

COST CA20120 - INTERACT Training School: *Open-RAN networks: from theory to implementation*

5-7 July 2022

Poznań, Poland

Scope

Open RAN is a recent trend in the telecommunications market (especially in the 5G area), aiming at the realization of the following key objectives:

- splitting of a base station into several functional components, including central unit (CU), distributed unit (DU), and a remote unit (RU);
- opening interfaces to enable interoperability (especially Open Fronthaul);
- disaggregating software from hardware in the RAN domain;
- introducing advanced automation into the RAN system by means of an abstracted entity to manage the radio networks, i.e., RAN Intelligent Controller (RIC), which serves as a platform for xApps (optimization applications in the RAN domain) and rApps (optimization applications in the management plane) using AI/ML.

The participants of the school will have the opportunity to deepen their knowledge and experience in various domains of Open RAN. These include the discourse on the evolution of the cellular network architecture from regular to virtualized and open one and the discussion on Open-RAN architecture (modules, interfaces, with particular attention put on intelligent controllers). Next, the ongoing world initiatives (such as O-RAN Alliance, ONF/SD-RAN, TIP/RIA) will be overviewed. Moreover, opportunities and challenges of the Open RAN approach will be presented together with the analysis of the ongoing trials and implementations. The school will be interactive, allowing the participants to join the hands-on part devoted to the demo xApp implementation.

Targeted Audience

The school is devoted for all persons interested in Open RAN in the context of future wireless systems. The training school covers various aspects of the Open RAN, including theoretic background, application and business perspectives, as well as real hands-on implementation. No specific knowledge on Open-RAN is necessary to attend the school, however, the overall experience in contemporary wireless network architecture will be helpful.

Dates

5-7 July 2022

Format

The School will be held in **hybrid format**: most of the speakers will be available physically in the premises; regarding attendees, both in-person and remote participation attendees is possible for all modules, which have different registration fees.

Speakers

- Marcin Dryjański (Rimedo Labs CEO, ORAN trainer)
- Adrian Kliks (PUT, Rimedo Labs)
- Hanna Bogucka (PUT, Rimedo Labs)
- Łukasz Kułacz (PUT, Rimedo Labs, implementation specialist)
- Mateusz Buczkowski (Grandmetric, virtualization expert)
- Raphael Rosa (Open Networking Foundation - ONF, a company delivering an open source OpenRAN platform called SD-RAN)
- Michał Ingielewicz (TietoEvery, a system integrator)
- Matt Kozbielak, Naresh Rao, Aymen Saidi (AWS, an AI platform provider supporting xApp development)
- Alister Burr, to present the implementation of DU functions, overall software radio/hardware acceleration architecture - "DU-Volution" view.

Detailed Programme

- F2F – speaker will be present **physically** in Poznań
- R – speaker presenting **remotely**, not present physically in Poznan
- L – presentation in form of a **lecture**
- S – **video demonstration** of the implementation
- Lab – **hands-on laboratory**, where students follow the guidelines by the lecturer

Day	Time	Lecturer	Type	Topic covered
5 July 2022	9.00-10.30	Marcin Dryjański (RIMEDO)	F2F, L	Introduction to 5G, Private Mobile Networks and Open RAN
	10.30-10.50	Coffee break		
	10.50-12.20	Marcin Dryjański (RIMEDO)	F2F, L	O-RAN Architecture
	12.20-13.30	Lunch		
	13.30-15.00	Adrian Kliks (PUT, RIMEDO)	F2F, L	On the RAN Intelligent Controller and Use Cases
	15.00-15.15	Coffee break		
	15.15-17.00	Adrian Kliks (PUT, RIMEDO)	F2F, L	Conflict mitigation and automation process
6 July 2022	9.00-10.30	Hanna Bogucka (PUT, RIMEDO)	F2F, L	ORAN Security
	10.30-10.50	Coffee break		
	10.50-12.20	Matt Kozbielak (AWS), Naresh Rao (AWS), Aymen Saidi (AWS), Adrian Kliks (PUT, RIMEDO)	R/F2F, L&S	Cloud platforms for AI performance improvement, PoC showcase
	12.20-13.30	Lunch		
	13.30-15.00	Raphael Rosa (ONF, Intel)	F2F, L&S	Inside an end-to-end SD-RAN trial
	15.00-15.15	Coffee break		
	15.15-17.00	Michał Ingielewicz (TietoEvry)	F2F, L	Real-Time SD-RAN systems with FlexRAN
	19.00-xxx	Social Event		
7 July 2022	9.00-10.30	Alister Burr (York)	F2F, L	Implementation and Role of the Distributed Unit (DU): “DU-Volution” view
	10.30-10.50	Coffee break		
	10.50-12.20	Mateusz Buczkowski (Grandmetric)	F2F, L&Lab	From docker to Kubernetes - theory and practice
	12.20-13.30	Lunch		
	13.30-15.00	Łukasz Kułacz (PUT, RIMEDO)	F2F, Lab	xApp Implementation - installation
	15.00-15.15	Coffee break		
	15.15-17.00	Łukasz Kułacz (PUT, RIMEDO)	F2F, Lab	xApp Implementation - installation

