

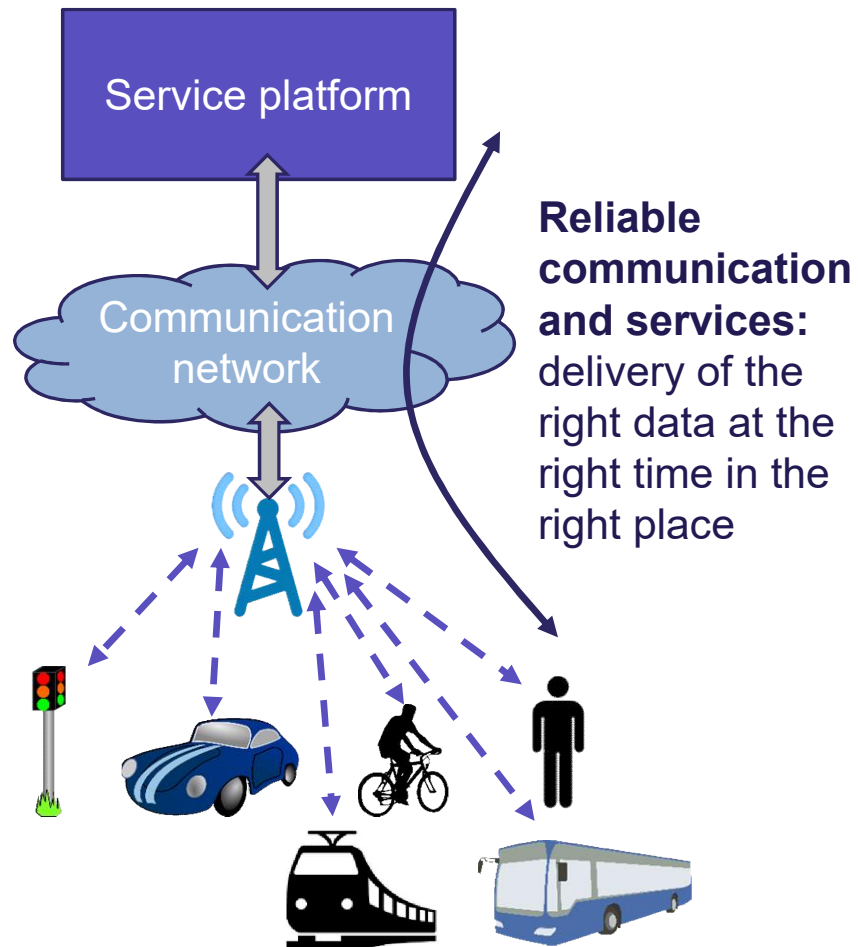
CONNECTIVITY AND SERVICE PLATFORMS FOR MOBILITY SERVICES

MADS LAURIDSEN – ML@ES.AAU.DK
WIRELESS COMMUNICATION NETWORKS SECTION
DEPARTMENT OF ELECTRONIC SYSTEMS

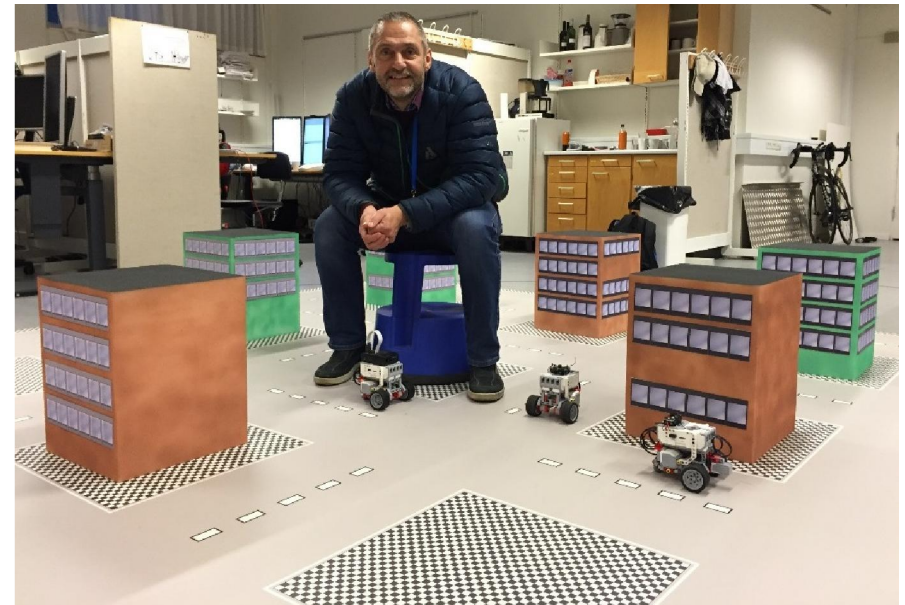


Introduction

The Wireless Communication Networks Section at Aalborg University performs research in the area of reliable vehicular communication and services



