Communication in Transport: Connected Cars, C2X and The Internet of Things (IoT) - a global perspective.

Watson IoT

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GM – T&T and Government

Created with input from NXP/Qualcomm and other IBM partners
SAFE & SECURE COMMUNICATION IN TRANSPORT – 90% INNOVATION THROUGH INTERNET OF THINGS (IOT)

Seamlessly Connected Mobility Experience

- One hour per day in the vehicle
- Enjoying Life

E-call and Driver Assistance Towards Self-Driving

- 1.3M global road fatalities every year
- Saving Lives

Energy Efficiency

- US mandates 163 grams / mile and 54.5 MPG by 2025
- Reducing PM10 / CO2

IBM Watson
CONSUMERS INCREASINGLY UTILIZE OTHER MEDIA IN THE VEHICLE. CREATING LAWS PROHIBITING THEM IS NOT THE SOLUTION

Interaction with phones and social media while in the vehicle is inevitable…

…the response, thus far, has been laws prohibiting the use of phones while driving…

Collision claims per 100 insured vehicle years, by month before and after texting law for all drivers

... study finds no reductions in crashes after laws take effect that ban texting

Among 18-25 year-olds, the group most likely to text

45% in states with bans

48% in states without bans

Finding a safe way to enable that interaction requires technology and connectivity solutions.

**WATSON and Cognitive interaction increases safety in the vehicle**

- Keeps the vehicle in an "ideal road position", 19% more than manual dialing and 40% faster to make a call.
- Manually selecting music on a MP3 player made the driver 50% more distracted and doubled the amount of time to change lanes.

**Driver focused clustering reduces the time needed to access and review information**

- Five way controllers on steering wheels
- Displays in visually ‘friendly’ areas
- Using color to convey functionality

**Heads-up display allows for ‘eyes on the road’ driving**

- Projected dashboard and navigation
- Sign-recognition
- “Virtual” road edge and lane edge for bad weather conditions
- Night vision

**Attention monitoring systems improve driver alertness levels**

- Audio and visual warnings for:
  - Lane departures
  - Speed warnings
  - Pedestrian crossing
  - Collision warnings

Source: Nuance Communication, 2008
Telematics will be deployed in different configurations, effecting how the vehicle is personalized.

- **Built In**
  - Emergency assistance
  - Vehicles health reporting
  - Security and safety
  - Battery management
  - Autonomous / ADAS
  - Cognitive Interactions voice and gesture

- **Beamed In**
  - Weather
  - Traffic management
  - Points of interest
  - Business listings
  - Video, Radio, VR

- **Brought In**
  - Driving routes / navigation
  - Music and video
  - Calendar
  - Social Media
  - E-mail and SMS

Hybrid models are emerging that require integration points depending on what the application is best suited for.
New Watson IoT technology's enable many potential value-added services in Travel and Transportation

- Traffic information
- Traffic prediction
- Dynamic navigation
- Route planner
- m-Commerce
- e-Intelligent driving
- Traffic & navigation
- Environment protection
- Communication/collaboration
- Industry solutions
- Emergency & safety
- Emergency assistance
- Safety alert
- PAYD insurance
- Visitor information
- Location-based advertising
- Public transport
- Carbon calculator
- Vehicle usage
- Group tracking
- Family & friends
- Collaboration
- Fleet management
- Taxi management
- Emergency management
- Road warnings
- Congestion alert
- Driver status
- Parking locator
- Route planner
- Traffic prediction
- Dynamic navigation
- Location-based advertising
- Vehicle usage
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European/Russian legislation leads to e-Call
Mandatory 31 march 2018

Incident  Automated eCall  Rescue centre  Ambulance

eCall technology can save thousands of lives each year, reducing the emergency services reaction time by 50% rural and 40% in urban areas.