General Schedule

The overall schedule is given below:

Day 1 – 5th of July (9-17):

- Introduction to virtualized wireless networks
- Open RAN architecture and Interfaces
- RAN Intelligent Controllers and Use cases
- Conflict Mitigation Problems

Day 2 – 6th of July (9-17):

- Open RAN Security
- Cloud-based AI platform for xApp development
- Open source platforms
- Integration perspective

Day 3 - 7th of July (9-17)

- DU functionality presentation
- Kubernetes, helm charts and other tools
- Hands-on lab

Supporting Info

Presentations will be distributed in PDF.

Language

The School will be entirely held in English.

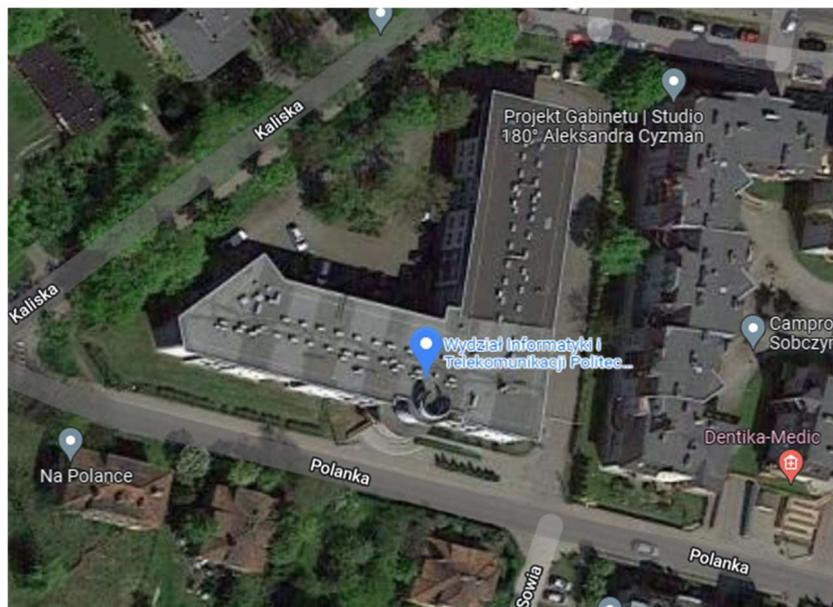
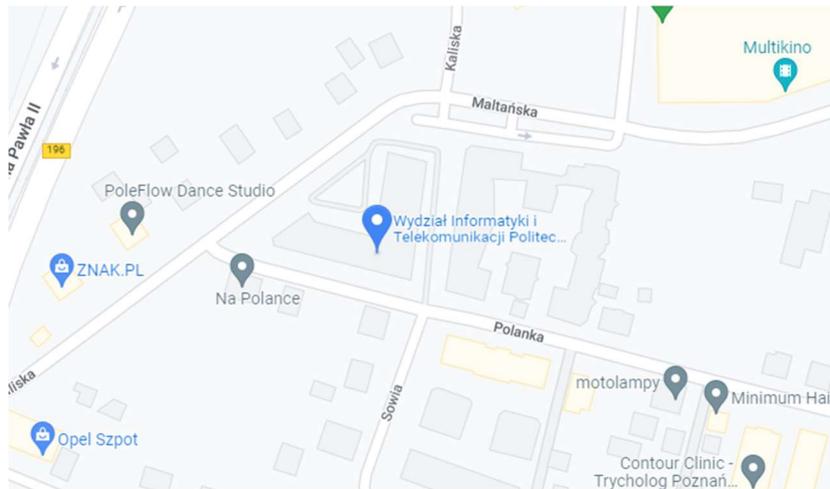
Location

