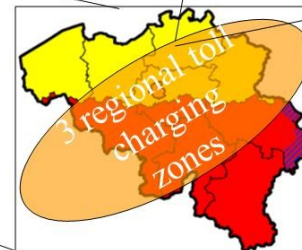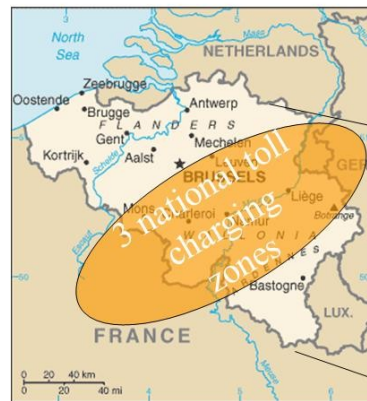
EETS (European Electronic Tolling Service)

o EU directive Electronic Fare Collection Directive (2004/52/CE)

o Vision: a single OBU allowing trucks/cars to drive in all toll area's

o Additional expectations:

- Governemental added value services (e-Call, traffic info, …)
- Private added value services: Logistic services payment, ….

Traditional view

- A Polish truck enters Flanders via Dutch boarder
- Seemless road pricing starts

Car ITS view
Case Flanders

At least 2 city toll zones…

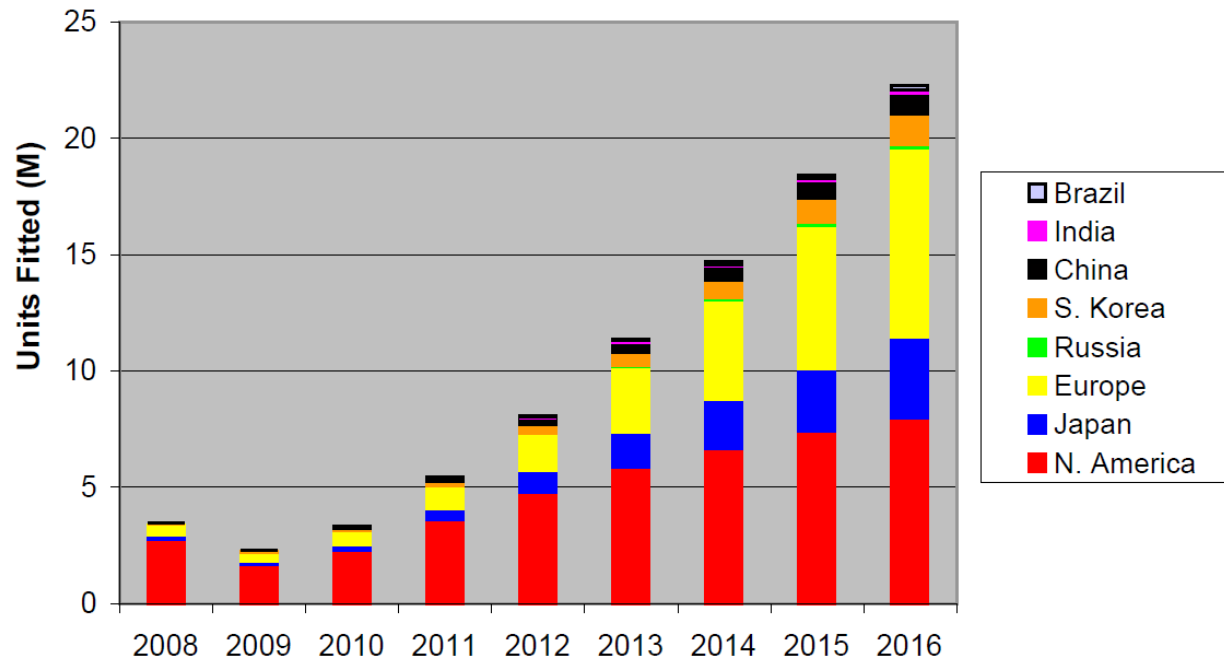3 national toll charging zones

3 regional toll charging zones

EETS (European Electronic Tolling Service)

