Training Plan of the ITU CoE at FEEIT in Skopje

Meeting of the Steering Committee
for the ITU Centres of Excellence in Europe in 2019

Prof. Dr. Toni Janevski

Faculty of Electrical Engineering and Information Technologies
Ss. Cyril and Methodius University in Skopje, Macedonia

Email: tonij@feit.ukim.edu.mk

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Type of participants in the ITU Academy e-learning courses

- Different types of participants follow a given e-learning course, and they are coming from different organizations, including:
  - National regulators
  - Government organizations and ministries
  - Network and service providers
  - Telecom and IT companies
  - Students from universities
  - Professors from academia and instructors from training centers
  - …and every individual which want to update their knowledge or have up-to-date information in a given field
- Different participants may have different interests and different focuses in a single ITU e-learning course, since most of them are professionals
  - Working in telecommunications/ICT or related fields
- Let see some feedback from participants regarding their benefits from ITU e-learning practices

ITU e-learning Feedback from Participants:
Broadband Internet and Future Networks

- I am at a desk job and this course has certainly added to my knowledge on the latest technologies. I found the course to be very useful.
- One of the most areas that would be benefited is net neutrality issues.
- The course helps us to have a more comprehensive view of the evolution of the Internet and broadband networks and their potential use in sustainable cities.
- The course is relevant as it makes me understand better the world of ICT. This is an advantage as when am analysing the data from administration side (supply side) i understand better. It also helps me in writing ICT related papers.
- n/a
- Sure, My organization is a provider. This course has added to my knowledge and i has understood the overview of Broadband Internet and Future Networks.
- It will help me in analysing the ICT statistics and writing reports on the same better
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- I work for the Turkish Regulatory Body (ICTA) and Training materials include up to date information. Very helpful for the regulation side of the sector.
- It helps my organisation through proper understating of new technologies. Planning benefits a lot.
- I'm in academic sector, the main benefit is in order to study the ultimate regulation on telecommunications technologies.
- The mindset of the participants is definitely changed and right now I see things in a different perspective. I realise that there is no other way into the future than plan for the Future Networks.

- It provides a good understanding of where the ICT industry is currently at and the future of it (which is closer than we think). It provides for greater appreciation of the subject and helps in preparing for it.
- It provides a general point of view on the emerging technologies.
- It will contribute towards my daily work and enhance my knowledge on future networks and where technology is heading to and what to expect.
- My organization benefit from this course in many aspects. First we need to build our capacity in the novel new areas of ICTs like OTT, IoT, NGN, 5G, etc... in terms of the technical and legal aspects with the new economy challenges that we will be facing. So sharing best practices by discussing with other people all around the world is a very good way that has been possible within the course earned by ITU Academy. I'm a professional of Telecommunication but this course helped me understand some new guidelines and business trends of the economy. Thanks to all of you ...
- The organization was excellent and this e-learning course was very informative, very well presented, plus enjoyable.

  Thanks for all.
- I am more enlightened.

  I will assist my organization to understand the Broadband and Future Networks trends so

Each ITU course has participants from regulators, operators, academic sector...

ITU e-learning Feedback from Participants:

4G and Next Generation Mobile Internet

In your opinion, how your organization benefiting from the knowledge and experience you acquired through this course? *Please explain*

