

MObility and Training fOR beyond 5G ecosystems: The Scope of the MOTOR5G Project

Presenter:

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- ❑ **European Training Networks (MSCA-ITN-ETN)**
- ❑ **Grant Agreement (GA) No.: 861219**
- ❑ **Topic: Innovative Training Networks**
- ❑ **Duration: 48 months (November 2019 – October 2023)**
- ❑ **Overall budget (requested grant) of ~3.979 Million Euro**
- ❑ **Consortium members: 9 partners (from 6 EU member states)**
- ❑ **Project Coordinator: University of Aarhus (DK)**

Beneficiaries:



Partners:



The **main objectives** of the project MOTOR5G are to:

- + **Motivate and skill competitive young researchers** *through involvement and engagement in a variety of research activities;*
- + **enabling them to work on real-life technical issues**, *across multiple European countries and organizations;*
- + **training them** *with the ability to propose new technological solutions (such as dealing with high data rate, enhanced capacity, efficient spectrum utilisation, reduced latency, adaptive traffic steering, longer battery life, etc.), and;*
- + **providing them a strong networking opportunity** *through participation as speakers in conference and workshop events and through engagement with industry and other stakeholders (e.g., standardization).*

MOTOR5G also aims to provide young researchers with:

- **reliable communications skills**,
- **the ability to work in interactive groups** and
- **an understanding of the integrity and ethics** *in research, conformant to EU practices and standards.*

Scientific Objectives:

- ➔ **Propose new principles for mm-Wave and Licensed Shared Access (LSA)**, in harmony with optimal business models-enhance capacity, data rate and reliability of Future Wireless Networks (FWNs).
- ➔ **Develop Artificial Intelligence (AI) algorithms** for network prediction, QoE, and intelligent tools for supporting MANO-improve cooperation, orchestration and security of FWNs.
- ➔ **Design new antennas for FWNs**, based on novel Beam-Forming (BF) algorithms, to improve communication efficiency by saving energy and making FWNs environmentally friendly.
- ➔ **Develop, test and validate different proofs-of-concept (PoC)** to demonstrate the feasibility and effectiveness of the proposed innovative techniques and encourage deployment, through prototyping and experimental research activities.

Technological and Industrial Objectives:

- ➔ **Create a continual network between industry and academia.**
- ➔ **Enhance coverage, capacity, intelligence**, and **reduce latency** by enabling self-organised and self-aware FWNs.
- ➔ **Develop a pool of talented researchers** for innovative and entrepreneurially oriented research on FWNs with expertise in mm-Wave, LSA, AI, UAV, IoT, and antenna design technologies.
- ➔ **Enhance the impact on standardisation** through training-educational events and by disseminating the results of MOTOR5G in selected fora.

The MOTOR5G project considers aspects such as

- **Use of drone-based technology** for enhanced multi-antenna and data forwarding techniques;
- **use of artificial intelligence** for novel adaptive digital beamforming techniques applied on realistic antenna arrays;
- **communications in the millimetre-wave bands**;
- **blockchain-based approach** to spectrum management and sharing, and;
- **use of machine learning** for enhanced quality of experience.

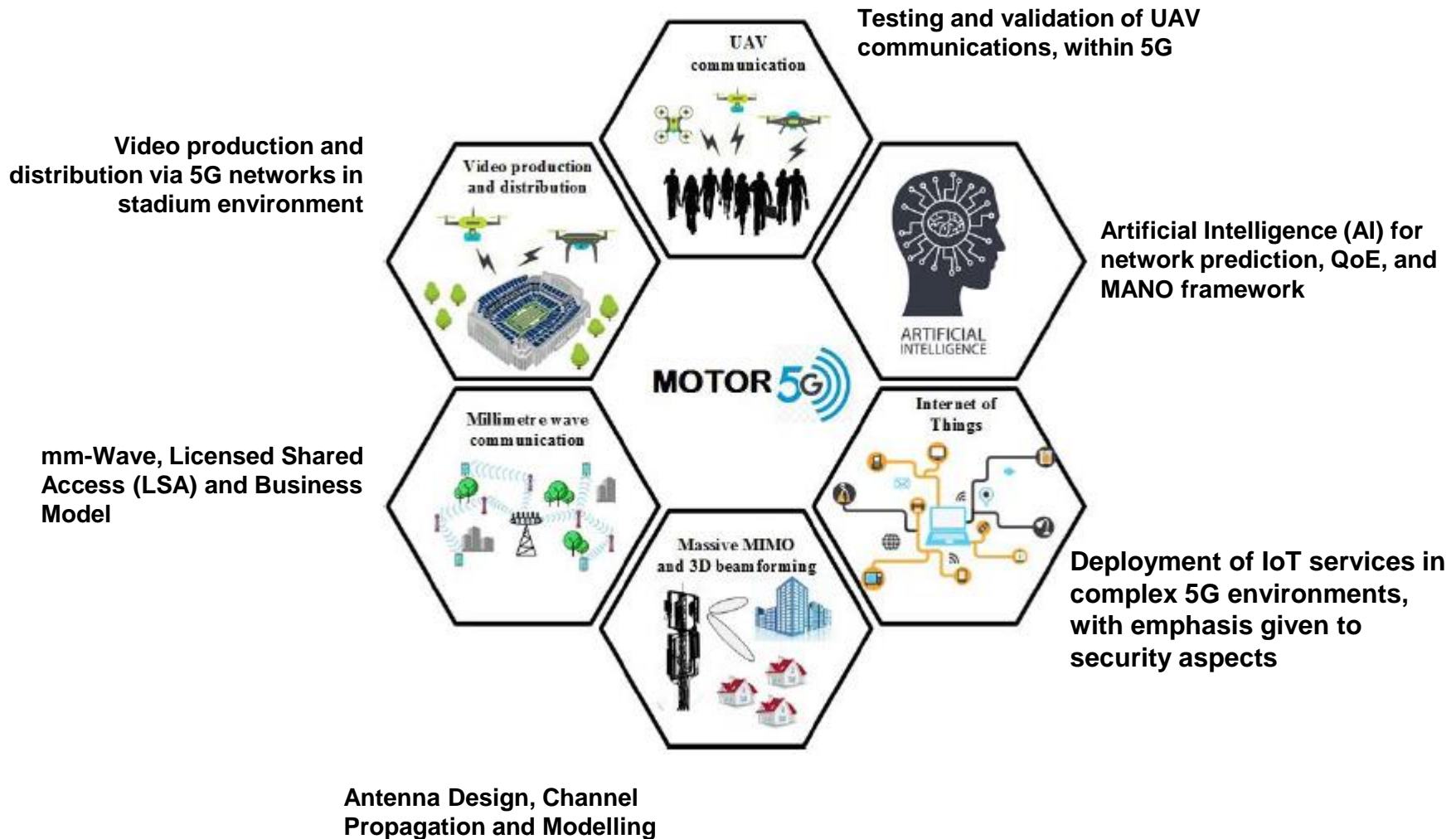
MOTOR5G also focus on novel business models to sustain profitable operation of beyond 5G ecosystems.

