

Mikel Irazabal:

PhD Thesis Title	Enhanced Quality of Service mechanisms for 5G networks
Supervisor(s)	Elena Lopez Aguilera, Ilker Demirkol
Estimate finishing date (MM/YY)	05/2021
3 main Objectives	<ul style="list-style-type: none">- Low-latency- 5G networks- Bufferbloat

Papers published and others:

Papers published with Impact Factor (Title, Journal, year, DOI, Impact Factor) (ordered by date)

M. Irazabal, E. Lopez-Aguilera, I. Demirkol, and N. Nikaein, “Dynamic Buffer Sizing and Pacing as Enablers of 5G Low-Latency Services”, Accepted (Early access), IEEE Transactions on Mobile Computing, 2020. (Area: Telecommunications; Quartile Q1; IF: 5.112). DOI: 10.1109/TMC.2020.3017011

M. Irazabal, E. Lopez-Aguilera, I. Demirkol, R. Schmidt and N. Nikaein, “Preventing RLC Buffer Sojourn Times in 5G”, Accepted (Early access), IEEE Access, 2020. (Area: Telecommunications; Quartile Q1; IF: 3.745) DOI: 10.1109/ACCESS.2021.3063769.

PhD Student name Maryam Tahmooresi (ORCID number):

PhD Thesis Title	Contributions to Breast Cancer Detection Using Machine Learning with Thermograms
Supervisor(s)	<i>Jesús Alcober, David Remondo</i>
Estimate finishing date (MM/YY)	01/07/2023
3 main Objectives	<ul style="list-style-type: none">- To design an effective method based on ML and image processing for early breast cancer detection.- To apply and validate the benefits of the proposed method in a real use case, by designing and implementing an app considering offloading in an edge computing context.

Papers published and others:

Papers published with Impact Factor (Title, Journal, year, DOI, Impact Factor) (ordered by date)	
Other relevant activities related (Patents, Projects)	

PhD Student name (ORCID number): Ahmed El-mekkawi (0000-0002-1374-0601)

PhD Thesis Title	Resource Allocation and Management under Priorities Based on the Squatting-Kicking Model for Multi-Slice 5G Networks
Supervisor(s)	Dr. Xavier Hesselbach Dr. Jose Ramon Piney
Estimate finishing date (MM/YY)	06/2021
3 main Objectives	<p>The main objective of this PhD thesis is to:</p> <p>Develop a novel intelligent algorithm to solve the resource allocation problem using the advanced Bandwidth Models and Delay Constraints in multi-slice network</p> <p>Specifically, the following tasks will be performed to realize the main objective:</p> <ol style="list-style-type: none">1. Develop a QoS algorithm for multi-class networks based on squatting and kicking techniques can be used with any networks such as Elastic Optical Network (EON), wireless network, MPLS and among others.2. An intelligent service deployment algorithm that uses SKM strategy to jointly maximize resource utilization, acceptance rate and ensure QoS for higher priority slices while meeting various service constraints in a multi-slice scenario. The algorithm is defined mathematically considering a real-time application for full network topology with strict constraints demand such as priority and bandwidth. The algorithm proposed takes into account QoS management and QoS constraint routing with autonomic features and feasible computation time. Moreover, the proposed algorithm can be adapted to different constraints, topologies and scenarios. The proposed algorithm provides a novel policy for E2E network slicing deployment based on efficient selection and serving demands. This policy takes into account QoS constraints for different priorities/slices. It is also suggested for optimizing the behavior of network slicing using intelligent mechanism that is proposed to be adopted in NFV architecture. Moreover, it acts as an admission control function to ensure proper performance of QoS levels while increasing the overall use of resources across the entire substrate network3. Performance evaluations and analyses of the proposed algorithm are presented against service deployment algorithms incorporating BAM strategies in terms of several metrics. These metrics aim at reflecting the algorithm ability to manage multi-slice demands under various input traffic loads in a resource-limited 5G network.4. In-depth analysis of the impact of delay constraints on the performance of the proposed online algorithm, which represents the direct applicability of network slices on future 5G networks and beyond. <p>Moreover, Promised performance enhancements by the proposed model (i.e., SKM) are listed as follows:</p> <ol style="list-style-type: none">1. Optimized resource utilization through efficient allocation of the resource demands on the network.2. Guarantees high admission of higher priority slices under different input traffic volumes (especially in congested scenarios). On the other hand, when the traffic is not congested the SKM behaves similar to BAMs.3. Adaptability to emerging technologies that are characterized by diverse QoS requirements and prioritized admission control, especially under network slicing

Papers published and others:

Papers published with Impact Factor (Title, Journal, year, DOI, Impact Factor) (ordered by date)

Journals

1. Ahmed El-mekkawi, Xavier Hesselbach, and Jose Ramon Piney, "Evaluating the impact of delay constraints in Network Services for Intelligent Network Slicing based on SKM Model." Journal of Communications and Networks (Impact Factor: 2.43), 2020. (SUBMITTED 2thDec-2020, first round revision was done, and expecting final decision during the writing of this thesis)
2. Ahmed El-mekkawi, Xavier Hesselbach, and Jose Ramon Piney, "Novel NFV Aware Network Service for Intelligent Network Slicing Based on Squatting-Kicking Model" Journal of IEEE ACCESS (Impact Factor: 3.745), vol. 8, pp. 223041-223068, 2020, doi: 10.1109/ACCESS.2020.3044951.
3. Ahmed El-mekkawi, Xavier Hesselbach, and Jose Ramon Piney, "Squatting and kicking model evaluation for prioritized sliced resource management" Journal of Computer Networks (Impact factor: 3.11), Elsevier, Vol. 167, ISSN 1389-1286, 2020, doi:10.1016/j.comnet.2019.107006.