Venue:

Building of the Faculty of Computing and Telecommunications, Poznan University of Technology

Address:

3 Polanka Str., Poznań (coord. in Google Maps: 52.40059224512654, 16.955716264429153)



Visa

The list of countries whose citizens are not required to have a visa when entering Poland can be found here - <https://www.gov.pl/web/diplomacy>.

Please check with a Polish consulate in your country what documents are needed to apply for a visa.

For an invitation letter or any other confirmation of being a Training School participant please write to School Organizers: adrian.kliks@put.poznan.pl.

Travel

How to reach Poznan

By plane

Poznan Airport “Ławica” is located 7 km from the city centre, in the vicinity of the route leading directly to the major city points and next to the road out of Poznań to Berlin and Warsaw. At Poznan airport operate a number of airlines: Lufthansa (a few connections daily to Frankfurt and Munich), Polish Airlines LOT, SAS, Wizzair, Ryanair, Eurowings.

It is possible to get to the city centre from the airport using line 159 that is going directly to Railway Station. Poznan public transportation system consists of buses and trams. Very useful trip planner is available at <http://poznan.jakdojade.pl/?locale=en>. You should choose departure place, e.g. Poznan-Lawica Airport and arrival place, e.g. Polanka 3. The system shows route, transfers and tickets you should buy as well. The stops closest to the conference venue are called “Baraniaka”, “Politechnika” and “Kórnicka”.

Next to the airport hall exit there is a TAXI rank, it is however worthwhile calling any of the RADIO TAXI services. Travel from Poznan airport „Lawica” to conference venue takes about 30 minutes - 1 hour (depending on traffic conditions). It costs about 40-50 PLN (Polish Zloty), i.e. 8-10 EUR. Services like UBER or BOLT may be considered as well.

By car

You can get to Poznań driving A2 motorway (access from the west direction).

The city centre is covered by the Parking Zone. Fare is collected for each vehicle parked within the zone. Drivers pay the parking fee in parking meters located along streets in the city centre. Drivers coming to the city are recommended to leave their cars in guarded car parks and specially prepared buffer car parking lots placed around the Parking Zone.

By train

It is possible to travel to Poznan by train. Main station (“PKP Poznań główny”) is located close to the city centre, next to the shopping mall “Avenida Poznan” (main entrance thru it). There are a few direct trains daily from Warsaw and Berlin (where bigger airports are located). Schedule can be checked at <http://rozkład-pkp.pl/en>.

CURRENCY

The official currency in Poland is the Polish zloty (PLN): 1 zloty = 100 grosz. Bills come in 200, 100, 50, 20 and 10 zloty denominations. Coins are 5, 2 and 1 zloty, and 50, 20, 10, 5, 2 and 1 grosz. Money can be exchanged in banks and money exchange offices without commission.

Poznan has a well-developed ATM network supporting Visa, MasterCard, Maestro and Cirrus cards. Cash machines of particular banks can mostly be found in their branch offices.

In most places payment can be made using credit/debit cards. Exchange offices are located at the Railway Station, at the airport and in the city centre, as well as in shopping centres. Money can also be exchanged in banks.

Accommodation

Various hotels are available in Poznan via online booking systems. Some of the recommended hotels are listed below:

Ibis Poznan Hotel

The Ibis Poznan Hotel is located in the centre of the city, near the Old Town Square and the Warta river. Walking distance from the conference venue- approx. 10 min.

<https://all.accor.com/hotel/3110/index.pl.shtml>

Hotel HP Park Poznań ***

Hotel HP Park Poznań is situated on the Malta lake shore, just 4 km from the city centre. Next to the hotel and around the lake you can enjoy excellent recreation grounds such as artificial ski slope, luge track and cycle tracks. Walking distance from the conference venue – approx. 20 min.

<http://poznan.hotelepark.pl/en>

Novotel Poznan Centrum

The Novotel Poznan Centrum is situated in the city centre, 500 m from the train station, opposite the Old Brewery shopping centre, near the Old Town and the Poznan International Fair. Five tram stops from the conference venue.

