RelCOvAir

Project ID: C2015/2-5

Start Date: 1 January 2016

Closure date: 31 December 2018

Partners:

CETECOM GmbH, Germany

Fraunhofer-Institut für Integrierte Schaltungen IIS, Germany

Fraunhofer-Institut für Nachrichtentechnik, Heinrich-Hertz-Institut HHI, Germany

GHMT AG, Germany

Institut für Automation und Kommunikation e.V., Germany

Kaltio Technologies Oy, Finland

Qosmotec GmbH, Germany

Sapotech Oy, Finland

Software Quality Systems S.A., Spain

Trimek S.A., Spain

University of Oulu, Centre for Wireless Communications, Finland

Verkotan Oy, Finland

Co–ordinator:

Thomas Heyn

Fraunhofer-Institut für Integrierte Schaltungen IIS

E-mail: thomas.heyn@iis.fraunhofer.de

Project Website

www.celticplus.eu/project-reicovair

Reliable Industrial Communication Over the Air

Replacing wired connections with radios and providing reliable over the air connections for advanced manufacturing and processing systems is the vision of the CELTIC-Plus project ReICOvAir for the near future of Industry 4.0.

Using ReICOvAir's solutions more flexibility in the deployment of machinery can be reached allowing data connections for formerly unreachable spots with an overall reduction of installation costs.

Main focus

The driving question is: Is it possible with sufficient reliability to exchange wired communication in the industry with wireless communication or to use wireless communication for specific new systems to be deployed? Wireless communication is the enabler for locations and areas that currently are not at all or hardly reachable by wired connections (e.g. rotating parts, autonomously moving machinery, intelligent moving objects like workpiece carriers and automatic guided vehicles (AGV)). Although much network planning and connectivity estimation has been done, still there exists no standardized rating system for the suitability of wireless systems for a given usage scenario.

In the ReICOvAir project, the necessary standards, methods and testing tools for providing proof of industrial wireless communication will be developed. The work includes the standardization of the test cases and methodology in the appropriate Standards Developing Organizations and development of comprehensive software and hardware testbed solutions with unified control. By gathering requirements from the industry, current research activities (e.g. FITS project), and standardization activities (e.g. 3GPP, LoRa alliance), a rating system for wireless communication systems will be developed.

With ReICOvAir, industry will finally be able to overcome the uncertainty barrier of using wireless communication for the production process.

Approach

At the moment, the trend in the industry is to rely more and more on many proprietary solutions and different wireless transmission standards like e.g. IEEE 802.11, IEEE 802.15, IEEE 802.16 etc. For applications being uncritical to delay and safety, these systems are absolutely fine. However, for applications that require a defined maximum transmission time or

Copyright Fraunhofer IIS

specific reliability, these solutions may be questionable.

To be able to address these critical use cases, it must be guaranteed that a wireless communication system fulfils the relevant requirements for a given industrial application. Therefore, it is necessary to qualify communication systems and to provide a standardized rating system, which the developers as well as the customers can rely on. In ReICOvAir, a hard authoritative forecast on the performance of a wireless communication system is provided by running tests under reference conditions (e.g. interference level, received power, number of deployed nodes) for the real-time capabilities of both current and future wireless transmission systems and individual transceivers. By using the methods and the tools developed in ReICOvAir for the emulation of the propagation characteristics in industrial environments, it finally becomes possible to qualify existing or emerging transmission standards, leading to the usage of the right technology for the right application. The results in ReICOvAir enable the qualification of devices that are still under development, and enable to re-validate the quality statements of manufacturers by neutral bodies with standardized testing conditions, leading to trustworthy quality statements.

European collaboration in this project takes into account the differences in typical industries of several countries. Different pools of mentalities flow into the project as people from different countries take varying approaches to a problem. This makes the overall results less prone to failure and the project results relevant for European companies.

Main results

A set of relevant test cases for the rating process will be defined. These will consist of standard use cases as well as methods of referring individual reception scenarios to given standard test cases (e.g. finding the worstcase scenario of a real deployment). Both the rating system and the test cases shall be provided to European standardization bodies like ETSI.

To provide the means to practically rate communication systems, testbeds will be developed. The development will encompass the following parts:

♦ A state-of-the-art propagation channel model enhanced for industrial use cases: QuaDRiGa 2.0

♦ Parameters for this channel model extracted from channel sounder measurement campaigns in different industrial environments

♦ Methods of taking into account the media access behavior in industrial environment based on "Radio-Transfer-Tester for Industrial Radio Solutions"

♦ Software testbed for hardware-independent rating of communication standards, even during the design of emerging wireless communication systems

♦ Hardware testbed for rating existing wireless communication solutions

♦ A single unified control-application able to control the software testbed as well as the hardware testbed, hiding the actual implementation of the emulation from the user.

Impact

A new way of looking at wireless transmission systems will develop in Europe, as trust on wireless communication systems in production systems will increase. Hence, the layout of factories will significantly change. As standardization is one of the goals in the project, it strengthens the European industry.

Manufacturer of industrial wireless solutions benefit:

♦ Better design of the industrial wireless communication systems due to testbeds with standardized testing criteria

♦ Better comparison with rival solutions on the market.

♦ Better marketing of industrial wireless communication solutions due to certification against standardized criteria

Benefit for end user of industrial wireless communication systems (e.g. producing industry):

♦ During the selection process of a wireless technology, ReICOvAir provides clear guidelines to evaluate/assess/determine which of the transmission technologies and standards are feasible for the envisioned industrial application.

About Celtic–Plus

Celtic-Plus is an industry-driven European research initiative to define, perform and finance through public and private funding common research projects in the area of telecommunications, new media, future Internet, and applications & services focusing on a new "Smart Connected World" paradigm. Celtic-Plus is a EUREKA ICT cluster and belongs to the intergovernmental EUREKA network. Celtic-Plus is open to any type of company covering the Celtic-Plus research areas, large industry as well as small companies

or universities and research organisations. Even companies outside the EUREKA countries may get some possibilities to join a Celtic-Plus project under certain conditions.

Celtic Office

c/o Eurescom, Wieblinger Weg 19/4

69123 Heidelberg, Germany

Phone: +49 6221 989 381
E-mail: office@celticplus.eu
www.celticplus.eu