Conferences

1. Ahmed El-mekkawi, Xavier Hesselbach, and Jose Ramon Piney, "A novel admission control scheme for network slicing based on squatting and kicking strategies," Polytechnic University of Valencia Congress, XIII Jornadas de Ingenieria Telematica - in: 2019 12th International Conference on Transparent Optical Networks (JITEL), Zaragoza, 2019. [El-mekkawi (2019)].
2. Ahmed El-mekkawi, Xavier Hesselbach, and Jose Ramon Piney, "Network function virtualization aware offline embedding problem using squatting-kicking strategy for elastic optical networks," in: 2018 20th International Conference on Transparent Optical Networks (ICTON), Bucharest, 2018.

Other relevant activities related (Patents, Projects)

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PhD Student name (ORCID number): Nasibeh Mohammadazadeh (<https://orcid.org/0000-0001-5950-0964>)

PhD Thesis Title	Invoice Factoring Through Blockchain
Supervisor(s)	Dr. Jose Luis Muñoz Tapia Dr. Sadegh Dorri Nogoorani
Estimate finishing date (MM/YY)	02/2022
3 main Objectives	Prevent double factoring via Blockchain Secure information exchange between entities. Study possible ways of doing cost optimization in Ethereum.
Papers published and others:	
Papers published with Impact Factor (Title, Journal, year, DOI, Impact Factor) (ordered by date)	1) Invoice Factoring Registration Based on a Public Blockchain,IEEE Access, 2021, DOI: 10.1109/ACCESS.2021.3056626, Impact Factor :3.745, Q1 2) Will be submitted: Decentralized Factoring using Verifiable Credentials,MDPI,2021, Q2
Other relevant activities related (Patents, Projects)	1) European Symposium on Research in Computer Security (ESORICS) 2018, Assistant and Organizer Of ESORICS 2018 2) European Blockchain Convention Barcelona 2020 , Audience

PhD Student name: **Yaqoob Al-Zuhairi**

ORCID number: **0000-0002-7964-7696**

PhD Thesis Title	Privacy-aware federated learning for vehicular networks
Supervisor(s)	Prof. Mónica Aguilar Igartua
Estimate finishing date (MM/YY)	06/2024
3 main Objectives	<ul style="list-style-type: none">• Implementing Federated Learning at the edge level of vehicular networks• Preserving Data Privacy• Reducing the transmission overhead• Design & Implement new proposals, using a simulation framework based on OMNeT++/Veins/SUMO. Performance evaluation to assess the benefits.

Papers published and others:

Papers published with Impact Factor (Title, Journal, year, DOI, Impact Factor) (ordered by date)

Journals

- Talib M. J. Al Taleb, Sami Hasan, and Yaqoob Yousif Mahd, "**On-line Analytical Processing (OLAP) Operation for Outpatient Healthcare**", Iraqi Journal of Science, ISSN: 0067-2904, 2021, Special Issue, Pages 225-231, (CiteScore 2019: 0.1), DOI: <https://doi.org/10.24996/ijs.2021.SI.1.32>. scbaghdad.edu.iq/eijs/index.php/eijs/index
- Talib M. J. Al Taleb, Sami Hasan, and Yaqoob Yousif Mahdi, "**Data Warehouse System for Outpatient Healthcare**", Journal of Fundamental and Applied Sciences, ISSN 1112-9867, Volume 10, No 6S, Pages 187 - 192, March 2018, (Impact Factor 2015 = 1.120), doi: <http://dx.doi.org/10.4314/jfas.v10i6s.115>. www.jfas.info
- Talib M. J. Al Taleb, Sami Hasan, and Yaqoob Yousif Mahdi, "**Enhance the Performance of a Data Warehouse by Indexed View**", Journal of Fundamental and Applied Sciences, ISSN 1112-9867, Volume 10, No 6S, Pages 211 - 215, March 2018, (Impact Factor 2015 = 1.120), doi: <http://dx.doi.org/10.4314/jfas.v10i6s.119> www.jfas.info

Conferences

- Talib M. J. Al Taleb, Sami Hasan, and Yaqoob Yousif Mahd, "**DATA WAREHOUSE SYSTEM FOR OUTPATIENT HEALTHCARE**" , 7th ICCMIT IEEE conference, University of Warsaw, Warsaw, Poland, April 2017. www.iccmit.net/index17.htm

Other relevant activities related (Patents, Projects)

Projects

- M.Sc. Thesis:- "**Building a Data Warehouse System For Outpatient Consultant Clinics**", Al-Nahrain University, Baghdad, Iraq, 2017.
- B.Sc. Graduation Project:- "**Design, Simulation & Implementation of Double-Sideband Suppressed- Carrier System**", University of Baghdad , Baghdad, Iraq, 2012.

Conferences attended

- "**Research directions of postgraduate students and employing them to serve institutions and society**", Al-Nahrain University, Baghdad, Iraq, April 2016.
- "**National Conference of Scientific for Outstanding Projects**" sponsored by the Iraqi Ministry of Youth and Sports, Baghdad, Iraq, May 2012.

