

Robotic Systems in 5G Environment

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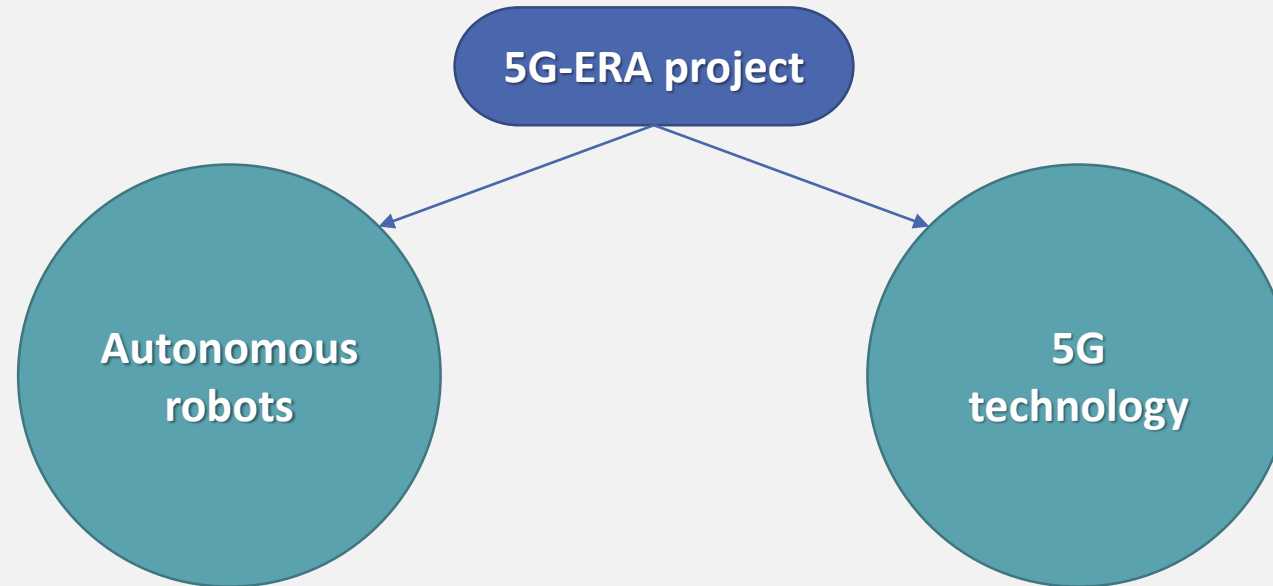
5G-ERA project overview



5TH GENERATION Enhanced ROBOT Autonomy

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





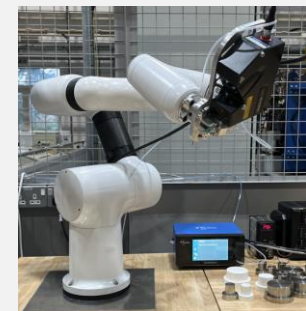
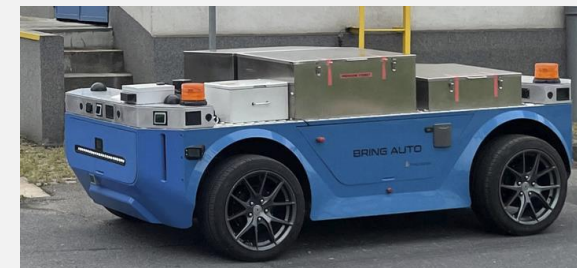
fast information processing between the robot and its environment

cloud and robots linked for collective intelligence
robots send data to the cloud updates and the local decision model

