

ITUEvents

## ITU Seminar for Europe and CIS on spectrum management and broadcasting

1-2 July 2020  
Remote meeting

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ITU Regional Initiative for Europe on Broadband Infrastructure, Broadcasting and Spectrum Management

ITU Regional Initiative for CIS on Fostering innovative solutions and partnership for the implementation of Internet of Things technologies and their interaction in telecommunication networks, including 4G, IMT-2020 and next-generation networks, in the interests of sustainable development

BROADBAND  
CONNECTIVITY

5G  
AND BEYOND

FREQUENCY  
MANAGEMENT

FROM WRC-19  
TO WRC-23

DIGITAL  
BROADCASTING



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# OUTCOME REPORT

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## ACKNOWLEDGEMENTS

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In addition, ITU would like to express their gratitude to **panel moderators** (Mr. Istvan Bozsoki, Head of Telecommunication Networks and Spectrum Management Division, ITU; Mr. Laszlo Pados, Consultant, National Media and Infocommunications Authority (NMHH), Hungary; Mr. Joaquin Restrepo, Capacity Building Coordinator; Study Groups Department (SGD), Radiocommunications Bureau (BR), ITU; Mr. Arseny Plossky, Rapporteur, ITU-D Q4/1; Mr. Jaroslaw Ponder, Head of ITU Office for Europe, ITU; Mr. Albert Nalbandian, Chairman, WG WRC-23, Regional Commonwealth in the Field of Communications (RCC); Mr. David Wood, Consultant, Technology and Innovation, European Broadcasting Union (EBU); Mr. Farid Nakhli, Programme Coordinator, Regional Office for CIS, ITU) for ensuring an excellent flow of proceedings.

Finally, ITU thanks all members of the **Programme Committee** who made this event possible: to Mr. Jaroslaw Ponder, Head of ITU Office for Europe for organizing and chairing the conference; to Natalia Mochu, Regional Director, ITU Office for CIS, to Mr. Istvan Bozsoki, Head of Telecommunication Networks and Spectrum Management Division, ITU, to Mr Farid Nakhli, Programme Coordinator, ITU Regional Office for CIS, to Joaquin Restrepo, Capacity Building Coordinator, Radiocommunications Bureau, ITU and Dr. Laszlo Pados, Consultant, National Media and Infocommunications Authority of Hungary (NMHH) for valuable input in the preparation of the conference; to Mr Iago Bojczuk Camargo, Junior Policy Analyst, ITU Office for Europe, who provided support to operations and input to this report; and to Julian McNeill, ITU Consultant, ITU Office for Europe, who coordinated the delivery of this event and is editor of this report.

## CONTENTS

<b>ACKNOWLEDGEMENTS</b> .....	2
<b>1. INTRODUCTION</b> .....	4
<b>2. PARTICIPATION</b> .....	4
<b>3. DOCUMENTATION</b> .....	5
<b>4. OPENING ADDRESSES AND SETTING THE CONTEXT</b> .....	5
<b>5. CONFERENCE SESSIONS</b> .....	6
SESSION 1: WORLD RADIOCOMMUNICATION CONFERENCE 19 AND BEYOND: GLOBAL, REGIONAL, NATIONAL PERSPECTIVES AND PREPARATION FOR WRC-23 .....	6
SESSION 2: STRATEGIC PLANNING AND POLICIES FOR WIRELESS INNOVATION IN EUROPE AND CIS .....	8
SESSION 3: SPECTRUM MANAGEMENT AND THE FUTURE OF 5G .....	10
SESSION 4: ECONOMICS OF SPECTRUM IN THE CONTEXT OF 5G, TENDERING OF 5G FREQUENCIES .....	12
SESSION 5: ELECTROMAGNETIC FIELDS AND 5G IMPLEMENTATION .....	15
SESSION 6: NEW AVENUES IN THE SPECTRUM MANAGEMENT AND BROADBAND MEASUREMENT METHODS AND TOOLS.....	18
SESSION 7: DIGITAL BROADCASTING: NEW SERVICES AND BEYOND .....	19
SESSION 8: INTERNATIONAL FREQUENCY COORDINATION: PROCESSES, RESULTS AND TASKS: REGIONAL AND SUB REGIONAL PLATFORMS FOR COORDINATION OF SPECTRUM ISSUE .....	22
<b>CLOSING CEREMONY</b> .....	25

