Digital Innovation in Transport Systems

OECD Workshop, Jun. 20, 2018
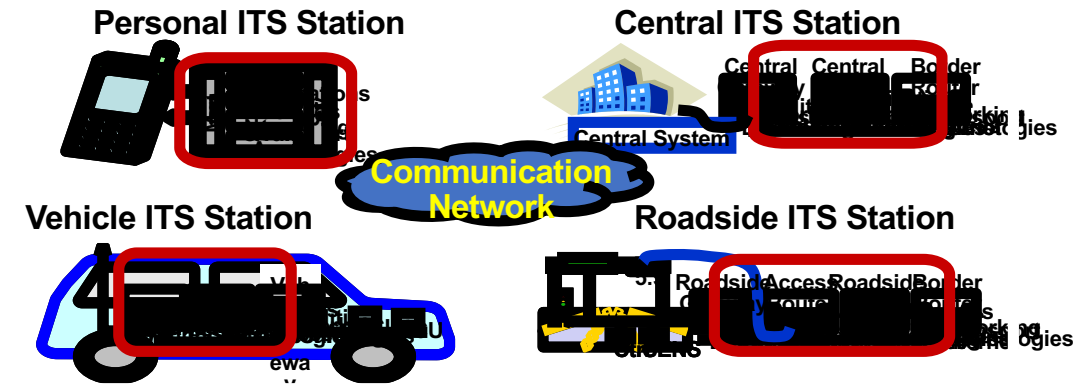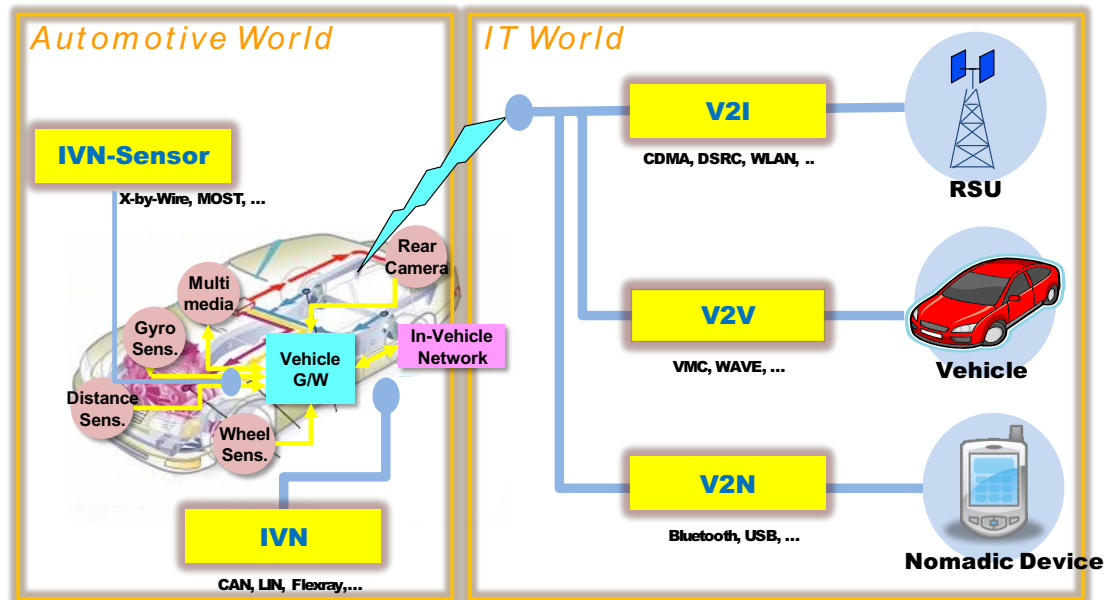
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Digitalization in Transport Systems

- Vehicle & ICT Convergence for V2X (V2I, V2V, V2N, V2P) Connectivity

- Cooperative Intelligent Transport Systems (C-ITS)

