Agenda

1- Introduction

2- Today Wireless applications in Automotive
   - MegaTrends
   - Examples

3- Future Trends

4- Continental Solutions & Portfolio
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1. Introduction

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3. Future Trends

4. Continental Solutions & Portfolio
1-Introduction

Some decades ago, Wireless was poorly present in Automotive:

AM-FM (Broadcast Radio)

Access (InfraRed, Radio Frequency)

Immobiliser (Anti-theft/ Low Frequency communication)
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Today, this situation has changed significantly…
How RF participates to these **Today** MegaTrends

- Tire Pressure Monitoring System
- E-Call
- Radars/ speed adaption
How RF participates to these Today MegaTrends

- Mobile Phones/ BlueTooth pairing
- Navigation
- Multimedia (AM-FM/ DAB/ DVB-T)
How RF participates to these Today MegaTrends

- Enhanced Access (PASE, long Range)
- Phone Charger
- Identification & security
Management of Wireless Communication Definition

RF Communication

- Spread Spectrum/Wideband
- Silicon technologies
- Chipsets

Hardware and Technologies

- Software Defined Radio

- Car2Device/Car2x
- ARIB/KRETS
- ETSI
- FCC
- Bluetooth
- ZigBee
- GPS

Standards

- Current, Cost&Size
- Worldwide Homologation

Requirements

- Amount of data to transmit
- Reliability
As a summary, Wireless Services Today
As a summary, Wireless Services **Today** which help the MegaTrends

<table>
<thead>
<tr>
<th>RF Services</th>
<th>Technologies / some examples of Frequencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile Phone</td>
<td>2G / 3G / WiMax / LTE</td>
</tr>
<tr>
<td>Satellite Radio</td>
<td>SDARS (2,32-2,345 GHz) / DVB SH / digital S-band Satellite</td>
</tr>
<tr>
<td>Long Range Services, <em>like: Heating, Car Check and Status Request</em></td>
<td>ISM Band (315 MHz / 433,92 MHz / 868 MHz / 915 MHz)</td>
</tr>
<tr>
<td>Remote Keyless Entry</td>
<td>ISM Band</td>
</tr>
<tr>
<td>PASE // TPMS</td>
<td>ISM Band + 125 KHz</td>
</tr>
<tr>
<td>Car Sharing</td>
<td>NFC – 13,56 MHz</td>
</tr>
<tr>
<td>WLAN</td>
<td>Wifi Standard IEEE 802.11 / 2,4 GHz &amp; 5 GHz</td>
</tr>
<tr>
<td>Digital Radio Broadcasting</td>
<td>DAB / DMB / DVB Band II (174–240 MHz) and L band (1452–1492 MHz)</td>
</tr>
<tr>
<td>Bluetooth (Device pearing)</td>
<td>ISM band from 2400–2480 MHz</td>
</tr>
<tr>
<td>Device Charger</td>
<td>WPC (100-200 KHz)</td>
</tr>
<tr>
<td>Fleet Management / Tolling</td>
<td>Use GPS &amp; GPRS informations</td>
</tr>
<tr>
<td>Navigation / E-call</td>
<td>GPS-Galileo-Glonass(1575.42 MHz / …)</td>
</tr>
<tr>
<td>Analog Radio</td>
<td>88 – 108 MHz</td>
</tr>
</tbody>
</table>
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1 example: Tire Pressure Monitoring Systems (TPMS)

**Environment**
- Allows maximum opportunity for minimizing fuel consumption & C0₂ output
- Maximizes tire life
- Focus of legislation in Europe (Nov-2012) & South Korea (Jan-2013)

**Safety**
- Avoidance of roadside breakdowns and risk of road congestion
- Focus of legislation in US (Oct-2005)
- Future possibilities to link tire information into the Chassis & Powertrain systems for optimized vehicle control

**Information**
- Provides accurate tire data to the driver
- Additional functions like “Filling Assistant”, “C0₂ Assistant”, “Load Detection” etc., simplify & encourage better tire management

**Affordable Cars**
- Tire Information System sensors available for all vehicle & rim sizes
- Scalable solution to meet functional needs of all vehicle platforms
TPMS: how does it work?

