5G for smart manufacturing: Latest status on the trials

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2020-10-14





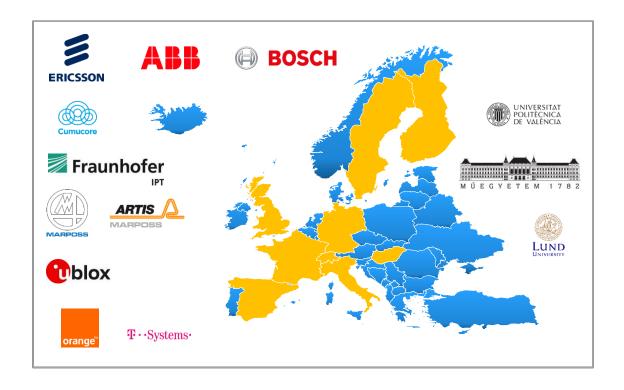
The 5G-SMART project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857008.



5G-SMART project facts

EU H2020 project within ICT-19 call: "Advanced 5G validation trials across multiple vertical industries"

- Coordination:
 - Project coordinator: Ericsson
 - Technical coordinator: ABB
- Consortium:
 - Information and communications technology: 39%
 - Operational technology: 47%
 - Academia: 14%
- Duration:
 - Duration: June '19 November '21





5G-SMART objectives

☐ Industry field trials:

 Demonstrate, evaluate and validate 5G-systems in industry field trials for smart manufacturing

Business models:

 Identify viable business models for smart manufacturing

☐ Concept work:

 Develop new 5G technology features, 5G radio deployment and network architecture options **Industry field trials Concept work Business models**

smart will show how 5G can boost smart manufacturing





5G Integration in manufacturing ecosystem

5G-SMART trials for evaluation and validation of 5G capabilities

Optimizing 5G for smart manufacturing

Beyond 5G-SMART

WP1

- New manufacturing use cases
- Business impact analysis
- Evaluation of the real world factory radio deployment options

Trial 1: WP2

Testbed and Validation Trials for 5G-Enhanced Industrial Robots

Kista

Trial 2: WP3

5G for Enhanced Industrial Manufacturing Processes

Aachen

Trial 3: WP4

Trials and Validation of 5G in Semiconductor Factory

Reutlingen

WP5

- 5G network architecture for the smart factory
- Advanced 5G features for TSN, positioning, etc.

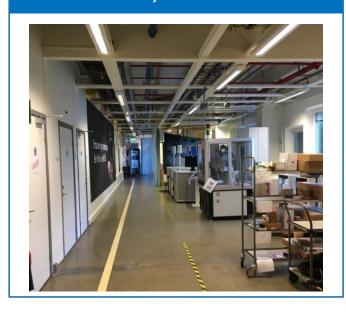
WP6

- Uptake in standard
- Exploitation in future product
- Early adoption of 5G





Ericsson smart factory Kista, Sweden



Fraunhofer IPT shopfloor Aachen, Germany



Bosch semiconductor factory Reutlingen, Germany







Ericsson smart factory Kista, Sweden

- ☐ Test area of approx 50 m² close the production line in the Ericsson smart factory
- ☐ 5G non-standalone
- ☐ NR highband 28 GHz
- ☐ LTE midband 1.8 GHz

Fraunhofer IPT shopfloor Aachen, Germany

- ☐ Indoor (2600 m²) and outdoor area in close relation with the Industry Campus Europe
- ☐ 5G non-standalone (5G standalone planned for '21)
- NR midband 3.7-3.8 GHz
- ☐ LTE midband 2.3 GHz

Bosch semiconductor factory Reutlingen, Germany

- ☐ Approx 8000 m² cleanroom factory floor
- ☐ 24/7 operation
- ☐ 5G standalone
- ☐ NR midband 3.7-3.8 GHz



