

Ultra-Wide Band Short Range Radar (UWB SRR)

eSafety Forum
Implementation Road Map Working Group
22 May 2007

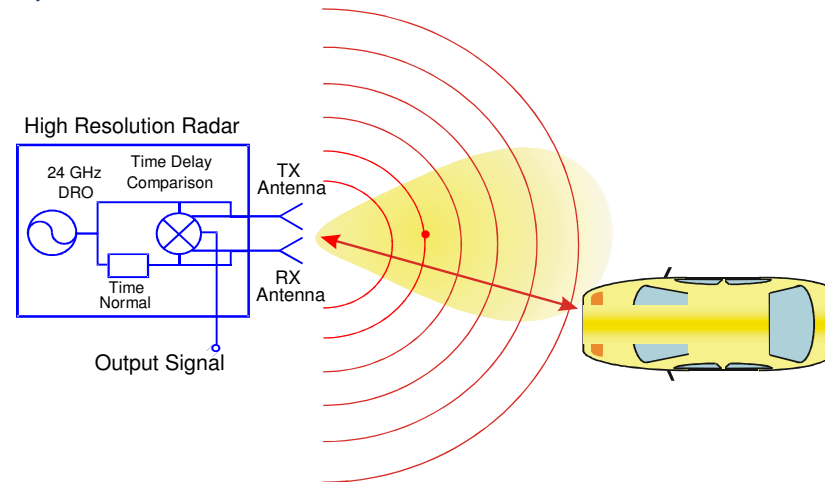
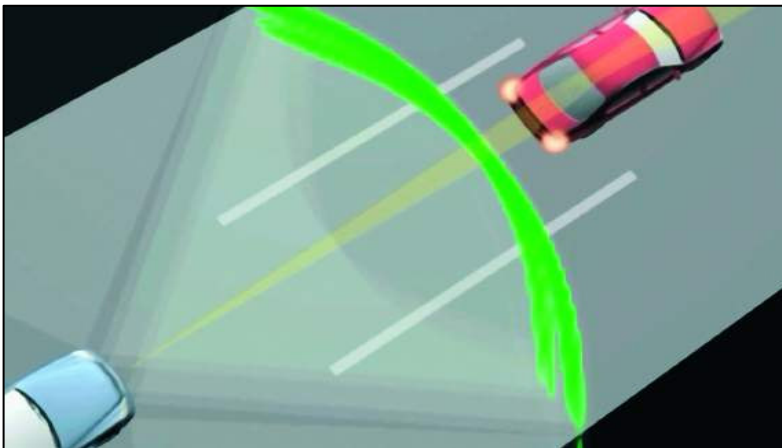
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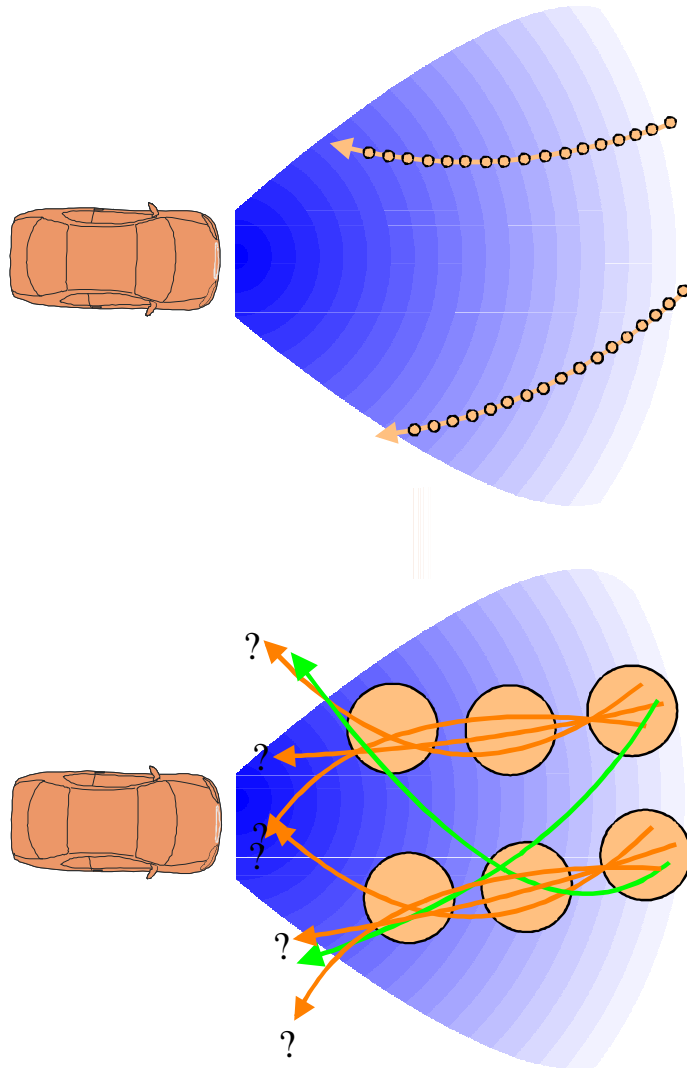
Outline