o Hurdles/opportunities for new standards

- Country or toll specific certifications
- Country or system specific enforcement needs
- OBU delivered by service provider
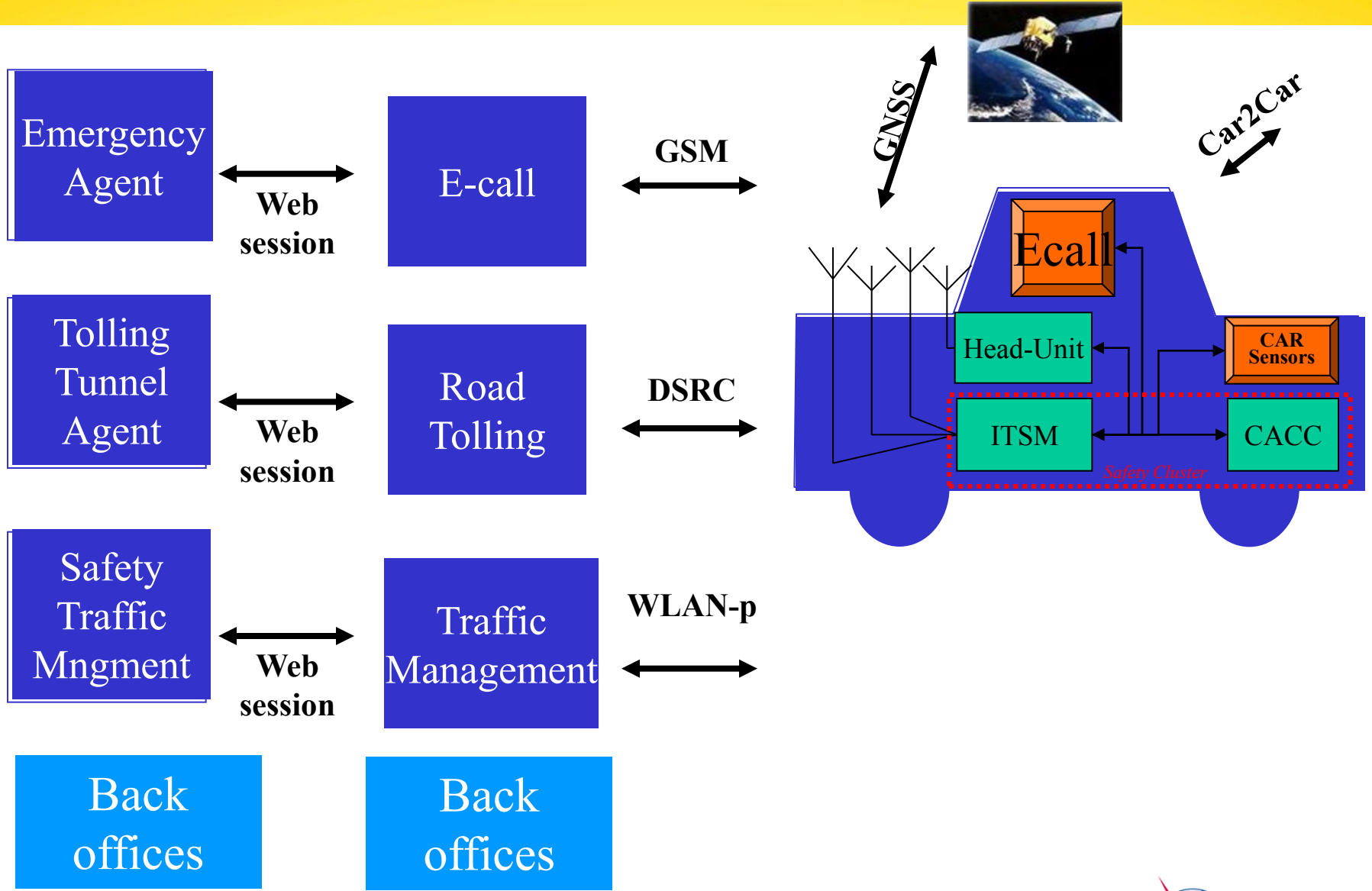- Multi Standard DSRC transceiver for tolling and enforcement

eCall: A need for Multi-Standard GNSS ?

o Growing globally to 22M+ units in 2016

o Still unknown what % will require multi standard GNSS (e.g. Galileo+GPS or Glonass+GPS)

o OEMs are expected to have low interest to go for multi-standard GNSS (adds cost, no value), however some OEMs are interested in having one global platform

