**National Institute of Telecommunications**

**Online Training Course on**

# Technical, business and regulatory aspects of 5G network

**23-30 August 2021**

## TRAINING COURSE OUTLINE

## COURSE DESCRIPTION

| | |
|---|---|
| Title | Technical, business and regulatory aspects of 5G network |
| Objectives | This course will focus on technical, business and regulatory aspects of the 5G mobile networks. It include will 4G mobile technology transition toward the 5G, considering the access and core networks as well as end-user services. Mobile broadband Internet after 4G will continue with the next generation, 5G, so the course will cover also IPv6 and its impact on 5G mobile networks. Further, it will include M2M (Machine-to-Machine) and mobile Internet of Things (IoT) services are foreseen types in future 5G mobile environments, as well as mobile cloud computing implementations. Also, the course will include spectrum management for IMT (International Mobile Telecommunications) including the 5G considerations. The QoS in mobile networks going from 3G/4G mobile world toward the 5G will continue to be important, hence the course will also focus on QoS and QoE in next generation mobile environments. Finally, the course will focus on emerging services and applications in 5G mobile networks in different verticals, including technology, as well as their business and regulation aspects. |
| Dates | 23-30 August 2021 |
| Duration | 8 days |
| Registration deadline | 23 August 2021 |
| Training fees | USD 150 |
| Course code | 21OI26414EUR-E |

## DESCRIPTION OF THE TRAINING COURSE

This course will focus on technical, business and regulatory aspects of the 5G mobile networks. It include will 4G mobile technology transition toward the 5G, considering the access and core networks as well as end-user services. Mobile broadband Internet after 4G will continue with the next generation, 5G, so the course will cover also IPv6 and its impact on 5G mobile networks. Further, it will include M2M (Machine-to-Machine) and mobile Internet of Things (IoT) services are foreseen types in future 5G mobile environments, as well as mobile cloud computing implementations. Also, the course will include spectrum management for IMT (International Mobile Telecommunications) including the 5G considerations. The QoS in mobile networks going from 3G/4G mobile world toward the 5G will continue to be important, hence the course will also focus on QoS and QoE in next generation mobile environments. Finally, the course will focus on emerging services and applications in 5G mobile networks in different verticals, including technology, as well as their business and regulation aspects.

## LEARNING OUTCOMES

At the end of the training, the participant should have gained an understanding of the key aspects of:

- Mobile broadband evolution
- LTE-Advanced-Pro: transition from 4G toward 5G mobile networks
- 5G network architecture: network slicing
- 5G New Radio access
- 5G Next Generation core network
- 5G services: mobile ultra-broadband and ultra-reliable low latency services
- Massive Internet of Things (IoT) and IPv6 in 5G
- 5G Quality of Service (QoS)
- Business aspects of 5G networks and services
- 5G/IMT spectrum management and regulation

## TARGET POPULATION

This course is targeted at managers, engineers and employees from regulators, government organisations, telecommunication companies and academia, who are interested in understanding, implementation and regulation of technical, business and regulatory aspects of 5G network, including technologies, standardization, regulation and content. Other institutions and individuals that are dedicated in building their capacity related to technical, business and regulatory aspects of 5G network are also welcome to participate.

## ENTRY REQUIREMENTS

No prior knowledge or qualification is required to register for this course, considering the given target population.

## TUTORS/INSTRUCTORS

| NAME OF TUTOR(S)/INSTRUCTOR(S) | CONTACT DETAILS |
|---|---|
| Prof. Toni Janevski | tonij@feit.ukim.edu.mk |

## TRAINING COURSE CONTENTS

There are in total eight days, from which first 5 days (23-27 August 2021) there will be given recorded video lectures, 2 per day, five days in total and that gives the total of 10 video lectures in this course. The lectures are on the following subjects:

| Lecture | Subject |
|---|---|
| Lecture 1 | Mobile broadband evolution |
| Lecture 2 | LTE-Advanced-Pro: transition from 4G toward 5G mobile networks |
| Lecture 3 | 5G network architecture: network slicing |
| Lecture 4 | 5G New Radio Access |
| Lecture 5 | 5G Next Generation Core Network |
| Lecture 6 | 5G services: mobile ultra-broadband and ultra-reliable low latency services |
| Lecture 7 | Massive Internet of Things (IoT) and IPv6 in 5G |
| Lecture 8 | 5G Quality of Service (QoS) |
| Lecture 9 | Business aspects of 5G networks and services |
| Lecture 10 | 5G/IMT spectrum management and regulation |

