

# BlackForestLightning

Dr. Bernd X. Weis, Dr. Astrid Sandweg

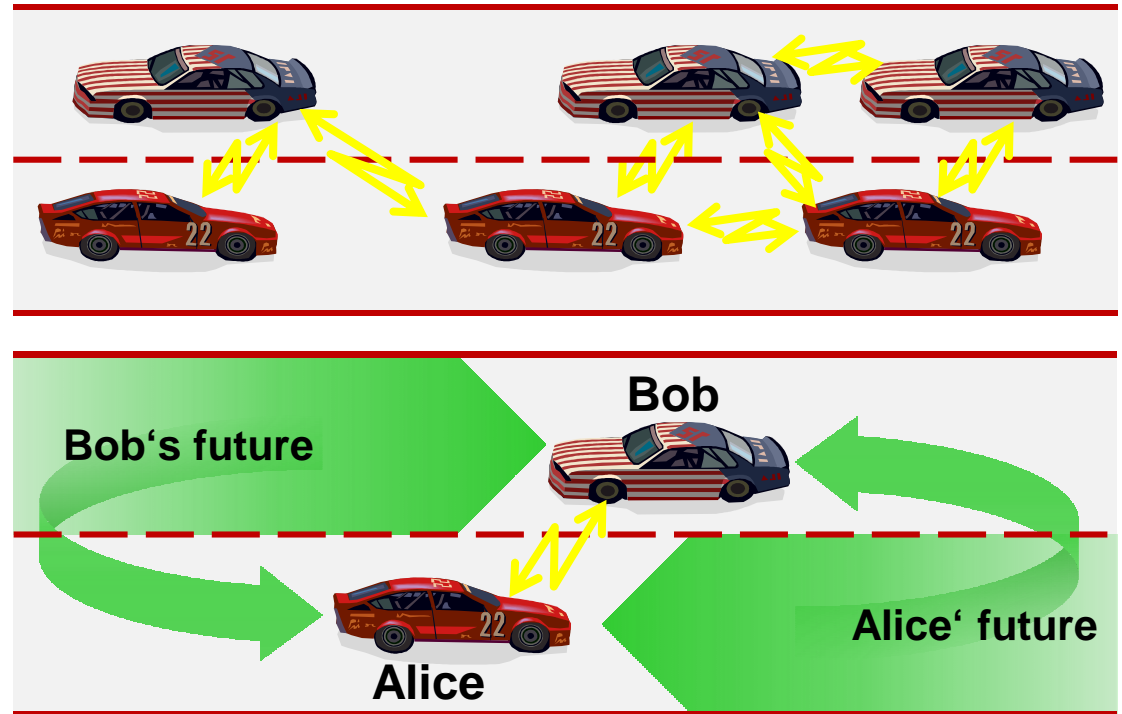
## GuideWeb

**Route Navigation Based on Communicating Vehicles**



### GuideWeb

- creates high-quality traffic information based on communicating vehicles
- is based on co-operative give-and-take principles, i.e. information is
  - ◆ **freely** offered and
  - ◆ **anyone** can take it
- provides a reliable individual **synthesis** of virtually every participant's best knowledge,
- and its functionality is constituted from the multitude of cooperating autonomous **MapSynthesiser**.





## GuideWeb

- senses traffic flows and makes them available for navigation
- is based on simplified car-2-car communication (WLAN broadcast)
- is by design not supporting safety relevant applications
- uses smart phone, personal navigation device or embedded platforms
- may – besides its own merits – serve as a test bed for further car-2-car communication applications

MapSynthesiser supports navigation

- ◆ **wherever** you are
  - in the city
  - over land
  - on the motorway
  
- ◆ **timely** and
  
- ◆ **accurate.**

### MapSynthesiser is

- a support system for navigation providing timely and accurate information - wherever you are - on expected
  - ◆ traffic speed
  - ◆ traffic density and
  - ◆ traffic trend
- independent of specific map features because information processing is based on geo-coordinates
- creating messages from a map-like information representation
- ensuring privacy and data security (no route tracing)

GuideWeb performance can easily be improved by autonomous fixed MapSynthesiser installations.

- Installing a MapSynthesiser for instance at a lively crossing it can process the entire information of all the other passing MapSynthesiser. In addition „Location Based“ information can be offered fast at very low cost (e.g. advertisement, points of interest, ...).
- The information resulting from this process is offered to the passing MapSynthesiser.
- This ensures that penetration requirements can be reduced substantially in certain areas.
- The cost of such an installation is low.



**BlackForestLightning**  
ease of navigation

GuideWeb



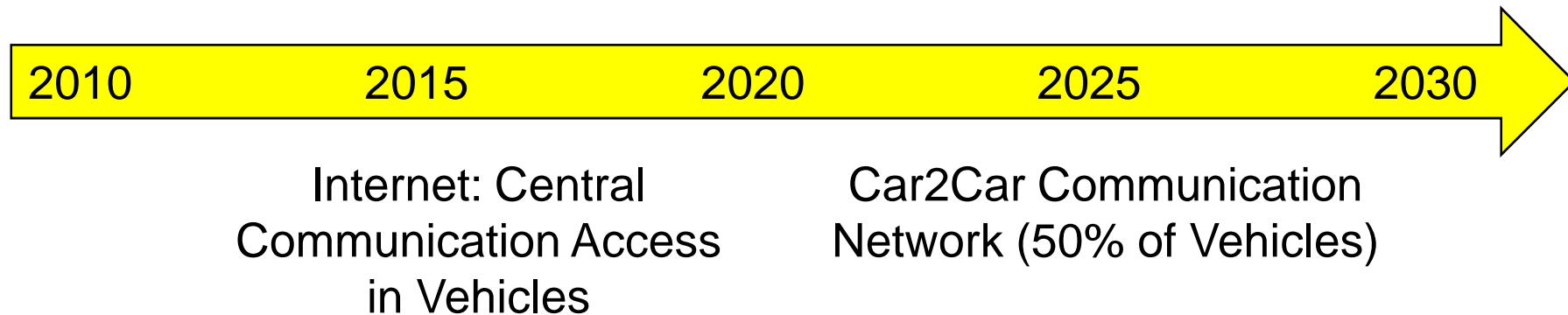
17<sup>th</sup> ITS World Congress  
BUSAN, KOREA 2010