<https://all.accor.com/hotel/3376/index.pl.shtml>

Mercure Poznan Hotel ****

Mercure Poznan Hotel is synonymous with comfort and relaxation. The hotel is situated near the Old Town and the airport. Approx. 15 min. away from the conference venue (by taxi/public transportation).

<https://all.accor.com/hotel/3393/index.pl.shtml>

Grants

Dedicated travel and participation grants will be provided by COST CA202120 – INTERACT to help participating in the ORAN Training School.

Registration

Registration fees are as follows:

- 20 €: remote attendance
- 130 €: in-person attendance

The Registration Guidelines and the Registration Form are available at the corresponding page of the COST CA202120 – INTERACT website, <https://interactca20120.org/training-schools/2nd-training-school>.

Social Events

During the school on the second day (6th of July) a social event is planned to be organized in one of the famous restaurants in Poznan old market square area.

If you have any dietary constraints, please contact Adrian Kliks – adrian.kliks@put.poznan.pl.

Contacts

For any questions, please contact Adrian Kliks – adrian.kliks@put.poznan.pl.

Organisation and Scientific Programme Committee

The organising institutions are:

- Poznan University of Technology, Poznan, Poland
- Rimedo Labs, Poznan, Poland

The Scientific Programme Committee is composed of:

- Adrian Kliks (adrian.kliks@put.poznan.pl)
- Marcin Dryjański (marcin.dryjanski@rimedolabs.com)

Speakers



Marcin Dryjański (CEO - Rimedo Labs, Poland): Marcin Dryjanski received his Ph.D. (with distinction) from the Poznan University of Technology in September 2019. Over the past 12 years, Marcin served as an R&D engineer and consultant, technical trainer, technical leader, advisor, and board member. Marcin has been involved in 5G design since 2012 when he was a work-package leader in the FP7 5GNOW project. Since 2018, he is a Senior IEEE Member. Marcin is a co-author of many articles on 5G and LTE-Advanced Pro and a co-author of the book „From LTE to LTE-Advanced Pro and 5G” (M. Rahnema, M. Dryjanski, Artech House 2017). From October 2014 to October 2017, he was an external consultant at Huawei Technologies Sweden AB, working on algorithms and architecture of the RAN network for LTE-Advanced Pro and 5G systems. Marcin is co-founder of Grandmetric, where he served as a board member and wireless architect between 2015 and 2020. Currently, he serves as CEO and principal consultant at RIMEDO Labs, conducting training and consulting in the area of Open RAN.

Introduction to 5G, Private Mobile Networks and Open RAN: The first lecture provides an overview of the mobile networks and their evolution including the RAN aspects coming from 5G era. The main focus is on the RAN design with 3GPP split options, along with Fronthaul, Midhaul and Backhaul. This is complemented by the evolution of RAN architecture to set up the scene for Open RAN concept. Secondly, Private Mobile Networks are described including the various implementation options, and technological components, and put in the context of Open RAN. Finally, the concept of Open RAN per-se is introduced along with the roles of various organizations including O-RAN ALLIANCE, ONF and TIP.

O-RAN Architecture: This lecture will guide the students towards the details of Open RAN as defined by O-RAN ALLIANCE. We will start with the scope of the O-RAN ALLIANCE standardization and focus of its working and focus groups. This will be followed up by the formal definition of the various O-RAN components. The central point of the lecture will be the O-RAN architecture, where the introduced components will be connected by interfaces.

Once, the architecture is in place, we will discuss various implementation options and deployment scenarios. Finally, the focus will be shifted towards Open Fronthaul.