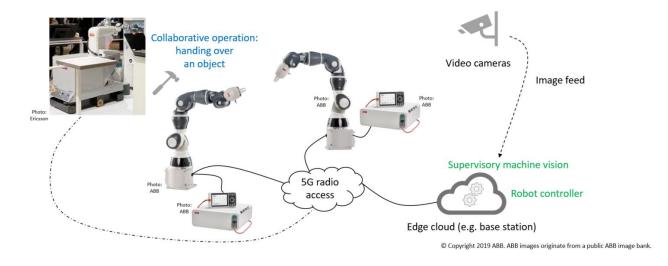


USE CASES

- 5G-connected robots and remotely supported collaboration of connected robots
- Machine vision assisted real-time human robot interaction over 5G
- 5G-aided visualization of the factory floor

CHALLENGE

- Seamless operation with major control functionalities being moved to the edge cloud:
 - Motion planning, robot localization, map building, human localization, AR processing



- lack 5G deployment finalized. lack
- Use case development ongoing.



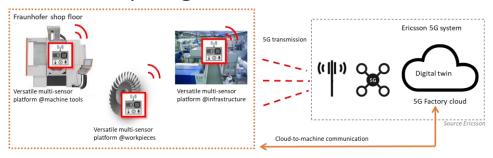


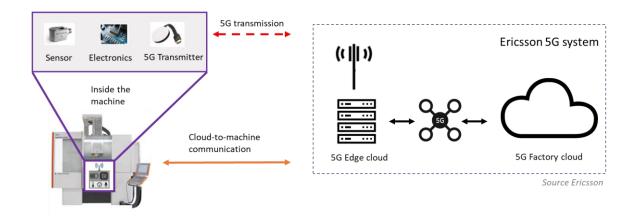
USE CASES

- 5G for wireless workpiece monitoring, Acoustic Emission Monitoring
- 5G versatile multi-sensor platform for digital twin

CHALLENGE

 The signal processing will be performed on an edge gateway or by cloud computing.





- 5G Deployement finalized.
- Use case development on site ongoing.
- First demo ready. \(\forall
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- Evaluation/validation ongoing.



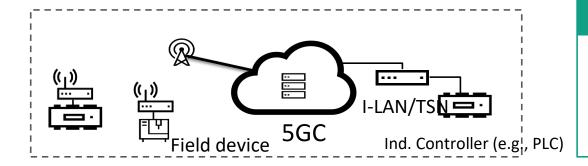
Bosch semiconductor factory

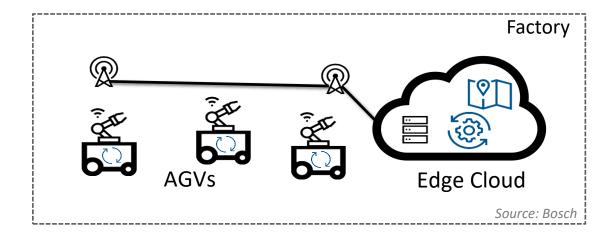
USE CASES

- Cloud-based mobile robotics
- TSN/Industrial LAN over 5G

CHALLENGES

 Reliable, low-latency communication between centralized intelligence and local intelligence and I/O devices, strict QoS guarantees, timesynchronization between domains





- 5G Deployment finalized. 🗸
- Use case development ongoing off-site.





MEASUREMENT CAMPAIGN

- Channel measurements and modeling in a semiconductor factory @ 3.7 GHz and 26 GHz
- Electromagnetic compatibility (EMC) test on very sensitive semiconductor and sensor production equipment

CHALLENGES

 Operational factory environment with very strict requirements like safety and clean-room certification.



- Channel measurement campaign finalized.
- EMC tests finalized. ✓
- Evaluation ongoing.

Summary and outlook



- ☐ All 5G-SMART trial sites are now operational.
- ☐ Use case development ongoing for all sites.
- Evaluation and validation planned during 2021 with final results ready in Q4 2021.

Thank you for listening!







5G-SMART Grant Agreement No. 857008

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