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# Market

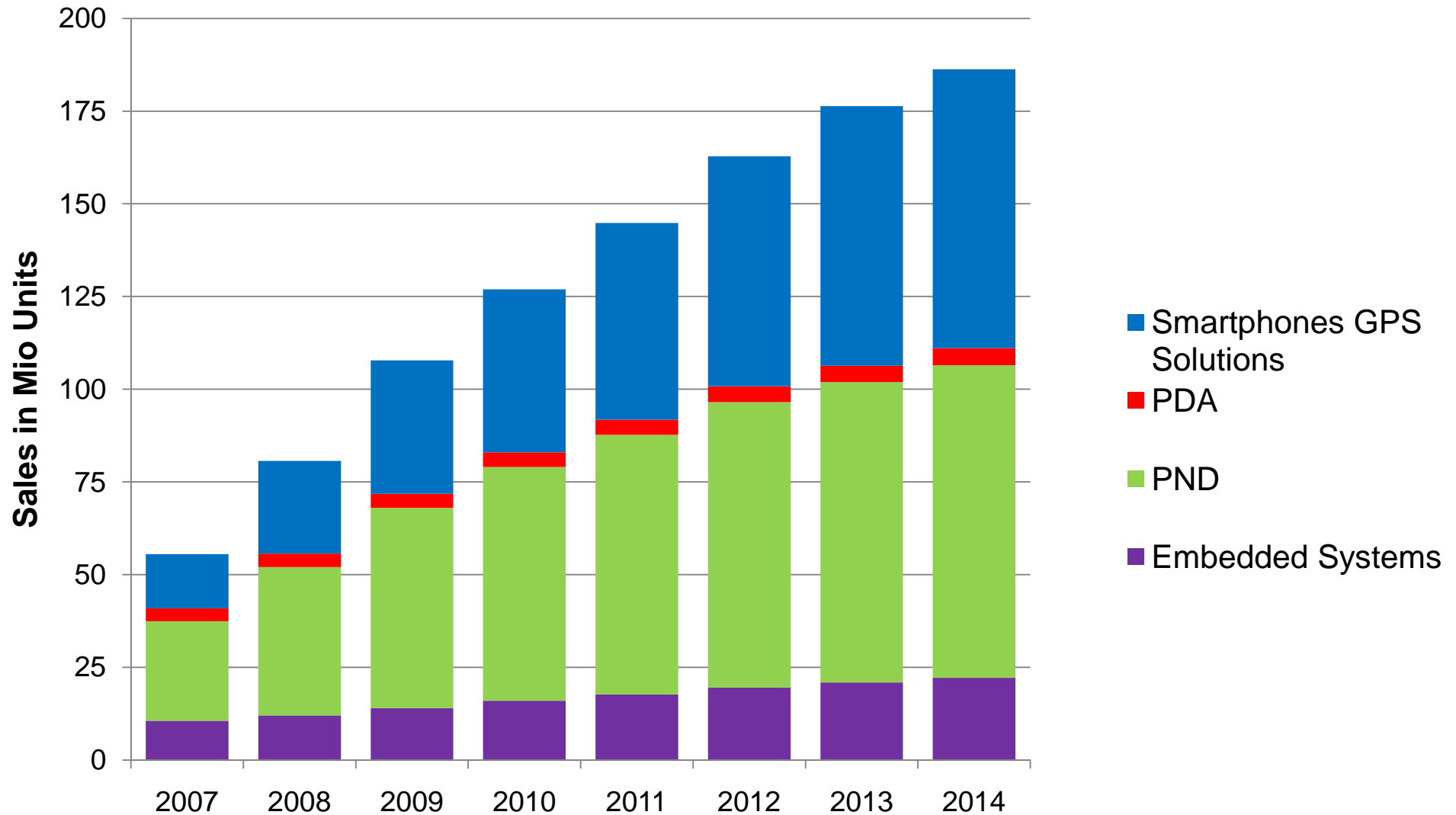


## GuideWeb Application

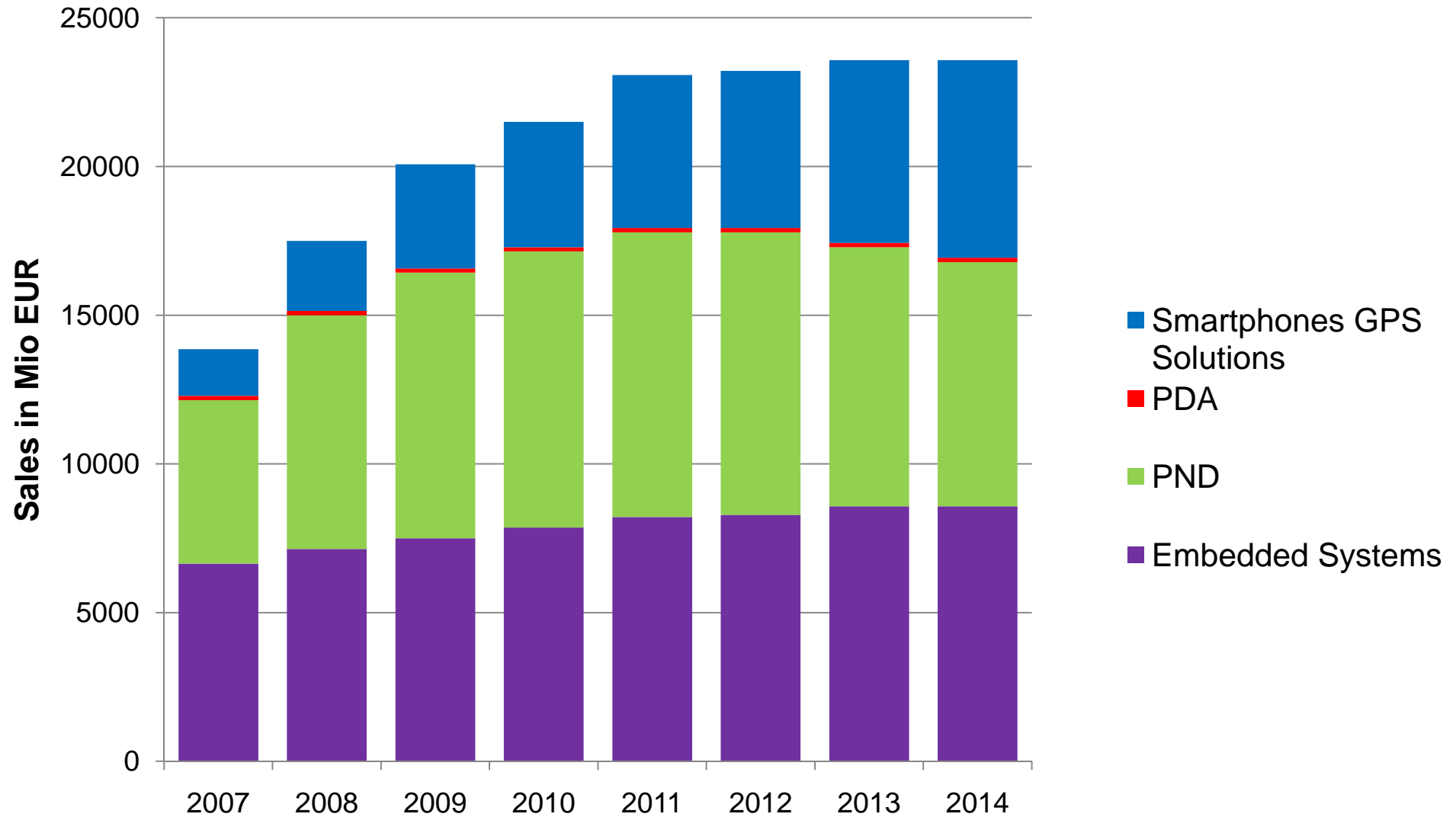


*Zukunft und Zukunftsfähigkeit der Informations- und Kommunikationstechnologien und Medien, Internationale Delphi-Studie 2030, Münchner Kreis e.V., EICT GmbH, Deutsche Telekom AG, TNS Infratest GmbH, November 2009*

