



# WaveComBE

mmWave Communications in the Built Environments

## WaveComBE\_D4.11

### Year 4 project workshop

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<sup>1</sup> CO = Confidential, only members of the consortium (including the Commission Services)

PU = Public

## Table of contents

Table of contents .....	3
Executive Summary .....	3
1 Introduction .....	4
2 Project workshop year 4 – Propagation model in Ranplan Professional Network planning and optimization .....	5
2.1 Brief overview .....	5
2.2 Agenda .....	5
2.3 ESR attendance .....	6
2.4 Picture of virtual session .....	6
3 Project workshop year 4 – IPR & Patents .....	7
3.1 Brief overview .....	7
3.2 Agenda/Goal .....	7
3.3 ESR attendance .....	7
3.4 Picture of virtual session .....	8
4 Project workshop year 4 – Product and mixed-signal design Training Seminar .....	9
4.1 Brief overview .....	9
4.2 Agenda/Goal .....	9
4.3 ESR attendance .....	9
4.4 Picture of virtual session .....	10
5 Project workshop year 4 – Closing technical workshop .....	11
5.1 Brief overview .....	11
5.2 Agenda/Goal .....	11
5.3 ESR attendance .....	13
5.4 Picture of virtual session .....	13
5.5 Overall conclusions and observations .....	13
References and more information .....	14

## Executive Summary

Training is an important aspect of any H2020-MSCA-ITN project and in particular for WaveComBE as well. In order to get all ESRs at the same level and to promote knowledge sharing among the consortium project workshops have been setup. This document describes the Year 4 project workshops organized by Ranplan and Televic. Additionally, a closing technical workshop will be held, allowing to provide an overview of work done by all ESRs.

Because of the covid-19 situation, these were virtual workshops.

## 1 Introduction

Within WaveComBE project there were a number of training events defined. Next to the schools which are organized, there were also yearly project workshops.

In the sections below, you can find more detailed information about the Year 4 project workshops. There were four workshops

- Training Seminar on Propagation model in Ranplan Professional Network planning and optimization
- Training Seminar on IPR & Patents
- Product and mixed-signal design Training Seminar
- Closing technical workshop

Note: this deliverable was updated on September 30<sup>th</sup>, 2021, after the Closing Technical Workshop which took place on September 28<sup>th</sup>, 2021. The previous version 1.2 submitted on August 31<sup>st</sup>, 2021, didn't contain detailed input of the Closing Technical Workshop.

## 2 Project workshop year 4 – Propagation model in Ranplan Professional Network planning and optimization

### 2.1 Brief overview

- Host: Ranplan, UK
- Venue: virtual (through Microsoft teams)
- Time: February 25<sup>th</sup>, 2021, 9h-11h30 & 14h00-16h30
- Organizer: Kan Lin (Wireless engineer, Ranplan research group)
- Trainer: Jiming Chen

### 2.2 Agenda

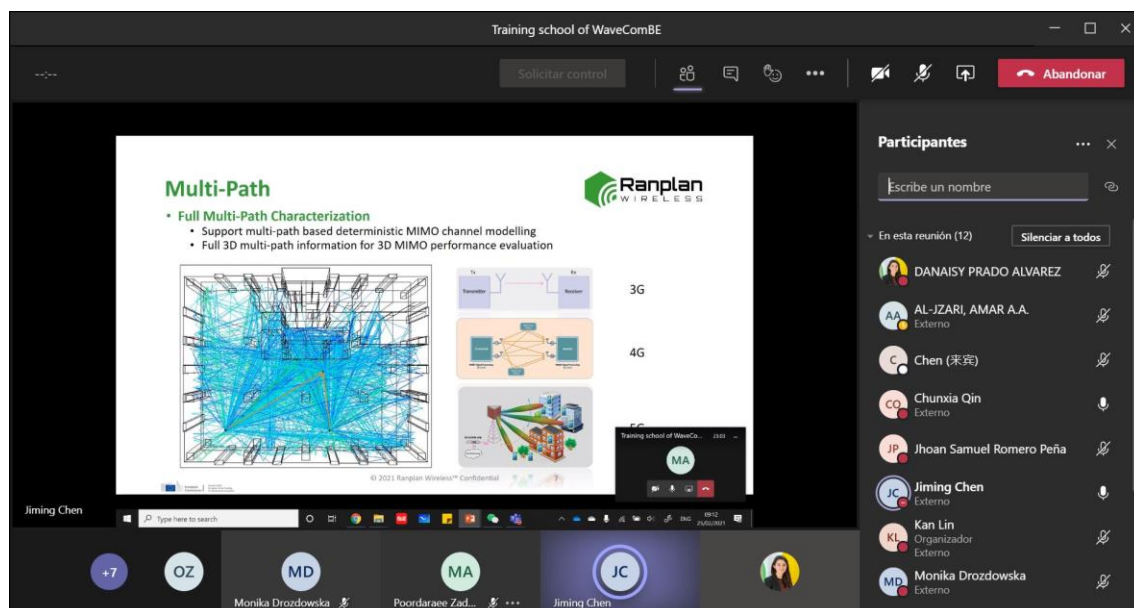
1. Propagation engine [0.5 day]
  - Ranplan propagation model introduction
  - Propagation model structure
    - Indoor scenario
    - Outdoor scenario
    - Hybrid scenario
  - Propagation model calculation
    - Transmission
    - Diffraction
    - Reflection
  - Calculation accuracy report
  - Calibration
    - Material calibration
    - Parameter calibration
2. Network planning and optimization [0.5 day]
  - The network planning
    - Site planning
    - Coverage planning
    - Capacity planning
  - 5G NR parameters configuration
  - Network optimization
    - Intelligent frequency optimization
    - Intelligent cell optimization
    - Intelligent RSI/PCI planning

