Universidad del País Vasco Euskal Herriko Unibertsitatea

OFERTA TRABAJOS FIN DE GRADO Y FIN DE MÁSTER

(GRUPO TSR – LÍNEA NEXT GENERATION BROADCAST SYSTEMS)

CONTENT

AREA: WIRELESS COMMUNICATIONS FOR INDUSTRIAL APPLICATIONS

TFG1/TFM1	
Title	Analysis of multipath in industrial environments with propagation measurements
Objective	Method and graphical interface to process empirical measurements taken in industrial environments.
Methodology	1. Study the state of the art of propagation channels in industrial environments 2. Study available datasets with propagation measurements in industrial environments 3. Define multipath description functions and associated parameters 4. Desing a sw tool to visualize/calculate multipath parameters (Matlab or Python) 5. Process NIST & Crawdad database and obtain multipath parameter values 6. Identify and quantify the impact of different factors (environment, polarization, frequency band, Tx antenna height, etc.) on the multipath parameter values 7. Reporting
Deliverables	Graphical tool for visualizing and batch processing of propagation channel parameters

TFG2/TFM2	
Title	Factory Automation Cell: Wireless Communications Platform Architecture Design
Objective	Design of a simulation and analysis tool for wireless communication systems in a Factory Automation Cell
Methodology	1. Study of the state of the art of wireless communication systems in industry 2. Study of the state of the art of propagation models in industry 3. Analysis of the functional specifications that an industrial communications simulation platform must have 4. Design of the system architecture 5. Selection of the technology to build the platform (Phython, NS3, Omnet++, Matlab) 6. Design and implementation of a simple prototype 7. Documentation
Deliverables	Software prototyping of the platform and design of the complete system architecture

TFG3/TFM3	
Title	Analysis of space-time multipath measurements in industrial environments at mmWave frequencies
Objective	Characterization of wireless channels in industry in mmWave frequencies by numerical processing and analysis of measurement datasets
Methodology	1. Study the state of the art of propagation channels in industrial environments 2. Study the available documentation concerning the measurement campaign deployment and the structure of the datasets 3. Define metrics for characterizing the channel in delay/time/space dimensions 4. Develop algorithms to process the datasets and obtain all defined metrics 5. Analyze the impact of all metrics on channel performance 6. Documentation

Deliverables	Software with the proper implementation of the algorithms needed for metrics calculation from datasets

TFG4/TFM4	
Title	DECT 2020 NR Standard Performance in Industrial Wireless Channels
Objective	Evaluation of the performance of the wireless standard DECT2020 NR in different industrial propagation channels
Methodology	1. Study of the PHY layer of the DECT 2020 NR Standard 2. Study of different wireless channel models applicable to DECT2020 links 3. Definition of parameters that describe the DECT 2020 NR PHY performance 4. Analysis of channel modelling parameters applicable to industrial environments 5. Definition of several use cases where simulations will be carried out 6. Simulation system set-up (adaptation of already existing MATLAB testbenches) 7. Simulation, Results and Discussion 8. Documentation
Deliverables	DECT 2020 NR Standard PHY simulation platform DECT 2020 NR PHY Performance curves in different channels

AREA: ML/AI BASED SIGNAL PROCESSING IN WIRELESS SYSTEMS

TFG1/TFM1	
Title	Memory-aided Artificial Intelligence solutions for interference cancelation
Objective	Implement and test AI cancelation alternatives based on memory
Methodology	1. State-of-the-art of AI-based cancelation and ITCN 2. Study the potential alternatives: RNN, LSTM, etc. 3. Implement one of the alternatives 4. Comparison with existing solutions 5. Implement another alternative
Deliverables	SW and evaluation of the results

TFG2/TFM2	
Title	Deep-unfolding method for antenna beamforming definition
Objective	Implement and test deep-unfolding techniques for antenna beamforming
Methodology	1. State-of-the-art of deep-unfolding techniques 2. Study existing implementations (PLS) 3. Propose and implement enhancements 4. Replicate the solution in 2/3. for beamforming in ITCN use case 5. KPI definition and evaluation of the results
Deliverables	SW and evaluation of the results

TFG3/TFM3	
Title	AI-based channel estimation prediction using Artificial Intelligence techniques
Objective	Implement and test a SW system that predicts the channel estimation of a wireless communication system
Methodology	1. State-of-the-art of AI-based techniques for wireless communications 2. Study the data (channel estimation) generation method 3. Implement a supervised learning approach that predicts future channel estimations 4. KPI definition and evaluation of the results with synthetic data 5. Evaluation of the results with real data
Deliverables	SW and evaluation of the results

AREA: MULTIMEDIA NETWORKS

TFG1/TFM1	
Title	Implement, validate, and test a Quectel 5G-M2 modem and 5GC
Objective	Obtain the KPIs of a professional 5G receiver
Methodology	1. Study of 5G SBA and Quectel 5G Modem 2. Connect the receiver and the 5G CORE 3. Simulate a predefined case 4. Modify the simulation condition (available TH, delay, network congestion) 5. Evaluate system performance
Deliverables	Metrics associated with a professional 5G receiver under different network conditions

TFG2/TFM2	
Title	Implement, validate, and test an open 5G SBA architecture.
Objective	5G SBA architecture for multipoint video delivery
Methodology	1. Study of 5G SBA 2. Implement already defined 5G SBA 3. Simulate a predefined case 4. Modify the 5G SBA to allow a multicast test (or other) 5. Evaluate system performance
Deliverables	Modified SBA architecture and evaluation results

TFG3/TFM3	
Title	Distribution protocols for low-latency Cloud Production
Objective	Propose a modification/configuration of existing distribution protocols for ip video delivery
Methodology	1. SoTA of Transport protocols (RIST, CMAF, SRT, etc.) 2. Select the preferred protocol in terms of pre-selected KPI 3. Define the modifications or configuration parameters 4. Implementation 5. Evaluate system performance
Deliverables	Metrics associated with the evaluation of the algorithms

TFG4/TFM4	
Title	Develop a new NF for the integration of broadcast services in the 5GC
Objective	Design an external NF that enables the offloading of data to the ATSC 3.0 RAN
Methodology	1. State of the art of 5GC 2. Amarisoft 5GC capabilities 3. Definition of a NF for accessing the 5GC from external entities 4. Implementation of the NF 5. Test of the offloading case 6. Validate the proposal with a PoC DEMO
Deliverables	NF definition and PoC results