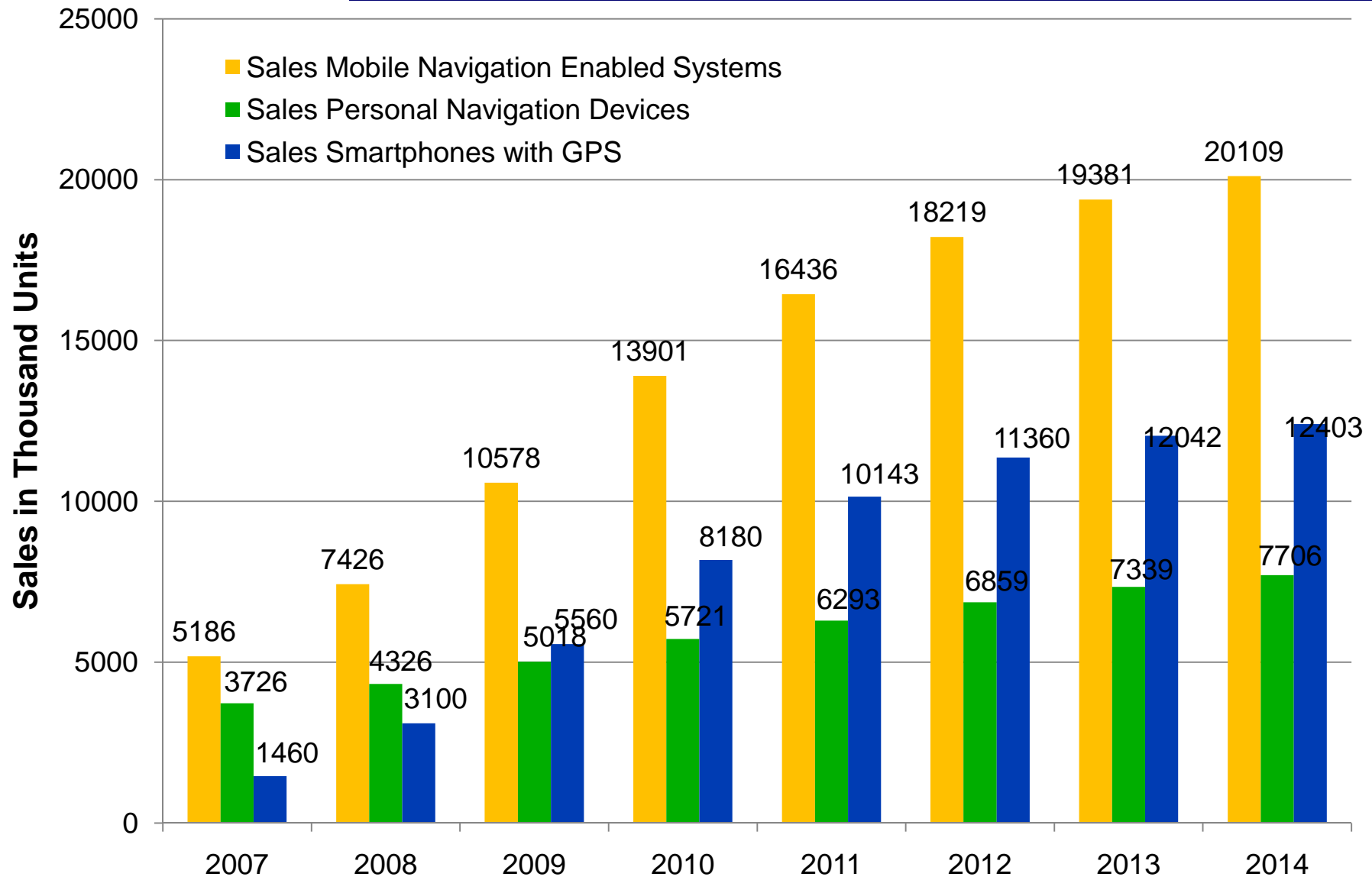
# Global Navigation Market Sales in Units Shipped



# Global Navigation Market Sales in Mio EUR



# German Navigation Market Sales in Units Shipped



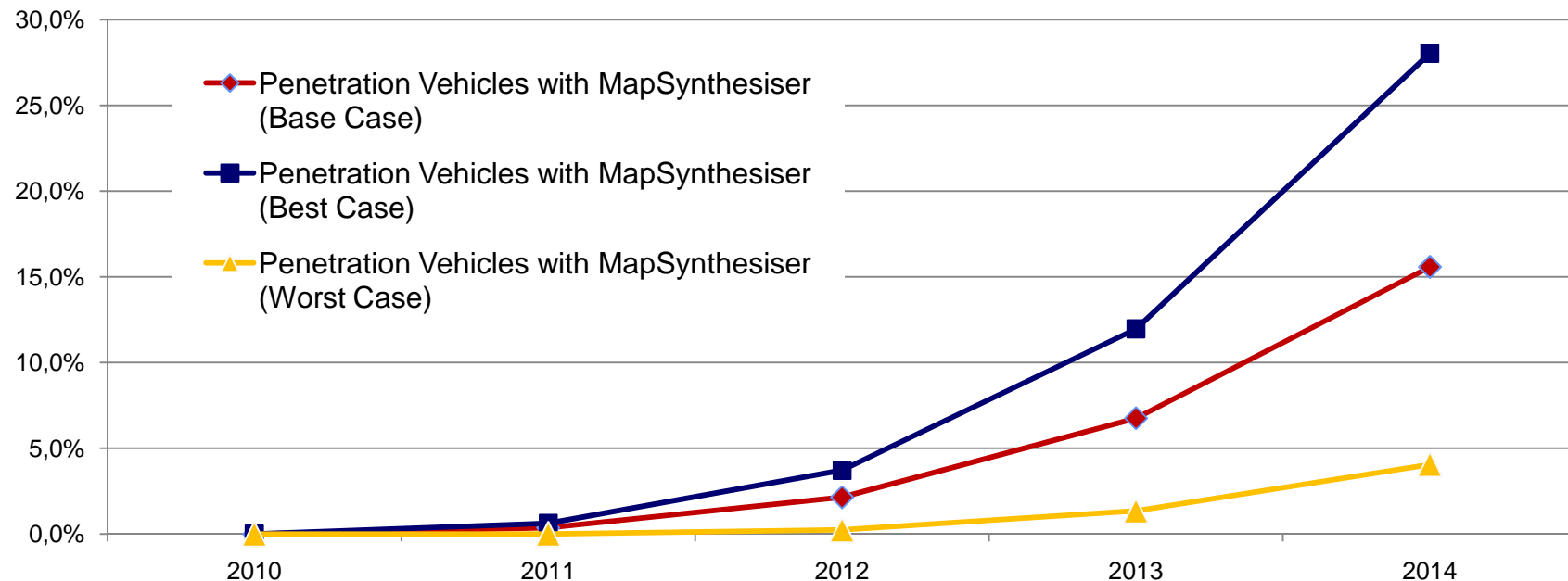
Typical Lifetime of Mobile Navigation enabled Systems (MNS) **3 Years**

