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# 5G-CONNI

ICT-23-2019

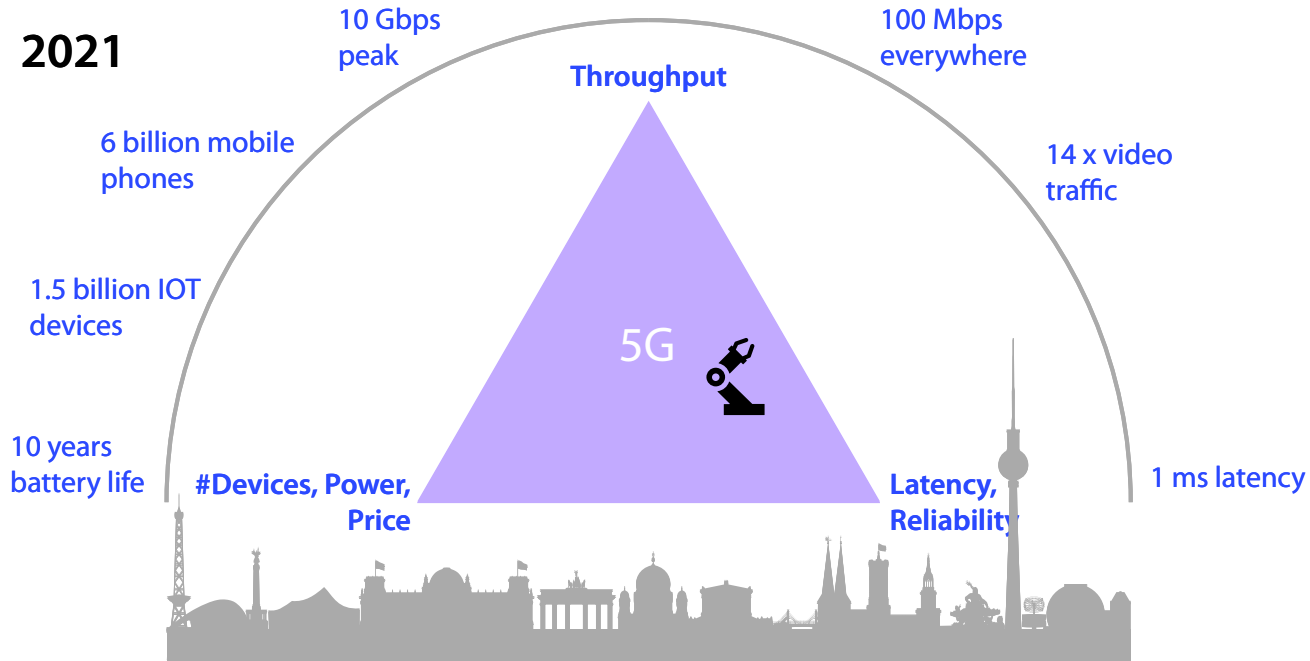
EU-TW 5G COLLABORATION in H2020

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# Private 5G Networks for CONNected Industries

## EU-Taiwan Collaboration Project in Industry 4.0



Project scope on factory automation

# Private 5G Networks for CONNected Industries



## Objectives from the Work Programme ICT-23-2019

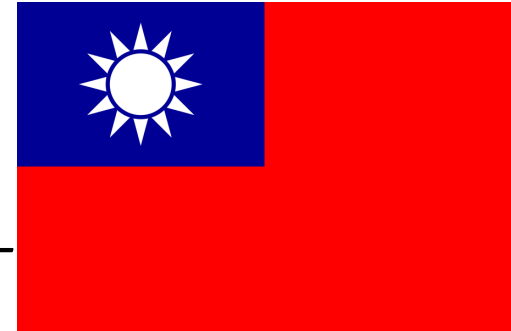
- The integrated **end-to-end network for 5G trials** activity is to utilize the infrastructure of the integrated 5G access/core networks **in test beds, in Europe and Taiwan**.
- Conduct 5G trials addressing **technology and business validation of 5G end-to-end connectivity** and associated management from applications in Taiwan that will support the development of advanced 5G technology.
- Consider **network virtualization approaches** such as SDN/NFV and network slicing to make the best use of the resources for services with a reduction in CAPEX and OPEX.
- Support the **specific performance requirements** stemming from the considered vertical use cases. The trials should **go beyond proof of concept** and leverage the results of related 5G PPP projects and Taiwan's 5G Program.