Adrian Kliks (Prof. - Poznan University of Technology & CTO - Rimedo Labs, Poland):

Adrian Kliks received his postdoctoral degree in technical sciences, discipline: technical computer science and telecommunications in February 2019. He works as a university professor at the Institute of Radiocommunications of the Poznan University of Technology. He took part in numerous international research projects: URANUS, NEWCOM ++, ACROPOLIS, COGEU, NEWCOM #, COHERENT, in COST IC0902 and COST-Terra (IC 0905) and in national projects EcoNets, Bionets, OPUS project manager on V2X communication, and did he manage numerous industrial and commissioned projects. A member of the IEEE for many years, IEEE Senior Member since 2013, a member of the IEEE Broadcasting Society, IEEE Communication Society, IEEE Standard Association. Dr hab. Adrian Kliks, participated in the years 2012-2017 in the work of the IEEE P1900.x standardization group, as a member with voting rights, and also served as secretary. Member of the groups: Radio Communications Committee and Research Group on Software Defined and Virtualized Wireless Access. In the years 2014-2016 he was the Membership Development / Web Visibility Chair in the IEEE for the EMEA area. From 2019 – editor-in-chief of the Journal of Telecommunications and Information Technology of the Institute of Communications, editor-in-chief of EAI Endorsed Transactions on Wireless Spectrum.

On the RAN Intelligent Controller and Use Cases: One of the key components in the Open RAN architecture is the RAN Intelligent Controller, called also RIC, which is responsible for the whole controlling and managing process in a real-time and non-real time scale. In the first part of this lecture, the students will listen to the overview of the RICs structure, roles, and responsibilities. Next, in the second part of this module, we will discuss various use cases, defined in detail within the Open RAN Alliance group. These will be a sample of the great opportunities created by the open architecture applied to access network part

Conflict Mitigation Issues and Automation Process: As a continuation of the prior lectures, in this module, we will emphasize some challenges highly related to the practical implementation of Open RAN. One of them is the need for some procedures and logic for conflict mitigation between various xApps/rApps, which by assumption may be delivered by the third parties. It is easy to imagine such a situation, where two or more xApps will try to modify the same parameters of the network – it cannot be done without any control. As a continuation of this aspect, we will overview also the need for automation at various stages of the xApp lifetime: design, test, deployment and true functioning.



Hanna Bogucka (Prof. - Poznan University of Technology, Poland): Hanna Bogucka received the Ph.D. degree with honors and the Doctor Habilitus degree in Telecommunications from Poznan University of Technology (PUT), Poznan, Poland in 1995 and 2006 respectively. Currently, she is a full professor and the Director of the Institute of Radiocommunications at PUT. Moreover, prof.

Bogucka is the co-founder, Board Member and the Head of Cooperation of RIMEDO Labs, a successful startup and the spin-off from PUT. Prof. Bogucka is involved in the research activities in the area of wireless communications: radio resource management, cognitive radio, and green communication. She has been involved in multiple European 5th – 7th Framework Programme and Horizon 2020 projects, European COST actions, National Science Centre projects, and industry cooperation. Prof. Bogucka is the author of 200 research papers, 3 handbooks in the area of radio communications and digital signal processing (in Polish) and 3 scientific monographs on flexible and cognitive radio. Prof. Bogucka has been appointed IEEE Communications Society Director of the EAME Region (Europe, Africa, Middle East) and elected IEEE Radio Communications Committee Chair for the term of 2015-2016. Currently, she is the IEEE ComSoc Fog/Edge Industry Community Regional Chair in Europe and the member of the Polish Academy of Sciences.

ORAN Security: The architectures of the 5G and future 6G networks will be almost entirely virtualized and based on software functionalities. As a result, they are and will be vulnerable to being used, attacked, and disrupted by hackers. The radio segment (Radio Access Network - RAN) of this architecture is inherently exposed to attacks related to the omnipresent transmission medium. Moreover, the open specification of the radio interface (O-RAN) poses a challenge for its security. Inadequately defined and poorly secured ORAN applications, e.g. in the physical or MAC layer, may be vulnerable to these attacks. Furthermore, in a decentralized approach to information processing, such as Multi-Access Edge Computing (MEC), security management becomes difficult as significant parts of the network can be attacked from anywhere at any time. During the lecture, we will first overview identified attacks on RAN in 5G/6G networks, and the best practices of network organization in terms of cybersecurity. Then, we will discuss security opportunities emerging from O-RAN architecture and MEC, and the zero-trust approach as indicated in the White Paper by O-RAN Alliance Security Focus Group. Finally, specialized programming modules/applications (xApps) in near-real-time RAN Intelligent Controller (RIC), will be considered to continuously monitor and analyze security threats and protect RAN from malicious and illegal access to network segments.