**Vehicles with MNS**

	2010	2014
Base Case	31%	62,5%
Best Case	33%	75%
Worst Case	29%	50%

**MNS equipped with MapSynthesiser**

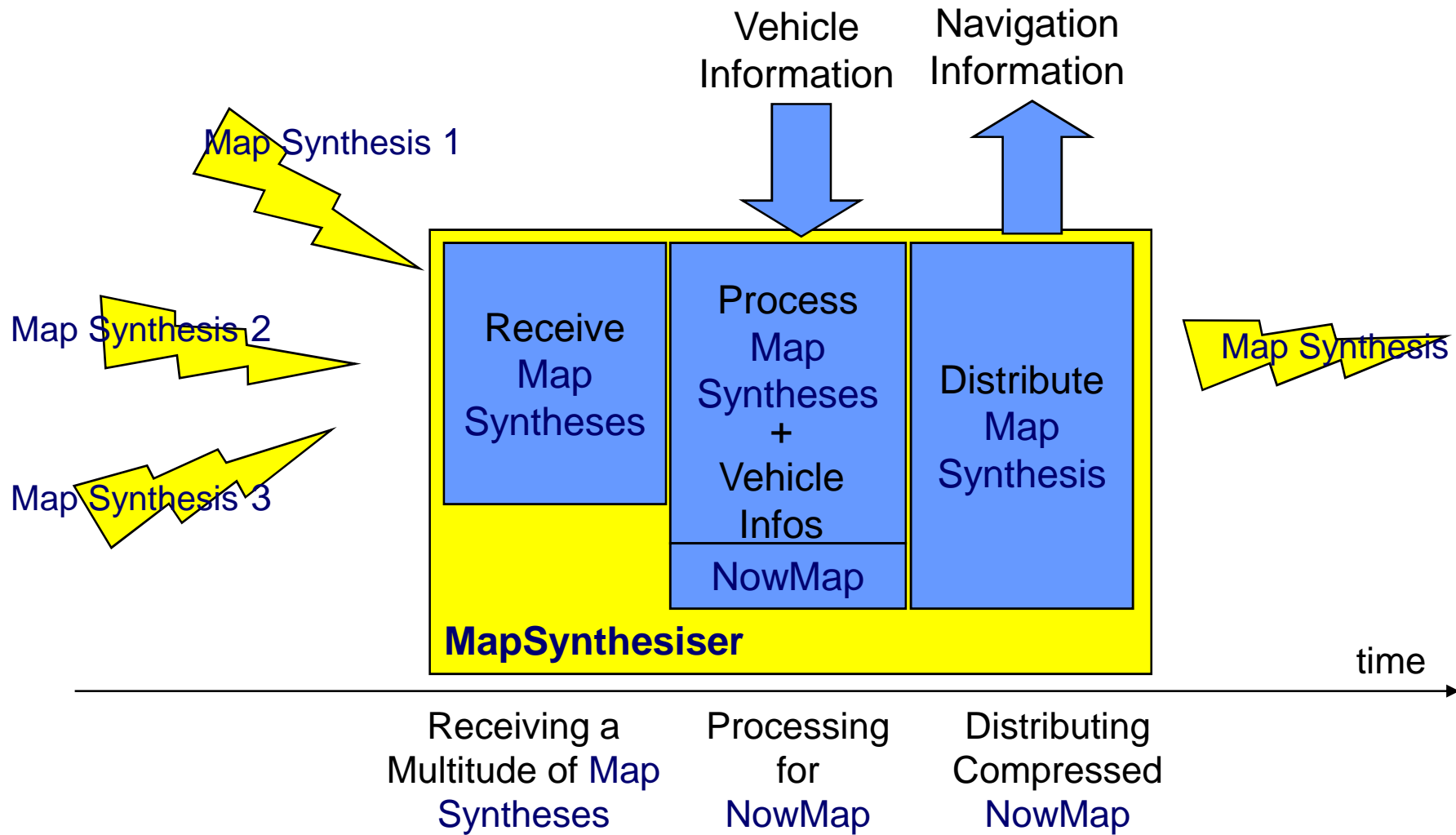
	2010	2014
Base Case	0%	40%
Best Case	0%	60%
Worst Case	0%	15%