high degree of autonomy

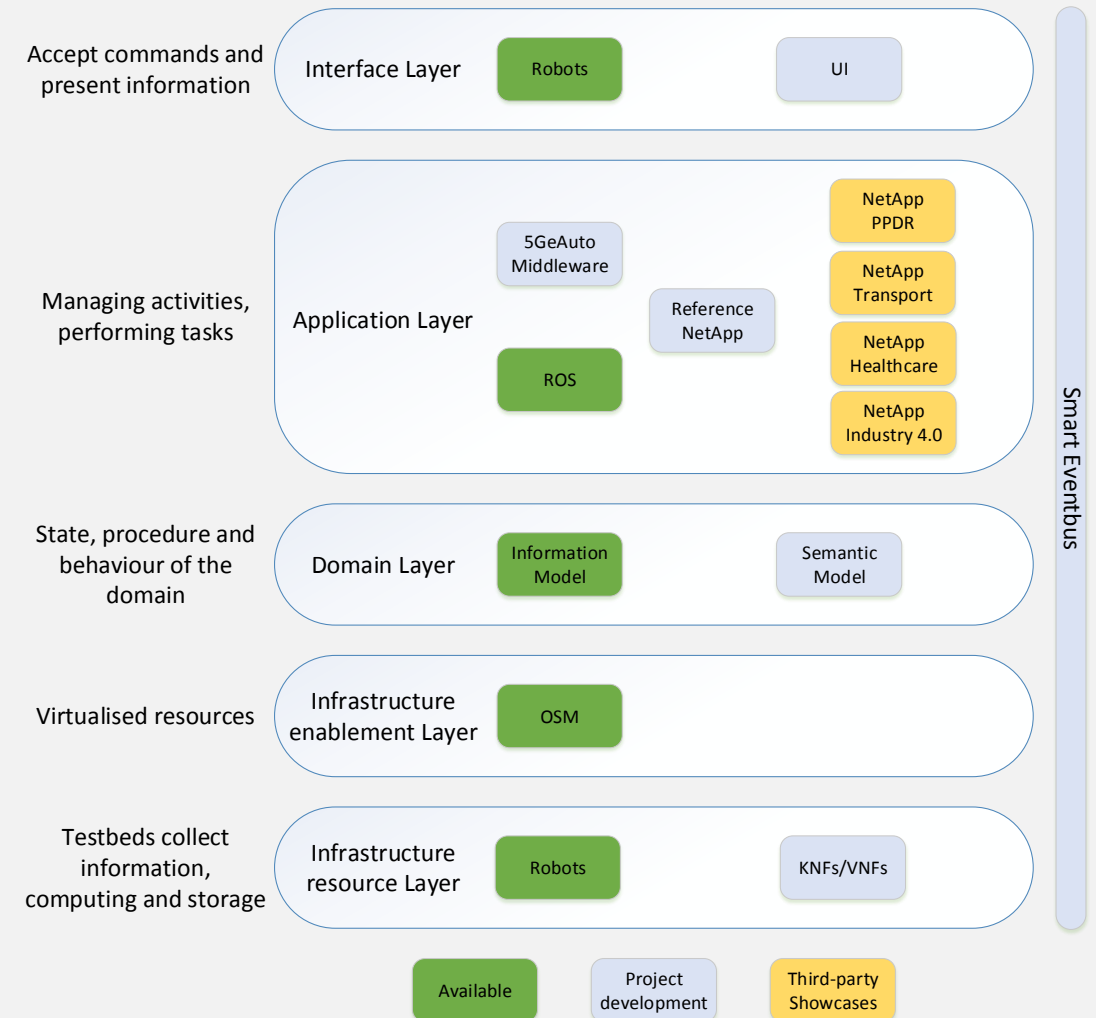


- **Healthcare:** robots are manufactured to transport medicines and consumables to patients and to take biometric readings (*e.g. patient temperature*)
- **Public Protection and Disaster Relief:** robots are equipped with sensors, cameras and metal detectors and will be able to avoid, have autonomous navigation, locate and rescue trapped individuals and guide people safely to the nearest exit.
- **Transport:** robots can deliver products, using the optimal route, in the shortest possible time.
- **Industry 4.0:** robotic arms performs automated inspections to predict and avoid future damage.