### 2.3 ESR attendance

<i>Name</i>	<i>Attendance</i>
ESR1 – Wai Yan	Present
ESR2 – Mohammad Poordaraee	Present
ESR3 - Alireza Bagheri	Not present
ESR4 - Amar Al Jzari	Present
ESR5 - Othman Zahid	Present
ESR6 - Samuel Romero	Present
ESR7 - Danaisy Prado Alvarez	Present
ESR8 - Chen Chen	Present
ESR9 - Yixin Zhang	Present
ESR10 - Chunxia Qin	Present
ESR11 - Monika Drozdowska	Present

Note: all ESRs present received a training certificate

### 2.4 Picture of virtual session



### 3 Project workshop year 4 – IPR & Patents

#### 3.1 Brief overview

- Host: Televic Conference, Belgium
- Venue: virtual (through Microsoft teams)
- Time: December 9<sup>th</sup>, 2020, 13h00 -16h30
- Trainer: Frederik Naessens (Televic Conference)

#### 3.2 Agenda/Goal

- Types of IPR
- Zoom in on patents
- Best practises as a researcher/developer
- Patent search (hands-on)

#### 3.3 ESR attendance

<i>Name</i>	<i>Attendance</i>
ESR1 – Wai Yan	Present
ESR2 – Mohammad Poordaraee	Present
ESR3 - Alireza Bagheri	Present
ESR4 - Amar Al Jzari	Present
ESR5 - Othman Zahid	Present
ESR6 - Samuel Romero	Present
ESR7 - Danaisy Prado Alvarez	Present
ESR8 - Chen Chen	Present
ESR9 - Yixin Zhang	Present
ESR10 - Chunxia Qin	Present
ESR11 - Monika Drozdowska	Present

Note: all ESRs received a training certificate

## 3.4 Picture of virtual session

## IPR and patents

WaveComBE project training

December 2020

televic  
conference

### POLL


### What do you know about patents?

Q4: Do you believe patents existed before year 1800?

Q5: Would it cost more than 25k€ to have a patent?

Q6: Can you get a patent granted within 2 years after filling?

televic  
conference



AB OZ Y JP AA WY DA MA CQ

Rohan Samrat Romero Pofa ALI DARU AMAR A.A. Yang Wai Yan, W.Y. (EEMCS) DANADY PRADO ALVAREZ Poortman Zaden Abarghooee, M... Chunxia Qin



## 4 Project workshop year 4 – Product and mixed-signal design Training Seminar

### 4.1 Brief overview

- Host: Televic Conference, Belgium
- Venue: virtual (through Microsoft teams)
- Time:
  - Part 1: April 26<sup>th</sup>, 2021, 13h30-17h00
  - Part 2: April 30<sup>th</sup>, 2021, 9h00-12h00
- Trainer: Frederik Naessens (Televic Conference)

### 4.2 Agenda/Goal

#### PART 1

- A. General introduction on product development (high-level)
- B. Zooming in on infra-red communication standard (IEC 61603-7) and the particular challenges

