



Expected impacts of 5G on Connected, Cooperative and Automated Transport Systems

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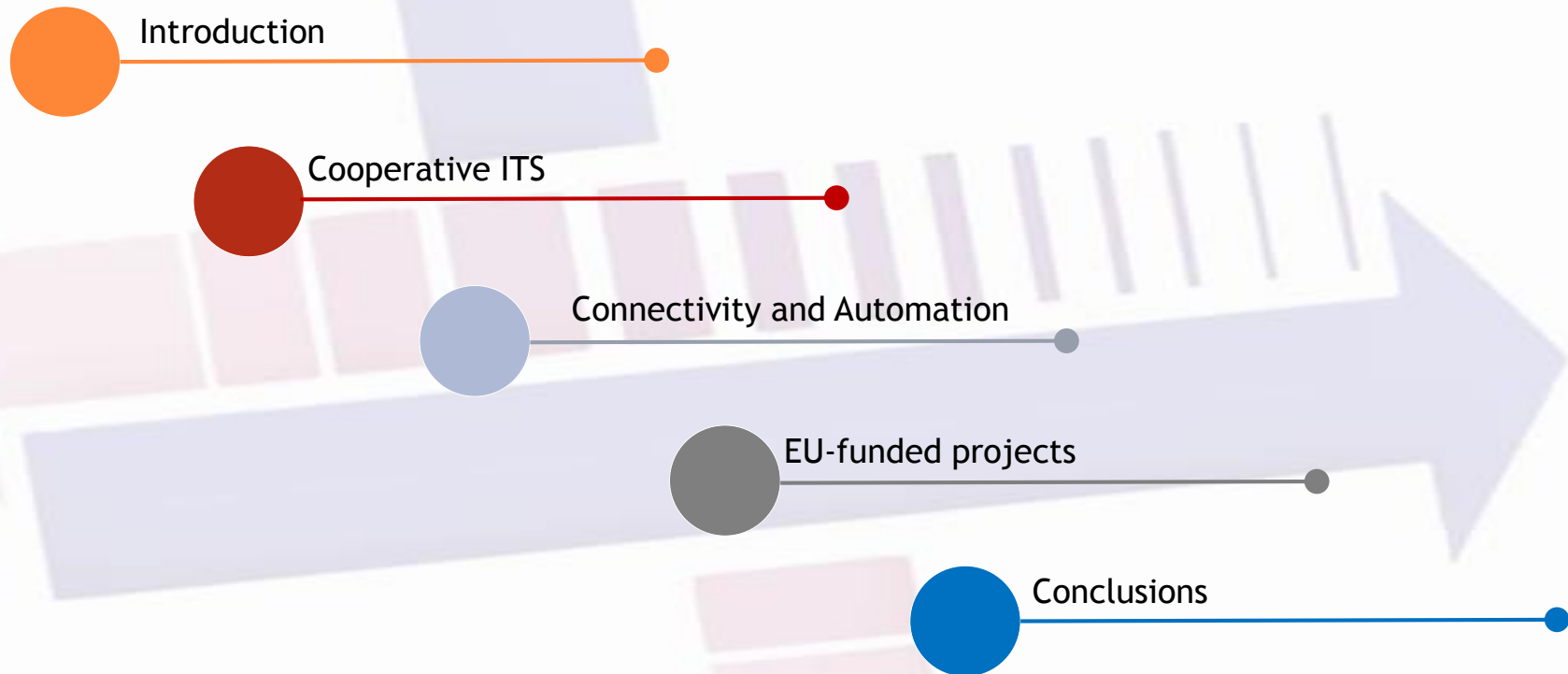
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“Towards 5G Enabled Gigabit Society”