This technology will also assist in solving other treats to drivers like:
Car theft, robbery, hijacking and kidnapping by vehicle tracking.
eCall Status, cellular in band modem and third party 3G/4G implementations in the market

- Specification approved standardization
  - Pan European eCall Operating Requirements
  - Minimum Set of Data (MSD)
  - Application Requirements
  - The “Third Party eCall” already implemented
  - The eCall discriminator (‘eCall flag’) agreed
  - Safe automatic call also when driver is unconscious
  - Verification via voice link
  - Use of eCall flags to distinguish automated/manual calls

- Positive response on eCall Public consultation strongly supports eCall introduction

- EU mandatory introduction March 31, 2018 for all new type approvals. Legislation approved

- Russia adopted eCall already, based on extra insurance fee for cars not equipped

- eCall service shall comply with privacy and data protection recommendations provided by art. 29 WP

- 20 Member and 3 Associated States have signed
  - More countries have announced their signature
  - Commitment from the automotive ACEA and telecom industry (GSM Association Europe)
  - 120+ other organizations have signed as well, representing all the stakeholders involved
Car sensors in Watson IoT platform with V2X for Aquaplaning prediction

Increase safety and driving experience

Hyper local weather will help car and driver to drive safer

Current weather data is not local. With The Weather Company’s hyper local weather, the car can adopt to the road conditions before it gets dangerous. (example case proposed to Porsche)
The Weather Company: Sensor Data combined with Watson IoT

- 26 Billion daily forecasts / visits for 2.2 billion weather forecast locations
- Daily Data from 50 Million mobile devices: location & pressure
- Atmospheric data from 50,000 flights per day
- 250,000 worldwide weather stations
- 100TB of data per day
- 1000+ radar locations
- 150+ meteorologists

ForecastWatch.com: “TWC gives the most accurate weather prediction for the last 7 years (2010 - 2016) across all regions and timeframes after analyzing 142 Million forecasts from 11 different providers”
ENABLING THE SECURE CONNECTED CAR

SENSE
- Radar Vision
- Secure V2X

THINK
- Processing
- Sensor Fusion
- Security

ACT
- Powertrain
- Chassis
- Braking

IoT / BIG DATA
- Digital Networking
- Infrastructure
- Security
EXTENDING SENSING BEYOND THE VEHICLE & LINE OF SIGHT

802.11p required for Safety-critical V2X features:
- Low Latency, Secure & Beyond-line-of-sight
- Providing additional safety data earlier than any other sensor can „see“
CAR-TO-CAR AND CAR-TO-INFRASTRUCTURE COMMUNICATION

A paradigm shift in mobility

Solutions to **avoid accidents, improve traffic flow** and **enable autonomous driving**

Automotive communication standard IEEE802.11p is derived from IEEE802.11a/g (today’s WiFi standard in computing)
V2X COMMUNICATION – IEEE 802.11P

Dedicated Short Range Communication (DSRC) between cars, roadside infrastructure etc
- ‘WiFi-like link’ upgraded for high speed automotive: IEEE 802.11p
- Optimized for mobile conditions, including multi-path reflection situations
- Dedicated reserved frequency band at 5.9 GHz (several 10 MHz channels)
- Typical 500-1500 meter range
- Can ‘look around corners’ thanks to reflections

Does not rule out other communication channels (cellular 4G and LTE 14+ => 5G)
- 802.11p focuses on short range low latency, complementing the long range / more latency cellular network
- Autonomous driving capacity requirements need more than DSRC can offer in current standard
- Different use cases, different requirements => Consumer Value added services
- On the edge computing (Watson IOT) with cellular networks
- Connected value added services
V2X GLOBAL TEST BEDS