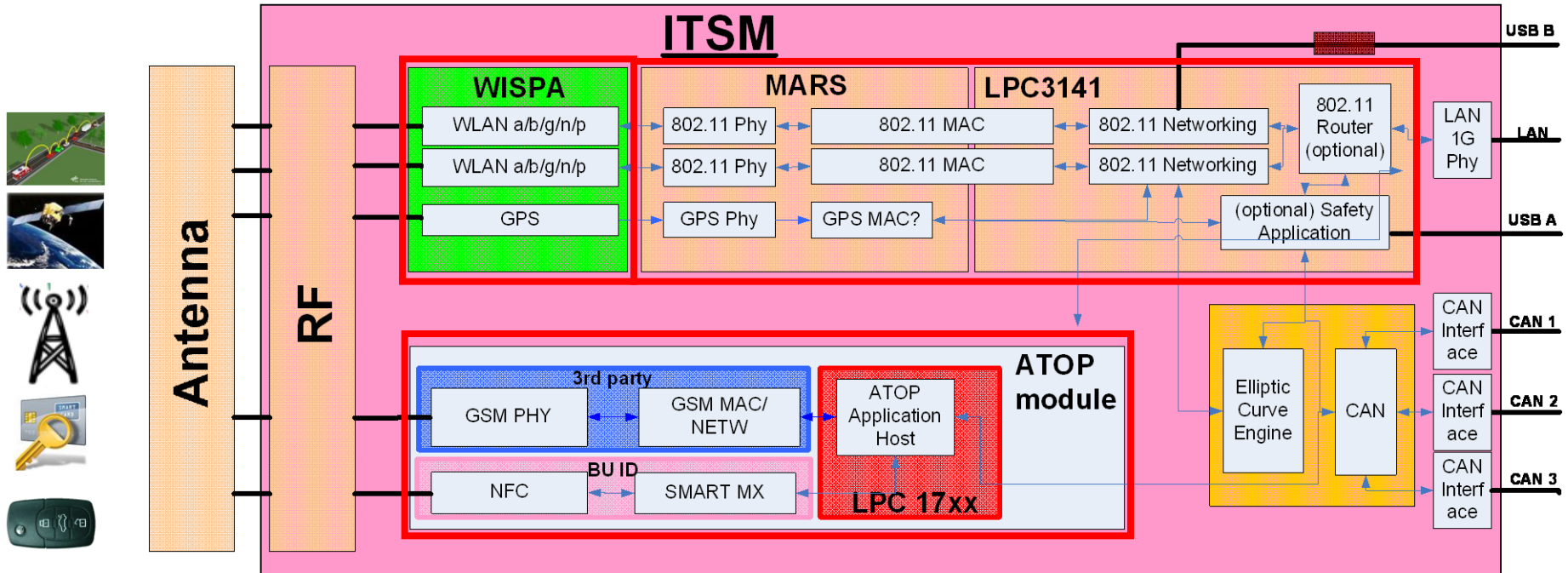**Total In-vehicle OE Telematics Systems Demand (eCall Based)**

Conclusion: ITS Use-cases to be supported

Emergency Agent ←→ **Web session** ←→ E-call ←→ **GSM** ←→

Tolling Tunnel Agent ←→ **Web session** ←→ Road Tolling ←→ **DSRC** ←→

Safety Traffic Mngment ←→ **Web session** ←→ Traffic Management ←→ **WLAN-p** ←→

Back offices

Back offices

GNSS

Car2Car

Ecall

Head-Unit

CAR Sensors

ITSM

CACC

Safety Cluster

ISO IEC ITU International Telecommunication Union

•Multi DSRC
•Multi GNSS
•C2X

The telematics roadmap

Demonstrator
Functional
Final
Fully qualified

2.5G ITS

ATOP 2.5G
SB, CAN, NFC,…)

(Z) (BR) ATOP 2.5G-XMOP
(derived types)

Target market
•After market : roadpricing + services
•OEM market: eCall + services
•Low bandwidth and Batch based Services

3.5G ITS

ATOP 3.5G
(Cellular OneChip HSxPA, GPS, USB, CAN; NFC, SMX,.)

Target market
•OEM market: broadband telematics
•After market: Volume connectivity ITS services
•Always on line services

Main ITS

ITSM
(Cellular OneChip HSxPA, GPS, USB, CAN; NFC, SMX,..
Multi GNSS-Multi DSRC-WLAN r.... (DVBt))

Target market
•Advanced telematics OEM services

The driver expects his car environment to be equipped to drive seamlessly through all toll zones and addressing all available services

After market

OEM

2010   2011   2012   2013

ISO   IEC   ITU International Telecommunication Union