PhD Student name: Prashanth Kannan

(ORCID number): 0000-0002-4668-2460

PhD Thesis Title	Design of privacy-aware services for Autonomous Hybrid Vehicle using vehicular networks and route planning
Supervisor(s)	Prof. Mónica Aguilar Igartua
Estimate finishing date (MM/YY)	06/2025
3 main Objectives	<ul style="list-style-type: none">• Autonomous Hybrid Vehicle for different routes• V2X, V2V communication, Platooning of vehicles• Data privacy with federated learning

Papers published and others:

Papers published with Impact Factor (Title, Journal, year, DOI, Impact Factor) (ordered by date)

1. Srihari, S., Thirumalini, S. and Prashanth, K. (2017). An experimental study on the performance and emission characteristics of PCCI-DI engine fuelled with diethyl ether-biodiesel-diesel blends. Renewable Energy. 107(C): 440-447. DOI: <https://doi.org/10.1016/j.renene.2017.01.015>. Impact factor: 5.42, Quartiles rank: Q1
2. Prashanth, K. and Srihari, S. (2016). Emission and Performance Characteristic of a PCCI-DI Engine fuelled with Cotton seed oil Bio-Diesel blends. ARPN Journal of Engineering and Applied Sciences. 11(9): 5965-5970. Quartiles rank: Q2
3. Prashanth. K. and Amjad. S. (2019). Design Analysis of 3D Printed Non-Pneumatic Tyre. SAE International. 2019-28-0059. DOI: <https://doi.org/10.4271/2019-28-0059>. Impact factor: 0.52, Quartiles rank: Q2
4. Amjad Shaik, Raju Tappa, Prashanth Kannan. (2019) Design Considerations and Analysis of Electric Microcar for Cities. SAE Technical Paper. 2019-28-0161. DOI: <https://doi.org/10.4271/2019-28-0161>. Impact factor: 0.52, Quartiles rank: Q2
5. Pavan B, Sandip Deshmukh, Prashanth K, Amjad Shaik. (2019) Recent Trends on Drivetrain Control Strategies and Battery Parameters of a Hybrid Electric Vehicle. SAE Technical Paper. 2019-28-0155. DOI: <https://doi.org/10.4271/2019-28-0155>. Impact factor: 0.52, Quartiles rank: Q2

Conference:

1. Prashanth. K., Emission and Performance Characteristic of a PCCI-DI Engine Fueled with Cotton Seed Oil Bio-Diesel Blends. 2nd International Conference on Advanced Engineering and Technology for Sustainable Development

Other relevant activities related (Patents, Projects)

Projects Handled while working:

- Simulation and development of plugin hybrid electric bike.
- Advanced wheel locking mechanism.
- Designing and analysis of 3D printed non-pneumatic TWHEEL (Tyre+Wheel).
- Design and development of Electric Vehicle.

Intern project:

- Failure identification of contact cable for Transmission Control Module using Root Cause Analysis

Masters project:

- Analyzed the performance and emission characteristics of PCCI-DI engine with 20% biodiesel and varying percentages of Diesel and Diethyl ether.

Bachelor project:

Workshop on Green Vehicle Manufacturing and Design

Akram Galal (ORCID: 0000-0002-3852-7436):

PhD Thesis Title	Contribution to The System Architecture Design for Nano-network Communications
Supervisor(s)	Prof. Xavier Hesselbach-Serra
Estimate finishing date (MM/YY)	12/2021
3 main Objectives	<ol style="list-style-type: none">1. Develop a hierarchical SDN/NFV-based nano-network architecture in order to manage and control nano-devices.2. Develop routing protocols for nano-networks.3. Extend AI/ML methods with nano-networks.

Papers published and others:

Papers published with Impact Factor (Title, Journal, year, DOI, Impact Factor) (ordered by date)	<ul style="list-style-type: none">● A. Galal, X. Hesselbach, Probability-based path discovery protocol for electromagnetic nanonetworks, Computer Networks 174 (2020) 107246, doi.org/10.1016/j.comnet.2020.107246. (IF: 3.111)● A. Galal, X. Hesselbach, Nano-networks communication architecture: Modeling and functions, Nano Communication Networks 17 (2018) 45 – 62, doi.org/10.1016/j.nancom.2018.07.001. (IF: 2.621)
Other relevant activities related (Patents, Projects)	

PhD Student name (ORCID number): Carlos Pupiales Yépez (0000-0003-4921-8724)

PhD Thesis Title	Efficient Integration of Radio Access Technologies for Dual Connectivity in Mobile Networks
Supervisor(s)	Ilker Demirkol
Estimate finishing date (MM/YY)	05/2022
3 main Objectives	<ul style="list-style-type: none">- To develop an effective method for traffic splitting- To develop a traffic-based and network-adaptive in-sequence delivery method- To develop a centralized controlling architecture for MR-DC
Papers published and others:	

Papers published with Impact Factor (Title, Journal, year, DOI, Impact Factor) (ordered by date)	<ul style="list-style-type: none">- Software-based Implementation of Dual Connectivity for LTE, MASS 2019, 10.1109/MASSW.2019.00048
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Other relevant activities related (Patents, Projects)	<p>Project: Dual Connectivity for ORCA “DALI”</p> <ul style="list-style-type: none">- Develop a testbed for Dual Connectivity using Open Air Interface
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PhD Marta Expósito (ORCID number)

PhD Thesis Title	Towards a better online advertising ecosystem
Supervisor(s)	Jordi Forné and José A. Ruipérez Valiente
Estimate finishing date (MM/YY)	09/22
3 main Objectives	<ol style="list-style-type: none">1. Standarization of viewability in the ad industry.2. Identification of the stakeholders of the Online Advertising Ecosystem, their main challenges and their relationship with viewability.3. Improvements on Publisher's techniques commonly used in the ad industry, such as Ad refresh based on viewability.

Papers published and others:

Papers published with Impact Factor (Title, Journal, year, DOI, Impact Factor) (ordered by date)	<p>Analyzing and Testing Viewability Methods in an Advertising Network M Expósito-Ventura, JA Ruipérez-Valiente, J Forné IEEE access 8, 118751-118761, 2020, doi: 10.1109/ACCESS.2020.3005478. Impact Factor: 3.745</p> <p>Expósito-Ventura, Marta, José A. Ruipérez-Valiente, and Jordi Forné. "Measuring online advertising viewability and analyzing its variability across different dimensions." Proceedings of the 10th International Conference on Web Intelligence, Mining and Semantics. 2020. Impact Score: 1.98</p>
Other relevant activities related (Patents, Projects)	

PhD Student name (ORCID number): Alejandro Llorens Carrodegua (0000-0002-4329-7962)

PhD Thesis Title	Data Distribution Service and Machine Learning in Hierarchical Controller Architecture: A 5G Control Plane Proposal
Supervisor(s)	Cristina Cervelló Pastor
Estimate finishing date (MM/YY)	04/22
3 main Objectives	<ul style="list-style-type: none">• Design an scalable and distributed control plane for the 5G networks using SDN controllers.• Perform the delegation of functionalities and exchange of network information among controllers.• Optimize the controller performances by means of ML techniques in order to predict and respond dynamically to different events in the network.