#### PART2

- C. General approach for mixed signal design
  - Functional split analog/digital
  - Quantization
- D. Simulation tools → through hands-on

### 4.3 ESR attendance

<i>Name</i>	<i>Attendance</i>
ESR1 – Wai Yan	Present
ESR2 – Mohammad Poordaraee	Present
ESR3 - Alireza Bagheri	Present
ESR4 - Amar Al Jzari	Present
ESR5 - Othman Zahid	Present
ESR6 - Samuel Romero	Present
ESR7 - Danaisy Prado Alvarez	Present
ESR8 - Chen Chen	Present
ESR9 - Yixin Zhang	Present
ESR10 - Chunxia Qin	Present
ESR11 - Monika Drozdowska	Present

Note: all ESRs received a training certificate

#### 4.4 Picture of virtual session

Product design with focus on  
mixed-signal

WaveComBE training

Televic Conference, April, 2021

televic  
conference



## 5 Project workshop year 4 – Closing technical workshop

### 5.1 Brief overview

- Host: Universitat Politècnica de València (as Project coordinator)
- Venue: virtual (through Microsoft teams)
- Time: September 28<sup>th</sup>, 2021 (0.5 day, 9h-13h30)
- Invitation list:
  - All ESRs
  - Supervisors / work package leaders
  - Supervisory board members

### 5.2 Agenda/Goal

Time	Content	Slot duration	Speaker
9:00	Welcome	5 min	Coordinator
9:05	Introduction from Coordinator	10 min	Coordinator
9:15	Antenna design	55 min (3 papers)	ESRs or/and supervisors
	"Millimeter-wave Phased Array Antenna for 5G outdoor base station."	12' +5	Wai Yan Yong, U.Twente/ Gapwaves
	"Design and implementation of 28-GHz phased arrays based on Gap waveguide"	13' +5	Alireza Bagheri, Gapwaves
	"Compact Over-The-Air measurement setup for evaluation of MIMO antenna systems"	15' +5	Mohammad Poordaraee, U.Twente
10:10	Break	15 min	
10:25	Radio channel and propagation	60 min (3 papers)	ESRs or/and supervisors
	"The Effect of Precipitation & Interference on mmWaves from Long Term	15' +5	Othman Zahid, UDUR

	Measurements in the Built Environment"		
	"Influence of the human body on millimeter wave propagation channel and how to avoid it."	15' +5	Samuel Romero, UPV
	"How friendly are building materials as reflectors to indoor LOS MIMO communications?"	15' +5	Yixin Zhang, USFD
11:25	Break	15 min	
11:40	System aspects and planning	70 min (3 papers)	ESRs or/and supervisors
	"Network modelling and optimization for the dense deployment of mmWave massive MIMO small cells in indoor and outdoor built environments"	15' +5	Chen Chen, USFD
	"60 GHz directional channel measurement and Ray Tracing simulation in a conference room Environment"	25' +5	Monika Drozdowska, Danaisy Prado, Amar Al Jzari (Televic, UPV, UDUR)
	"Intelligent cell optimization with massive MIMO in mmWave"	15' +5	Chunxia Qin, Ranplan
12:50	Board final remarks, feedback	10 min	Board members
13:00	Wrap up, end of meeting	5 min	

### 5.3 ESR attendance

<i>Name</i>	<i>Attendance</i>
ESR1 – Wai Yan	Present
ESR2 – Mohammad Poordaraee	Present
ESR3 - Alireza Bagheri	Present
ESR4 - Amar Al Jzari	Present
ESR5 - Othman Zahid	Present
ESR6 - Samuel Romero	Present
ESR7 - Danaisy Prado Alvarez	Present
ESR8 - Chen Chen	Present
ESR9 - Yixin Zhang	Present
ESR10 - Chunxia Qin	Present
ESR11 - Monika Drozdowska	Present

### 5.4 Picture of virtual session



### 5.5 Overall conclusions and observations

- All ESRs reported status in their research domain, links were made between the work of different ESRs (was even emphasized through some joint presentations).
- In general feedback of supervisory board was very positive. They stressed the research maturity which was grown amongst all ESRs. Some advice was given with respect to future work.

Note: presentation slides are available in the WaveComBE repository.

## References and more information

<https://wavecombe.eu/> - Wavecombe portal website