



Horizon 2020 Program

WIDESPREAD-03-2018-TWINNING

Innovation and excellence in massive-scale communications and information processing

INCOMING (Project No. 856967)

D4.3: Yearly plan/report of 5G-IT-Hub promotion activities¹

Abstract: This document presents a report on the 3rd year activities of 5G Innovation and Technology Hub established at the ICONIC centre as part of the INCOMING project including the amended project extension period.

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List of Abbreviations

5G-IT-Hub	5G Innovation and Technology Hub
AAU	Aalborg University
CHALMERS	Chalmers University of Technology
DLR	German Aerospace Centre
EU	European Union
FTN	Faculty of Technical Sciences, University of Novi Sad
ICT	Information and Communication Technologies
IPR	Intellectual Property Rights
UNS	University of Novi Sad

Executive Summary

ICONIC centre (Faculty of Technical Sciences, University of Novi Sad) aims to establish itself as a leading research centre in the domain of wireless communications and information processing domains with applications in 5G and beyond 5G technologies in the region. Besides research and development activities, ICONIC aims to be active and visible in education and knowledge sharing on 5G and beyond 5G technologies. As part of H2020 INCOMING, ICONIC established so called 5G Innovation and Technology Hub (5G-IT-Hub) to organise lectures and spread knowledge about exciting developments in the world of wireless communications and mobile cellular systems.

The main goals of 5G-IT-Hub are following:

- The hub provides local and regional stakeholders opportunity to access information, expertise, training, and best practices related to research, development and business opportunities in 5G ecosystem.
- 5G IT hub stimulates knowledge and experience exchange, networking among local and regional academic and industrial community, sharing and exchange of ideas, and stimulating innovation and entrepreneurship in 5G domain.
- The hub creates links between ICONIC and regional ICT-related stakeholders, thus raising ICONIC visibility among wider ICT community.

In this deliverable, we provide details on 5G-IT-Hub activities conducted during the third year of H2020 INCOMING project. We also discuss the hubs prospects beyond the project lifetime.

For more information about 5G-IT-Hub and its activities, please check the hub's webpage: <https://5ghub.ftn.uns.ac.rs/>.

1 Introduction

H2020 INCOMING project aims to stimulate innovation and entrepreneurship environment in and around ICONIC centre (<http://iconic.ftn.uns.ac.rs/>, Faculty of Technical Sciences, University of Novi Sad) in the domain of 5G and beyond 5G technologies. ICONIC centre established **5G Innovation and Technology Hub (5G-IT-Hub)** as a virtual entity that supports various educational, promotion and networking activities of the centre. 5G-IT-Hub is established in month 6 (01.06.2020.) of the H2020 INCOMING project.

5G-IT-Hub serves to connect ICONIC researchers with local and regional stakeholders with interest in 5G technologies and applications. The main tasks of 5G-IT-Hub are to:

- promote internal research and development capacity of ICONIC researchers,
- expand knowledge in ICT innovation and entrepreneurship of ICONIC staff members,
- gain experience, knowledge, support from EU partners and access to global stakeholders via their network of contacts,
- connect with local and regional stakeholders and startup community interested in 5G technologies,
- connect with local organizations that promote innovation in ICT.

The major activity of 5G-IT Hub is to organize seminars that will be useful both to ICONIC members as well as to wider community. These include three main seminar series:

- **5G and Beyond 5G Seminar Series**
- **Meet the ICT Industry Seminar**
- **Startup Success Stories Seminar.**

5G-IT Hub will also organize trainings in the domain of Innovation, IPR and Entrepreneurship in ICT domain.

Unlike the first two years, the third year of the project and the extension period has not been affected by global COVID-19 pandemic and are done in physical in-person mode. In this deliverable, we present all such activities of WP4 realised during the third project year and extension period granted by amendment, thus covering all the events that were organised from 30.06.2022 (the period covered by Deliverable D4.2) and the end of the project (30.09.2023). The description is divided into three seminar series, and for each seminar series, we provide details of all the different events organised. We conclude this deliverable with future plans for 5G IT Hub beyond the project lifetime.