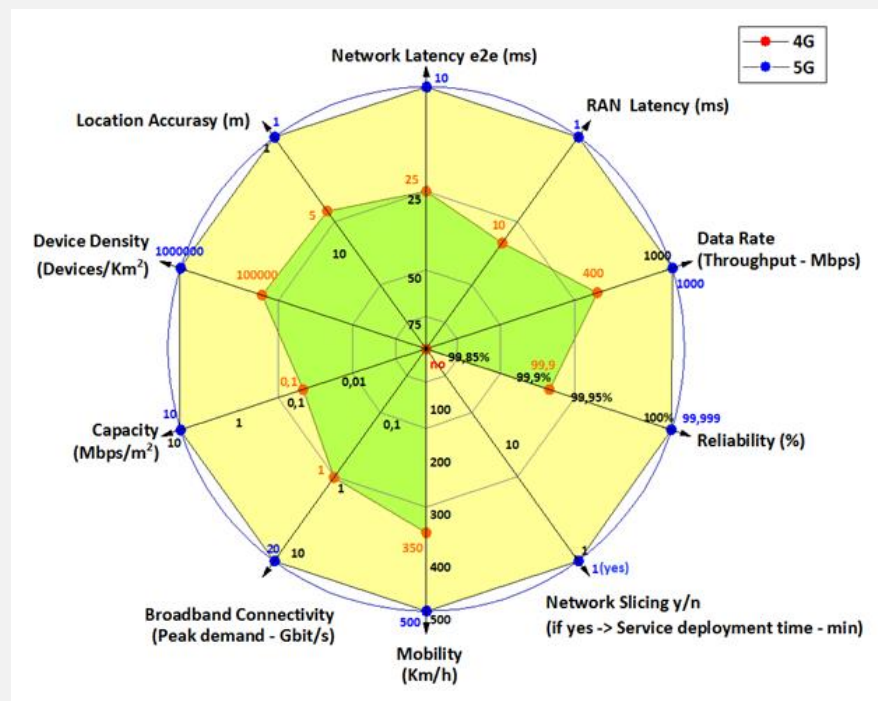
System architecture

- **Interface layer:** accepting commands and presenting the information
- **Application Layer:** managing activities and performing tasks
- **Domain layer:** generating intent-based network policy
- **Infrastructure enablement layer:** managing virtualized hardware resources
- **Infrastructure resource layer:** providing connectivity, computing resources, and storage.
- **Smart event bus:** connecting event across the layers.



The added value of the 5G technology in robotic systems

5G and Beyond 5G networks are **not** introduced to **redesign** the production line **but** to enable operating models with networking characteristics that **enable added value services**



5G technology characteristics

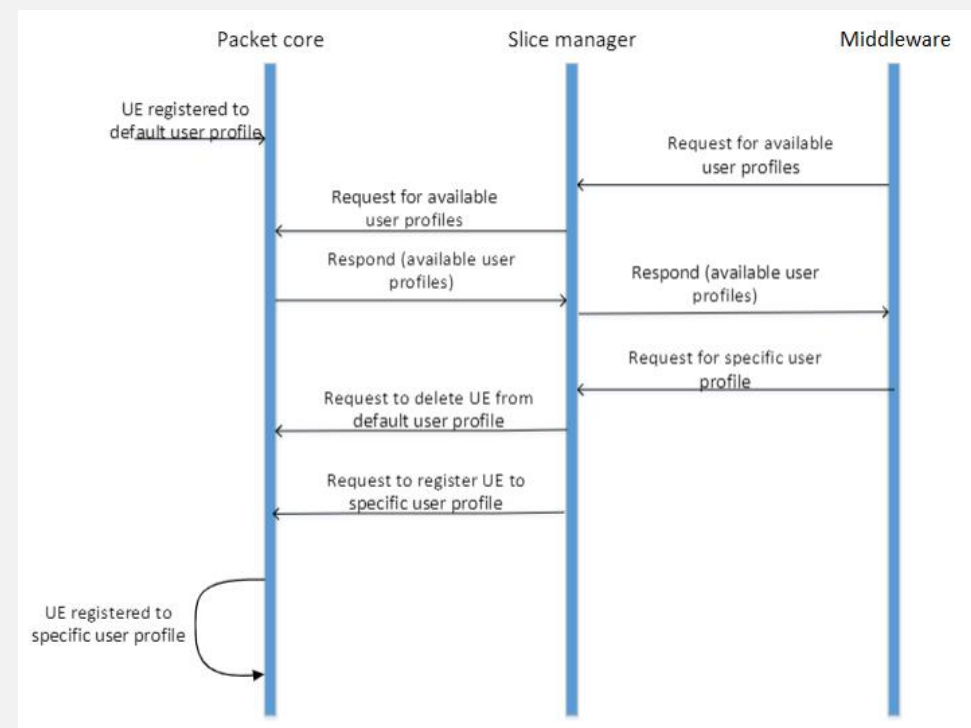
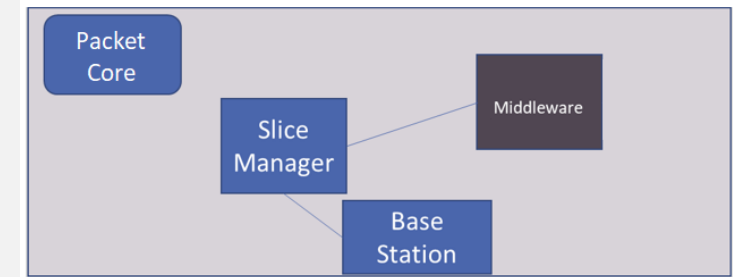
- **Better network performance**
 - High reliable and high available network
 - High throughput
 - Low latency
- **5G networks combined with cloud computing**
 - high degree of autonomy
 - fast information processing between the robot and its environment
- **Slicing**



Slicing Mechanism

Slicing mechanism components: **Middleware, Slice manager and Packet Core**

1. Middleware sends a message to the slice manager to get information about the available user profiles
2. Slice manager forwards the request to the packet core and the packet core responds with the list of user profiles
3. Middleware chooses the proper user profile
4. Slice manager sends a request to delete the user equipment from the default slice and re-register it in a new one



- Robotic applications are finding applications across multiple sectors. The deployment of robots can now scale up their capabilities beyond what was feasible in the past.
- Deployment of 5G networks offers additional advantages:
 - high-speed
 - low-latency
 - Slicing
- Robots communicate/interact with the network



Thank you
for
listening

