

Frequency Requirements
of the
Automotive Industry

Future Perspectives

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Future Considerations

- **The Automotive Industry is likely to be a substantial user of radio technology (esp. Short Range Devices)**
- **Automotive electronics will be 20 - 30 % of total vehicle value**
- **Focus will be on emerging radio based applications, such as for traffic safety – “vision of accident free driving”**
- **Worldwide harmonized spectrum is important – vehicles are mobile and used worldwide / production lines require economies of scale**
- **Strategic Frequency Management (frequency planning) is not consistently used in the automotive sector today, but should be established to ensure long term frequency spectrum needs**

Frequency Needs – Automotive Industry Requirements

- **Historically, the Automotive Industry shared ISM/SRD* frequencies with other users on a non-interference and generic basis. These bands will be overcrowded in the future**
- **Recent frequency allocations have been made for automotive applications (77 GHz ACC and 24/79 GHz SRR**), still on a non-interference, non-protection basis**
- **Future automotive applications, especially for safety-related applications, require frequency allocations ensuring “effective protection” – especially for C2C safety applications (around 5.9 GHz)**

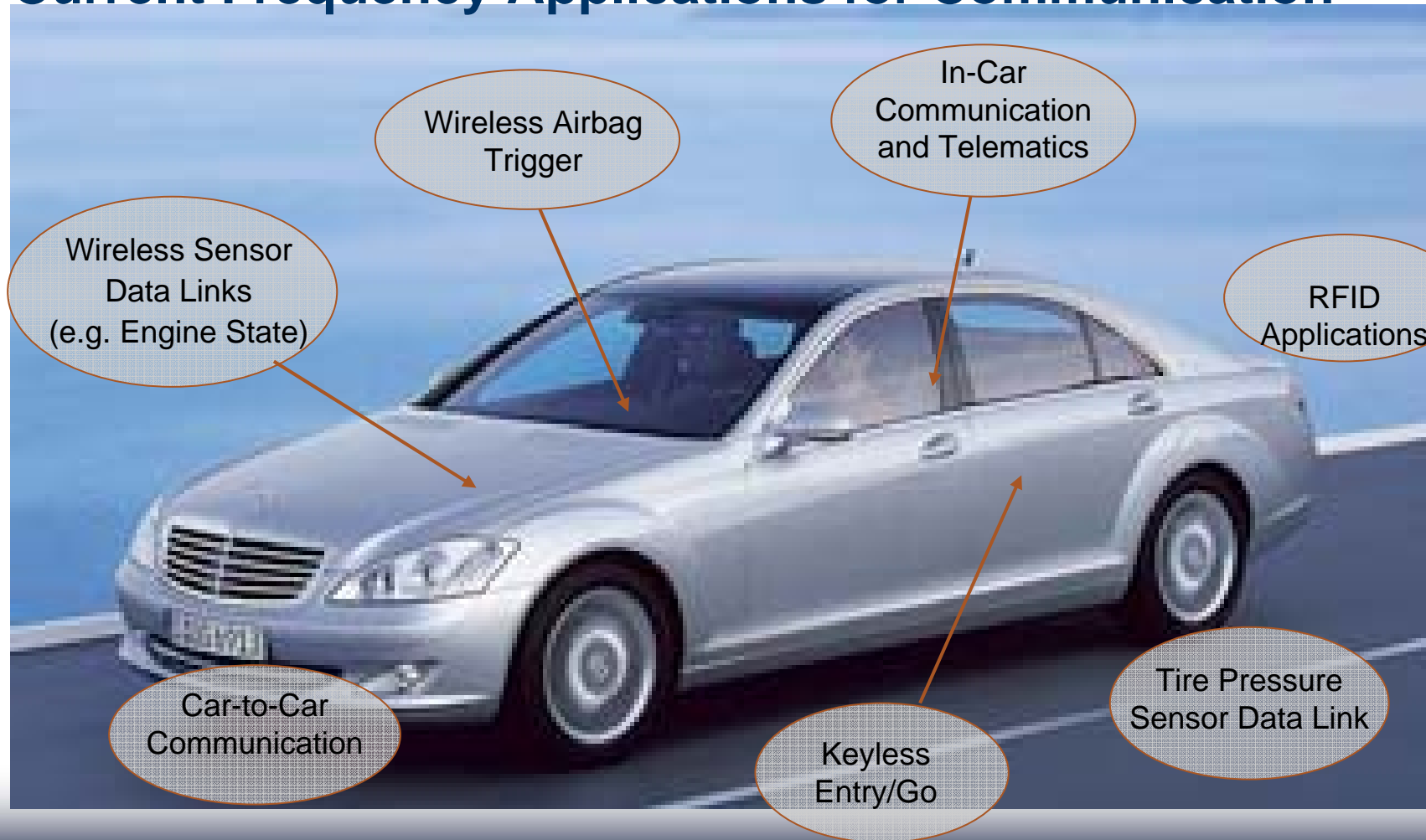
* ISM – Industrial, Scientific and Medical applications / SRD – Short Range Devices

** ACC – Adaptive Cruise Control / SRR – Short Range Radar

Frequency Needs – Automotive Industry Examples

- Radar applications at 77 GHz and 24/79 GHz
- Car-to-Car / Car-to-Infrastructure communication (5.x GHz and 63-64 GHz in future)
- In-Car Communication / Sensors / Services and Infotainment (e.g. UWB)
- Long Range applications with target frequencies above 100 GHz (e.g. ACC)
- Short Range applications with target frequencies below 100 GHz
- Ubiquitous connectivity and data link availability (Comms-market dependent)

Current Frequency Applications for Communication



Future applications – Automatic Highway Driving



System Check and Login →



Navigation Info (Route, Stops, etc.) →



Automatic Drive (Platooning) →



Leave AHS Lanes - Logout

Necessary prerequisite: Car-to-Car and Car-to-Infrastructure Communication
Reliability needs: Safe and Secure Data communication with protection/certification

Cost sensitivity is high:

- Automotive Industry is normally not the technology driver – typically uses/adapts other consumer electronics
- Automotive market is highly cost sensitive
- License exemption is necessary
- Harmonized approach (one product worldwide)

Special Features of Automotive applications:

- Frequency user is car owner/driver, not car manufacturer/supplier
- Safety applications benefit the driver, but also other vehicles even if not equipped

Summary and Conclusions

- **Automotive Industry has an increasing demand for frequency resources**
- **Today's automotive applications work on a non-interference, non-protection basis**
- **Future applications will require certain protection criteria and spectrum user status (e.g. for secure data communication)**
- **License exemption is necessary**
- **Worldwide harmonized frequency bands are important**
- **Continuous long term participation of the Automotive Industry in spectrum management is necessary to ensure the availability of frequency spectrum for future needs**