# Private 5G Networks for CONNected Industries

## Project Goal

*Demonstration of 5G radio, network and cloud technologies as enablers for future Smart Factories by integrating private local 5G networks into a multi-site end-to-end industrial communication testbed.*

*Exploring new operator models, planning and deployment strategies for private 5G networks.*



# Private 5G Networks for CONNected Industries Consortium

## Consortium



# Private 5G Networks for CONNected Industries

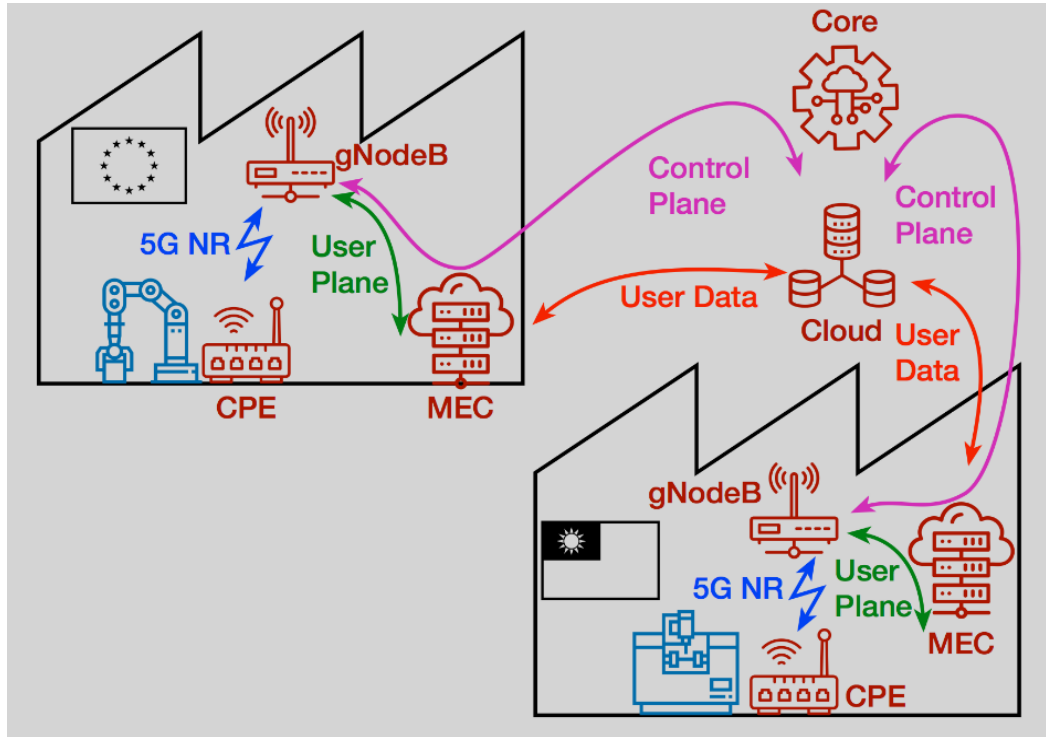
## Key Figures

- 3 years project, start October 1<sup>st</sup> 2019
- 386 person months for 7 work packages
- Funding: 2 Million € in EU, matched fund in TW
- Coordinators: Fraunhofer HHI and ITRI
- Industry: Bosch, Alpha Networks, Chunghwa Telecom
- SME: Athonet
- Research: Fraunhofer, CEA-LETI, ITRI, III
- Academia: University of Rome
- Advisory Board: Nokia, Rohde & Schwarz, Intel