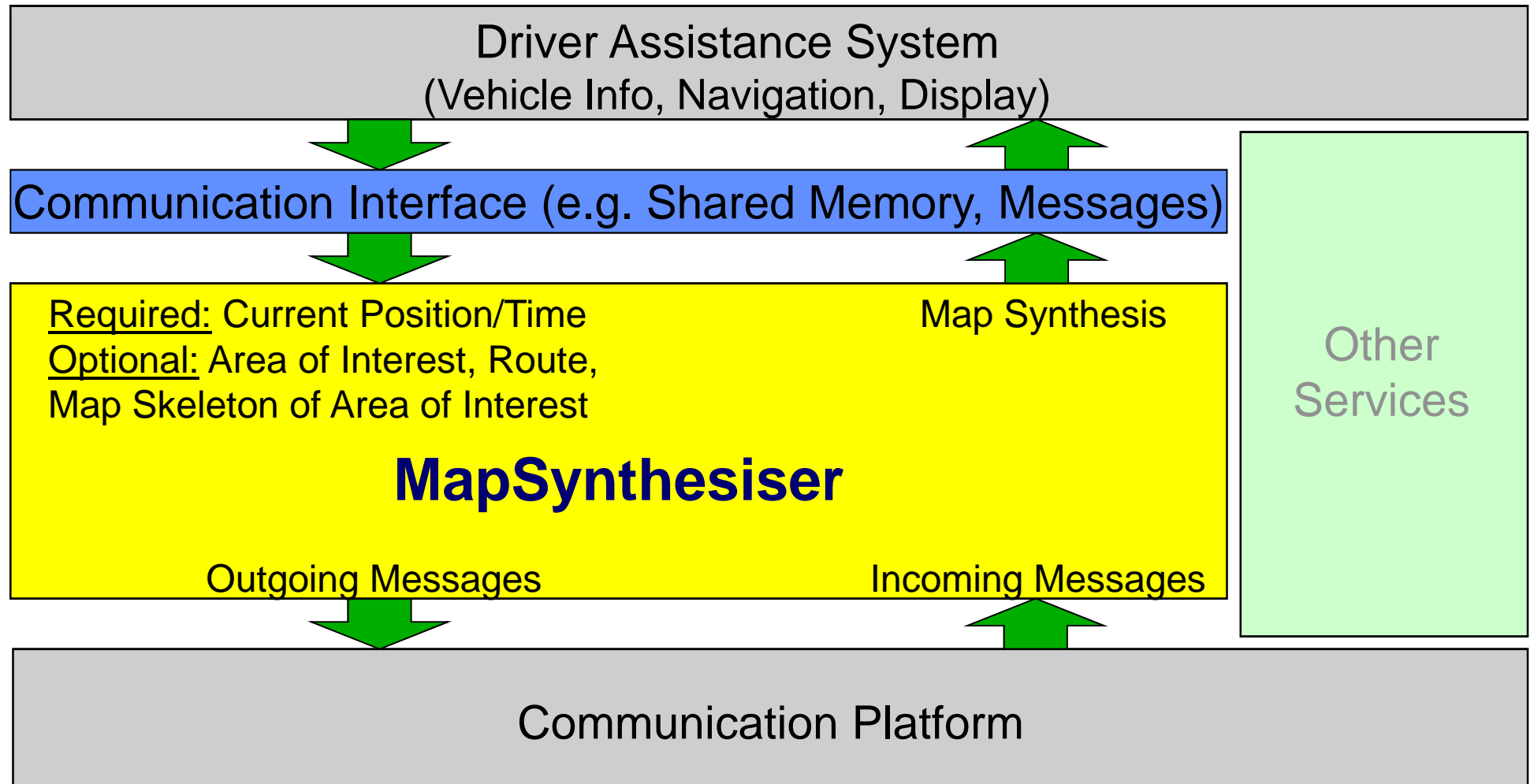


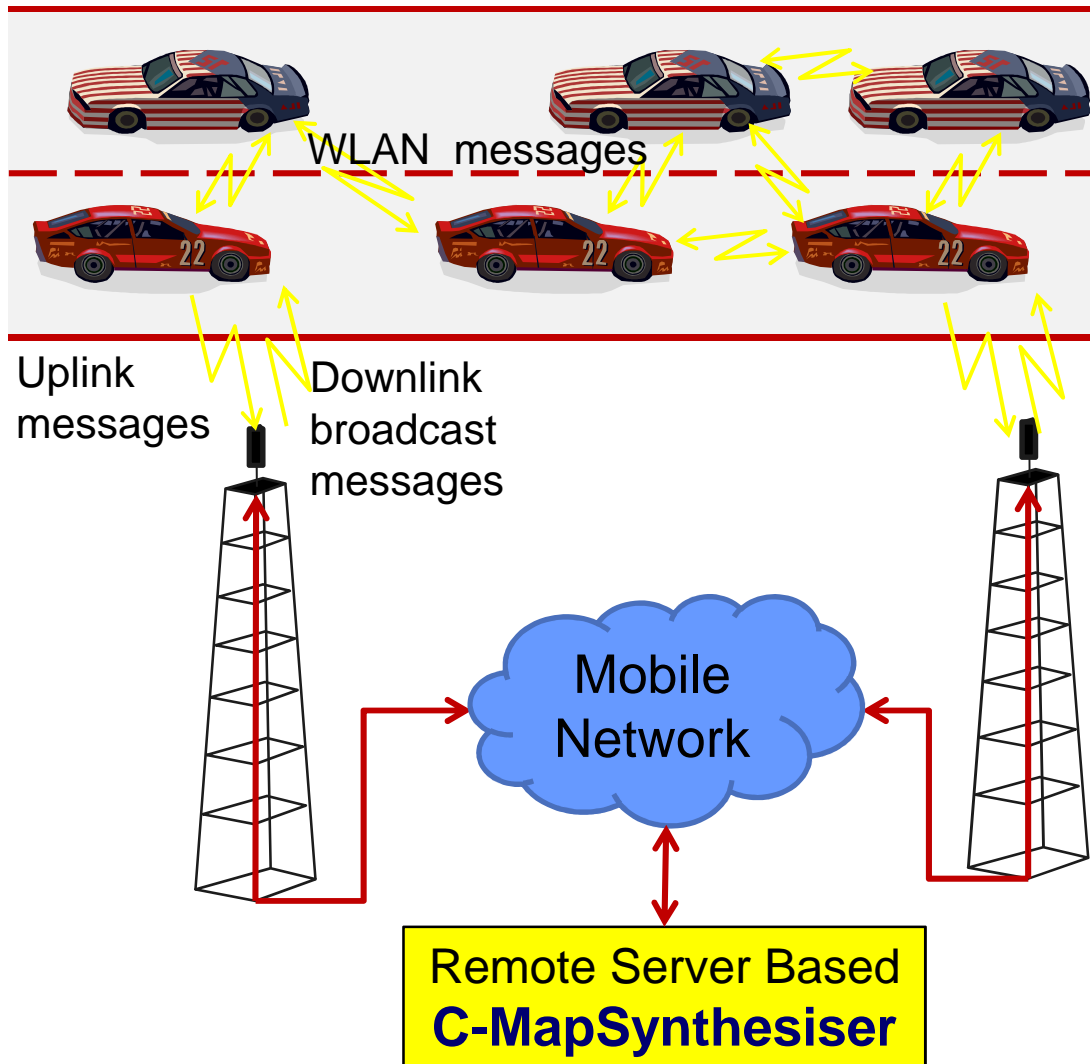
# Brief Technical Description

- The **GuideWeb** relies on the co-operation of the multitude of autonomous **MapSynthesisers** installed in each of the participants.
- Each **MapSynthesiser** broadcasts information to its environment and can receive information from its environment.
- All information needed is processed solely within the **MapSynthesiser**. No support from external processing, evaluation or distribution units is required for the **GuideWeb**'s functioning, however a configuration with a remote server based **C-MapSynthesiser** communicating through a mobile network is foreseen.
- Information is disseminated in such way that privacy is ensured and tracing of specific subsystems is not possible.
- It deploys digital short-range radio in the 2,4 or 5 GHz band reserved for WLAN applications and free of charge or a mobile network (GSM, UMTS, LTE, ...).









- **MapSynthesiser** communicate either
  - directly by WLAN broadcast or
  - by mobile networks' cell broadcast or
  - a combination thereof.
- Mobile network (GSM, UMTS, LTE, ...) base stations receive broadcast messages from and distribute them to the vehicles within range.
- **C-MapSynthesiser** is a server based map synthesis processor.
- On a remote server all received map syntheses are optimally allocated to **C-MapSynthesiser** areas and processed. The resulting map syntheses are broadcasted within the associated **C-MapSynthesiser** areas.
- **C-MapSynthesiser** increases area coverage and **GuideWeb** performance.

### Configuration 1

- Communication between **MapSynthesiser** via WLAN broadcast
  - ◆ Short range ( $\cong$  100 m – 300 m), message limited to Ethernet packet size (1522 Byte)

