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5G networks in Industry 4.0: 5G-INDUCE and VITAL-5G use cases

Christina Lessi
Stelios Androulidakis

OTE Laboratories for Technology Evaluation Fixed and Mobile



5G INDUCE

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GROUP OF COMPANIES



Outline

- Industry 4.0
- 5G-INDUCE
- VITAL-5G
- 5G network characteristics
- Conclusion



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Industry 4.0

- Industry 4.0 combines physical and digital technologies under connected system infrastructures
 - improve efficiency in manufacturing productivity and quality
 - work safety
 - environmental protection
 - supply chain optimization
- 5G will open the field to new business value propositions, aiming at a deep ecosystem transformation with vertical industries and disruptive applications.
- Design and development of 5G platforms and ecosystems, enabling infrastructure virtualization and supporting edge processing, smooth and costless porting of NetApps in 5G ecosystems



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5G-INDUCE project

Open cooperative 5G experimentation platforms for the industrial sector
NetApps



- ICT-41-2020 research projects
- 21 partners
- <https://www.5g-induce.eu>



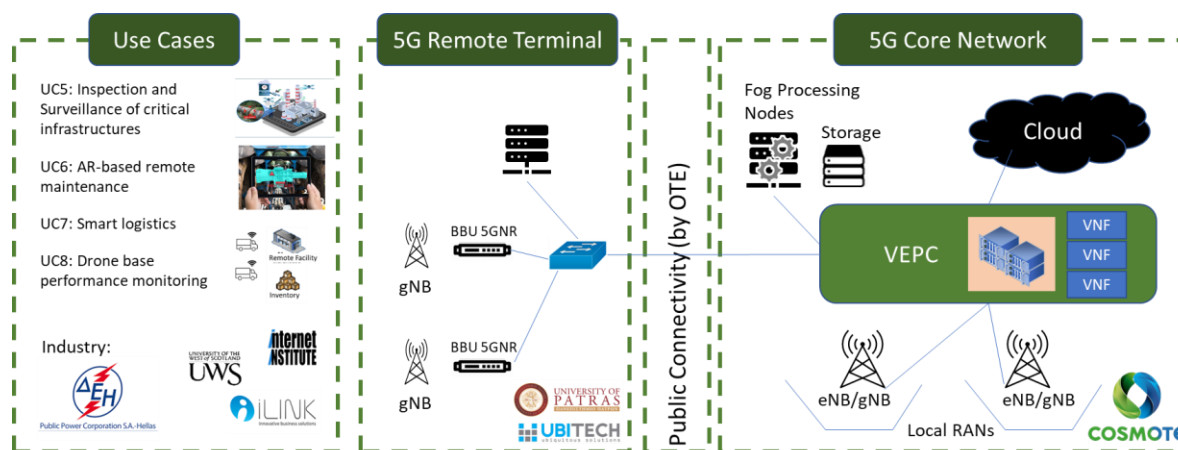
EIGHTBELLS
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5G-INDUCE vision

- end-to-end orchestration platform for 5G applications that can be easily ported, deployed and managed, showcasing advance 5G trial use cases, with demonstratable performance metrics that conform to specific KPI requirements
- interaction between a NetApp developer or service provider and a telecom infrastructure provider with links to big customer private networks
- build of real 5G NetApp trial testbeds applied over a set of Industry 4.0-specific use cases, addressing the three classes of ITU requirements (eMBB, mMTC, URLLC use cases)





5G-INDUCE Use Cases

- Demonstrate ML-powered predictive maintenance using edge analytics in industrial settings, using federated learning to allow the propagation of system-wide models to distinct production lines to improve accuracy at near real-time, taking also into consideration the overall production targets and schedule of the whole industry
- Perform automatic UAV-based tank and pipeline inspection and area surveillance monitoring, based on advance AI-assisted object status and human identification algorithms, and linked to efficient warning mechanisms
- 5G environments can provide added security in remote maintenance use cases to prevent personal injury or confidentiality breaches.
- Provide industrial grade end-to-end network performance and coverage monitoring of the critical communications infrastructure in 5G smart factory environments using continuous and on-demand operational mode with drone-assisted metrics collection to enable visual mapping of 5G radio, network and service metrics and industrial SLA KPIs.



VITAL-5G project

Vertical Innovations in Transport And Logistics over 5G experimentation facilities