The research team would comprise young researches supervised by **committed experts from the industry and academia** to advance the state-of-the-art in the above areas.

Three demonstration scenarios have been planned:

- **Localization**;
- **drone-based communications**;
- **combined 5G-based video production and video distribution network in a stadium.**

Overall System Model of MOTOR5G





Objectives

OBJ 1: New algorithms using blockchain and deep learning for DSA, LSA and mm-Wave. Novel Business models.

OBJ 2: Design AI algorithms for Network Prediction, QoE and Intelligent Tools for MANO Framework.

OBJ 3: Develop Green Antennas and Antenna Arrays using AI and metamaterials. New 3D models for UAVs.

OBJ 4: Develop Proof-of-Concept to demonstrate the feasibility of the Proposed Innovative Techniques.

Work Packages

WP1: mm-Wave, Licensed Shared Access and Business Models.

ESR 3, 4, 10

WP2: Artificial Intelligence for Network Prediction, Quality of Experience and MANO.

ESR 7, 9, 15

WP3: Antenna Design, Channel propagation and modelling.

ESR 1, 5, 6, 12, 14

WP4: Prototyping, Implementation and Proof-of-concept.

ESR 2, 8, 11, 13

WP5: Reference Scenarios and System Requirements.

All ESRs

WP0 (“Project Management”) concerns the management and monitoring of the overall performance of the project.

The main activities are: (i) Coordination of scientific, training and administrative activities. (ii) provision of a centralised network communication with the EC; (iii) supervision of MOTOR5G’s budget, ensuring appropriate funding for all partners; (iv) ensuring that the required reports are provided on due date and fulfil agreed requirements, and; (v) following the project evolution of developing actions in order to correct deviations, where necessary.

WP1 (mm-Wave, Licenced Shared Access (LSA) and Business Models (BMs)) aims to improve spectrum usage across a range of frequency bands, with particular emphasis on below 6GHz bands and the mm-Wave bands.

Two very different approaches: a) Blockchain, and b) Deep learning for DSA (Dynamic Spectrum Access) / LSA (Licensed Spectrum Access) will be adopted to improve the utilisation of spectrum in these band

WP2 (“Artificial Intelligence (AI) for Network Prediction, QoE & MANO”) aims to design novel algorithms for network prediction and enhanced QoE using machine learning.

NFV and Multi-access Edge Computing (MEC) are vital technologies for FWNs. AI will be used in MANO for autonomous closed-loop optimisation of end-to-end services with a fully programmable underlying infrastructure.

WP3 (“Antenna Design, Channel Propagation and Modelling”) aims to design and develop green antenna and antenna arrays using AI and metamaterials.

The main aim is to enhance communications between antennas without wastefully spreading radiated power into space. It will also develop accurate path loss and 3-dimensional (3D) channel models for wireless communication between UAVs and ground stations.

WP4 (*“Prototypes, Implementation, and Proof of Concept”*) intends to implement some of the techniques developed in the project, gain insight about complexity issues, and proof of feasibility. *It also aims to display some key applications of the MOTOR5G technology.*

WP5 (*“Reference Scenarios and System Requirements”*) will define the most relevant scenarios that will also be used as test cases in the evaluation and PoC phase. *This WP is conceived as a cohesive element between all the research activities to be carried out, as MOTOR5G has to deal with a diversity of technologies that need to be properly reflected by the scenarios and end-user requirements.*

WP6 (*“Training, Secondments and Standardisation”*); here the aim is the management and monitoring of the project training, secondments and standardisation activities. *MOTOR5G will provide a comprehensive research and training programme and promote the interaction and contributions to several Standards Developing Organisations (SDOs).*

WP7 (*“Communication, Dissemination and Exploitation”*) aims to ensure that the impact and reach of the project results and outcomes are maximised. *This can be achieved through the development of strategic dissemination and exploitation policies across a wide range of stakeholders, including industry, academia and government.*



Thank You Very Much!

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