Papers published and others:

Papers published with Impact Factor (Title, Journal, year, DOI, Impact Factor)	Ongoing Internship Paper to Sensors Journal.
Other relevant activities related (Patents, Projects)	<ul style="list-style-type: none">• An Architecture for the 5G Control Plane based on SDN and Data Distribution Service (Conference: SDS 2018)• Software Defined Networks and Data Distribution Service as key features for the 5G Control Plane (Conference: PAAMS 2018)• The Role of Data Distribution Service in Failure-Aware SDN Controllers (Conference: URSI 2018)• A Data Distribution Service in a Hierarchical SDN Architecture: Implementation and Evaluation (Rank A Conference: ICCCN 2019)• Stay at University of Glasgow, United Kingdom (10/2019-01/2020)• Adaptive Management of 5G Services to Support Critical Events in Cities (National competitive project)• Towards zeRo toUch nEtnetwork and services for beyond 5G (National competitive project)• Participation in 15 courses and seminars in 5G, SDN, DDS and Machine Learning• Participation in 10 conferences/workshops (face-to-face and/or online)

PhD Student name (ORCID number): Irian Leyva Pupo (0000-0001-6356-5840)

PhD Thesis Title	Placement Strategies for 5G Network Functions
Supervisor(s)	Cristina Cervelló Pastor
Estimate finishing date (MM/YY)	04/22
3 main Objectives	<ul style="list-style-type: none">• Design a 5G network architecture based on the criteria of scalability, reliability and programmability, capable of meeting 5G services requirements and reducing deployment and operational costs.• Develop mathematical models and heuristic algorithms in line with 5G system requirements to determine the optimal placement of 5G Network Functions.• Develop mechanisms to dynamically optimize resources utilization and enhance the network response time.

Papers published and others:

Papers published with Impact Factor (Title, Journal, year, DOI, Impact Factor)	<ul style="list-style-type: none">• A framework for the joint placement of edge service infrastructure and User Plane Functions for 5G, MDPI Sensors, 2019, https://doi.org/10.3390/s19183975, IF: 3.245.
Other relevant activities related (Patents, Projects)	<ul style="list-style-type: none">• The resources placement problem in a 5G hierarchical SDN control plane (Conf: PAAMS 2018).• A framework for placement and optimization of network functions in 5G (Conf: URSI 2018).• Optimal placement of User Plane Functions in 5G networks (Conf: IFIP WWIC 2019).• Dynamic Scheduling and Optimal Reconfiguration of UPF Placement in 5G Networks (Conf: ACM MSWIM 2020).• Ayudas para contratos predoctorales para la formación de doctores (Scholarship: FPI-MINECO 2017).• Stay at University of Glasgow, United Kingdom (10/2019-01/2020).• Adaptive Management of 5G Services to Support Critical Events in Cities (Project).• Towards zeRo toUch nEtnetwork and services for beyond 5G (Project).

PhD Student name (ORCID number): Pablo Barbecho (0000-0002-5281-9208)

PhD Thesis Title	CONTRIBUTION TO THE DESIGN OF CHARGING MANAGEMENT SYSTEM FOR EVs USING VANETs
Supervisor(s)	MONICA AGUILAR IGARTUA, LUIS FELIPE URQUIZA AGUIAR
Estimate finishing date (MM/YY)	07/2021
3 main Objectives	<ul style="list-style-type: none">• Design an efficient communication framework for an electric charging service for on the move EVs.• Develop strategies and algorithms to find the optimal CS for each energy-requiring EV.• Design of a framework to assist the smart grid energy provisioning system by considering the forthcoming energy demand from the increasing number of EVs in the city.

Papers published and others:

Papers published with Impact Factor (Title, Journal, year, DOI, Impact Factor) (ordered by date)	<ul style="list-style-type: none">• "Large-scale simulations manager tool for OMNeT++: Expediting simulations and post-processing analysis", IEEE Access, 2020, DOI: 10.1109/ACCESS.2020.3020745, IF 2019 = 3.745, 35/156, Q1.• "Comparison of SUMO's vehicular demand generators in vehicular communications via graph-theory metrics", Ad hoc networks, 2020, DOI: 10.1016/j.adhoc.2020.102217, IF 2019 = 3.643, 39/156, Q1.• "A probability-based multimetric routing protocol for vehicular ad hoc networks in urban scenarios", IEEE access, 2019, DOI: 10.1109/ACCESS.2019.2958743, IF 2019 = 3.745, 35/156, Q1.• "A traffic-aware electric vehicle charging management system for smart cities", Vehicular Communications, 2019, DOI: 10.1016/j.vehcom.2019.100188, IF 2019 = 4.706, 16/90, Q1.
Other relevant activities related (Patents, Projects)	MAGOS. Inteligencia de Fuentes Abiertas para Redes Eléctricas Inteligentes Seguras. Privacidad de Datos y Comunicaciones Fiables.