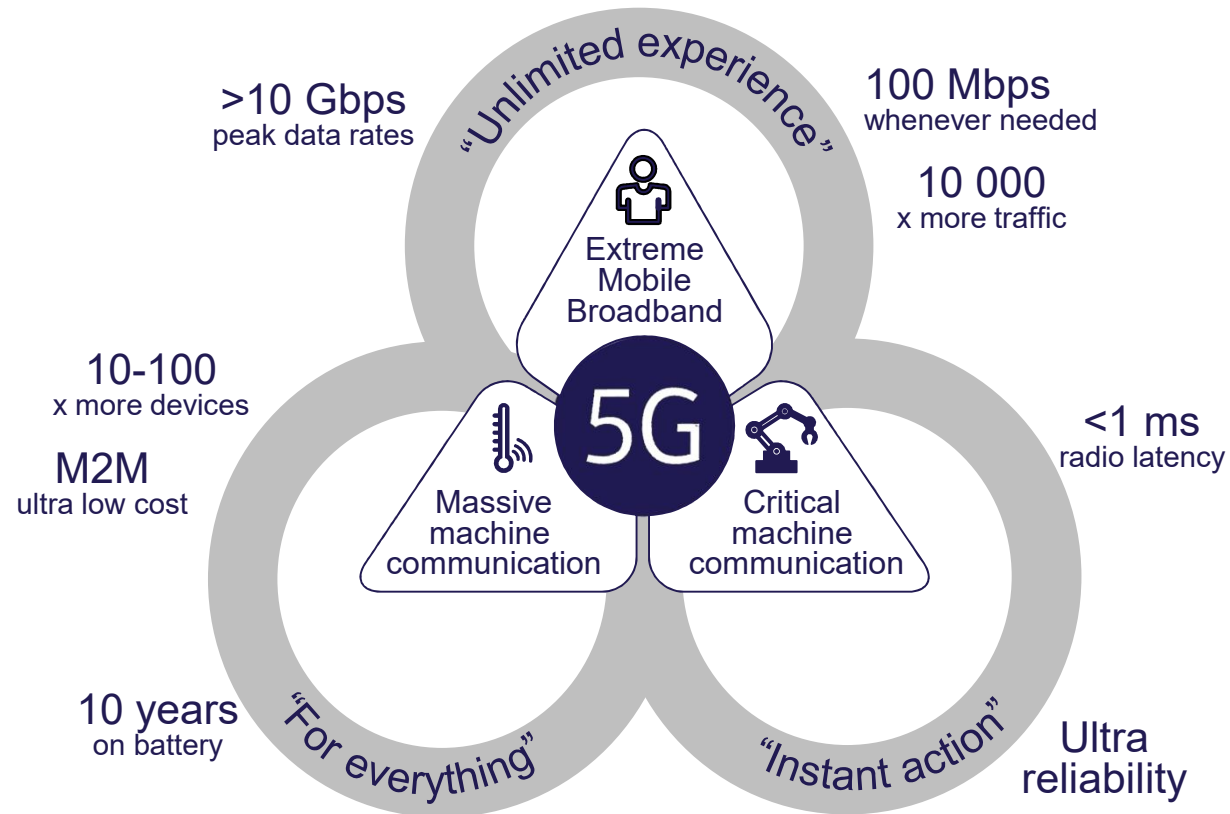
LEGO city demo



5G for Reliable Vehicular Communication

Fifth Generation (5G) is

- a cellular Radio Access Technology
- enabling mobile broadband and Internet of Things
- many EU 5GPPP projects and industry are in the exploration phase
- expected to launch in 2018-2020