- ICT-41-2020 research projects
- 16 partners
- <https://www.vital5g.eu>



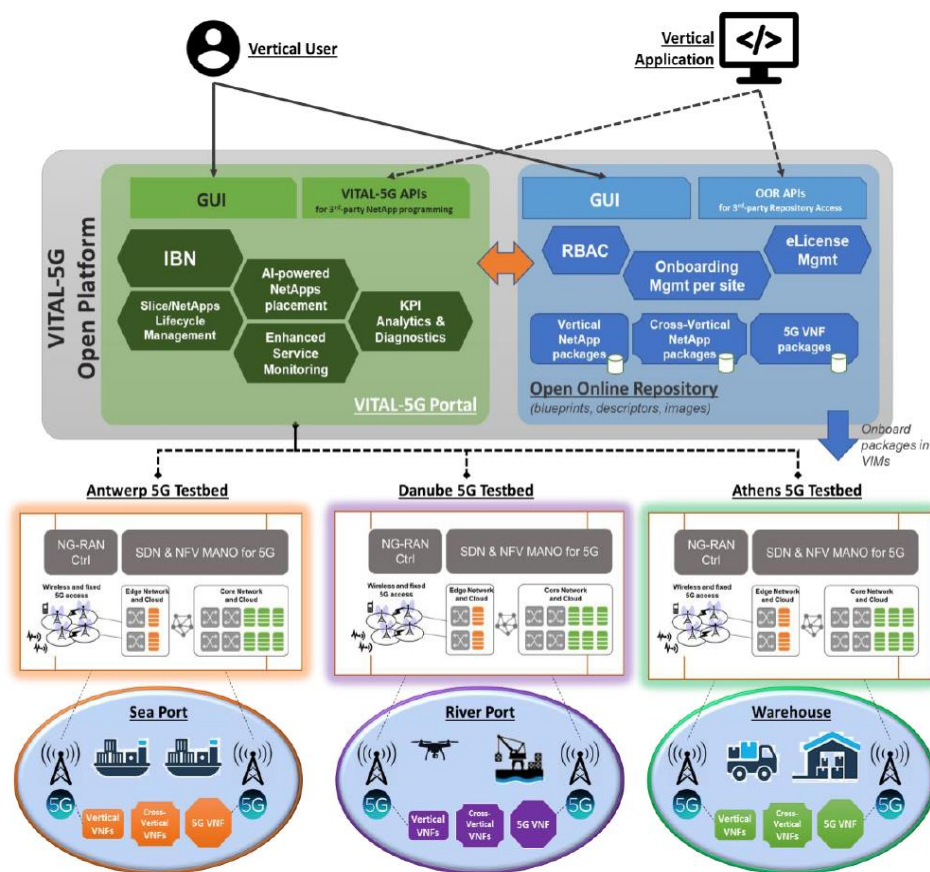
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VITAL-5G vision

- Flexible platform to serve specific needs of transport and logistics sector
- Creation, deployment, management and validation of NetApps
- 3 experimentation areas
- 3rd party experimenters will be enrolled





VITAL-5G use case

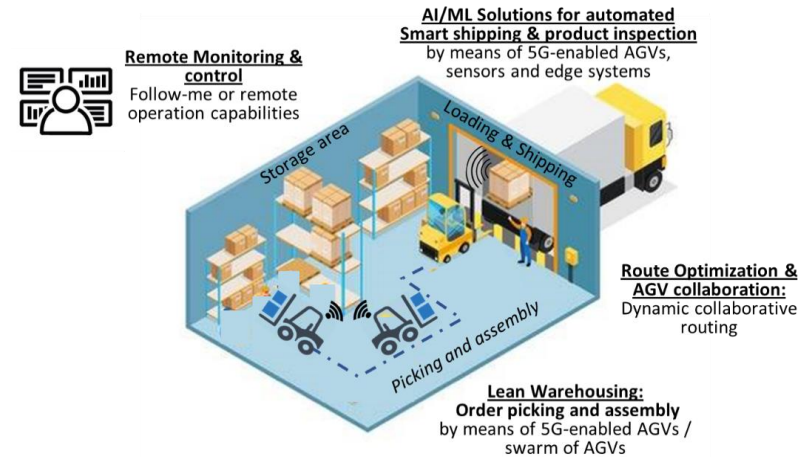
- *Warehouse logistics* processes optimization through 5G-enabled solutions

- Challenges

- Manual labour dominates the storing, picking and checking procedures in modern warehouses
- *Workers walk more than 8 kms/day* on average while
- ~50% of daily man-hours are spent on *picking operations* and ~16% are spent on *driving manually operated forklifts*
- *Inefficient use of resources, increased OPEX and prone to human errors*

- VITAL-5G targeted improvements

- Use of 5G-connected *Automated Guided Vehicles (AGV)* to automate all product/pallet transports
- *Optimization* of storing patterns, picking and checking procedures
- Real-time remote *monitoring & control* capabilities
- *Minimization of errors and OPEX and improved resource utilization efficiency*



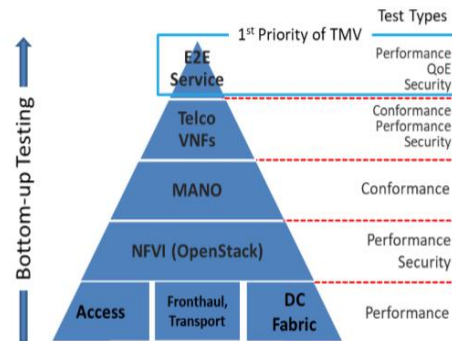
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5G network characteristics

- 5G is not introduced to redesign the production line but to enable operating models with networking characteristics that enable added value services for enhanced productivity, quality, safety and security.
- several complex and heterogeneous components
- three generic services with vastly heterogeneous requirements:
 - Enhanced Mobile Broadband (eMBB): aims to service more densely populated metropolitan centers.
 - Ultra-Reliable and Low Latency Communications (URLLC): addresses critical communications where bandwidth is not quite as important as latency.
 - Massive Machine Type Communications (mMTC): 5G enables an 1000X increase of devices connected to the Network
- service heterogeneity can be accommodated by network slicing.



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**VITAL
5G**



Conclusion

- Industry 4.0 targets
 - improve efficiency in manufacturing productivity and quality
 - work safety
 - environmental protection
 - supply chain optimization
- NetApps in 5G ecosystems make the Industry 4.0 sector ready to exploit its full potentials
- 5G is not introduced to redesign the production line but to enable operating models with networking characteristics that enable added value services



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Thank you