RF band (ISM): 315MHz/433.92MHz

RF Receiver

Wheel Unit

Data: 98bits
DR: 9.6 kbits/s
Pwr: -20dBm
Autonomy: 10 years

HMI
(Human Machine Interface)
TPMS: a market driven by regulations

**United States – Regulation from 2005**
FMVSS 138 mandates TIS equipment for new vehicles starting from October 1st, 2005

**Russia – Regulation from 2016**
2010/706 mandates the carryover of UN EC-R 64 for new vehicle models of M1 & N1 vehicle categories starting in 01.01.2016. From 01.01.2016 all vehicles of categories which are voluntarily equipped with TPMS must be type approval according to ECE 64

**South Korea – Regulation from 2013**
TIS to be installed on passenger vehicles and vehicles of GVW 3.5 tons or less. From 1st January 2013 for new models and 1st January 2015 for existing models

**European Union – Regulation from 2012**
EC661-2009 mandates TIS equipment starting from Nov. 1st 2012 for new type approved vehicles and for all new vehicles starting from Nov. 1st 2014

+ TPMS will be tested as part of the new EU standardized plan for Vehicle Periodical inspection

**Indonesia, Israel, Malaysia, Philippines, Turkey**
Require European Whole Vehicle Type approval for vehicles imported from Europe. As a consequence, for those vehicles they will require a TPMS type approval according to ECE 64 and ECE 121 from 01.11.2012 for new types and 01.11.2014 for new vehicles
Example of useful function

Smart Phone example

Filling assistant provides the recommended inflation pressure

Feedback provided during the filling action

Target pressure reached, filling action completed
Other applications which add comfort & help to sell Cars

- PASE: New Functions & Technologies
  - Welcome Lighting
  - Door Secure Loc
  - Bi-Directional Communication
  - Walk Away Locking
Other applications which add comfort & help to sell Cars

**Long Range System**

**TARGETS:**
- maximum world wide com. range
- bi-directional communication
- multi channel capable
- ultra narrow band

**FUNCTIONS (examples):**
- access control
- car check, status feedback
- alarm on key
- heat or air condition control
- remote start etc.

<table>
<thead>
<tr>
<th>Condition: line-of-sight</th>
<th>Europe</th>
<th>US</th>
<th>Japan</th>
<th>Korea</th>
<th>China</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Range Target</td>
<td>600 m</td>
<td>600 m</td>
<td>100 m</td>
<td>75 m</td>
<td>150 m</td>
</tr>
<tr>
<td>Typical Range Target</td>
<td>~2 km</td>
<td>~2 km</td>
<td>~400 m</td>
<td>~300 m</td>
<td>~700 m</td>
</tr>
</tbody>
</table>
Other applications which add comfort & help to sell Cars

**NFC Interface becomes an integral part of our future Identification Devices**

**Applications:**

- Gateway Key
- Vehicle configuration/ option release
- Cell Phone based Car Finder

Day km: 231  
Total km: 15.321  
Average fuel consumption: 3.1l  
Remaining fuel: 23l  
Tire Pressure: 2.0/2.0/1.2/2.4  
Lock status: Locked

© Continental Automotive GmbH
Other applications which add comfort & help to sell Cars

WPC (Wireless Power Charger)

Use cases

- Start authentication
- User profile reading (car personalization)
- Automatic WLAN pairing
- Wireless charging
- Back-Up Ecall
Other applications which add comfort & help to sell Cars

- Lower costs
- Improved performance
- Reduced complexity
- Best scalability
RF is introduced at very large scale in Automotive world.

It participates to Today Automotive MegaTrends and is now mandatory to give added value to sell cars, from safety reason to comfort.