- Introduction
- Basic Technology / Possible Applications
- First Car Lines and Applications
- Frequency Allocation Worldwide
- Summary

24 GHz UWB Short Range Radar (SRR)

- Information about vehicle surroundings (Object detection)
- Sensor invisible integrated into the bumper
- Sensing range: Bumper to Object: a few cm up to 30 m
- Center frequency at 24.125 GHz
- Availability of components off-the-shelf
- Today's 77 GHz ACC technology not applicable for SRR (Substantial development still needed)



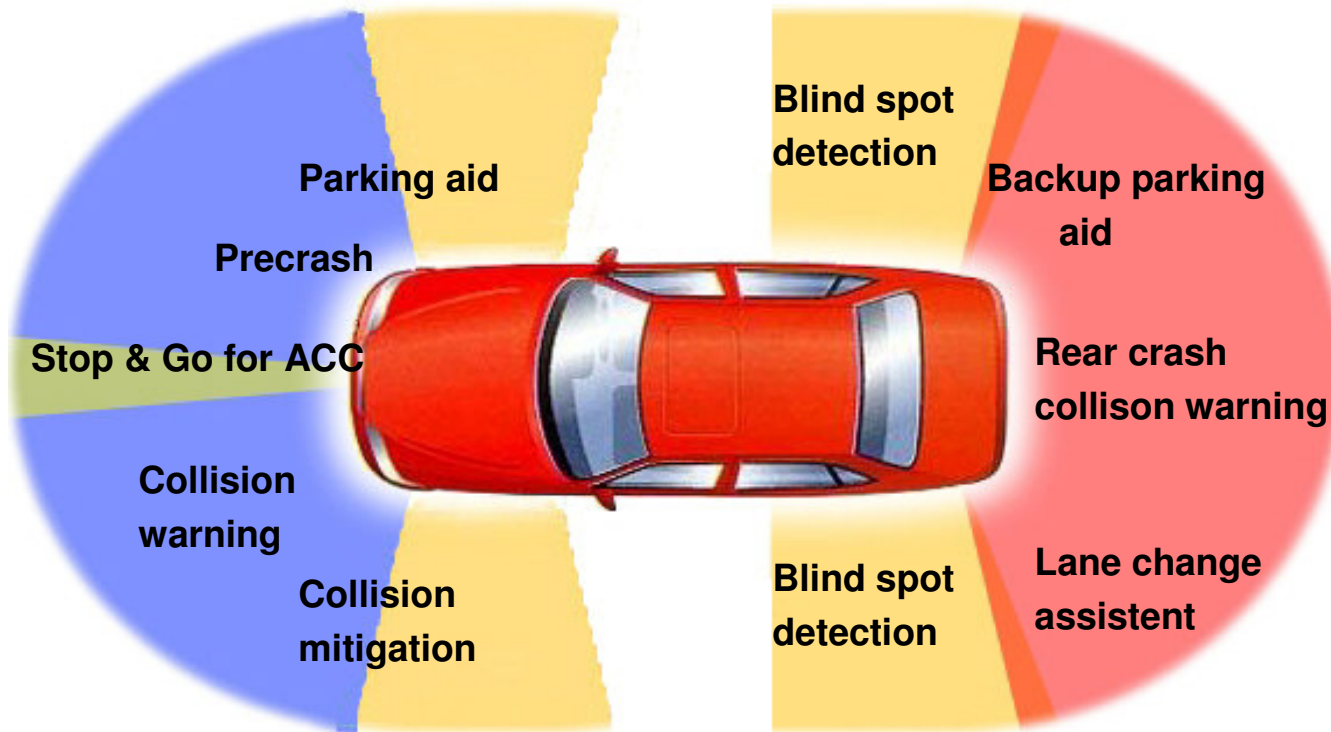


Example: Object Tracking

Only a high resolution system is capable of reliable object tracking, i.e. predict the further path of the obstacle. This is essential to forecast a crash.

A low resolution system does not allow a reliable tracking to determine if an object will crash into the car or not. Predictability even deteriorates with multiple objects in field of view.

Possible Safety Applications based on UWB Short Range Radar (UWB SRR)



➡ **Complete surround sensing up to 30 m with 8 sensors**

➡ **Multiple applications with one kind of sensor possible**

First Applications (1)



Combination of Long Range Radar and Short Range Radar: ACC Stop&Go, Collision Warning and Mitigation