2 5G and Beyond 5G Seminar Series

The first and the most important seminar series organized by 5G-IT-Hub is **5G and Beyond 5G Seminar Series**. The original goal of this seminar series was to bring leading 5G industry experts to ICONIC centre and Novi Sad, to present their view on 5G technology and applications. Next, we review seminars held in 5G and Beyond 5G seminar series. The first five seminars took place during the first two project years and are reported in D4.1 and D4.2. Thus we continue the description of seminars starting from the sixth seminar in the series.



Figure 1: 5G and B5G Seminar Series Lectures 6 and 7: Dr Sandra Lagen and Dr Biljana Bojovic (CTTC)

5G and B5G Seminar 6 and 7: Dr Sandra Lagen and Dr Biljana Bojovic

The joint sixth and seventh lecture in this seminar series was delivered in the form of two-day intensive training by Dr Sandra Lagen and Dr Biljana Bojovic, researchers at the Catalan Centre for Telecommunications (CTTC). The information of the presenters at their talks are provided on the following link:

<https://5ghub.ftn.uns.ac.rs/5g-it-hub-seminar-sandra-lagen-and-biljana-bojovic-cttc/>

Their seminar training entitled 5G LENA System Level Simulator and Extensions for 5G NR V2X provided an intensive training on usage of 5G LENA network simulator integrated into NS-3 simulation framework and extension of this simulator to 5G NR vehicular V2X standard. Both 5G and 5G V2X simulators are important tools for research and development of ICONIC.

The seminar took place as a physical event on Tuesday and Wednesday, 08th and 09th of November of 2022 at the NTP building of Faculty of Technical Sciences, lecture hall NTP-001, with about 20-30 students and staff members attending the seminar.

The event poster for the lecture is presented via ICONIC centre and INCOMING project social media (LinkedIn and Twitter) and distributed through various University of Novi Sad, Faculty of Technical Sciences and global communication channels, and is presented in Figure 1.



Figure 2: 5G LENA simulator training presented by Dr Sandra Lagen (CTTC)

5G and B5G Seminar 8: Prof. Jean Marie Gorce

The core topic of INCOMING project investigated in WP2 is massive Internet of Things. One of the most active researchers in this domain in Europe is Prof. Jean Marie Gorce from INSA Lyon, also affiliated with INRIA institute in Lyon. The group of Prof. Gorce is on the forefront of both fundamental information-theoretic and implementation aspects of massive IoT networks. The team in INRIA maintains one of the most advanced software defined radio (SDR) testbeds in Europe called CortexLab, which is openly accessible and highly relevant for INCOMING development activities.

More information about the talk presented by Prof. Gorce is provided on the link below:

<https://5ghub.ftn.uns.ac.rs/5g-it-hub-seminar-jean-marie-gorce-insa-lyon/>

The seminar entitled Known limits, achievability and trends for M2M: Towards massive, reliable and real-time communications took place as a physical event on 17th of November 2022 at the NTP building of Faculty of Technical Sciences, lecture room NTP-L-01, with more than 30 students and staff members attending the seminar.

The event poster presented on ICONIC centre social media (LinkedIn and Twitter) and distributed through various University of Novi Sad, Faculty of Technical Sciences and global communication channels is presented in Figure 3.