Continental is a key player to propose solutions on the markets, and works closely with OEMs to introduce all these new technologies.
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In future, Automobile Market will have to face the following issues

- End of Petrol
- Increase of Cars from 1 billion → … several billions
- Actual MegaTrends will stay
How RF will help to these future Challenges

End of Petrol

- Need of New Infrastructure (called SMART GRID) like BETTER PLACE, based on Navigation System, long range communication & Secured Wireless Payment

- Wireless Car Charging
In future, Automobile Market will have to face the following issues:

- Increase of Cars 1 billion (BRIC)
- Traffic Jam
- Security
- Sharing development & Increase in the development of Multi modal system
- ADAS
- C2X with Applications

**ADAS: Advanced Driver Assistance System**

- CC: Cruise Control
- ACC: Adaptive Cruise Control
- LDW: Lane Departure Warning
- GPS
- Parking assistance
- Driver wake up system
- Night visibility
- E-call, etc....
In future, Automobile Market will have to face the following issues

- Increase of Cars 1 billion → ?
- Traffic Jam
- Security
- Sharing development & Increase in the development of Multi modal system
- ADAS
- C2x with applications

# Automatic vehicle from 1 point to another point

# Association of small vehicles which can go from 1 address to another (and form a kind of parametric bus) & bi mode car

All these solutions will rely on RF Solutions linked Automatisation of the road (C2x)

- # Intelligent Crossway
- # Real time traffic adaptation
- # Telematic signalisation
In future, Automobile Market will have to face the following issues

Actual MegaTrends will stay

- CO2 emission reduction
  New generation of TPMS
  Sensors network for data optimisation

- Your home in your car
Your home in your car ➔ Trend for being Always Connected

Device Connectivity

Office & E-Mail

Web Services

MegaTrend: Always connected

C2X Functions
RF domain will be a key technology to answer future automotive challenges.

Continental is already working on all technologies described above (advanced development, patents, …) and is ready to invent our future…
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## Strong Divisions and Business Units

### Continental Corporation

#### Automotive Group

- **Chassis & Safety**
  - Electronic Brake Systems
  - Hydraulic Brake Systems
  - Sensorics
  - Passive Safety & Advanced Driver Assistance Systems (PSAD)

- **Powertrain**
  - Engine Systems
  - Transmissions
  - Hybrid & Electric Vehicle
  - Sensors & Actuators
  - Fuel Supply

- **Interior**
  - Instrumentation & Driver HMI
  - Infotainment & Connectivity
  - Body & Security
  - Commercial Vehicles & Aftermarket

#### Rubber Group

- **Tires**
  - PLT, Original Equipment
  - PLT, Repl. Business, EMEA
  - PLT, Repl. Business, Asia Pacific
  - Commercial Vehicle Tires
  - Two Wheel Tires

#### ContiTech

- Air Spring Systems
- Benecke-Kaliko Group
- Conveyor Belt Group
- Elastomer Coatings
- Fluid Technology
- Power Transmission Group
- Vibration Control
- Other Operations

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## Division Interior Product Overview

### Instrumentation & Driver HMI
- Instrument clusters
- Secondary displays
- Head-up displays
- Climate controls
- Haptic controls
  - Faceplates
  - Central input devices
  - Roof controls
- Integrated centerstacks
- Cockpit modules

### Infotainment & Connectivity
- Radios
- Connected radio & entry navigation
- Multimedia systems
- Embedded telematics
- Device connectivity
- Software & special solutions

### Body & Security
- Body control modules
- Access control systems
- Door systems
- Seat comfort systems
- Power closures
- Tire information systems
- Gateways
- Energy management
- Exterior light control units
- Intelligent antenna modules

### Commercial Vehicles & Aftermarket
- Tachographs, telematics & services
- Visual & haptic HMI
- Powertrain control
- Chassis-, body & transmission electronics
- Wear parts, spare parts & services for the independent aftermarket
- Original equipment services
Today's Wireless Product Portfolio Continental

- Remote Keyless Entry, PASE
- Tire Pressure Monitoring
- ISM Band Transceivers
- Telematics & Connectivity
- Infotainment, Multimedia, Radio
CES: An original approach to apply Continental Standard Solutions to other markets

Continental standard products & functions

- Control access, identification
- Tire pressure monitoring
- Wireless communication, Radar

Continental Engineering Services

- Technology
  - Reduce size for integration in new supports (watch, bracelet, …)
  - Wireless Network Sensors in Aeronautics
  - In medicine for patient identification and treatment

- Market
  - Adapt product for new environment
  - In Aeronautics

- Application
  - Add functions
  - Anti-collision avoidance for aircraft
  - In car rental with mobile
Thank you for your attention.