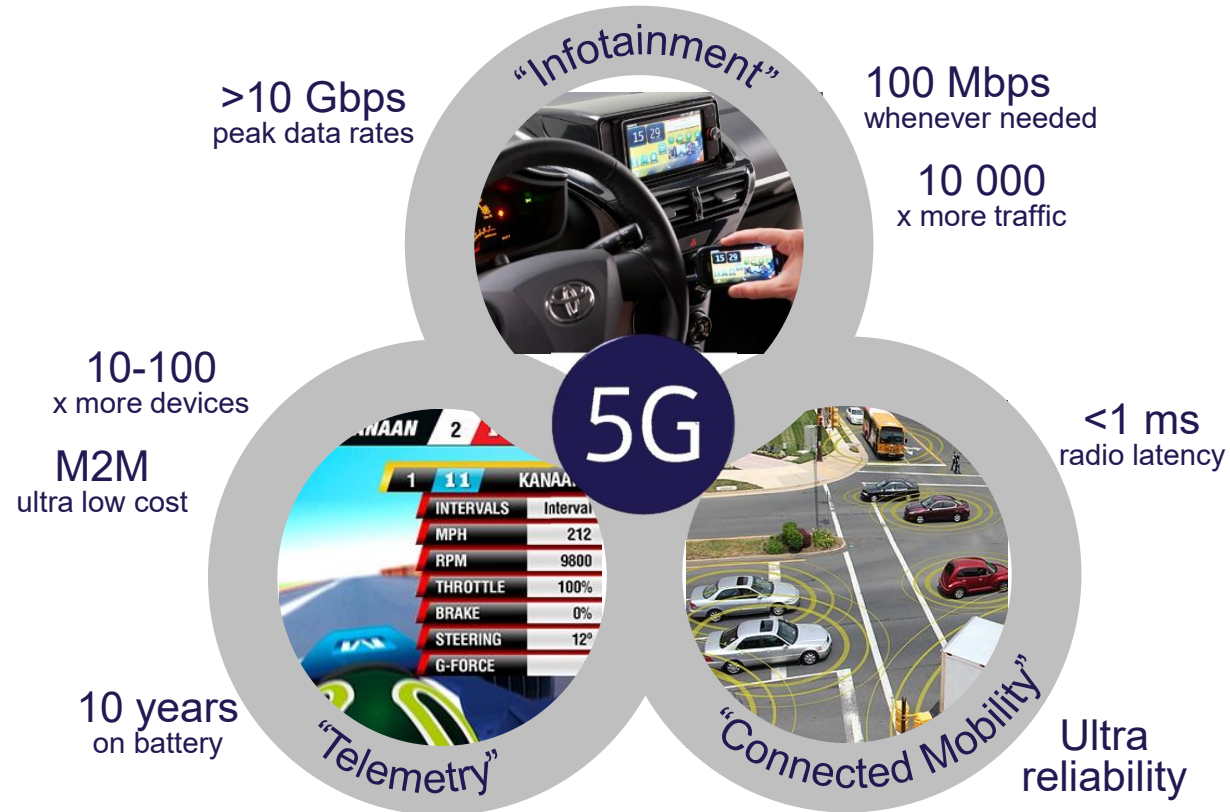


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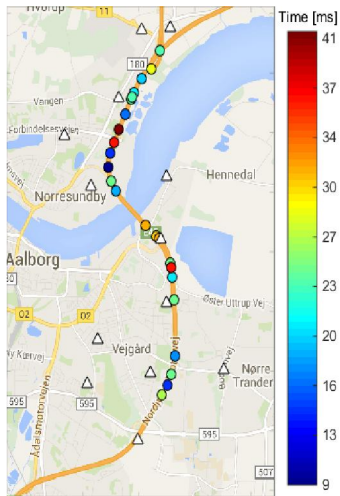
5G is an enabler for reliable vehicular communication, which targets safe and efficient mobility