SARA members: Audi, Avtovaz, BMW, DaimlerChrysler, Fiat, Ford, Jaguar, MAN, GM/Opel/Saab, Porsche, Seat, Skoda, Volkswagen, Volvo, Autocruise, Autoliv, Bosch, Cambridge Consultants, CEL, Continental, Delphi, Hella, Infineon, InnoSent, Mitsubishi Electric, Siemens VDO, s.m.s., STMicroelectronics, Takata-Petri, TDK, TRW, Tyco Electronics, UMS, ValeoRaytheonSystems, Visteon.



Mercedes-Benz

First Applications (2)

BAS PLUS and PRE-SAFE®: new dimensions in accident avoidance and occupant protection

PRE-SAFE® with new advanced occupant protection functions

Closing of sunroof

Longitudinal adjustment plus backrest and cushion angle of front passenger seat

Radar systems warn if the distance to the vehicle in front is too small. Brake Assist PLUS helps the driver during emergency braking



Raising of rear head restraints

Adjustment of seat backrests and cushions. Inflating of supporting bolsters in the rear seat backrests

Closing of side windows

Pre-tensioning of driver and front passenger seat belts

Inflating of supporting bolsters in seat cushions and backrest of both front seats

Implemented Applications Today



Mercedes S-Class (since Sept. 2005):

- ACC Stop&Go
- Collision Warning and Brake Assistance
- PreCrash

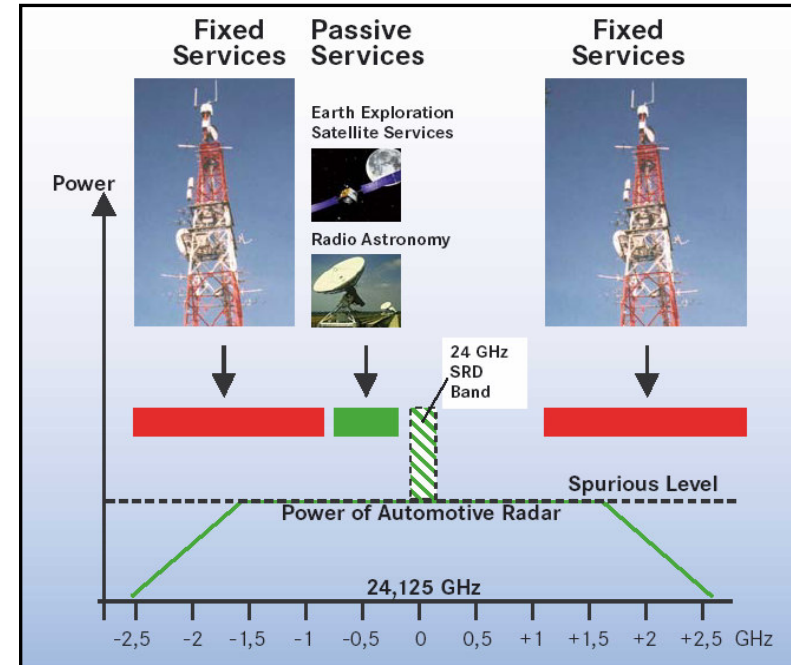
BMW 5-Series (since Jan. 2007):