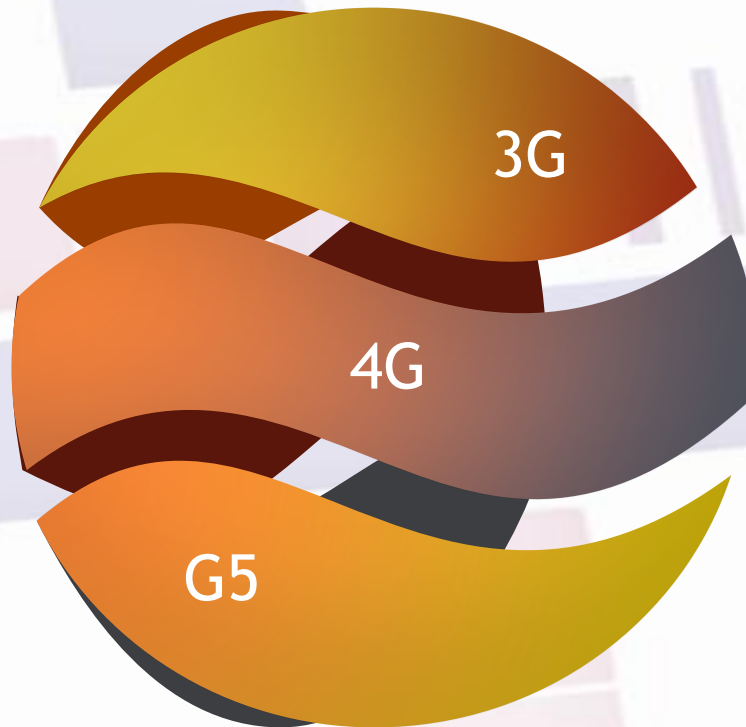
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Outline



Introduction

Today's uncertainties in transport related communication technologies



Introduction

Today's challenges related to transport

Smartphones

Vehicles'
networks

3G & 4G

Low speeds

RSUs

OBUs

G5

High costs for
RSUs and OBUs

Introduction

5G solution

Meets the connectivity needs of new & innovative transport & mobility services



Game changer for citizens and industry alike

Significantly improved performance (up to a thousand times higher data volume with a similar increase in device density)

Introduction

5G solution

01

Connecting vehicles
to everything

02

Transforming the in-
vehicle experience

03

Paving the way to
autonomous driving

Cooperative ITS

- **Cooperative ITS (C-ITS)** use DSRC and cellular technologies to enable real-time communication between vehicles, roadside infrastructure, mobile devices and back-office systems
- **Goal** → improve road safety, increase the efficient flow of traffic, reduce environmental impacts, provide additional traveler information services



C-ITS services

Day 1 services

Hazardous location notifications

Slow or stationary vehicle(s) & Traffic ahead warning

Emergency brake light

Road works warning

Emergency vehicle approaching

Weather conditions

Other hazardous notifications

Signage applications

In-vehicle signage & In-vehicle speed limits

Green Light Optimal Speed Advisory (GLOSA)

Signal violation / Intersection Safety

Probe vehicle data

Traffic signal priority request by designated vehicles

Shockwave Damping

C-ITS services

Day 1,5 services

Information on fueling
& charging stations for
alternative fuelled
vehicles

Vulnerable Road user
protection

On street parking
management &
information

Off street parking
information

Park & Ride
information

Connected &
Cooperative navigation
into and out of the city

Traffic information &
Smart routing

Cooperative ITS

Current state in Europe

C-ITS are considering both ETSI-ITS-G5 and cellular C-ITS

Existence of several regulatory actions supporting development/deployment of C-ITS

- Standardization
- ISO (TC 204)
 - ETSI (TC ITS)
 - CEN (European Committee for Standardization) (TC 278)

- Relevant groups / alliances
- C-Roads platform
 - C2C-CC
 - Amsterdam Group
 - ERTICO ITS Europe

Cooperative vehicles (C-ITS)

Current state

Potentials are not fully deployed

Either 3G/4G network or DSRCs

Low speeds which cannot transmit the required data

5G solutions

5G will assist at deploying the full potentials of C-ITS

Potential of supporting DSRCs and more challenging use cases

V2V & V2I communications at higher speeds and bandwidth

Connected and Automated Transport Systems

- 5G paves the way to connected and automated transport systems by offering essential technologies for the connected cars
 - Unified connectivity with C-V2X
 - 3D mapping and precise positioning
 - On-board intelligence



Connected and Automated Transport Systems

Current state

5G solutions

3G/4G do not have the needed speed to support the requirements for CAD

5G provides sufficient speed and bandwidth

3G/4G do not meet the both the technical and safety requirements set for connected and automated driving

5G will provide low-latency connectivity, supporting also infrastructure assisted CAD

Connected and automated driving is not fully deployed - use of connected and automated vehicles only in controlled areas

5G will provide large scale deployment capabilities for connected and automated vehicles

Related EU-funded projects

C-Mobile

TransAID

Compass4D

C-Roads

Related EU-funded projects

**NL-D-AT ITS
Corridor**

SCOOP@F

NordicWay



Thank you for your attention!

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