

# REINDEER

## RESILIENT INTERACTIVE APPLICATIONS

THROUGH HYPER DIVERSITY IN  
ENERGY EFFICIENT RADIOWEAVES  
TECHNOLOGY

### Message from the Coordinator

The intention of this Newsletter is to open a new communication channel to provide news on the project progress and to discuss ongoing topics relevant to REINDEER. This newsletter is intended for internal and external project partners, stakeholders and all other interested bodies. For more detailed information about the project, we invite you to visit our [project website](#), which is constantly updated with the latest project related news. The project has successfully started with a virtual kick-off meeting in January 2021. The event was coordinated by TECHNIKON, with the main purpose of verifying plans and matching team members with first activities and to build the foundation for further collaborations.



## Issue 01

October 2021

[reindeer-project.eu](https://reindeer-project.eu)



@H2020Reindeer



[reindeer-h2020](https://reindeer-h2020.com)

### Technology Lead

Liesbet Van der Perre

KU Leuven

### Project Coordinator

Martina Truskaller

Technikon Forschungs- und  
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### Budget

€ 4.7 Million

100% EU-funded



### Consortium

9 Partners

4 countries



### Duration

42 Months

01/2021 - 06/2024

# REINDEER Overview

REINDEER intends to develop “RadioWeaves” technology: a new wireless access infrastructure consisting of a fabric of distributed radio, computing, and storage resources which functions as a massive, distributed antenna array with embedded processing. The aim is to develop a new smart connect-compute platform which 1) offers an unprecedented capacity that is scalable to quasi-infinite, 2) operates

with perceived zero latency, and 3) enables interaction with an extremely high number of embedded devices. Protocols and algorithms will be developed in order to establish novel resilient interactive applications that require ‘real-time’ and ‘real-space’ cooperation, for future robotized industrial environments, immersive entertainment, and intuitive care.

## The Workpackages in REINDEER

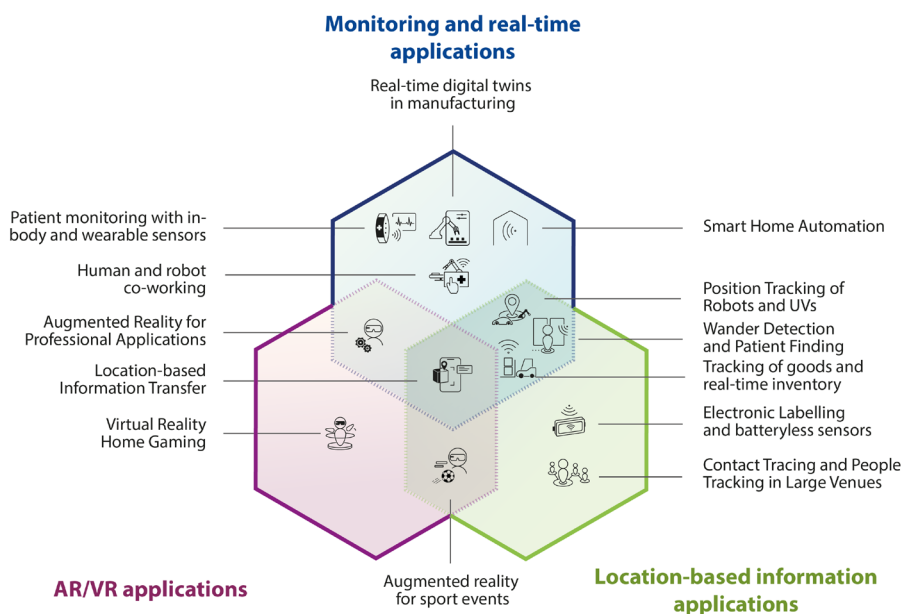
### WP-1

#### Analysis of future interactive applications, detailed technical requirements, propagation modelling, and assessment of achievable gains

This WP delivers technical requirements for the activities in WP2, WP3 and WP4 and provides the propagation models. The consortium has identified and analyzed the planned use cases in detail and defined the main technical requirements for each use case. Currently the partners are working on the deliverable D1.1 which describes the “Use case-driven specifications and technical requirements and initial channel model.” This deliverable provides an inventory of interactive use case specifications, representative deployment scenarios, technical requirements and KPIs for the four focus domains:

- *Adaptive robotized factories, warehouses, retail and logistics*
- *Immersive entertainment for crowds of people*
- *Human-machine interaction in care environments, hospitals and assisted living*
- *Home automation and smart home systems*

It also reports on the particular investigation of the origin of latency in wireless applications. This analysis aims to comprise thirteen representative future interactive use cases enabling new services in the mentioned application domains. Also an initial channel model, based on existing measurements and models, is included.



Type classification of use cases application



## Past Events

### REINDEER Kick-Off Meeting

25-26 January, 2021  
ONLINE

### 5G networks – and beyond: Technologies for a new application era

28-29 January, 2021  
ONLINE

### 1st IEEE International Online Symposium on Joint Communications & Sensing

23-24 February, 2021  
ONLINE

### REINDEER's 6G vision, technical enablers and envisioned challenges

16 March, 2021  
ONLINE

### Technikon's financial webinar for H2020 projects

24 March, 2021  
ONLINE

### MSCA ETN PETER Network Wide Event 2

16 April, 2021  
ONLINE

### **WP-2 RadioWeaves platform: models, architectures, and topologies**

In WP2 the transformative RadioWeaves architecture is developed and the infrastructure topologies are designed. For the overall success, a well-balanced co-design of hardware and algorithms is essential. To kick-off this WP, a workshop was executed and the study of architectures and distributed processing was initiated. Novel terminology fit to represent the new features of RadioWeaves and to reflect both physical and logical architectures has been formulated.