### Configuration 2

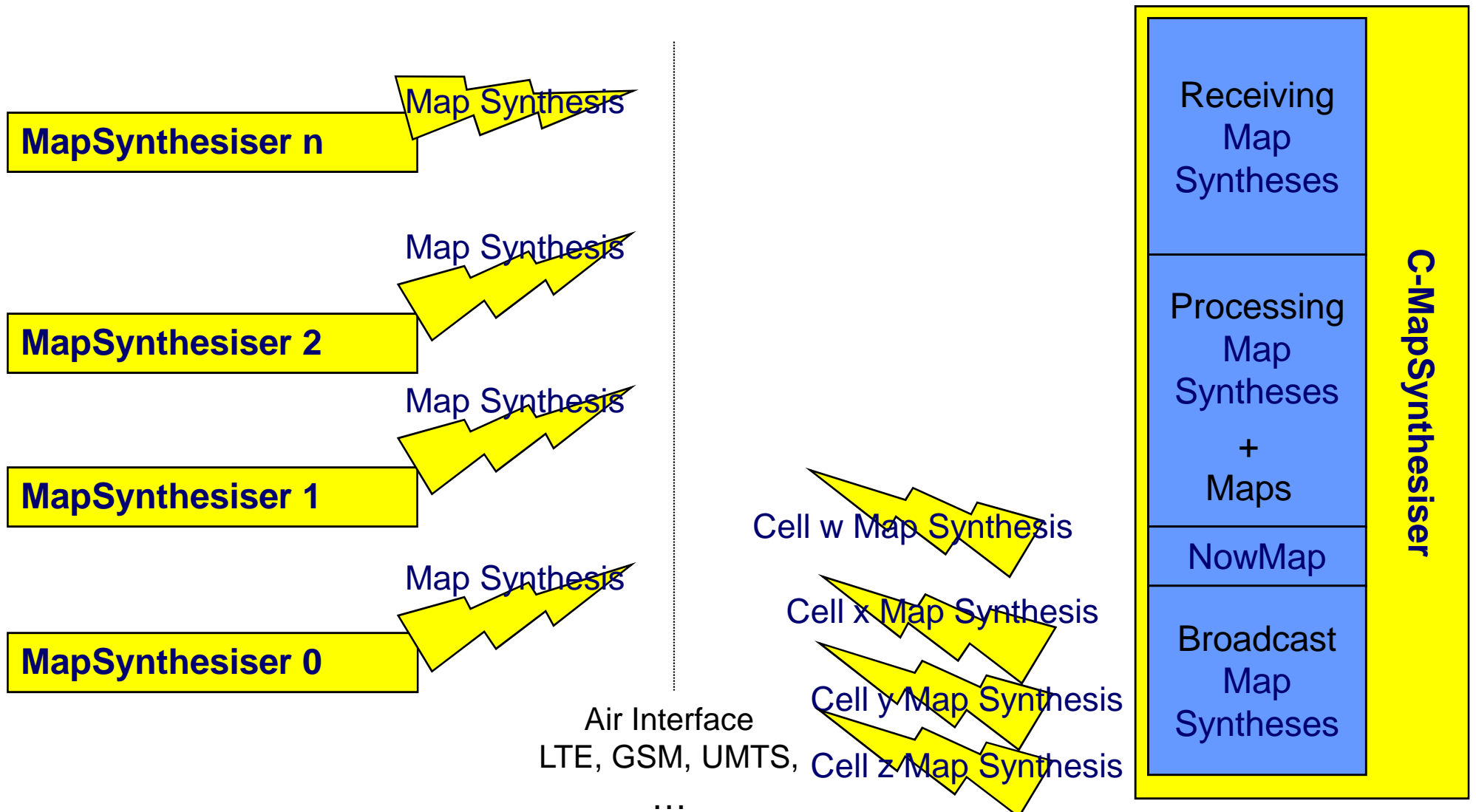
- Communication between **MapSynthesiser** via mobile network cell broadcast
  - ◆ Wider range (mobile network cell diameter)

### Configuration 3 (combining Configuration 1 and 2)

- Communication between **MapSynthesiser** via WLAN broadcast and via mobile network cell broadcast
  - ◆ Wider range (mobile network cell diameter)

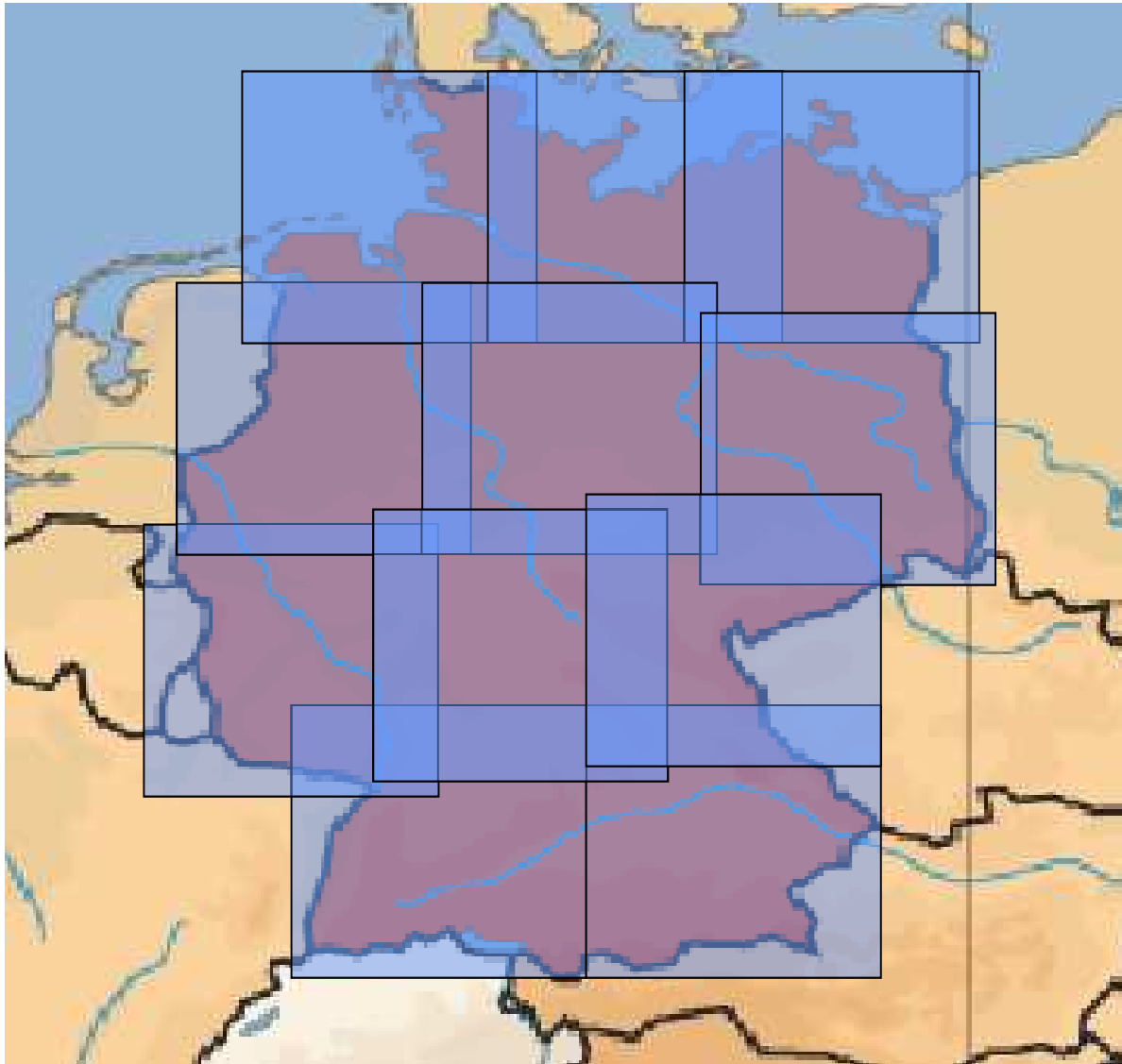
### Configuration 4

- Communication between **MapSynthesiser** by WLAN broadcast and by mobile network cell broadcast as well as a **C-MapSynthesiser** on a remote server processing all incoming map syntheses in the network and sending back per mobile network cell the specific NowMaps. **C-MapSynthesiser** significantly increases performance.
  - ◆ Wide range (network wide)