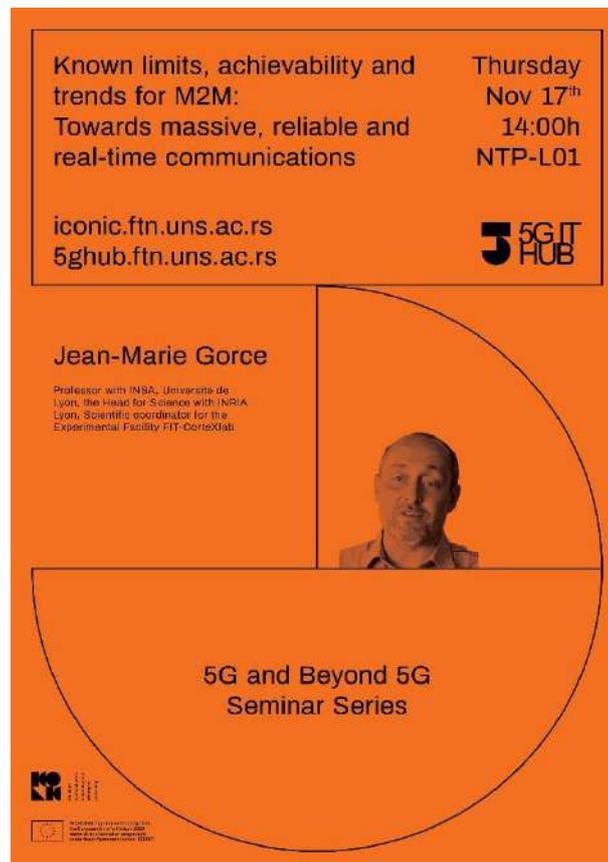


Figure 3: 5G and Beyond 5G Seminar Series Lecture 8: Prof. Jean Marie Gorce

5G and B5G Seminar 9: Prof. Ian Akyildiz

One of the world leading names in the domain of telecommunications, Prof. Ian Akyildiz, visited ICONIC centre and presented a lecture on future of communication networks entitled Networking 2030: Extended Reality, Hologram Type and Mulsemedia Communication Challenges for 6G and Beyond Wireless Systems. Prof. Akyildiz lecture attracted large number of students and staff members and was held in a large amphitheatre of the Faculty of Technical Sciences.



Figure 4: 5G and Beyond 5G Seminar Series Lecture 9: Prof. Ian Akyildiz

The lecture was held on 23rd of May, 2023, and was announced on ICONIC centre social media (LinkedIn and Twitter) and distributed through various University of Novi Sad, Faculty of Technical Sciences and global communication channels is presented in Figure 5.



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i telekomunikacije



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tehničkih
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Novom Sadu

NETWORKING 2030: Metaverse, Extended Reality, Hologram Type and Mulsemedia Communication Challenges for 6G/Beyond Wireless Systems

Prof. Ian Akyildiz, President, Truva Inc.

When: Tuesday, 23. 05. 2023, 12:00-13:00h

Where: Faculty of Technical Sciences, Amphitheatre A1



Abstract: The term "METAVERSE" (META= BEYOND) and (VERSE=UNIVERSE) can be regarded as the evolution of the Internet where there will be almost no separation between digital and physical. This will be made possible thanks to the convergence of key emerging technologies such as Extended Reality (XR) (the umbrella term for Virtual Reality (VR), Augmented Reality (AR), Mixed Reality (MR)), Mulsemedia as well as Hologram Type Communication (HTC). In this talk, the XR, Mulsemedia, HTC technologies are explored and research challenges concerning wireless communications for the next decade are presented. XR, Mulsemedia and HTC provide truly immersive experiences for a plethora of use cases for the Networking 2030 and Beyond. They face great challenges in transmitting high volume data with high throughput and guaranteed end-to-end latency which cannot be addressed by existing/current communication technologies. In this talk, a roadmap towards wireless ultimate XR, Mulsemedia and HTC technologies is presented. The basics, existing products and use cases of these technologies are reviewed, and technical requirements and bottlenecks of realizing these technologies are identified.