- Singapore LTA “faster” Smart Mobility Test Bed
- Smart Port Hamburg Connected Trucks in UAE
- V2X in China with SAIC / Tongji university
- German automotive cooperation “HERE - “Transportation Cloud”
- BMW i8 Cognitive Car Watson IOT
- Singapore NTU / NXP Smart Mobility Test Bed
<table>
<thead>
<tr>
<th>Europe</th>
<th>Asia</th>
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<tbody>
<tr>
<td>• Car2Car Consortium prepares deployment 2019 onwards</td>
<td>• China: DSRC under evaluation, many trials</td>
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<tr>
<td>• Connect Motorcycle Consortium starts 2020</td>
<td>• Japan/Toyota: V2X (760MHz Japan standard) safety package launched already 2015</td>
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<td>• EU issued final framework for Cooperative-ITS</td>
<td>• Singapore: ERPII award for 2018 deployment</td>
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<td>• Declaration of Amsterdam</td>
<td>• Korea: Plan to mandate from 2020, C-ITS deployment from 2018 onwards</td>
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<tr>
<td>• Cooperative ITS corridor deployment started</td>
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<tr>
<td>• EU truck platooning challenge (DAF, Volvo, Scania, Daimler)</td>
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DEPLOYMENT IN EUROPE: COOPERATIVE ITS CORRIDOR

MOU between The Netherlands, Germany and Austria to deploy cooperative mobility on this corridor to improve traffic safety and reduce congestion
TRUCK PLATOONING

Declaration of Amsterdam

Cooperation in the field of connected and automated driving

14-15 April 2016
Connected, cooperative and automated driving developments should come together to harvest societal benefits.
• V2X Notice of Proposed Rule Making released end 2016 preparing Mandate of 802.11p
  • DSRC compliant technology at 5.9GHz
  • PKI / SCMS based security
  • Proposed Schedule:
    2021 50% of new cars need to have DSRC
    2022 75%
    2023 100%
• General Motors’ Cadillac already shipping, ahead of US mandate
• US DOT / Smart City Challenge Partnership (IBM + NXP)
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Combining Watson IoT and The Weather Company in an autonomous driving bus: OLLI

The ridership revolution with Customers:

- Cognitive Interaction with Watson IoT on a self driving 3D printed vehicle
- Anticipating on weather alerts, social media, restaurant reviews etc.
- Operational in Washington DC, Berlin and many more places in 2017

https://www.youtube.com/watch?v=9joEsWiYFEI
THE US WILL MANDATE V2X TECHNOLOGY WITHIN 5 YEARS

Cadillac to Introduce Advanced ‘Intelligent and Connected’ Vehicle Technologies on Select 2017 Models
Super Cruise and V2V technologies slated for production in about two years

The world’s first V2X in series-produced vehicles
Connected cars will be **differentiated through business models that sustain new value streams**

An IoT platform for growth includes:

**Use Case Portfolio**
- Designed to enable a nearly limitless set of potential use cases through V2x data interchange
- Enable use cases rapidly through a powerful recipe-based interface
- Contains sophisticated automotive use case solutions such as Advanced Driver Assistance Services (ADAS) and multi-layered, mapping technology that supports multiple vendors providing real-time for autonomous driving

**Vehicle to Cloud IoT Platform**
- Deployed through cloud, hybrid cloud or as an on-premises solution
- Built on open standards supporting a range of industry protocols and integration with third party services
- A rich set of advanced analytical tools to handle data streaming, modeling, reporting along with image and natural language processing

**Technology Infrastructure**
- Secure two-way vehicle communications through a hybrid cloud that scales to tens of millions of vehicles across the globe
- Globally distributed cloud data centers that can be in compliance with consumer privacy laws that vary internationally
- Priced per vehicle to alleviate large up-front costs

By 2020, the connected car will be the **#1 connected application**

200 million cars will be connected in 2015 and fully packed with sensor technologies

By 2020, connected vehicles will produce **350 MB of data per second**
Connectivity is enabling the Watson IoT use cases and solutions

Solutions need to be:

- Customer focused
- Enterprise focused

Driving real benefits for the users!

Offering Limitless opportunities for implementation.
Thank you!

Let’s work together to make Transportation Smarter