Reliable Vehicular Communication Research Areas

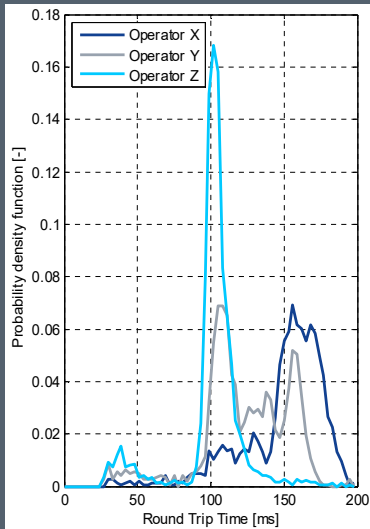
Make before break:
Macro diversity
Multi connectivity

Mobility



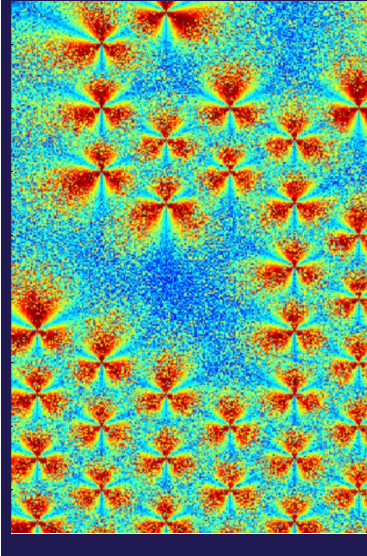
Short Frame
Robust link
Edge computing

Latency



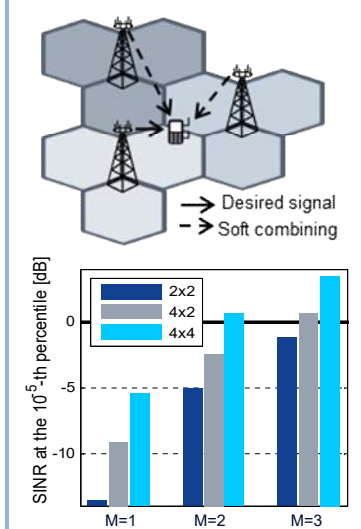
Resilience to network failures.
Redundancy

Resilience



Micro/Macro
Antenna
Frequency
Time

Diversity



Fast Discovery
Resource reservation
Multicast

Device2Device e support

?

