



# WaveComBE

mmWave Communications in the Built Environments

## WaveComBE\_D4.10

### Year 3 project workshop

Version v1.1

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

PU = Public

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## 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 3 project workshop organized by University of Sheffield. Because of the covid-19 situation it was a virtual workshop organized in two parts. The topic was ‘public engagement’.

## 1 Introduction

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

In the sections below you can find more detailed information about the Year 3 project workshops. There were two workshops

- Public engagement (consisting of two parts)
- Seminar with expert of Supervisory board

## 2 Project workshop year 3 – Public engagement (part 1)

### 2.1 Brief overview

- Host: University of Sheffield
- Venue: online via Google Meet
- Time: September 22nd, 2020, 15h-17h (CET)
- Trainer: Prof Xiaoli Chu (University of Sheffield)

### 2.2 Agenda

#### **Getting Started in Public Engagement (~35 minutes)**

[https://www.sheffield.ac.uk/polopoly\\_fs/1.861139!/file/Masterclass52.pdf](https://www.sheffield.ac.uk/polopoly_fs/1.861139!/file/Masterclass52.pdf)

Discussion and break (10 minutes)

#### **Working with stakeholders (~35 minutes)**

[https://prezi.com/o79ego8\\_uwyb/university-of-sheffield-stakeholder-involvement-masterclass/?utm\\_campaign=share&utm\\_medium=copy](https://prezi.com/o79ego8_uwyb/university-of-sheffield-stakeholder-involvement-masterclass/?utm_campaign=share&utm_medium=copy)

Discussion and break (10 minutes)

#### **Masterclass video: Working with the media and social media (~20 minutes)**

<https://www.youtube.com/watch?v=ZzEjLODaY1U&feature=youtu.be>

[https://www.sheffield.ac.uk/polopoly\\_fs/1.328810!/file/MediaRelationsTeam.pdf](https://www.sheffield.ac.uk/polopoly_fs/1.328810!/file/MediaRelationsTeam.pdf)

Discussion and wrap-up (10 minutes)

### 2.3 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

## 2.4 Picture of virtual session

The screenshot displays a virtual meeting interface. The main window shows a presentation slide titled "Public engagement – why bother?" with a list of six bullet points. The slide is presented by Xiaoli Chu. The bottom of the screen shows a row of participant avatars and names. To the right, a sidebar titled "Meeting details" lists 12 participants.

**Public engagement – why bother?**

- to disseminate the results of your research
- to involve the public in helping formulate a research question or project
- to consult the public on their views about your work
- to encourage people to help you do your research
- to collaborate with the public in developing and running a project or activity
- to influence future teaching and future students.

**Meeting details**

**People (12)**

- Danaïsy Prado Alvarez (You)
- Alireza Bagheri
- Amar AL-JZARI
- Chen Chen
- chunxia QIN
- Monika Drozdowska
- Othman Zahid
- SAMUEL ROMERO

**Participants in the bottom bar:**

- Xiaoli Chu
- Othman Zahid
- Warren Yo
- Monika Drozdo...
- chunxia QIN
- Chen Chen

### 3 Project workshop year 3 – Public engagement (part 2)

#### 3.1 Brief overview

- Host: University of Sheffield
- Venue: online via Blackboard Collaborate
- Time: October 8th, 2020, 14h-16h30 (GMT)
- Trainer: The UK National Coordinating Centre for Public Engagement. This training session was facilitated by Helen Featherstone, Head of Public Engagement with Research, University of Bath, UK.

#### 3.2 Agenda/Goal

In this engaging, interactive online course, participants are provided with the opportunity to examine a series of frameworks and tools that can be used to develop high quality public engagement. In applying these tools - through case studies, activities and discussions - participants will develop a more strategic approach to their public engagement practice.

##### *Learning objectives*

- To explore frameworks and concepts that begin to deepen thinking about People, Purpose and Process within public engagement work
- To start thinking about the importance of evaluation to high quality public engagement
- To apply learning to an example of their own public engagement practice and take away tools which will allow practical application of learning in the future

#### 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

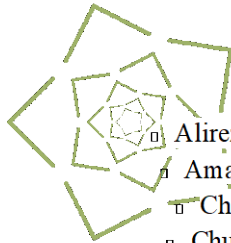
Note: all ESRs received a training certificate from the UK National Coordinating Centre for Public Engagement.



*This document is to certify the following H2020-MSCA-ITN “WAVECOMBE” Early Stage Researchers attended the*

## **High Quality Public Engagement Training Course**

*on 8.10.2020*



- ▣ Alireza Bagheri,
- ▣ Amar Al-jzari,
- ▣ Chen Chen,
- ▣ Chunxia Qin,
- ▣ Danaisy Prado,
- ▣ **Jhoan Samuel Romero Peña,**

- ▣ Mohammad Poordaraee,
- ▣ Warren Wai Yan Yong,
- ▣ Yixin Zhang,
- ▣ Othman Zahid,
- ▣ Monika Drozdowska.