PhD Student name (ORCID number): John Bosco Ssemakula (0000-0002-5457-2640)

PhD Thesis Title	Contribution to Network Management of Beyond 5G Services: Management and Orchestration Architecture to Support HTC Services
Supervisor(s)	Dr. Juan-Luis Gorricho
Estimate finishing date (MM/YY)	April, 2023
3 main Objectives	<ol style="list-style-type: none">1.To develop a management and orchestration architecture for the provisioning of HTC services. This architecture is the framework to locate algorithms and technologies mentioned hereafter.2. To extend the capabilities of identified tools such as kubernetes, Software Defined Networks (SDN), and Container Network Interface (CNI) in terms of network policies and network management aspects to meet our novel network management strategy.3. To develop an algorithms for the optimal user placement strategy to the appropriate MEC data center considering all variables in the geographically distributed paradigm, and a Scheduler and Controller Module (SCM) agent, which extends control and management to the edge section of the network, close to the end users.
Papers published with Impact Factor (Title, Journal, year, DOI, Impact Factor) (ordered by date)	
Other relevant activities related (Patents, Projects)	

PhD Student name (ORCID number): ADRIAN TOBAR NICOLAU (0000-0003-0198-2475)

PhD Thesis Title	Privacy protection in dynamic datasets with syntactic models
Supervisor(s)	Jordi Forne M., Javier Parra-Arnau
Estimate finishing date (MM/YY)	02/24
3 main Objectives	Improve and develop algorithms for continuous data release. Study and extend syntactic notions of security for dynamic datasets. Give guarantees of privacy in continuous data releases.

Papers published and others:

Papers published with Impact Factor (Title, Journal, year, DOI, Impact Factor) (ordered by date)	-
Other relevant activities related (Patents, Projects)	-

PhD Student name Matteo Vincenzi (ORCID number):

PhD Thesis Title	Efficient sharing mechanisms for virtualized multi-tenant Heterogeneous Networks
Supervisor(s)	Dr. Elena Lopez Aguilera, and Dr. Eduard Garcia-Villegas
Estimate finishing date (MM/YY)	08/2021
3 main Objectives	<ul style="list-style-type: none">• Study the improvement, in terms of spectrum utilization efficiency, guaranteed by sharing in 5G.• Define methodologies and architectures for making 5G networks flexible and scalable, providing on-demand customization in a sustainable way.• Assess the impact on the value chain added by the different sharing interactions among the players of the market ecosystem.

Papers published and others:

Papers published with Impact Factor (Title, Journal, year, DOI, Impact Factor)	<ul style="list-style-type: none">• "<i>Cooperation incentives for multi-operator C-RAN energy efficient sharing</i>," IEEE ICC 2017, doi: 10.1109/ICC.2017.7997131.• "<i>Multi-Tenant Slicing for Spectrum Management on the Road to 5G</i>," IEEE Wireless Communications 2017, doi: 10.1109/MWC.2017.1700138, IF: 9,202.• "<i>Maximizing Infrastructure Providers' Revenue Through Network Slicing in 5G</i>," IEEE Access 2019, doi: 10.1109/ACCESS.2019.2939935, IF: 3,745.
Other relevant activities related (Patents, Projects)	<ul style="list-style-type: none">• European project ITN-675806 5G-AURA (Application-aware User-centric Programmable Architectures for 5G Multi-tenant Networks) (H2020-MSCA-ITN-2015)

Reza Poorzare (<https://orcid.org/0000-0001-6763-3812>):

PhD Thesis Title	Contribution to Reliable End-to-End Communication over 5G Networks Using Advanced Techniques
Supervisor(s)	Dr. Anna Calveras Augé
Estimate finishing date (MM/YY)	08/2022
3 main Objectives	<ul style="list-style-type: none">• State of the art study, a survey of current challenges, solutions, and proposals• The identification of advanced techniques for achieving high-speed reliable end-to-end communications over 5G networks.• A contribution to reliable end-to-end communications over 5G networks based on advanced techniques.

Papers published and others:

Papers published with Impact Factor (Title, Journal, year, DOI, Impact Factor) (ordered by date)	<ul style="list-style-type: none">• R. Poorzare and A. Calveras, "Open Trends on TCP Performance over Urban 5G mmWave Networks," In PE-WASUN'20: 17th ACM Symposium Performance Eval. Wireless Ad Hoc, Sensor, & Ubiquitous Net. Proceedings, Alicante, Spain, Nov. 2020, pp.85-92. DOI: https://doi.org/10.1145/3416011.3424749.• R. Poorzare and A. Calveras, "Challenges on the Way of Implementing TCP over 5G Networks," IEEE Access, vol. 8, pp. 176393-176415, Sep. 2020. DOI: 10.1109/ACCESS.2020.3026540.• R. Poorzare and A. Calveras, "How Sufficient Is TCP When Deployed in 5G mmWave Networks Over the Urban Deployment?" IEEE Access, vol. 9, pp. 36342 - 36355, March. 2021. DOI: 10.1109/ACCESS.2021.3063623.
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PhD Student name Mohammad Zehri (0000-0002-8436-0163):

PhD Thesis Title	Contribution to resource allocation in 100G Passive Optical Access Networks
Supervisor(s)	Dr. David Rincon, Dr. Jose Ramon Piney Da Silva
Estimate finishing date (MM/YY)	December 2021
3 main Objectives	Develop Algorithms to dynamically allocate time and wavelength resources Introduce quality of service and energy consumption reduction to the allocation algorithms Introduce SDN, NFV and/or AI to the system

Papers published and others:

Papers published with Impact Factor (Title, Journal, year, DOI, Impact Factor) (ordered by date)	<p>Leveraging SDN-Based Management for Improved Traffic Scheduling in PONs Published in: 2020 22nd International Conference on Transparent Optical Networks (ICTON) Date of Conference: 19-23 July 2020 Date Added to IEEE Xplore: 22 September 2020 INSPEC Accession Number: 19991597 DOI: 10.1109/ICTON51198.2020.9203279 Publisher: IEEE Conference Location: Bari, Italy</p> <p>A QoS-aware Dynamic Bandwidth Allocation Algorithm for Passive Optical Networks with Non-Zero Laser Tuning Time Journal: Photonics-MDPI, Impact Factor 2.14 Accepted with major revisions - currently under second review</p>
Other relevant activities related (Patents, Projects)	#N/A