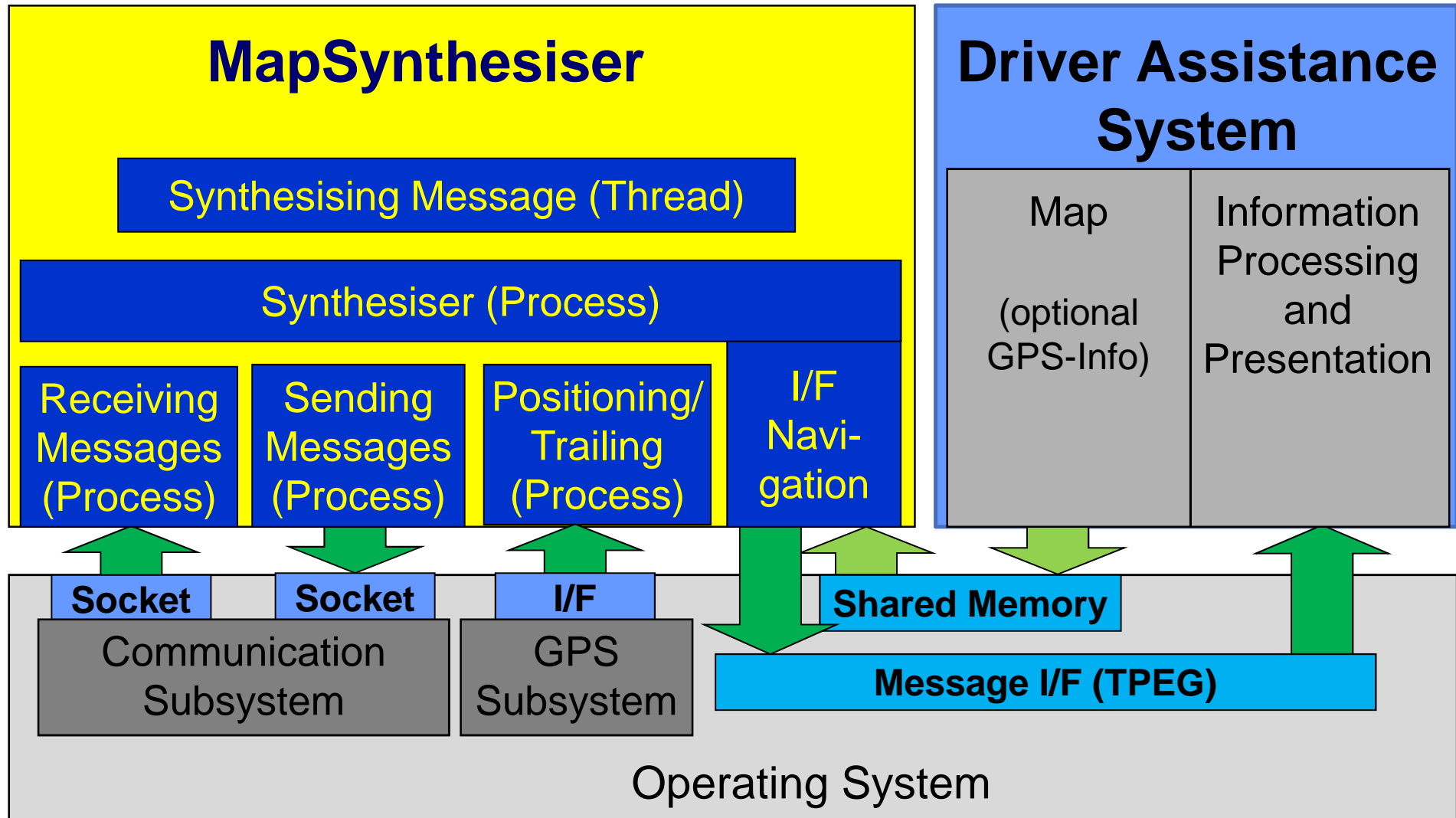


# GuideWeb C-MapSynthesiser: Design Considerations



- Geographic coverage with a server based C-MapSynthesiser
- Optimized allocation of received map syntheses to C-MapSynthesiser areas
- C-MapSynthesiser areas associated with mobile network radio cells for information broadcast.

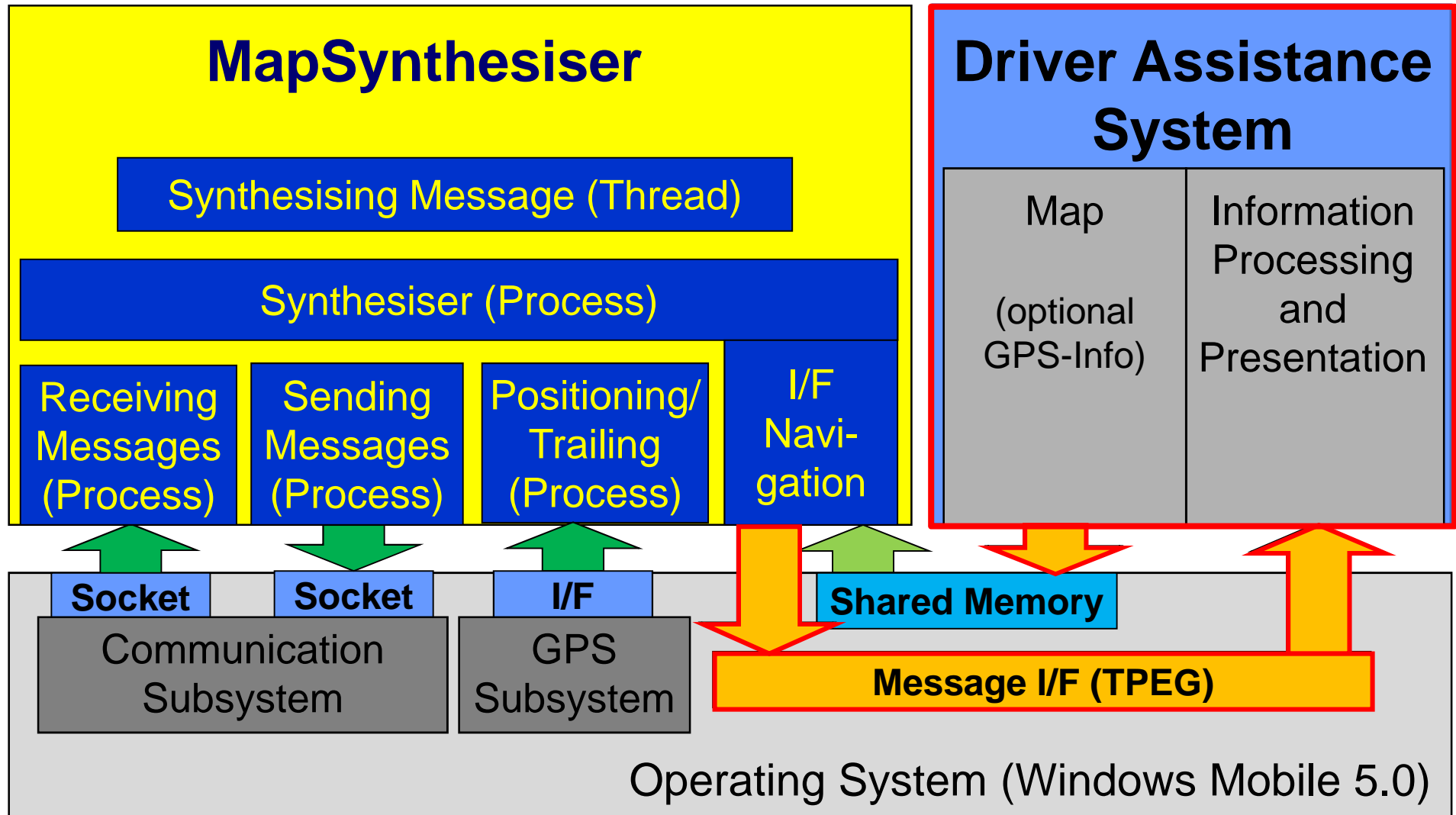
	WLAN	Mobile Network
<ul style="list-style-type: none"> <li>Message Size</li> </ul>	< 1,5 kB	< 100 kB
<ul style="list-style-type: none"> <li>Synthesis Message Transfer Time</li> </ul>	< 1 ms	< 100 ms
<ul style="list-style-type: none"> <li>Net Data Rate Required</li> </ul>	> 2 Mb/s	> 1 Mb/s
<ul style="list-style-type: none"> <li>Reach</li> </ul>	≅ 100 m – 300 m	cell size