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Figure 5: 5G and Beyond 5G Seminar Series Lecture 9 Poster: Prof. Ian Akyildiz

5G and B5G Seminar 10: Prof. Branka Vucetic

The 10th 5G and B5G seminar series has been presented by another big name in the domain of telecommunications, Prof. Branka Vucetic from the University of Sydney (Australia). Prof. Vucetic is also a member of the project advisory board and she visits the group at ICONIC centre at any opportunity and presents a lecture on recent trends in communications engineering. The lecture entitled AI-based Design of 6G Networks attracted large number of students and staff members and was held in a lecture room NTP-418 at the fourth floor of the NTP building of the Faculty of Technical Sciences on 21st of June 2023.



Figure 6: 5G and Beyond 5G Seminar Series Lecture 10: Prof. Branka Vucetic



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AI-Based Design of 6G Networks



Prof. Branka Vučetić, University of Sydney

When: **Wednesday, 21. 06. 2023, 11:00-12:30h**

Where: **NTP-418 (4th Floor), FTN-NTP Building**



Abstract: In this talk, a vision of use cases in future wireless 6G networks will be presented. 6G will provide distributed AI and a plug-and-play infrastructure for various IoT services. AI combined with domain knowledge will be used to design 6G, as conventional analytical methods will not be able to meet the stringent requirements of the future 6G services and deal with increasing network complexity. A framework for using AI in 6G design will be presented. Some research results from the Sydney Centre for IoT and Telecommunications on AI-based designs of 6G physical, MAC and network layers will be demonstrated.

Speaker's Biography: Prof Branka Vucetic currently works as a Laureate Professor and Director of the Centre for IoT and Telecommunications at the University of Sydney. During her career, she has held various research and academic positions in Serbia, Australia and UK. Her research interests include wireless communications, error control coding, and IoT applications in energy grids and industrial control. Prof Vucetic co-authored four books and more than four hundred papers in telecommunications journals and conference proceedings. She is a Fellow of the Australian Academy of Science, Australian Academy of Technology and Engineering and IEEE.



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Figure 7: 5G and Beyond 5G Seminar Series Lecture 10 Poster: Prof. Branka Vucetic

5G and B5G Seminar 11: Dr Nikolaos Bartzoudis

Dr Nikolaos Bartzoudis, senior researcher and team leader at CTTC, Catalan Centre of Telecommunications, visited ICONIC centre and presented a seminar on research topics in his research team at CTTC. The seminar that took place in Novi Sad on 29th of June 2023, in the form of mini workshop, also included two researchers from his team presenting online. The workshop also stimulated future research collaboration and joint preparation of EU projects between the two teams.



Figure 8: LinkedIn Post on 5G and Beyond 5G Seminar Series Lecture 11: Dr Nikolaos Bartzoudis

Overall, 11 5G and Beyond 5G Seminar Series have been organised until this report has been submitted (30th of September 2023). Out of these 11 seminars, 3 have been organised in an online format during the COVID travel restrictions, while the remaining 8 seminars have been organised as physical events starting from early 2022 until mid-2023. This seminar series will continue beyond the end of the project lifetime.

3 Meet the ICT Industry Seminar Series

The second seminar series organized by 5G-IT-Hub is **Meet the ICT Industry Seminar Series**. The goal of this seminar is to present local/regional ICT companies to students, academic and local/regional ICT community. The original goal of this seminar series was to bring local and regional ICT industry representatives to visit ICONIC centre and Novi Sad and deliver a lecture as a physical event to the interested researchers and students.

Overall, 5 out of 6 planned Meet the ICT Industry Seminar Series events have been organised until this report has been submitted (30th of September 2023). Out of six seminars, 3 have been organised in an online format during the COVID travel restrictions, while the last 2 seminars have been organised as physical events since the end of 2021.

4 Startup Success Stories Seminar Series

The goal of this seminar is to establish regular talks and presentations of the most successful ICT entrepreneurs in the region, where they would provide account on the initiation and first steps in development of their startups, the steps that followed to reach the first major success, share their best practices, and engage in discussion with the seminar participants.

This seminar series serves as an introduction to the first set of trainings that will be organized within 5G-IT-Hub, such as the training on Intellectual Property Rights (IPR), Entrepreneurship, and Fundraising.