### **WP-4 Processing and Signalling for Energy-Neutral Devices**

WP4 covers the support of energy-neutral devices, wireless nodes which operate without a battery, harvesting their energy from the RF field generated by the RadioWeaves infrastructure. Currently this WP is in its early stages and work has started on common definitions of scenarios, devices and related specifications.

### **WP-6 Communication, Dissemination, Exploitation, Standardisation and Training**

This WP encompasses the communication and dissemination of results obtained in other WPs to the scientific community and targeted stakeholder groups. Further, it will document each partner's exploitation outcomes, and document the project's impact on European and international markets and standards. Within the first months the project logo, the branding and some dissemination material (leaflet, press releases, newsletter, etc.) were designed. Furthermore, the IT infrastructure and official project website was established and social media channels were activated. The project has engaged in discussions and outreach activities with other related projects, which offers opportunities to strengthen the impact. Check out the REINDEER project on the [Website](#), [Twitter](#) and [LinkedIn](#)!

### **WP-3 Scalable Protocols and algorithms for robust cell-free operation**

Within this WP, protocols and signal processing algorithms are developed to enable efficient communication services using RadioWeaves, which also requires fundamental changes to the initial access, system information broadcasting, and spatial resource allocation. Within the first project months the consortium brainstormed on possible solutions for access in the distributed architectures and progressed in the direction of energy efficiency and operation in unlicensed bands.

### **WP-5 Experimental proof-of-concept of RadioWeaves platform and interactive applications**

WP5 will maximally validate and demonstrate the technological progress, therefore the active work in this WP will start in the second half of the project. However, preparation to establish adequate testbeds has well progressed and strategies for key functionality, e.g. synchronisation, is being discussed among partners. The target is to experimentally validate the main results of the project, including the overall concept of RadioWeaves-based networking, communication, positioning, the specific key technologies and enhanced functionalities.

### **WP-7 Project, Risk and Innovation Management**

WP7 defines the operational management and technical vitality of REINDEER encompassing management components on contractual, financial, legal, technical, administrative and ethical levels. Another focus is to respond to opportunities, which is addressed by active innovation management. These activities help to maximize the benefit to participants, project stakeholders and the overall project impact. The collaboration among partners is very effective due to successful project management.



## Past Events

**IEEE International Conference on Communications**  
16-20 June, 2021  
ONLINE

**Smart Networks and Services Info Session**  
11 June, 2021  
ONLINE

**6G Wireless Foundations Forum 2021**  
1 July, 2021  
@ Eurecom, France

**IEEE PIMRC 2021**  
13-16 September, 2021  
ONLINE

All past and upcoming events can be found on the REINDEER official webpage:

**[reindeer-project.eu](https://reindeer-project.eu)**



# The REINDEER Consortium

TECHNIKON

Technikon Forschungs- und  
Planungsgesellschaft mbH  
Austria [Villach]

li.u  
LINKÖPING  
UNIVERSITY

LINKÖPINGS UNIVERSITET  
Sweden [Linköping]

TU  
Graz

TECHNISCHE UNIVERSITÄT  
GRAZ  
Austria [Graz]

BLOO-  
LOC

BLOOLOC  
Belgium [Hasselt]

KU LEUVEN

KATHOLIEKE UNIVERSITEIT  
LEUVEN  
Belgium [Leuven]  
Belgium [Gent]

NXP

NXP Semiconductors Austria  
GmbH & Co KG  
Austria [Graz]

ERICSSON

ERICSSON AB  
Sweden [Stockholm]

Telefonica  
Telefonica  
Investigación y Desarrollo

TELEFONICA INVESTIGACION  
Y DESARROLLO SA  
Spain [Madrid]

LUND  
UNIVERSITY

LUNDS UNIVERSITET  
Sweden [Lund]

## Publications



### A Primer on Techtile: An R&D Testbed for Distributed Communication, Sensing and Positioning

– an [academic article](#) by Gilles Callebaut, Jarne Van Mulder, Geoffrey Ottoy and Liesbet Van der Perre.



### Physical Layer Latency Management Mechanisms: A Study for Millimeter-Wave Wi-Fi

– an [academic article](#) by Alexander Marinšek, Daan Delabie, Lieven De Strycker and Liesbet Van der Perre.

## Other Media



This [quick look](#) at the REINDEER H2020 project by the technology lead Liesbet Van der Perre from KU Leuven will give a few details about why this effort is important not just for the European Union as an industrial competitor but for the Citizens as well.



Technikon has published this slightly longer [video](#) which will deliver an overview of REINDEER aimed for the general public seeking more information.



Technikon has recorded a [podcast](#) with technical leader, Liesbet Van der Perre from KU Leuven. This first episode presents the scope and reach of REINDEER as well as a bit about use cases and challenges. The episode is now available on all major podcasting platforms such as Spotify, Apple and Google. Visit the REINDEER web page for the latest.



## Upcoming Events

### Asilomar Conference on Signals, Systems, and Computers 2021

31 October- 3 November, 2021

@Asilomar, USA

### 25th International ITG Workshop on Smart Antennas

10-12 November, 2021

ONLINE

REINDEER studies a novel connectivity platform, with the potential of making large enhancements in terms of coverage, throughput, latency, reliability, positioning accuracy, etc.

– Joao Vieira  
(Ericsson)