Digitalization in Transport Systems

- **Cooperative ITS (C-ITS) Pilot Project in Korea for V2X Connectivity**
  - **Focusing Safety, Promoting Mobility & Sustainability (Green Transport)**
  - **Next Generation ITS to provide a service on the open platform utilizing Big Data**
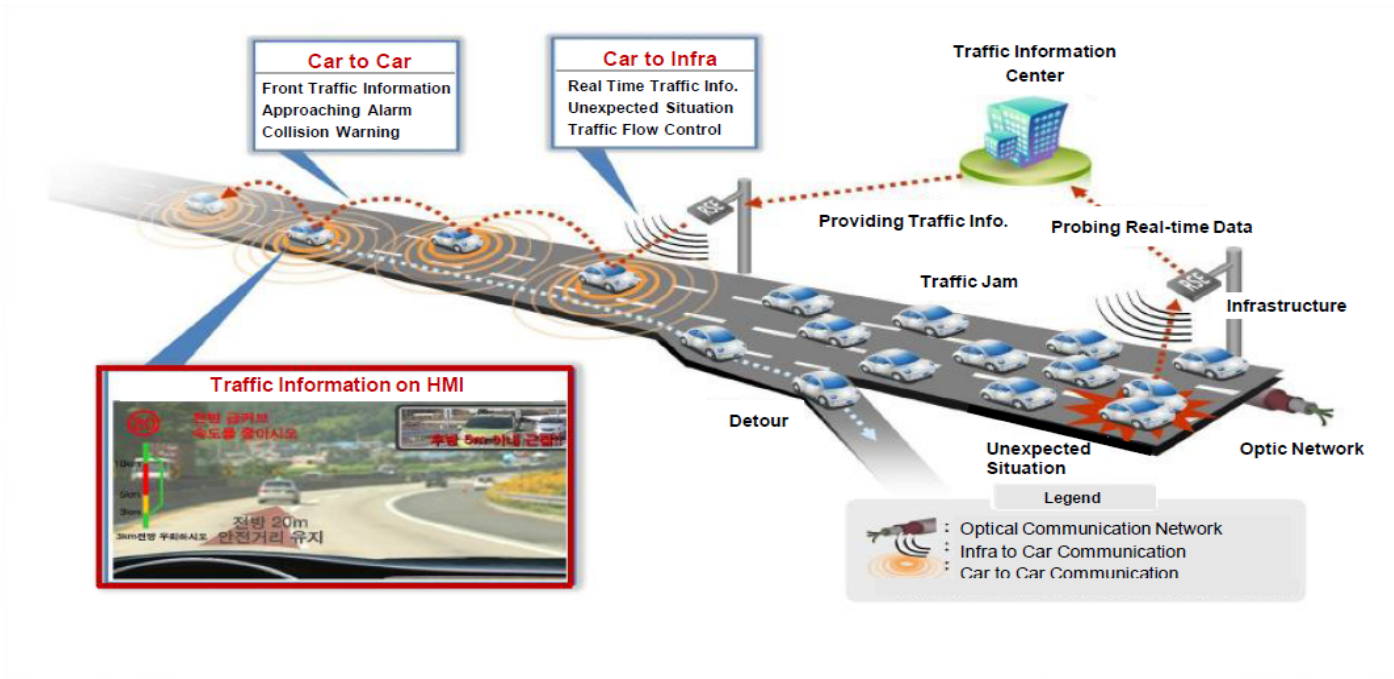
Digitalization in Transport Systems

- **Challenges of a resilient investment environment for transport systems**

Intelligent Transport Systems (ITS)
(1990s-2010s)
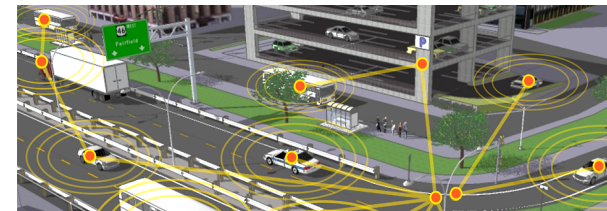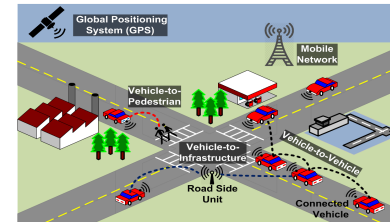Information Collection & Provision

