



USWA

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Project Websites

www.celticnext.eu/project-uswa

<https://www.celtic-next-uswa.org/>

Ultra Scalable Wireless Access

USWA project will focus on enabling ultra-scalable and affordable wireless communications for industrial facilities. This is needed for large scale application of digitalization in industrial environments that have been using extensive cable installations. The project researches how to best utilize recent ETSI DECT-2020 new radio (NR) standard and related first products in various industrial use cases and what kind of enhancements are beneficial in the standard's evolution towards 6G.

Main focus

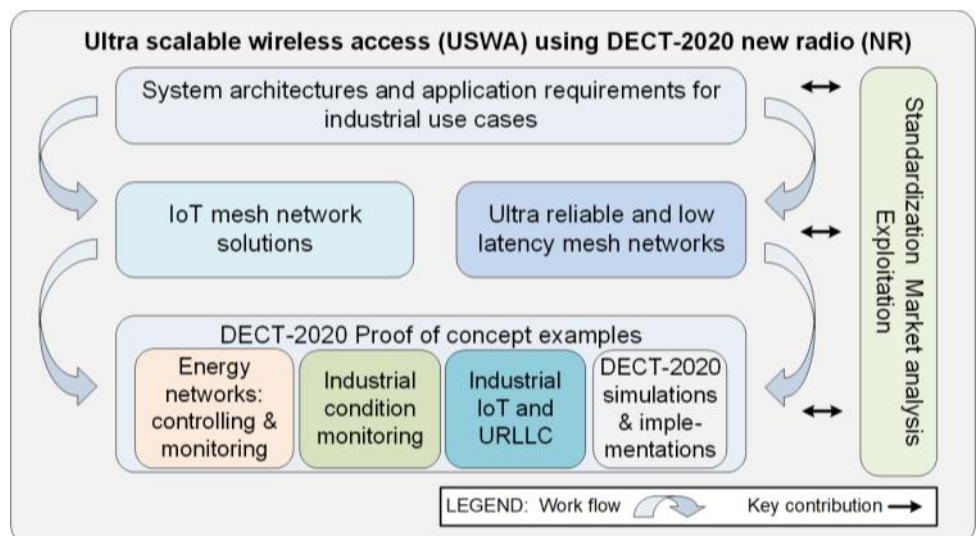
Digitalisation of industries requires efficient, flexible and cost-effective wireless connectivity solutions. Industrial facilities are still using extensively cables that is limiting e.g. scalability and expendability of the environments. USWA project has been built on collaboration between end-users, technology providers and researchers, so that new wireless solutions provide best fit to industry requirements. Project focuses on using and further developing DECT-2020 NR technology suitable for both massive machine type and ultra-reliable low latency communications. Advanced mesh network architecture of

DECT-2020 NR helps to simplify complex network planning, deployment and operation phases. DECT-2020 NR uses widely available DECT technology specific license exempt frequency bands (e.g. 1880 -1900 MHz in Europe and many other regions). Additionally, DECT-2020 NR can be used in other license exempt and licensed frequencies.

Application requirements of the project are directing system architecture definitions and performance evaluations. Both system simulations and proof-of-concepts developments are done for assessing performance of DECT-2020 in practical use cases. The project provides also contributions to next releases of ETSI DECT-2020 standardisation.

Approach

The project has five objective areas depicted in the workflow diagram below. First, application and system requirements are specified for use cases selected in the consortium. Based on the obtained requirements, system architecture and key performance indicator definitions are done. Spectrum usage and management for



USWA workflow diagram

co-existence purposes are also studied. The results are guiding obtaining remaining objectives of the project.

Next objectives are related to obtaining mesh networking solutions for industrial use cases: A) For massive scale Internet-of-things (IoT) solutions, number of devices is extremely high, and power efficient operation is essential. Efficient routing and medium access methods in the DECT-2020 NR mesh network are needed. It is also important to analyse suitability of different physical layer profiles for this scenario. System level performance and location-based solutions are investigated. B) Ultra reliable and low latency communications (URLLC) solutions target obtaining transmission latencies below 0.5 ms while ensuring error rates below 10^{-7} in industrial environments. For this goal, mesh concepts in the context of real-time requirements are first analysed. Then, system design for end-to-end real-time communication is done, and R&D performed for physical layer, medium access, and mesh networking. Laboratory test system is also implemented, and laboratory tests conducted.

Furthermore, implementing selected proof-of-concepts for relevant industrial use cases covering both IoT and URLLC applications is an important USWA objective. Obtained results will demonstrate and verify performance of DECT-2020 NR for industrial end-users.

In the project, standardization contributions are prepared based on the key technical results obtained. Relevant market analysis and exploitation plans are also done.

Main results

Main target of the project is to research technology enhancements and implementations for industrial use cases and applications based on the DECT-2020 NR to support overall goals of Industry 4.0. Generally, those things are needed for evolution towards ever changing factories and one of the most challenging examples is synchronized driving of different kind of autonomous vehicles including safety functions. The main foreseen results of the USWA project are:

- ◆ DECT-2020 NR system architectures and key performance indicators for industrial use cases and requirements that are obtained in strong ecosystem having expertise in the fields of several industrial applications, technology platforms and integration, and research.
- ◆ Verification of DECT-2020 NR technology by a set of proof-of-concept implementations and test deployments developed for selected industrial use cases and corresponding application requirements.
- ◆ Performance evaluations of and new solutions for DECT-2020 NR new radio in advanced mesh IoT and real-time URLLC scenarios.
- ◆ Standardisation contributions to ETSI DECT-2020 NR evolution based on results obtained in technical work packages.

Expected results will be demonstrating performance of DECT-2020 NR technology for different industrial

use cases. Both technology developers and end users will obtain valuable information for their technology roadmaps and future investments.

Impact

European manufacturing and wireless communication industry can build on direct collaboration, so that new wireless solutions provide best fit to manufacturing industry requirements. Hence, project results will be enabling ultra-scalable and affordable wireless IoT communications for industrial facilities. In addition, real-time solutions may be used e.g. in complex robotic systems and electricity networks in future. More generally, large scale application of digitalization in industrial environments is strongly supported by the project. For instance, condition monitoring solutions and automation industries will benefit from replacing cables by wireless connectivity in their future installations. Significantly, less time and effort is needed for installations and maintenance and more data can be collected for optimizing various processes. DECT-2020 NR supports easy network deployment and management by autonomous operation.

USWA project will contribute to the standardization of the ETSI driven DECT-2020 NR standard. It is beneficial to have digital sovereignty for Europe in this area. The project results can also help in obtaining zero CO2 emission targets as well as preparing the whole EU economy for future digitalization.

About CELTIC-NEXT

CELTIC-NEXT is the EUREKA Cluster for next-generation communications enabling the digital society. CELTIC-NEXT stimulates and orchestrates international collaborative projects in the Information and Communications Technology (ICT) domain.

The CELTIC-NEXT programme includes a wide scope of ICT topics based on new high-performance communications networks supporting data-rich applications and advanced services, both in the ICT sector and across all vertical sectors.

CELTIC-NEXT is an industry-driven initiative, involving all the major ICT industry players as well as many SMEs, service providers, and research institutions. The CELTIC-NEXT activities are open to all organisations that share the CELTIC-NEXT vision

of an inclusive digital society and are willing to collaborate to their own benefit, aligned with their national priorities, to advance the development and uptake of advanced ICT solutions.

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