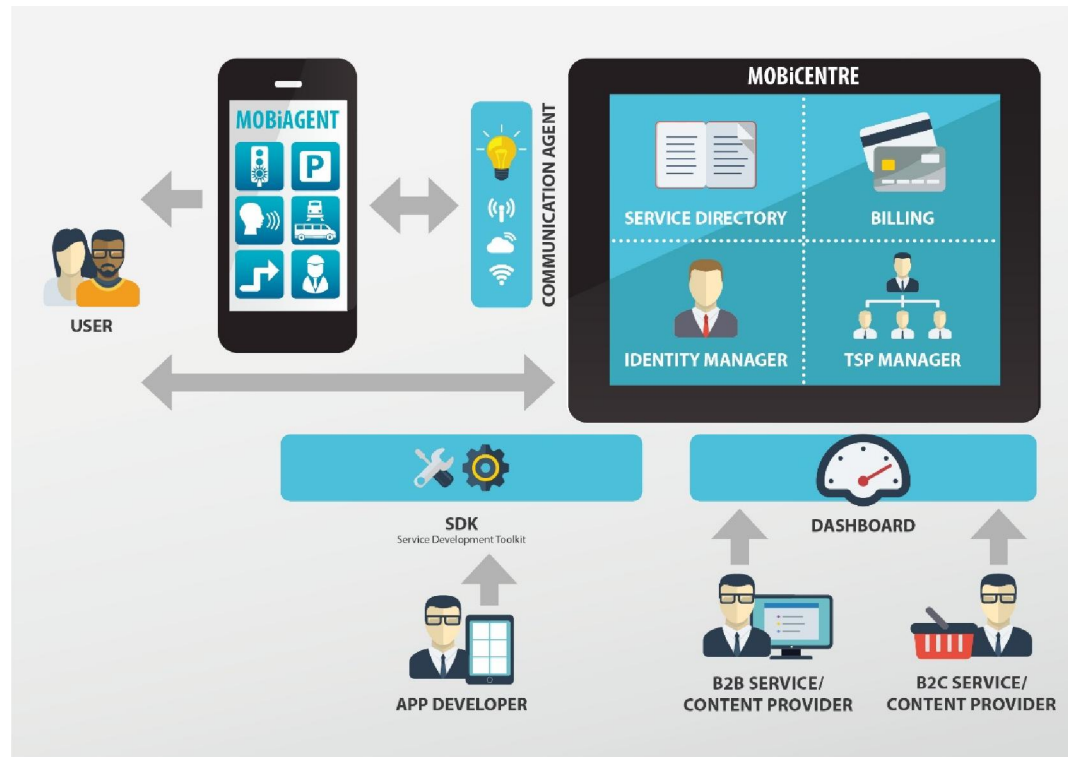
... and many other topics



Application Service Platform – MOBiNET example

Intelligent Transportation Systems (ITS) platform to support ITS oriented services in usage, distribution and promotion

- Communication agent
 - Receive and process information from end-user devices
- MOBiAGENT
 - Search for ITS applications and end-user services



- Key functionalities
 - Service management and discovery
 - Data format definition
 - Identity management
 - Billing handling



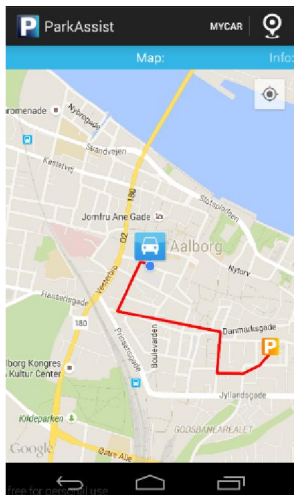
Intelligent Parking Assistant using MOBiNET

System functionalities

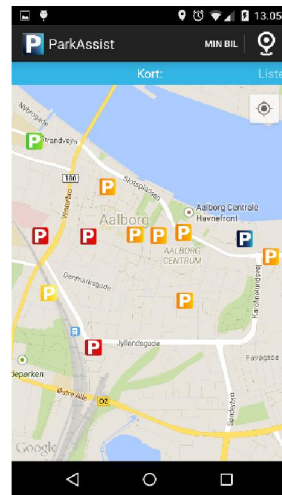
- Automatic location based discovery of parking information services
- Parking session management
- Automatic billing handling