- Vehicle Detection System (VDS)
- Road Surveillance & Monitoring
- Variable Message Signs (VMS)

Cooperative ITS (C-ITS)
(2020s-2040s)
Information Collection & Provision

- Digital Infrastructure by ICT (V2X)
- Mobile & Nomadic Devices
- Big Data & AI for Connected & Automated Driving

Digitalization in Transport Systems

- **Integrated Smart Mobility based on Connected & Digitalized Travelers**

- A User-Centric Approach to Mobility-as-a-Service

- Enabling real-time (on-demand), door-to-door, multi-modal transport services
- Bringing convenience, time & cost savings to mobility users

Intermodal Transportation

+

ICT Technology
e.g., wireless Comm.,
smart devices, (Big) data mining

+

New Mobility System
e.g., e-Mobility, AV

Digitalization in Transport Systems

- **V2X Issues for Connected & Automated Driving (CAD)**

Requires new levels of connectivity and intelligence

Heterogeneous connectivity
- Vehicle-to-Everything communications
- Connected infotainment
- Wireless EV charging
- Real-time navigation
- Bluetooth
- Wi-Fi / Hotspot
- Cellular 3G/4G/5G
- Always-on telematics
- CAN / Ethernet / Powerline

On-device intelligence
- Intuitive instrumentation
- Immersive multimedia
- Augmented reality
- Always-on sensing
- Computer vision
- Intuitive security
- Machine learning

Sources : Qualcomm, 2016

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▪ **V2X Issues for Connected & Automated Driving**

Sources : Qualcomm, 2016

Digitalization in Transport Systems

▪ V2X Issues for Connected & Automated Driving

802.11p has established the foundation for V2X

QCA6584

2nd generation Qualcomm Technologies 802.11p offering with integrated Wi-Fi LAN and Bluetooth

Wi-Fi based technology - 802.11p standard
Adapted for latency-critical V2X communications in the 5.9 GHz band

Established security and upper layer specifications
With service layer / performance requirements defined by SDOs, e.g.SAE, ETSI-ITS[1]

Path to DSRC[2] rulemaking in USA by NHSTA[3] expected to start in 2016[4]
Based on 802.11p standard

Large scale field trials completed over the last decade
Commercially available technology here today

Introducing Cellular V2X (C-V2X)
A unified connectivity platform for the connected vehicle of the future

lte Advanced Pro

Part of Release 14 of the global 3GPP standard
Target C-V2X specification completion end of 2016[1]

Builds upon existing LTE connectivity platform for automotive
LTE already delivering key services today, e.g. telematics, eCall, connected infotainment

Enhances LTE Direct for V2X direct communications
Improvements over 802.11p - up to a few additional seconds of alert latency and 2x range[2]

Leverages existing LTE networks for V2X network communications
Using LTE Broadcast optimized for V2X to offer additional applications/services

Rich roadmap towards 5G with strong ecosystem support
Technology evolution to address expanding capabilities/use cases

Sources : Qualcomm, 2016

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Digitalization in Transport Systems

- **Investment issues of digital infrastructure for V2X connectivity**
  - **DSRC (WAVE) V2X based on IEEE 801.11p by Public Sectors**
  - **Cellular V2X based on 4G/LTE and/or 5G by Private Sectors**
  - **Or, PPP?**

- **Management issues for Big Data in smart mobility & CAD services**
  - **Who owns the big data collected by V2X, Public(Government) and/or Private?**
  - **How much do users pay to get the services to be affordable?**

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Thank you very much!

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