PhD Student name (ORCID number): Zoraze Ali (<https://orcid.org/0000-0003-2679-0736>)

PhD Thesis Title	Big Data Empowered Self-Organizing Networks
Supervisor(s)	Lorenza Giupponi, Josep Mangués
Estimate finishing date (MM/YY)	November 2021
3 main Objectives	To study the importance of Self-Organizing the future mobile networks. To optimize the Self Organizing Network (SON) use cases in 4G and 5G networks by leveraging machine learning. To study and optimize the working of emerging features of 4G and 5G networks, e.g., LAA and V2X

Papers published and others:

Papers published with Impact Factor (Title, Journal, year, DOI, Impact Factor) (ordered by date)	Z.Ali, S.Lagen, L.Giupponi, 3GPP NR V2X Mode 2: Overview, Models and System-level Evaluation, IEEE Access (submitted 2nd March 2021) M. Miozzo, Z. Ali, L. Giupponi, P. Dini, Distributed and Multi-Task Learning at the Edge for Energy Efficient Radio Access Networks , IEEE Access, Vol. 9, No. 2169-3536, pp. 12491-12505, January 2021. (IF = 3.745) B. Bojovic, L. Giupponi, Z. Ali, M. Miozzo, Evaluating Unlicensed LTE technologies:LAA vs LTE-U , IEEE Access, Vol. 7, pp. 89714-89751, July 2019. (IF = 3.745)
Other relevant activities related (Patents, Projects)	Open source 5G network simulator (5G-LENA): https://5g-lena.cttc.es/ (2014 – now) NIST - Modeling, Simulation and Performance Evaluation of NR V2X (2017 – now) Huawei_ML_SON - Efficient Machine Learning for RAN PublicsafetyNIST - Modeling, Simulation and Performance Evaluation for Future Public Safety Networks 5GNORM - 5G Network Orchestration and Management

Farhana Javed (0000-0003-0122-4471):

PhD Thesis Title	Smart Contract-Based Marketplace for Multi-domain End-to-End Network Slicing
Supervisor(s)	Dr. Lorenza Giupponi Dr. Josep Mangues-Bafalluy Dr. Miquel Soriano Ibañez
Estimate finishing date (MM/YY)	Dec/2023
3 main Objectives	<i>1st: Design a Distributed Ledger Technology (DLT)/Blockchain-based marketplace for multi-domain E2E network slices</i> <i>2nd: Machine Learning (ML) and smart contracts for auction-based automated trading of services and resources,</i> <i>3rd: Management of Service Level Agreements (SLAs) using DLT and Machine Learning</i>

Papers published and others:

Papers published with Impact Factor (Title, Journal, year, DOI, Impact Factor) (ordered by date)	
Other relevant activities related (Patents, Projects)	

PhD Student name (ORCID number): Biljana Bojovic, <https://orcid.org/0000-0002-7996-9652>

PhD Thesis Title	Cellular and Wi-Fi technologies evolution: from complementarity to competition
Supervisor(s)	Lorenza Giupponi
Estimate finishing date (MM/YY)	The thesis is in the final rounds of internal reviews, but there are delays due to project deadlines. Final target date to deposit is May 2021 .
3 main Objectives	Study radio resource management (RRM) in wireless networks Study application of machine learning for RRM and SON in 4G and 5G networks Study RRC in coexistence and spectrum sharing scenarios in 4G and 5G networks

Papers published and others:

Papers published with Impact Factor (Title, Journal, year, DOI, Impact Factor) (ordered by date)

1. B. Bojovic, L. Giupponi, Z. Ali, M. Miozzo, **Evaluating Unlicensed LTE technologies: LAA vs LTE-U**, IEEE Access, Vol. 7, pp. 89714-89751, July 2019. (IF = 3.45)
 2. B. Bojovic, E. Meshkova, N. Baldo, J. Riihijärvi, M. Petrova, **Machine learning-based dynamic frequency and bandwidth allocation in self-organized LTE dense small cell deployments**, EURASIP Journal on Wireless Communications and Networking, Vol. 2016, No. 183, August 2016. (IF= 1.4)
- Other:
1. N. Patriciello, S. Lagen, B. Bojovic, L. Giupponi, **NR-U and IEEE 802.11 Technologies Coexistence in Unlicensed mmWave Spectrum: Models and Evaluation**, IEEE Access, Vol. 8, pp. 71254-71271, April 2020.N. (IF = 3.45)
 2. S. Lagen, L. Giupponi, S. Goyal, N. Patriciello, B. Bojovic, A. Demir, M. Beluri, **New Radio Beam-based Access to Unlicensed Spectrum: Design Challenges and Solutions**, IEEE Communications Surveys & Tutorials, Vol. 22, No. 1, pp. 8-37, March 2020. (IF=29)
 3. N. Patriciello, S. Lagen, B. Bojovic, L. Giupponi, **An E2E simulator for 5G NR networks**, Elsevier Simulation Modelling Practice and Theory, Vol. 96, 101933, Nov. 2019. (IF=2.2)

PhD Student name (ORCID number): Rakibul Islam Rony (ORCID: 0000-0001-7002-3214)

PhD Thesis Title	Joint access-backhaul mechanism in 5G cell-less architectures
Supervisor(s)	Dr. Elena Lopez-Aguilera, Dr. Eduard Garcia-Villegas
Estimate finishing date (MM/YY)	07/2021
3 main Objectives	<ol style="list-style-type: none">1. Develop and propose techniques to ensure the best usage of precious resources in a joint access-backhaul mechanism aspect.2. Propose a unique spectrum sharing technique considering the concept of spectrum pool among different potential links, i.e., access links, backhaul links and direct links.3. Review functional splits at the PHY layer and propose OPEX and TCO based optimization of fronthaul links.