Łukasz Kułacz (Research Assistant - Poznan University of Technology & Technical Team Leader - Rimedo Labs, Poland): Łukasz Kułacz is a research and teaching assistant at PUT's Institute of Radiocommunications, Poland, and he is a Senior R&D Engineer and Technical Team Leader at Rimedo Labs. He is currently pursuing a Ph.D. in the field of communication technologies with the Institute of

Radiocommunications. He is involved in both, national and international research projects. His research interests include the software-defined radio and utilization of context information for radio network operation improvement, in particular the radio resource allocation process improvement. His scientific works are already published in well-recognized international journals like IEEE Access, IEEE Vehicular Magazine, or MDPI Sensors. At Rimedo Labs he leads the R&D team developing xApps and realizing dedicated software and simulations for the company's customers.

Hands-on lab: This hands-on lab will guide students through the procedure of the installation and creation of the basic xApp. Firstly, the system will be prepared for SD-RAN deployment. This step considers the installation and configuration of Kubernetes cluster, docker, helm, etc. Secondly, SD-RAN will be deployed using helm and official and publicly available helm charts. Then, students will see some basic components of SD-RAN, some control of the system and RAN simulator, and deployment of example xApp. Finally, there will be a step-by-step guide shown where simple xApp will be designed and deployed into the SD-RAN environment.



Mateusz Buczkowski (Senior Software Engineer - Grandmetric, Poland): Mateusz Buczkowski is a senior software engineer and a leader of the R&D team at Grandmetric. Mateusz is responsible for the shape of the software projects developed at Grandmetric and as a software enthusiast tends to design software taking into account the modern approach. Apart from that, he takes part in backend development, where his main focus is Python. As an R&D engineer, he took part in two FP7 EU projects, namely 5GNOW and SOLDER, where he worked on solutions that were candidate technologies to be used in the 5th Generation wireless networks. 5GNOW focused on PHY and MAC layers of the system, where LTE and LTE-A base assumptions were challenged in terms of new requirements for e.g. MTC. SOLDER project on the other hand main focus was Carrier Aggregation techniques and opportunities in different spectrum combinations

From docker to Kubernetes - theory and practice: It would be hard to imagine today's software development without a container environment. Among many solved problems that containers provided one can find: separation between different services running on a single machine, repeatability of deployment between different environments, or ease of scaling. The benefits surely outweigh some difficulties one might find in docker. Good practices and tools can lower those difficulties even more. The same applies to the Kubernetes Deploying, scaling, and reconfiguring complex apps without an orchestrator is not only difficult but also more error-prone and slower. What is great for the administrator that was in charge of deploying a new version of the software that developers provided for him might come at some cost for the developers. How can they test their version locally? How can they debug what is going on in the dev or test environment? How can they quickly check if their change works? This lecture will cover a wide range of topics starting from containers to managing deployed Kubernetes applications. We will practice how to create, build and run the docker

application, how can we set up a local Kubernetes cluster, how can we deploy the app on such a cluster, and debug some issues that might arise during the process.



Raphael Rosa (Cloud Software Development Engineer – Intel, Brazil): Raphael, PhD in Computer Engineering by the University of Campinas in Brazil, currently works as a Cloud Software Development Engineer at Intel. Before he joined ONF where he worked on the design, implementation and testing of the SD-RAN and Aether projects. During his PhD, he worked for two years as a visiting researcher in Ericsson Research Hungary, in the EU-FP7 Unify and H2020 5G Exchange projects. His main interests sit on state-of-the-art SDN and NFV research topics entangled with disruptive technologies, aiming to open source his pet projects.

Inside an end-to-end SD-RAN trial: This talk will elaborate on the internal aspects of the design, implementation and testing of the SD-RAN trial in Berlin, specifically describing the ONF SD-RAN project. The goal is to provide an overview of the trial, the internal aspects of the ONF SD-RAN project, and the integration challenges.



Michał Ingielewicz (Development Engineer - Tietoevry, Poland): Michał Ingielewicz is a graduate of Wrocław University of Science and Technology's Microsystem Electronics and Photonics faculty. His 8+ years career is focused on LTE and 5G RAN systems design and development. During his career, he has worked on the design of Nokia's and Ericsson's Mobile Baseband products. Currently his main focus shifts towards O-RAN solutions, with FlexRAN-enabled PHY layer of LTE and 5G protocol stack.