- The mobile network operator where I work has just recently rolled out it's first LTE service. I believe that the knowledge acquired in this course will help to make better decisions during technical design, procurement, commissioning and troubleshooting of the LTE network. In summary, the things that I have learned from this course will help me to do my job better.
- I thing, the knowledge I acquired trough this course, will be useful in performance analysis of technical as well as business and regulation issues for 4G and next generation networks.
- I work at NTRA of Egypt , this course (material and interactions and discussions quizzes) are very useful for me and NTRA as a regulator (important knowledge, technical, administration) plus in my personal life.
- In my working domain it is necessary to understand the new technologies appearing in the mobile market. So the course covers this requirement.
- Show a certain level of interest in ITU courses.
- Being in charge of the regulatory and policy affairs in my organisation this course is relevant to my position and strenghened me to face regulatory and business challenges even technical aspects of 4G, 5G and Mobile Internet broadband.
- Let me know the origin and trends of the mobile network, characteristics and topologies. I will apply this knowledge for analysis and recomendations in my job.
- As an engineer with the national Telecom regulator, it is important to be on top of the current in next generations networks. I will now advice my entity on all technical issues of next generation mobile networks. I will also advice them on what to do as a regulator to prepare for the deployment of 5G networks.
- It will help to implement LTE into our network.
- More knowledge, better professional
- As an expert in Technical Directorate I think that every part of this course would be so helpfull for me in my work.
- Now that I have deeper knowledge in the area I could better see the real picture when preparing and assessing legal acts, solving questions at the NRI.
- In my particular case, I took the course to deepen knowledge in mobile networking issues in order to complement my knowledge because I am involved in virtualization technologies (NFV). Therefore, this would benefit my research for the doctorate.
- I work at Regulatory body and especially at IT unit so i must know these stuff clearly which the gave me. It will help in regulatory functions in my office
- The will benefit an increase in technical input due to increased knowledge

Each participant and organization has its specific benefit from a given ITU course.

ITU e-learning Feedback from Participants:
NGN, Cloud Computing and Ultra-Broadband

In your opinion, how your organization benefiting from the knowledge and experience you acquired through this course?, *Explain*

- We are public telecom operator and we follow requirements of our cotumer and markets.
- In my opinion i get many useful information and knowledge witch i can use to support my organization.
- Information is power.
  NGN is the future of the networking. If you are working in the networking and not be informed of its evolution, you will be exceeded in a short time. This technology goes at the speed of MACH. Networking is a dynamic technology.
- -
- The knowledge and experience I acquired through this course will help me for future work in my company especially in NGN environment.
- As a National Regulators, my entity needs to have vast knowledge and understanding in all forms of telecommunications. This will enable her to render sound decisions in regulating the telecommunications sectors properly.
- Since ICT Office is a national agency in implementing and regulatory entity in terms of ICT here in the Phlippines, this course definitely contributed a lot in terms of net technologies and the likes.
- This is good course, I need to share the NGN and Clouding computing. let org know about it
- In my opinion they will get some on one who can involve on the future networks design and recommendation. This course helps me to acquire this knowledge.
- As a regulatory body of Nepal, I have gain knowledge about How can correlate cloud computing and NGN in telecom indusrty.
- This training will allow me to improve the courses I taught already, including NGN. Cloud Computing and Mobile Cloud Computing are new acquisitions but very beneficial for my school
- I would be able to understand the new concepts in a better way and utilize the acquired knowledge.
- ..
- I will be usage the knowlegde gain during this training in my work and also will help desired collegues or others to understand the FN and cloud computing.
- After this course I know more about future network and this knowledge will definitely help me in my future work.
- I have new knowledge that I could put into practice in my various courses at our institute
- The knowledge about ICT trend is necessary for the employees to have self development and to gain important skills in their occupations.
- I am working in telco operator and we are faceing with this migration phase.
- It has give me much more insights into NGN in a very concise and comprehensive manner too.

Each ITU course is global, reaching all regions and countries worldwide.

ITU e-learning Feedback from Participants:

Giga Speed Wireless and Mobile Broadband Internet

In your opinion, how your organization benefiting from the knowledge and experience you acquired through this course? *Please explain*