PhD Student name (ORCID number): Rakibul Islam Rony (ORCID: 0000-0001-7002-3214)

Papers published and others:

Papers published with Impact Factor (Title, Journal, year, DOI, Impact Factor) (ordered by date)

[Journal - 1]. R. I. Rony, Elena Lopez-Aguilera, and Eduard Garcia-Villegas. "Cost Analysis of 5G Fronthaul Networks Through Functional Splits at the PHY Layer in a Capacity and Cost Limited Scenario." IEEE Access 9 (2021): 8733-8750. DOI: [10.1109/ACCESS.2021.3049636](https://doi.org/10.1109/ACCESS.2021.3049636). Impact factor: 3.745.

[Conference - 4]. R. I. Rony, Elena Lopez-Aguilera, and Eduard Garcia-Villegas. "Optimization of 5G fronthaul based on functional splitting at PHY layer." In 2018 IEEE Global Communications Conference (GLOBECOM), pp. 1-7. IEEE, 2018. DOI: [10.1109/GLOCOM.2018.8647928](https://doi.org/10.1109/GLOCOM.2018.8647928). Core: B.

[Conference - 3]. R. I. Rony, Elena Lopez-Aguilera, and Eduard Garcia-Villegas. "Access-aware backhaul optimization in 5G." In Proceedings of the 16th ACM International Symposium on Mobility Management and Wireless Access, pp. 124-127. 2018. DOI: [10.1145/3265863.3265881](https://doi.org/10.1145/3265863.3265881)

[Conference - 2]. R. I. Rony, Elena Lopez-Aguilera, and Eduard Garcia-Villegas. "Cooperative spectrum sharing in 5G access and backhaul networks." In 2018 14th International Conference on Wireless and Mobile Computing, Networking and Communications (WiMob), pp. 239-246. IEEE, 2018. DOI: [10.1109/WiMOB.2018.8589187](https://doi.org/10.1109/WiMOB.2018.8589187). Core: B.

[Conference - 1]. R. I. Rony, A. Jain, E. Lopez-Aguilera, E. Garcia-Villegas, and I. Demirkol, "Joint access-backhaul perspective on mobility management in 5G networks", IEEE Conference on Standards for Communications and Networking, CSCN 2017, pp. 115–120, Sept. 2017. DOI: [10.1109/CSCN.2017.8088608](https://doi.org/10.1109/CSCN.2017.8088608)

Other relevant activities related (Patents, Projects)

H2020 Project: Application-aware User-centric Programmable Architectures for 5G Multi-tenant Networks. Grant agreement ID: 675806.

PhD Student name (ORCID number): Lluís Casals Ibáñez (0000-0002-1203-0595)

PhD Thesis Title	Contributions to the Evolution and Improvement of LoRaWAN
Supervisor(s)	Carles Gómez, Rafael Vidal
Estimate finishing date (MM/YY)	12/2021
3 main Objectives	<ol style="list-style-type: none">1. Energy performance of LoRaWAN2. The SF12 well problem3. Packet size optimization

Papers published and others:

Papers published with Impact Factor (Title, Journal, year, DOI, Impact Factor) (ordered by date)	Modeling the Energy Performance of LoRaWAN. Sensors, 2017, 10.3390/s17102364, 2.475
Other relevant activities related (Patents, Projects)	<ul style="list-style-type: none">- Low-power-radio internet-of-things wireless mesh (Competitive project)- A unified solution for building wireless sensor networks (Competitive project)- Wireless Networks Group (Competitive project, SGR 376)

PhD Student name (ORCID number): Daniel Ramos (0000-0001-6797-0333)

PhD Thesis Title	N/A
Supervisor(s)	José Luis Muñoz, Oscar Esparza
Estimate finishing date (MM/YY)	12/2025
3 main Objectives	Research about DeFi projects like Uniswap or MakerDAO, decentralized finance projects based on blockchain technology.

Papers published and others:

Papers published with Impact Factor (Title, Journal, year, DOI, Impact Factor) (ordered by date)	N/A
Other relevant activities related (Patents, Projects)	N/A

PhD Student name SERGIO AGUILAR ROMERO (ORCID number):

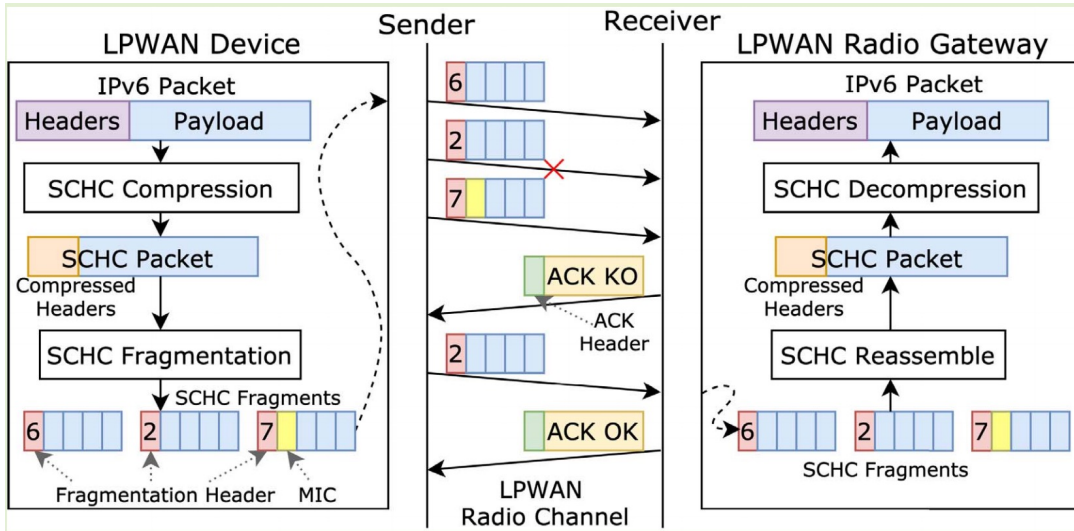
PhD Thesis Title	Contributions to IPv6 support over Low Rate Low Power Wireless Networks
Supervisor(s)	Carles Gomez Montenegro Rafael Vidal Ferré
Estimate finishing date (MM/YY)	12/21
3 main Objectives	Development and Evaluation of an Adaptation Layer for IPv6 Support over a Low Rate Channel using Secondary Radios Performance Analysis of SCHC F/R Modes Alternative feedback techniques for SCHC F/R