## 4 Project workshop year 3 – Seminar with an Expert of Supervisory Board

### 4.1 Brief overview

- Host: Prof. Narcís Cardona - Universitat Politècnica de València, Spain
- Venue: virtual (through Microsoft teams)
- Time: October 14th, 2020, 17h-19h
- Expert: Dr. David Lopez (Huawei Paris, formerly at Nokia Bell Labs)

### 4.2 Agenda/Goal

As a continuation of the External Supervisory Board meeting, the ESRs of WaveComBE discussed with Dr. David Lopez (Huawei Paris, formerly at Nokia Bell Labs) on research aspects of next generations of WiFi technologies.

### 4.3 ESR attendance

This workshop was focusing on specific aspects in detail and hence targeted a number of ESRs specifically. Below a list of the ERS involved in this workshop:

<i>Name</i>	<i>Attendance</i>
ESR1 – Wai Yan	Present
ESR2 – Mohammad Poordaraee	Present
ESR5 - Othman Zahid	Present
ESR7 - Danaisy Prado Alvarez	Present
ESR11 - Monika Drozdowska	Present

### 4.4 Topics covered (also containing feedback of the session)

#### 4.4.1 About the standards overall

- *How flexible the standard is?* – standard is a language that describes how machines talk to each other. It not intend to set features that are beyond basic conversation. So, scheduling or how to make a cluster is in implementation gestion, not the standard. It is more about interfaces. How to make sure that two devices/networks created by two different vendors will be able to communicate/sense each other even if they provide different solutions, features, and using different approaches in beamforming or scheduling.

- *What does it mean that something is (not) supported by the standard?* – If something is not supported by the standard it means that it is not essential for communication. If something should be supported the standard should be upgraded. But first it needs to be desired by others who also would like to use this particular feature. New feature -> patent -> propose to upgrade the standard.

- *Can we still provide our own solution for not supported features?* – Yes, it's all about that. Scheduling, clustering, etc. are in the gestion of the implementation, and it is not described by the standard.

#### 4.4.2 Steps in network planning

- *There are requirements for the network, the goal of its existence, the standard has been chosen: how to start working with scheduling data transmission?*

- *What should be first: protocol for the transmission or the plan for the deployment of the network's devices?*

To plan the network is to make customer happy. Firstly we should know the user distribution, traffic demand, how many, or how dense the devices will be deployed, coverage, whole performance of the network, etc.. With that we can start deployment planning.

In planning phase:

- 1) rough estimation of the deployment – how many BS and STAs, where located,
- 2) simulation of the performance with scheduling scheme (or different scheduling schemes),
- 3) decision that may lead to refine the scheduling scheme, but normally not deployment.

#### 4.4.3 In the protocol

- *Is it efficient to make first measurements, neighbour discovering, maintain links between STAs before the environment will be "ready" (so for example conference room will be empty, without people), and make additional measurements for updating the network topology when the room will be full of people?* – not done practically, because in most cases it is the user who is saying “hey, I want to transmit”. But this highly depends on the implementation and used features. MU-MIMO depends on CSI, so is better not to make measurements in advance, because the channel can change in the meantime. In VoIP the semi-persistence scheduling with resource blocks is used, and there this may have more sense.

#### 4.4.4 IEEE 802.11ay

- *In the standard, there is an expression "peer STA". For STAs is it always the PCP/AP or can it be the other non-AP STA? (for example in TDD Slot Schedule)* – probably it refers only to connection via AP: non-AP to AP, and AP to non-AP.

- *Considering the spatial sharing can two STAs be in TX mode in one TDD slot?* – Yes, in this standard up to 8 STAs in Tx mode in one time, because up to 8 beams will be supported.

- *Is neighbour discovering possible only by PCP/AP or other STAs also can perform that? Or should they receive the information about neighbouring STAs from PCP/AP?* – Neighbour discovery is possible only via AP. Packets or beacons received with header different than the AP header to that the STA is connected are considered as “aliens” and not read.

- *When comparing one AP with a distributed antennas system, and many APs with a single antenna (or array) what would be the pros and cons of both solutions?* – when we are using distributed AP system we can have more flexibility, but the coordination is more difficult, and the network is more power consuming. Using one AP with many antennas is easier to coordinate, but the power we can use is limited, so we don't have much flexibility. /new feature in 11b – coordinated OFDMA, distributed MIMO coordination with joint transmission reception (BroadComm company)/.

- *When we use a lot of APs in coordinated distributed massive MIMO then the power consumption is a problem. How to manage that?* – For now only 4 AP were considered in real

scenario, so the power consumption wasn't a problem, but when we considered more APs it may cause a lot of troubles. The main question is: how much the power consumption decrease.

#### 4.4.5 MU grouping

- *should it be flexible or constant?* – ideally as dynamic as possible, but then signalling and a lot of information is needed. Finding the best solution, the sweet spot, is the research question.

- *can one STA belongs to more than one MU group?* – yes, why not. The only concern is the memory of the base station, because it needs to remember them all.

- *is the number of STAs in the group limited? Would it be efficient if the number of STAs in the group will be the same as the number of beams we can use?* – there is the upper limit, but not more than 8 users can be served simultaneously (because of the number of beams)

- When groups are created we need to remember, that for the best performance users can't be correlated to multiplex their streams.

Channel is not really sparse, in 60 GHz band there is a lot of scattering and obstructionist that impact beamforming gain. Energy is not focused very well in the beam, when we have scattering. It is possible to use mmWaves for indoor networks, but the deployment needs to be really good. Channel should be taken into account, because it may be richer than we think.

## References

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