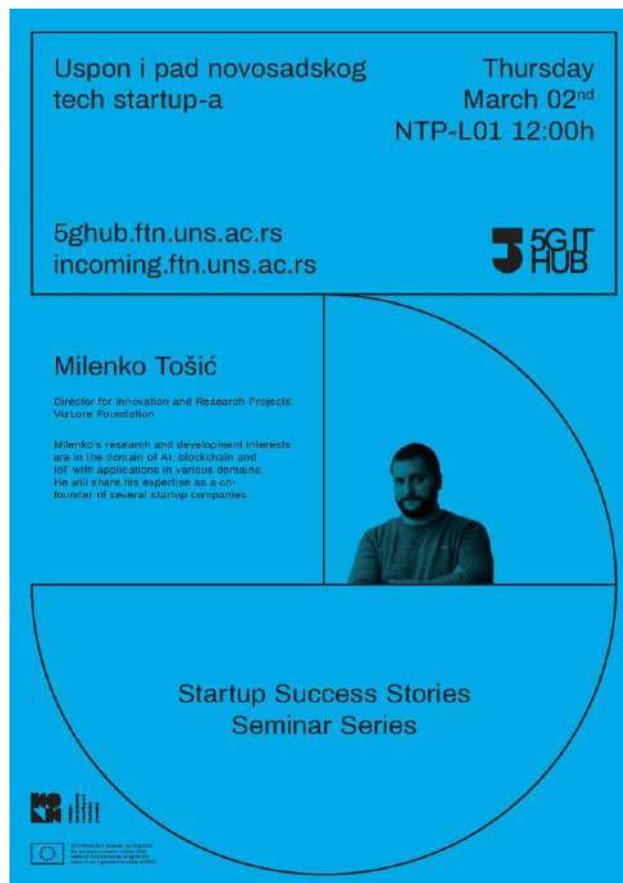


Figure 9: Startup Success Stories Seminar Series Lecture 4: Milenko Tosić

Startup Success Stories Seminar 4: Milenko Tosić (VizLore Foundation)

The fourth 5G-IT-Hub seminar of Startup Success Stories Seminar Series invited Milenko Tosić as a speaker. Milenko is a former student of FTN-UNS and for this reason, his experience presented in the lecture entitled The rise and the fall of Novi Sad's tech startup was valuable to the students in the audience, giving them example on how it is possible to advance in startup world after their studies. His experiences and views were valuable input to all the participants coming across ICONIC centre staff members, and FTN-UNS students. Milenko leads VizLore Foundation, a non-profit organisation that is active in a number of EU projects related to wireless communications and 5G networks. VizLore is incubator to several startups that emerged as the follow-up of their research and development activities.

The information of the presenter and the talk are provided in the link below:

<https://5ghub.ftn.uns.ac.rs/5g-hub-seminar-milenko-tosic-vizlore/>

The seminar took place as on 02nd of March 2023, with about 40 students and staff members attending the seminar session.

The event poster presented on ICONIC centre social media and distributed through various other communication channels is presented in Figure 9.

5 Complementary Skills Training

5.1 Intellectual Property Rights (IPR) Training

One of the principal ways to exploit the innovation potential of ICONIC is to train and stimulate researchers to produce intellectual property and provide mechanisms to its suitable protection. For this reason, in INCOMING, we organised two single-day seminar events on IPR protection. The seminar is held by a renowned IPR lawyer in Serbia, Ms Jelena Dzankic Zelincevic. Her outstanding approach to description of IPR rules in Serbia, EU and worldwide, filled with a large number of examples and small practical exercises, has been highly valued by the audience. The IPR trainings took place during two consecutive days, on 01st and 02nd December 2022, at the NTP building of Faculty of Technical Sciences, lecture room NTP-L-01, with more than 20 students and staff members attending the seminar. The agenda of the seminar (held in Serbian language) is presented below:

AGENDA	
„Trening – Prava intelektualne svojine, aspekti praktične primene i izazovi u primeni“	
01. i 02. decembar 2022. godine	
Novi Sad, Fakultet tehničkih nauka, Sala:	
Predavač: Jelena Džankić	
Prvi dan - 01.12.2022	
9:00 – 9:15	Registracija
9:15 – 9:30	Upoznavanje i predstavljanje plana rada
9:30 – 11:00	Uvod u prava intelektualne svojine, zaštita i značaj Autorska prava sa osvrtom na zaštitu softvera
11:00 – 11:15	<i>Kafe pauza</i>
11:15 - 12:30	Žig i znakovi razlikovanja
12:30 – 13:00	Pitanja i razgovor
13:00 – 14:00	<i>Pauza za ručak</i>
14:00 – 16:00	<i>Case study – samostalna analiza primera</i>

Figure 10: IPR Seminar Day 1 Agenda: Jelena Dzankic Zelincevic

Drugi dan - 02.12.2022	
9:00 – 9:15	Sumiranje prethodnog dana, pitanja
9:15 – 10:30	Zaštita pronalaska patentom – nacionalna prijava
10:30 – 11:00	PCT i Evropska prijava patenta - uvod
11:00 – 11:15	<i>Kafe pauza</i>
11:15 - 12:30	PCT i Evropska prijava patenta
12:30 – 13:00	Pitanja i razgovor
13:00 – 14:00	<i>Pauza za ručak</i>
14:00 – 15:45	Samostalna priprema predloga patentne prijave
15:45 – 16:00	Završne napomene

Figure 11: IPR Seminar Day 2 Agenda: Jelena Dzankic Zelincevic



Figure 12: IPR Seminar: Jelena Dzankic Zelincevic

5.2 EU Project Preparation Training

ICONIC staff members are active in preparation of EU Horizon proposals. Several senior staff members are or have been Principal Investigators on behalf of UNS-FTN in EU projects. These include Full Prof. Dejan Vukobratovic (the coordinator of H2020 INCOMING, PI of H2020 SENSIBLE, FP7 ADVANTAGE, FP7 MMCODESTREAM), Full Prof. Tatjana Loncar-Turukalo (PI of H2020 INCISIVE), and Prof. Dragana Bajovic (PI and Technical Coordinator of H2020 MARVEL). Several other members have experience in writing EU proposals, however, their bids were so far unsuccessful (Assist. Prof. Milica Petkovic and Assoc. Prof Mladen Kovacevic). Even though this level of activity of ICONIC staff is satisfactory, it is important to nourish it, improve it and stimulate more researchers to be part of the process. For this reason, INCOMING project organised two-part seminar on writing successful EU proposal. This training is presented by extremely experienced team from FoodScale Hub, a company specialised in leading, providing support for dissemination and outreach, and managing of EU projects. Two experts, Spiros Fountas and Maja Radisic, presented the seminar to ICONIC audience. The agenda of the event is presented below:

HOW TO PREPARE A SUCESSFUL PROPOSAL FOR HORIZON EUROPE

Location: FTN
 Date: March 17th & 18th, 2023
 Time: 10:00 – 14:00
 Trainers: Stavros Tsitouras
 Maja Radisic

Wednesday, May 17th, 2023

10:00 – 13:00	Welcome and introduction
	Introduction to Horizon Europe programme
	Decoding the call
	Section 1 of the proposal - Excellence
13:00 - 14:00	Discussion and Q&A

Figure 13: EU Project Preparation Seminar Day 1 Agenda: Spiros Fountas

Thursday, May 18th, 2023**10:00 – 13:00**

Section 2 of the proposal - Impact

Section 3 of the proposal - Implementation

13:00 - 14:00

Discussion and Q&A

Figure 14: EU Project Preparation Seminar Day 2 Agenda: Maja Radisic**Figure 15: EU Project Preparation Seminar Day 1: Spiros Fountas**

6 Final Outreach Event

The details on final outreach event are covered in Deliverable D6.3. However, the second day of the event has been also the final event of 5G IT Hub as it gathered 6 world-leading names in academic and industrial domain providing their views towards the development of future 6G networks. The list of speakers and agenda of the day 2 of the final event is presented below.