Papers published and others:

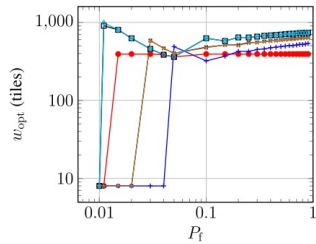
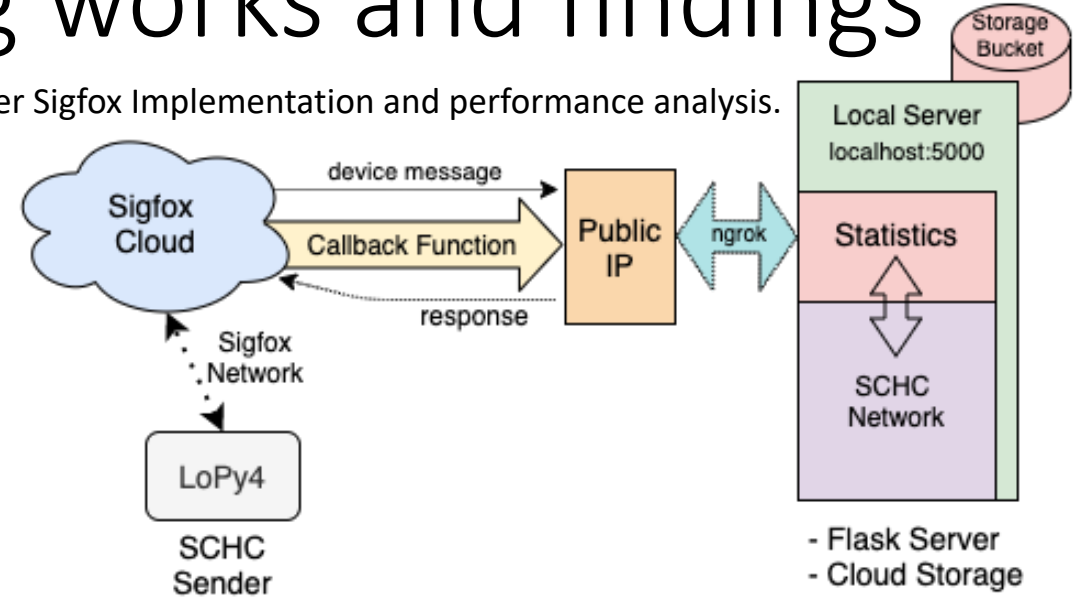
Papers published with Impact Factor (Title, Journal, year, DOI, Impact Factor)	LoRaWAN SCHC Fragmentation Demystified, Ad-Hoc, Mobile, and Wireless Networks. ADHOC-NOW 2019, Lecture Notes in Computer Science, 11803, 2019, https://doi.org/10.1007/978-3-030-31831-4_15 , Impact Factor: 1.071 Performance Analysis and Optimal Tuning of IETF LPWAN SCHC ACK-on-Error Mode, EEE Sensors Journal, 2020, https://doi.org/10.1007/978-3-030-31831-4_15 , Impact Factor: 3.076
Other relevant activities related (Patents, Projects)	IETF SCHC-over-Sigfox draft co-author. IETF LPWAN Working Group and IETF 110 participant. Projects: OpenSCHC, LoPy-SCHC (UChile & Sigfox)

Diagram of your on-going works and findings

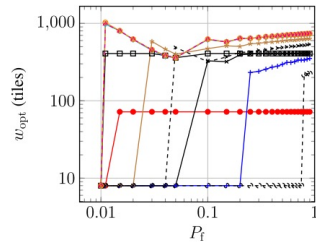
SCHC Performance analysis and optimal parameter settings



SCHC-over Sigfox Implementation and performance analysis.



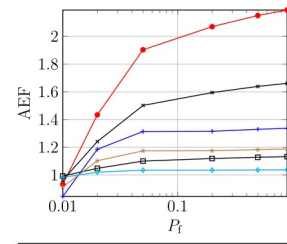
(a) F for LoRaWAN EU868.



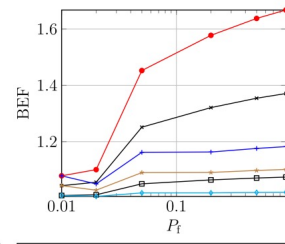
(b) F for LoRaWAN US915.

Fig. 16. Optimal window size (w_{opt}) vs P_f .

Optimal parameters settings



(a) AEF vs P_f



(b) BEF vs P_f

Fig. 17. Impact of w_{nopt} on the AEF (a) and on the BEF (b) for different R_{opt} of devices using w_{opt} . Results for LoRaWAN US915, SF10/DR0, $F = 11$, $L_{SCHC} = 1280$, and $t_{opt} = 9$.

ACK Excess Factor (AEF) and Byte Excess Factor (BEF)

Current consumptions measurements