- in near future, this knowledge would be in every day use in terms of planning of our organization.
- Better understanding for the upcoming network
- more confident in dealing with 4G/LTE devices, better understanding
- future RFP preparation can be done easily
- Our organization is Communications Regulatory Authority seeking the most advanced technological progress and quality of services. The main functions are supervision of radio spectrum and consistent planning of radio frequencies. So, the experience of the course may be applied in in our daily work, for example drafting national plans for 5G installation.
- All information is usefull and will be applied in development of future regulatory documents.
  Also received knowledge and experience increase professional level.
- With my better overlook on this topic
- This course will help my organization to be better prepared for the future of Mobile telephony.
- i have acquired lot of knowledge related to lot of technologies that have been detailed in this course and on my side IoT topics were so informative and according to that i am planning to come up with some IoT project using this course as guidance to easily implement it
- As Telecoms regulator, I am supposed to be on top of issues to enable me regulate all aspects of the telecoms industry. As such the knowledge i have acquired would be very beneficial in this aspect in that the content were up-to-date and dealt into the future.
- I work for regulatory department and therefore, learning from ITU courses better equip me for Policy/Regulatory discussions
- The course deals with antecedents, topics and aspects in process and on topics that will be discussed in the world radiocommunication conferences in the near future and this is fundamental for the administrations and for the personnel that prepare the documentation of officials that will participate in them. It shares knowledge that is important for making future decisions.
- This course has better my knowledge in wireless transmission field. This will benefit the organization in any wireless transmission works that may be assigned to me.
- The course allowed me to know relevant aspects of the current and new technologies that will help me in the moment of interpreting the current regulation in the region and propose new regulations as they are implemented in the telecommunications market.
- Knowledge about these things are essential to do the job and meet the targets (supervise that use of radio equipment don't cause harmful radio interferences).
  This course was great opportunity substantially update knowledge about mobile technologies in short time.
- Permanent employee improvement brings benefits to any organization, and studying up-to-date material about ever-evolving technologies is a guarantor of stability and innovation in every field.
- This training allowed me to understand the issues of 5G technology and the benefits it will bring us in the future

One the most challenging issues for course participants is to prepare themselves, their organizations and their countries for the future...

Proposal for ITU CoE activities in 2019

- For 2019 the ITU CoE at FEEIT in Skopje proposes two elearning courses as self-sustainable trainings to be provided via the ITU Academy:

1) The first elearning course in 2019 has a title "NGN Evolution, Future Networks and Ultra-Broadband Internet", with proposed delivery dates 28 May - 24 June 2019 (duration: 4 weeks).

2) The second elearning course in 2019 has a draft title “Wireless and Mobile Ultra-Broadband: LTE-A Pro, WLAN, and 5G NR", with proposed delivery dates 19 November - 16 December 2019 (duration: 4 weeks).

ITU elearning: “NGN Evolution, Future Networks and Ultra-Broadband Internet“

- **Dates:** 28 May – 24 June 2019
- **Duration:** 4 weeks
- **Course fee:** 150 USD

- **Target audience**: This course is targeted at managers, engineers and employees from regulators, government organizations, telecommunication companies and academia, who are interested in understanding, implementation and regulation of NGN Evolution, Future Networks and Ultra-Broadband Internet, including technologies, standardization, regulation and content. Other institutions and individuals that are dedicated in building their capacity related to NGN Evolution, Future Networks and Ultra-Broadband Internet are also welcome to participate.

ITU elearning course:
NGN Evolution, Future Networks and Ultra-Broadband Internet

WEEK	TOPICS
1	Internet fundamentals
2	NGN evolution, Future Networks and trusted ICT infrastructures
3	Ultra broadband Internet access and transport
4	Services over ultra-broadband

ITU elearning: “Wireless and Mobile Ultra-Broadband: LTE-A Pro, WLAN, and 5G NR“

- **Dates:** 19 November - 16 December 2019
- **Duration:** 4 weeks
- **Course fee:** 150 USD

- **Target audience**: This course is targeted at managers, engineers and employees from regulators, government organizations, telecommunication companies and academia, who are interested in understanding, implementation and regulation of Wireless and Mobile Ultra-Broadband, including technologies, standardization, regulation and content. Other institutions and individuals that are dedicated in building their capacity related to Wireless and Mobile Ultra-Broadband are also welcome to participate.