## TRAINING COURSE SCHEDULE

| Days | Activity | Exercises and interactions |
|---|---|---|
| Day 1 | Learning | Watching and listening to video lectures 1 and 2. Answering on questions asked by the tutor, and possibility to ask questions to him via course forum. |
| Day 2 | Learning | Watching and listening to video lectures 3 and 4. Answering on questions asked by the tutor, and possibility to ask questions to him via course forum. |
| Day 3 | Learning | Watching and listening to video lectures 5 and 6. Answering on questions asked by the tutor, and possibility to ask questions to him via course forum. |

| Day 4 | Learning | Watching and listening to video lectures 7 and 8. Answering on questions asked by the tutor, and possibility to ask questions to him via course forum. |
| Day 5 | Learning | Watching and listening to video lectures 9 and 10. Answering on questions asked by the tutor, and possibility to ask questions to him via course forum. |
| Day 6-7 | Consolidation of knowledge | Possibility to watch all video lectures one again with possibility to ask questions to the tutor. |
| Day 8 | Solving the Final Quiz | Solving the Final Quiz. |

## METHODOLOGY (Didactic approach)

The course methodology will be as follows:
- Each day from 23 to 27 August 2021 there will be made available two recorded video lectures, which are recorded in the face-to-face ITU Centre of Excellence workshop organised by National Institute of Telecommunications in Poland. In total there are 10 video lectures during the course.
- Discussion forum will be organized based on discussion topics given on a daily basis, where students are highly encouraged to participate and interact with instructors and other students.
- Quiz test will be assigned on the last day of the course, 30 August 2021.
- All announcements for all events (lectures, quiz and forum) will be given in a timely manner (prior to the event) by the course tutor.

## EVALUATION AND GRADING

On the last day of the course a quiz test will be assigned. It will consist of 20 questions (multiple choice) witch should be solved in a time frame of 90 minutes, with at least 12 correct answers (60%).

The course evaluation for obtaining the certificate at the end is based primarily on the results from the Quiz, however, replies to the raised discussion topics may also be considered in the evaluation process.

## TRAINING COURSE COORDINATION

| Course coordinator: | ITU coordinator: |
| --- | --- |
| Name: Sylwester Laskowski<br>Email address: S.Laskowski@il-pib.pl | Name: Ana-Maria Meshkurti<br>Email address: ana.maria.meshkurti@itu.int |

## REGISTRATION AND PAYMENT

**ITU Academy portal account**

Registration and payment should be made online at the ITU Academy portal.
To be able to register for the course you **MUST** first create an account in the ITU Academy portal at the following address: https://academy.itu.int/index.php/user/register

**Training course registration**

When you have an existing account or created a new account, you can register for the course online at the following link: https://academy.itu.int/training-courses/full-catalogue/technical-business-and-regulatory-aspects-5g-networks-0

You can also register by finding your desired course in our training catalogue https://academy.itu.int/index.php/training-courses/full-catalogue.

**Payment**

### 1. On-line payment

A training fee of USD 150 per participant is applied for this training. Payment should be made via the online system using the link mentioned above for training registration at https://academy.itu.int/training-courses/full-catalogue/technical-business-and-regulatory-aspects-5g-networks-0            .

### 2. Payment by bank transfer

Where it is not possible to make payment via the online system, select the option for offline payment to generate an invoice using the same link as above. Download the invoice to make a bank transfer to the ITU bank account shown below. Then send the proof of payment/copy of bank transfer slip and the invoice copy to Hcbmail@itu.int and copy the course coordinator.
**All bank transaction fees must be borne by the payer**.
**Failure to submit the above documents may result in the applicant not being registered for the training.**

### 3. Group payment

Should you wish to pay for more than one participant using bank transfer and need one invoice for all of them, create an account as **Institutional Contact. Institutional Contacts** are users that represent an organization. Any student can request to be an institutional contact or to belong to any existing organization.

To do this, head to your profile page by clicking on the **"My account"** button in the user menu. At the bottom of this page you should see two buttons:

  a. If you want to **become an institutional contact**, click on the "**Apply to be an Institutional Contact"** button. This will redirect you to a small form that will ask for the organization name. After you fill the name of the organization you want to represent, click on **"continue"** and a request will be created. An ITU Academy manager will manually review this request and accept or deny it accordingly.
  b. If you want to **belong to an existing organization**, click on the **"Request to belong to an Institutional Contact"** button. This will redirect you to a small form that will ask you to select the organization you want to join from an organization list. After you select the correct organization, click on **"continue"**, a request will then be created. The Institutional Contact that represents that organization will manually accept or deny your request to join the organization.

**ITU BANK ACCOUNT DETAILS:**

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|---|---|
| Name and Address of Bank: | UBS Switzerland AG<br>Case postale 2600<br>CH 1211 Geneva 2<br>Switzerland |
| Beneficiary: | Union Internationale des Télécommunications |
| Account number: | 240-C8108252.2 (USD) |
| Swift: | UBSWCHZH80A |
| IBAN | CH54 0024 0240 C810 8252 2 |
| Amount: | USD 150 |
| Payment Reference: | CoE-EUR 26414 - P.40595.1.04 |

### 4. Other method of payment

If due to national regulations, there are restrictions that do not allow for payment to be made using options 1 & 2 above, please contact the ITU coordinator for further assistance.

## CERTIFICATES

Each fully registered participant who successfully completes the course, based on the evaluation, will receive an ITU Certificate for this course.