→ Abstract the data to a higher layer

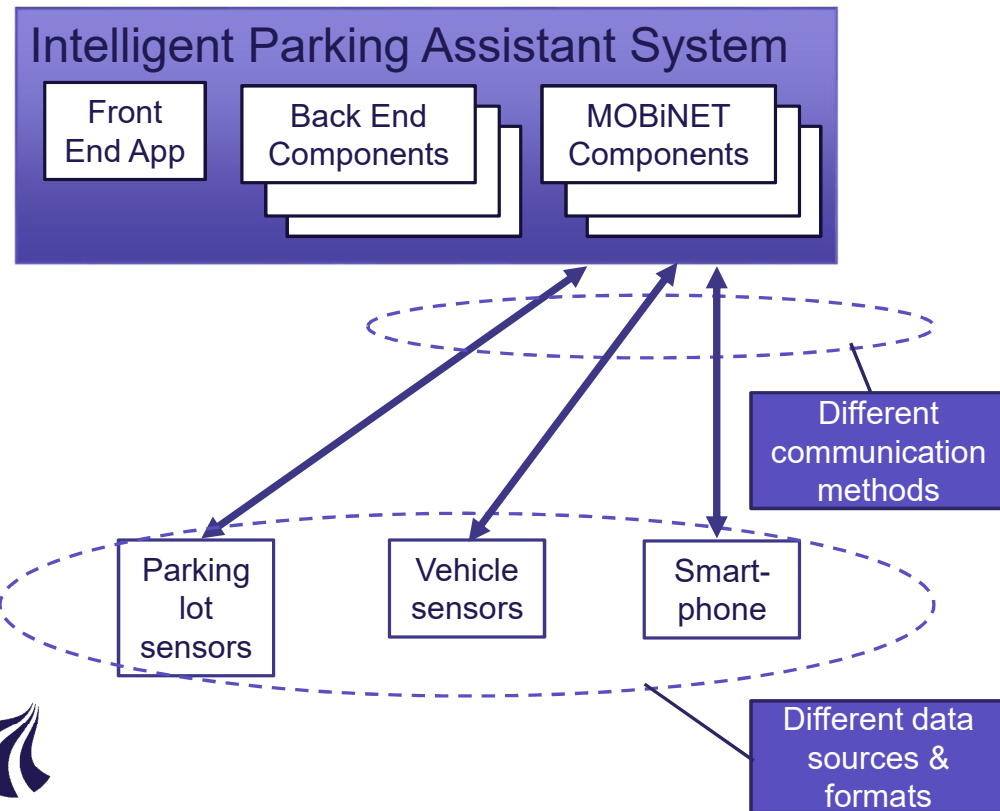
- delivered in a dependable way
- independent of source format
- independent of communication methods



Take me to nearest parking




Automatic park and pay



Conclusion

Dependable data is an enabler for urban mobility!

- Reliable communication using
 - many different sensors with
 - different communication methods
 - different types of data and formats
- 
- Dependable features in the service platforms ensure
 - quality of information/data
 - data fusion from heterogeneous sources

The Wireless Communication Networks section at Aalborg University is researching

- Cellular and local area Radio Access Technologies as wireless enablers
- Service platforms to provide data aggregation and management



Wireless Communications Networks Section

The Section

- **Preben Mogensen (section head)**
- **45 researchers:** 4 full and 9 associate professors, 8 post docs, 7 Assistant researchers and 15 Ph.D. students

Past 5 years performance

- 420 publications
- 26 graduated PhD students
- **Partners:** Intel MC, Sequans, Renesas, Agilent, Anite, Telenor, Vodafone, Telecom Italia, TDC, Telefonica, Asfinag, Nokia, NEC, Alcatel Lucent, Volvo, Volkswagen /carmaq /Seat, BMW, Thales, Ansaldo, Siemens, Bosch, Kapsch TrafficCom, Atos, SAP, GateHouse, Lego, INDT, Vale

Areas of expertise:

- 5G system design
- System expertise GSM, HSPA, LTE-A
- RRM for cellular, HetNet and small cells
- Smart network control and management
- Network coding implementation
- Network security
- Network performance evaluation and measurement
- Network evolution & planning
- MIMO and advanced transceivers
- Channel modeling and estimation
- Information, Communication, and Coding Theory (incl network coding)



Wireless Communications Networks Section

Project experience in the past 5 years:

- EU STREPs: SURFACE, SAMURAI, MOBINET, SmartC2Net, WHERE2, OPEN,
- FP7 NoE Newcom#, ACROPOLIS (Associate)
- WG Leader in Cognitive Nets in COST IC0902
- EU H2020 5GPPP: FANTASTIC 5G

Labs and test beds

- Smart grid network emulation test bed
- SDR 5G test bed with 16 nodes
- Cellular scanners and propagation measurement equipment up to 20GHz
- Micromesh network (20 nodes)
- NetFPGAs and SDN switches
- HoneyJar (malware testing and analysis facility)

Hot working topics:

- 5G system design (air interface, stack, RRM), demos, trials, and measurements
- Ultra Reliable communication, networking, and M2M (autonomous systems)
- Smart network management
- Open source simulation development (for 5G systems)
- Integration of network coding in existing technologies
- Crowdsourcing App for network performance measurements
- Smart grid emulation
- Network security (malware detection)
- Application-specific channel characterization