# Private 5G Networks for CONNected Industries

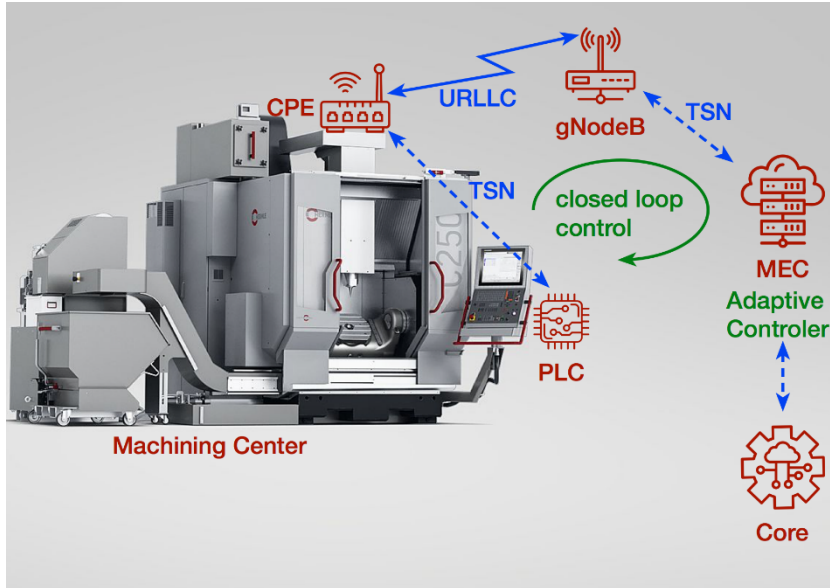
## OVERALL SYSTEM ARCHITECTURE



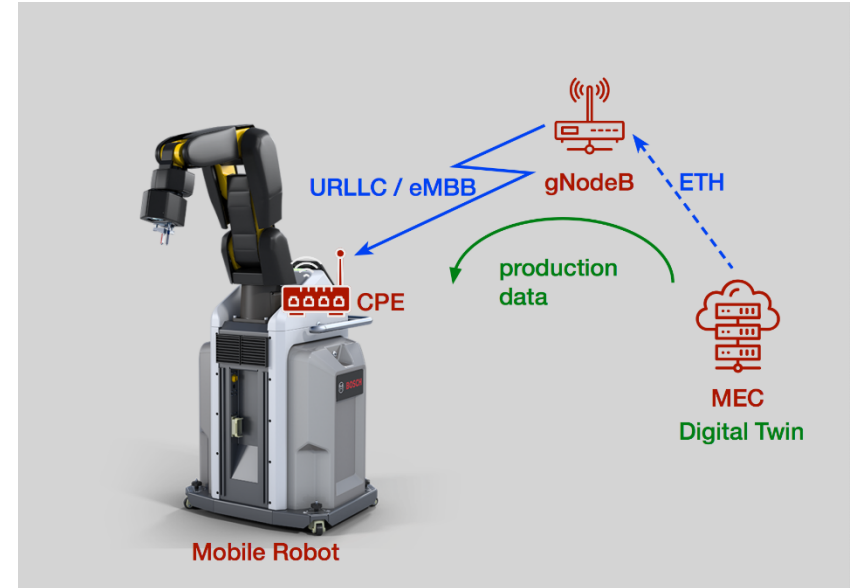
5G CONNI EU/TW Joint Testbed Architecture

# Private 5G Networks for CONNected Industries

## USE CASES



Use Case Machining Center



Wireless Connectivity of a Mobile Robot



# Private 5G Networks for CONNected Industries

## USE CASES



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Use Case: Intelligent Machining Center



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Use Case: Smart Assembly Line

# Private 5G Networks for CONNected Industries

## End-to-End Demonstration of Machining Center



- Highly automated machining center
- Adaptive control of machining with sensor readouts
- Predictive Maintenance
- Anomaly detection
- Quality control during machining



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# Private 5G Networks for CONNected Industries

## End-to-End Demonstration of Smart Assembly Line



- Flexible production cells with small lot sizes
  - Scalable w.r.t. multi-cell, multi-building, indoor-outdoor
  - Application specific slicing e.g. wireless bus extensions, production data up- and download, life cycle management
- Cloud assisted assembly and maintenance
- Support of AR / VR human machine interfaces

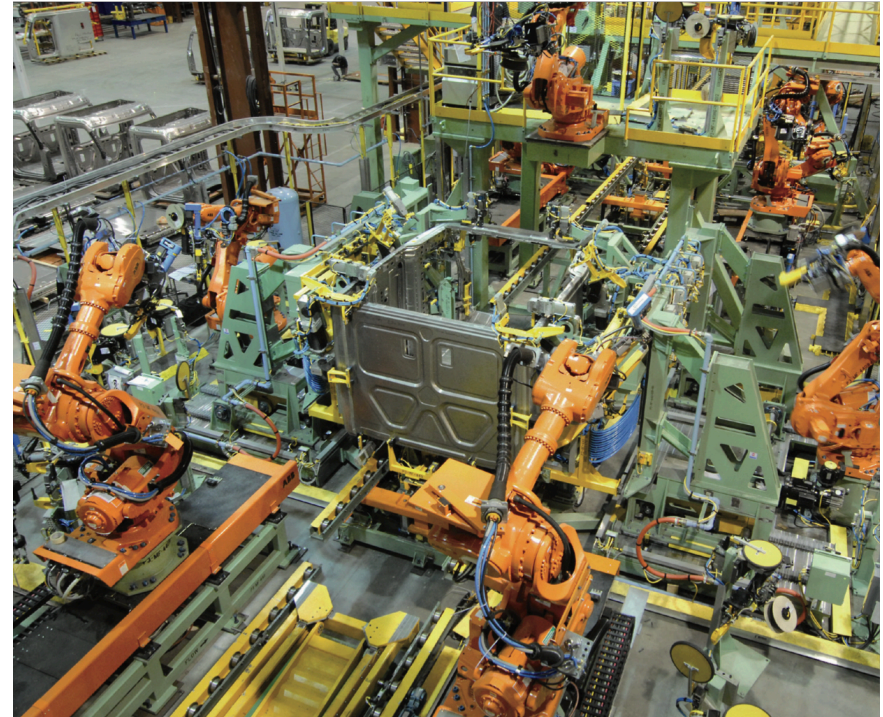


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# Private 5G Networks for CONNected Industries

## Implementation and Demonstration

- Deployment of private 5G networks at 3,7 GHz in two factories in EU and TW (3,7-3,8 GHz are dedicated to private 5G networks in Germany)
- Development and integration of specific 5G end-user equipment
- Integration of mobile edge computing capabilities within the local 5G network
- Development and implementation of specific core network functions
- Planning and testing of private networks



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# Private 5G Networks for CONNected Industries



## Impacts

- Proving feasibility of private 5G networks while defining new operator models and developing planning tools and edge cloud technologies for efficient deployments
- Contribution to understand and transfer how to plan, deploy, operate and maintain a private 5G network in a factory
- Demonstrate industrial applications in real-world 5G trial systems, potentially with global interconnectivity
- Contribution to trigger and facilitate the fast adoption of 5G CONNI key concepts by industrial players
- Contribution to standards and regulation aiming at private industrial 5G, exploiting the EU-Taiwan cooperation for working towards harmonized regulation for spectrum and numbering