Real-Time SD-RAN systems with FlexRAN: Low latency transmissions are, undeniably, a significant driving force behind 5G's development. To achieve support for higher transmission numerologies NR systems are required to be able to process each symbol under timing requirements that go below 9 μ s. Those requirements, combined with increased bandwidth, pose a significant challenge before RAN systems' architects. In this lecture, I will try to dive deep into the tricks, frameworks, and HW that make it possible to achieve the real-time processing of data in the x86-based FlexRAN systems.



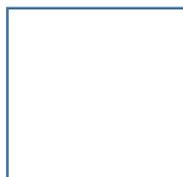
Alister Burr (Prof. - University of York, UK): Alister Burr has been Professor of Communications at the University of York, UK, since 2001. His research interests are in the physical layer of wireless communications, including modulation and FEC coding, MIMO techniques, and the implementation of the physical layer across the network, including radio access networks. He is author of more than 280 papers in refereed journals and conferences and author or co-author/editor of 8 books. He given more than 15 invited or keynote talks in international conferences and has served as associate editor for IEEE Communications Letters as well as on organising committees for four IEEE international conferences. He has served as working group chair for COST Actions 273, 2100, IC1004 and is currently co-chair of WG2 for COST INTERACT. He has received more

than €4m funding from the European Commission and UK Government for research on the development on 4G and 5G wireless, including currently the project 5G-DU-Volution.

Implementation and Role of the Distributed Unit (DU): “DU-Volution” view: The lecture will first discuss the role of the Distributed Unit within the O-RAN architecture, including the functions to be performed by this component. It will then discuss how these functions can be fulfilled, and the software radio and hardware acceleration that is likely to be used. At this point we will introduce the project “5G DU-Volution”, funded by the UK Government’s Future Radio Access Network Competition (FRANC), and describe the view taken by the project consortium in the development of an evolved DU, based on a combination of software radio implementation and hardware acceleration. We will then explore the influence of the DU, its detailed implementation and its location within the network, as well as related issues such as fronthaul and midhaul design, on the overall physical layer performance of the whole network. This will lead to a discussion of the potential for future developments to further improve performance, especially for future ultra-dense radio access networks.



Matt Kozbielak (Senior Solutions Architect - Amazon, Germany): Matt Kozbielak is the Sr. Solutions Architect with AWS Telecom Business Unit, helping major Service Providers in their cloud journey and optimizing their architecture and solutions. He has 20 years of experience in the telecommunication industry, primarily focusing on the area of BSS/OSS, DEVOPS and streamlining and scaling operations. He enjoys analysing and solving complex problems, and working on innovative telecom use-cases helping customers to increase their revenue and improve efficiency.



Naresh Rao (Principal Product Manager - Amazon, Germany): Naresh Rao is a Principal Product Manager at AWS EC2 Edge Business Unit, innovating Telco Vertical product and solution for Communication Service providers (CSPs) to help them to transform to Digital Service provider. With 20+ years of experience in the telecommunication industry, primarily focusing on the area of AIML, network analytics and automation. He is a passionate telco leader, collaborate with partners and CSPs and influence product strategy for digital transformation.



Aymen Saidi (Principal Product Management and Solutions Architecture - Amazon, Germany): Aymen Saidi is a Principal Product Management and Solutions Architecture for edge computing services at AWS. He works with AWS customers to define innovative products, applications and solutions to help them in their digital transformation journey. He specializes in OSS, Network & Service Orchestration, and Network Analytics.

Cloud platforms for AI performance improvement, PoC showcase: An Open Radio Access Network (O-RAN) is the concept based on interoperability and standardization of RAN elements. O-RAN architecture enables Communication Service Providers (CSPs) to democratize their application landscape, and further cloudify their networks for more

efficiency, intelligence and elasticity. Amazon Web Services (AWS) brings the most advanced and secure cloud infrastructure, fastest rate of innovation, and deepest telecom partner ecosystem to differentiate and cloudify business. AWS Global Infrastructure and its' broad set of services help CSPs transforming their networks and accelerating business value. The session provides overview of AWS service portfolio, diving deep into AIML space and its practical implementations for controlling and optimizing the RAN functions. The demonstration includes sample RAN Intelligence Controller (RIC) and xApps implementations on AWS cloud and the associated benefits.