

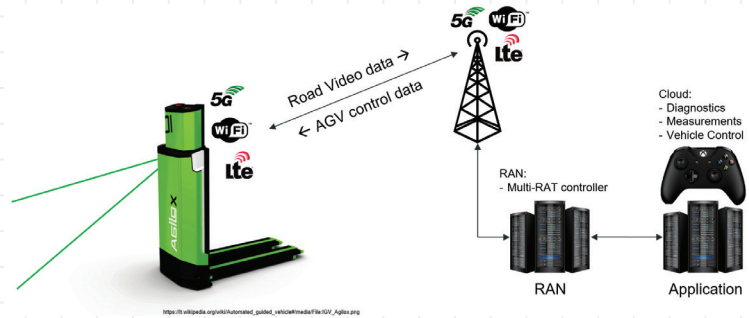


SHOWCASE 4

AGV NAVIGATION BASED ON MULTIPLE RADIO ACCESS TECHNOLOGIES

GOALS

- Demonstrate the concepts for interworking and aggregation of multiple radio access technologies (RAT) by leveraging the real-time Multi-RAT platform developed within ORCA project by NI, see D3.5 and D4.5 [1,2].
- Demonstrate a typical scenario of an industry 4.0 application on top of this platform for wirelessly connected automated guided vehicles (AGV) integrated into the ORCA factory of the future.



CHALLENGES

- Determinism and real-time behaviour are the keys for a reliable wireless system and the main development challenge.
- NI PXI or USRP 2974 real-time controller hardware with NI Linux RT operating system allows optimized process scheduling for real-time requirements of the higher layers which are represented by ns-3 modules for LTE and WIFI.
- 5G higher layer stacks were not fully available by the end of this project, see D3.5 [2]. That's why NI integrated an adapted LTE protocol stack towards the 5G flexible numerology physical layer (PHY).
- Implementation of PHY processing for all RATs on FPGA-based NI USRP-RIO SDR. The connection between PHY (on FPGA) and MAC (on CPU) with NI L1-L2 API has RAT-dependent throughput and latency requirements taken into account.

CONCEPT

- Multi-RAT base station and terminal station Software-Defined Radios (SDR) supporting LTE, WIFI and 5G radio access technologies
- RAT interworking technologies such as LTE-WLAN aggregation (LWA) for LTE-WIFI interworking and dual connectivity (DC) for LTE-5G interworking including runtime reconfiguration driven by a centralized Multi-RAT controller unit
- All RATs are implemented as full stack solutions supporting end-to-end data transfer
- Variable traffic routing during run-time allows seamless operation on application level
- Robot control application shows capabilities of wireless links in an industry 4.0 environment

[1] https://www.orca-project.eu/wp-content/uploads/sites/4/2020/05/ORCA_D3.5_Final_v1.0-compresso.pdf

[2] https://www.orca-project.eu/wp-content/uploads/sites/4/2020/05/ORCA_D4.5_Final_v1.0_compressed.pdf