- ACC Stop&Go
- Collision Warning

Frequency Allocation UWB SRR at 24 GHz

- SRR have to operate on a non-interference, non-protection basis
- Compatibility Studies with primary frequency users
 - in US 2001-2002
 - in Europe in 2002
 - in ITU 2003-2005

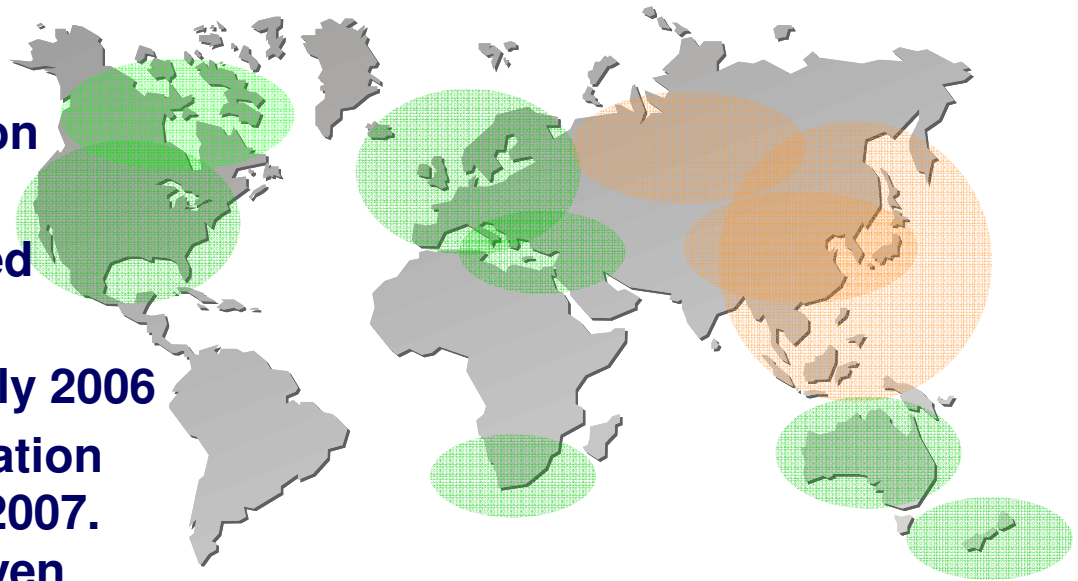
ITU: International Telecommunication Union
- Frequency Sharing is feasible with Earth Exploration Satellite Services and Radio Astronomy



**All approaches - US, EU , ITU, Australia - allow operation of SRR
in the passive band 23.6 – 24 GHz
on a non-interference basis according to ITU RR 4.4**

Frequency Allocation for UWB SRR – Current Status

- **US:** Regulation in force since February 2002
- **EU:** European Commission decision February 2005
- **Russia:** verbally confirmed (GKRCh -7 May 2007)
- **Australia:** regulated in July 2006
- **Canada:** Frequency allocation expected for first half of 2007. Interim allowance was given to start using vehicles equipped with UWB SRR.
- **Japan:** Compatibility Study group since December 2006
Release in early 2008 expected.



Since cars are offered worldwide, a globally harmonized frequency regulation is very important.

More than 50 countries in the world have approved 24GHz UWB SRR for contribution to their road safety.

Summary

- **First Car Lines are on the road.**
- **In Europe up to now two car makers use UWB SRR**
- **In US car makers announced to introduce UWB SRR shortly.**
- **In Japan the frequency regulation is expected for early 2008. Japanese car makers observe the market.**