Wednesday 20th September (Belgrade, Hotel Crowne Plaza Belgrade, Mediterranean Room)	
09:00 – 09:30	Arrival of participants
09:30 – 09:40	Welcome message from the Organisers
09:40 – 10:20	Keynote 1: Prof. Petar Popovski (Aalborg University, Denmark) Timing and Reliability towards 6G wireless systems
	Keynote 2: Ivan Seskar (WINLAB, Rutgers University, USA) Exploring the Horizons of Wireless Innovation: From Physical Layer Experiments to Smart City Applications on the COSMOS Testbed
11:00 – 11:20	Coffee Break
11:20 – 12:00	Keynote 3: Prof. Haris Gacanin (RWTH Aachen University, Germany) Metaverse-ready wireless communications and computing systems
12:00 – 12:40	Keynote 4: Prof. David Gomez Barquero (Polytechnic University of Valencia, Spain) Opportunities, Challenges and Lessons Learned of Deploying Advanced 5G Experimentation Platforms
12:40 – 14:00	Lunch Break
14:00 – 14:40	Keynote 5: Konstantinos Chalkiotis (VP 6G & NTN, Deutsche Telekom, Germany) On the way to 6G – Deutsche Telekom’s view
14:40 – 15:20	Keynote 6: Prof. Robert Stewart (Strathclyde University, UK) It’s all about the Spectrum – How the Broadcast Use Case can help drive 5G SA Private Network Growth
15:20 – 16:00	Panel (Selected questions collected from the audience during 6 keynotes through online app)

Figure 16: The list of keynote speakers for the INCOMING final event Day 2 in Belgrade

Poster event shared on the social media for the final event is presented below.



Figure 17: The poster for the INCOMING final event Day 2 in Belgrade

7 Summary of 5G-IT-Hub Activities and Future of 5G IT Hub

The third year of the project and the extension period continued with 5G-IT-Hub activities. Starting from the second half of 2021, most of the events were organised as physical events.

The main line of activities of 5G-IT-Hub are Seminar Series: public lectures that serve to inform the general audience about the 5G technology developments. The seminars exceeded expectations in terms of their quality and interest of audience which is why emphasis is placed on this particular seminar series. After three online seminars delivered during the first year of the project, additional eight physical seminars of 5G and Beyond 5G seminars were organised during the project. Meet the ICT Industry seminar series was completed with a total of five seminars organised during the project. Finally, the Startup Success Stories kick-started during the second year of the project and it total, four seminars of this kind are organised. Overall, the number of seminars organised exceeded the planned number, however their distribution between the three types of seminars has been slightly shifted in favour of 5G and Beyond 5G seminars, based on the audience response.

Other training activities within 5G-IT-Hub in the form of IPR and EU Funding trainings are delivered during second half of 2022 and early 2023. Among other activities, as the research outcomes of INCOMING collaboration become more mature, 5G-IT-Hub served as a platform for regular organization of demo sessions where a number of showcase demos were presented and discussed before or after the seminars.

To summarize, 5G-IT-Hub is established in June 2020. and after the first three years and 19 events taking place from October 2020 to September 2023, the activities of 5G-IT-Hub attracted significant attention from IT researchers and specialists in the region. The final project event also continued the tradition of inviting the best speakers worldwide to deliver their ideas and visions about the future of wireless communications. LinkedIn page and home page of ICONIC centre gained increased visibility due to 5G-IT-Hub events been announced, and very positive feedback has been received from local and regional ICT community. This trend is likely to continue as more events and world-class speakers are added to 5G-IT-Hub events agenda in the following years.