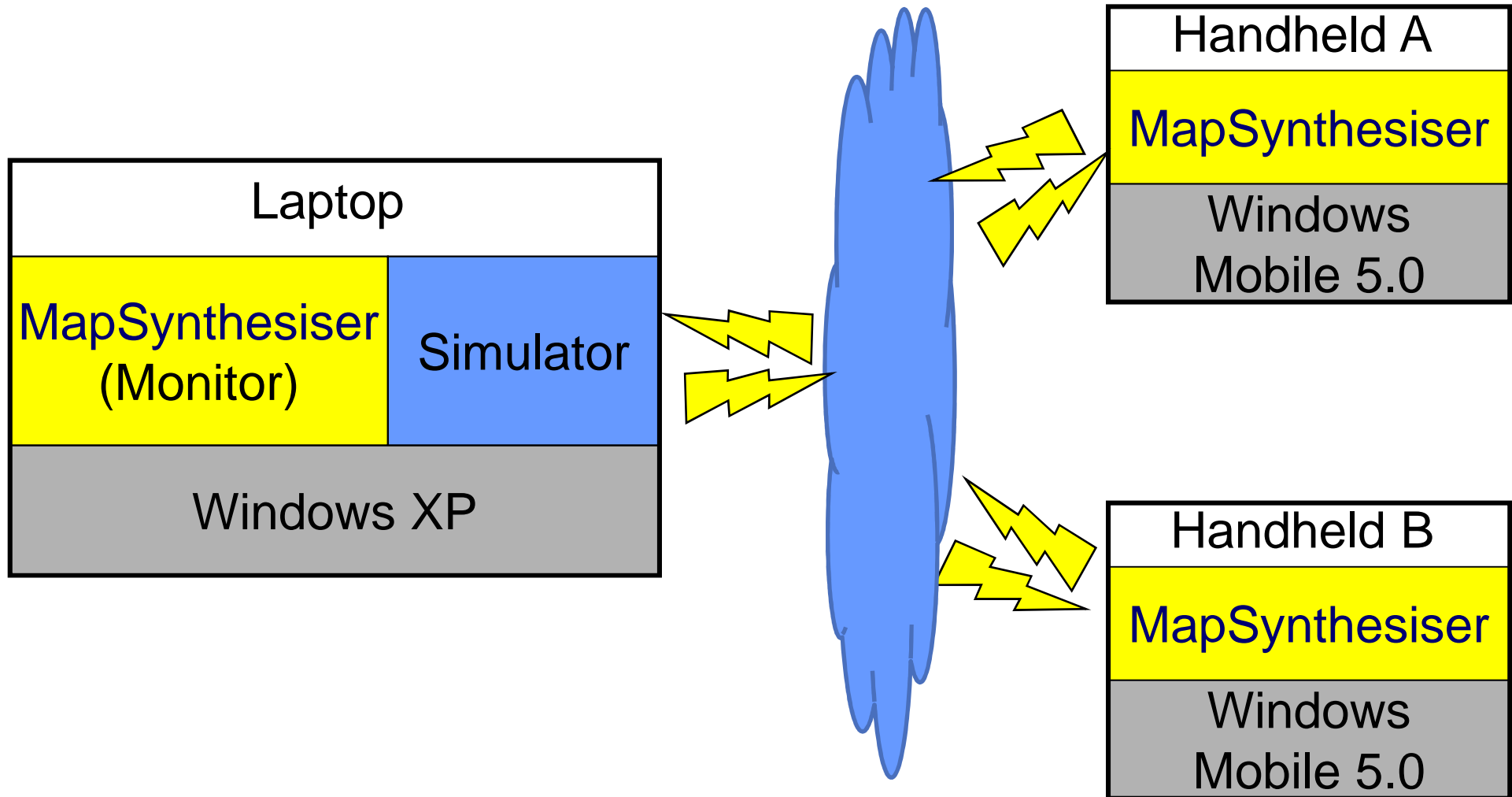
# Status





# GuideWeb

## MapSynthesiser: Prototyp Test Configuration





## In Short

## Product:

**MapSynthesiser** can support any navigation system and provides timely traffic information. This information can be used for individual route calculation.

## Market:

Strategy Analytics estimates the global market for navigation systems to be 127 Mio units with an annual growth of over 10% in the forthcoming years. Sales improve from 21.5 B€ with a rate of 2.3% (because of Smartphone applications).

## Competition:

Competing systems on the market

- **Free traffic information** via radio
- **Charged Services** via mobile communication
- Other proposals for **vehicle-vehicle-ad-hoc networks** require a penetration of 10% and more

## Unique Selling Proposition:

- **MapSynthesiser** provides more precise and timely traffic information
- Map-independence through usage of geo-coordinates, data security and privacy
- Broad variability in business models

## Technical Advantage:

- Since this technology is effective with 2% penetration there is a chance to become de-facto standard
- This technology is easily integrated with other applications of a mobile ad-hoc network

## Intellectual Property:

- BlackForestLightning owns the exclusive rights for **MapSynthesiser** technology secured by international patents (D, FR, UK, USA)

## Development Status:

- **MapSynthesiser** is implemented as prototype (ANSI-C)
  - integrated on an ASUS A636N and Windows Mobile 5.0,
  - portable to operating systems supporting threads and double precision arithmetic.
- Simulation suite available.

### Patent:

- “Device for exchanging data between moving vehicles”
- European patent 1639566 (filed 2003, granted 2008 in Germany, France and UK)
- US 7,447,569 B2 (filed 2003, granted 2008)

### Publications:

B.X. Weis, A. Sandweg, “GuideWeb: A New Paradigm for Navigation Support based on v2v Communication”, 14<sup>th</sup> International Forum on Advanced Microsystems for Automotive Applications (AMAA 2010), 2010

B.X. Weis, A. Sandweg, “GuideWeb: An introductory solution for v2v Communication”, 17<sup>th</sup> Intelligent Transport Systems (ITS) World Congress 2010