ITU elearning course: Wireless and Mobile Ultra-Broadband: LTE-A Pro, WLAN, and 5G NR

WEEK	TOPICS
1	Mobile broadband technologies: LTE/LTE-A/LTE-A Pro
2	Ultra-broadband WLAN
3	Mobile ultra-broadband: 5G New Radio (5G NR)
4	Mobile ultra-broadband services

Summary

- ITU CoE at FEEIT in Skopje aims to continue its successful delivery of ITU training courses established over past 10 years (2009-2018).
- In 2019-2022 cycle of activities FEEIT has been selected for the priority area of “Wireless and Fixed Broadband Access”, hence the following two e-learning courses are proposed for 2019:
  - "NGN Evolution, Future Networks and Ultra-Broadband Internet", proposed delivery dates 28 May - 24 June 2019 (duration: 4 weeks).
  - “Wireless and Mobile Ultra-Broadband: LTE-A Pro, WLAN, and 5G NR", proposed delivery dates 19 November - 16 December 2019 (duration: 4 weeks).
- The distance learning courses held by the ITU CoE at FEEIT have proven to be self sustainable and very interesting for the targeted audience worldwide, hence ITU CoE at FEEIT believes that it is able to continue such practice in 2019 training activities.

Thank you!

ITU elearning: “NGN Evolution, Future Networks and Ultra-Broadband Internet“

This course will focus on NGN Evolution, Future Networks and Ultra-Broadband Internet from technology, regulation and business aspects. It will cover the Internet fundamentals, including Internet architectures (client-server, peer-to-peer), protocols (IPv4, IPv6, TCP, UDP), IPv4 and IPv6 addressing, DNS, Internet networking (unicast, multicast), WWW services (Web 2.0, Web 3.0), Internet traffic management and QoS, as well as strategic Internet governance. Further, the course will include ITU's Next Generation Networks (NGN), NGN evolution (NGNe), Future Networks, Software Defined Networking (SDN), QoS for NGN and Future Networks, trusted environment in ICT infrastructures, as well as business and regulatory aspects of Future Networks and trusted ICT infrastructures. Also, it will cover ITU’s ultra-broadband xDSL access, cable access (DOCSIS 3.0/3.1), ITU’s ultra-broadband optical access (G-PON, XG-PON, NG-PON2), QoS for fixed ultra-broadband access, Carrier Ethernet (Metro, Regional, Global), MPLS and VPN (Virtual Private Networks), SDN control of transport networks, end-to-end QoS, as well as strategic aspects for ultra-broadband on digital economy and society. Finally, the course will incorporate NGN VoIP and IPTV, cloud edge and fog computing, Internet of Things (IoT) based on NGNe, Artificial Intelligence (AI) for ICTs, Big Data, Smart Sustainable Cities (SSC), OTT ultra-broadband services (2k/4k/8k video, AR/VR, voice, messaging, social networking), network neutrality, as well as business and regulatory aspects of ultra-broadband services in the digital era.

ITU elearning: “Wireless and Mobile Ultra-Broadband: LTE-A Pro, WLAN, and 5G NR“

This course will focus on Wireless and Mobile Ultra Broadband Internet – LTE-A Pro, WLAN and 5G NR, from technology, regulation and business aspects. It will cover mobile broadband technologies, including mobile and Internet convergence, ITU’s role in mobile broadband Internet, 4G LTE, LTE-A (4.5G), LTE-A Pro (4.9G), mobile Internet of Things (IoT) architectures, QoS in 4G/4.5G/4.9G mobile networks, ITU spectrum management, as well as business and regulation aspects of mobile broadband. Further, the course will include ultra-broadband WLAN, including architectures, ultra-broadband WLAN standards (IEEE 802.11 ac/ad), Next Generation WLAN (IEEE 802.11x), WLAN for Internet of Things (IoT), mobile traffic offload over WLAN, as well as regulation and business aspects of ultra-broadband WLAN. Also, it will cover 5G mobile ultra-broadband, including ITU’s IMT-2020, 5G network architectures, network slicing, 5G New Radio (NR), 5G Next Generation Core (NG Core), Mobile Edge Computing (MEC), QoS in 5G, ITU WRC-2019 and 5G spectrum allocations, as well as business and regulation aspects for 5G mobile ultra-broadband. Finally, the course will incorporate mobile ultra-broadband services, including Voice over LTE (VoLTE), Voice over 5G NR (VoNR), mobile TV and video over 4G/5G, enhanced Mobile Broadband (eMBB), Ultra-Reliable Low-Latency Communication (URLLC), massive Machine Type Communication (mMTC), Virtual Reality (AR) and Augmented Reality (AR), network neutrality vs. QoS as well as regulation and business aspects for mobile ultra-broadband services.