## 1. INTRODUCTION

The “[ITU Regional Seminar for Europe and CIS on Spectrum Management and Broadcasting](#)” was held virtually on 1 and 2 July 2020. The conference was organised by the International Telecommunication Union (ITU) and hosted by the National Media and Infocommunications Authority (NMHH) of Hungary.

The Regional Seminar was conducted by the ITU Office for Europe, within the context of the European Regional Initiative approved by WTDC-17 on "Broadband Infrastructure, Broadcasting and Spectrum Management" and the ITU Office for CIS, within the context of the Regional Initiative for CIS on "Fostering innovative solutions and partnership for the implementation of Internet of things technologies and their interaction in telecommunication networks, including 4G, IMT-2020 and next-generation networks, in the interests of sustainable development". The workshop was also supported by the ITU BDT Spectrum Management Division, two ITU BR Counsellors (for the ITU-R Conference Preparatory Meeting (CPM for WRC-23), ITU-R Study Group (SG) 1 (Spectrum Management), and ITU-R SG 6 (Broadcasting service)) the Chairman of ITU-R SG4 (Satellite Services), the BR Capacity building Coordinator, and ITU-T SG5 (Environment, climate change and circular economy).

The event provided an opportunity to address the key challenges in Spectrum Management in Europe and CIS with relevant international stakeholders covering a variety of topics, notably including WRC-19 outcomes and preparation of WRC-23, implementation of 5G Policies at the National level and addressing of the EMF question as well as new trends in Digital Broadcasting and International Frequency Coordination.

Key topics covered by the workshop included:

- Session 1: World Radiocommunication Conference 19 and Beyond: Global, regional, national perspectives and preparation for WRC-23;
- Session 2: Strategic Planning and Policies for Wireless Innovation in Europe and CIS;
- Session 3: Spectrum Management and the Future of 5G;
- Session 4: Economics of Spectrum in the Context of 5G, Tendering of 5G Frequencies;
- Session 5: Electromagnetic Fields and 5G Implementation;
- Session 6: New Avenues in the Spectrum Management and Broadband Measurement Methods and Tools;
- Session 7: Digital Broadcasting: New Services and Beyond;
- Session 8: International Frequency Coordination: Processes, Results and Tasks, Regional and Sub Regional Platforms for Coordination of Spectrum Issue;

The Regional Seminar’s main outcomes are outlined in this report, structured by presenting the key points from each session.

## 2. PARTICIPATION

The seminar mainly targeted National Administrations, National Regulatory Authorities (NRAs), regional and sub-regional organisations and intergovernmental organizations, as well as regional and sub-regional industry associations, representing both ITU Members and non-Members. Over 40

eminent speakers presented and discussed during the sessions. Details about the [agenda](#) and [speakers](#) as well as all [presentations](#) delivered, can be found on the event’s website<sup>1</sup>.

Over 300 registered participants from more than 60 countries took part in the conference and an average of almost 180 participants was online for each session. Participants included high-level representatives of national regulators from the ITU Europe and CIS Regions, the National Media and Infocommunications Authority of Hungary (NMHH) as well as relevant international and regional fora such as the Conference of European Postal and Telecommunication Administrations (CEPT), the Regional Commonwealth in the Field of Communications (RCC), Arab Spectrum Management Group (ASMG) and the African Telecommunication Union (ATU).

### 3. DOCUMENTATION

The Regional Seminar was held virtually paperless. Relevant documentation, including the agenda, speaker’s bios, presentations were made available on the event webpage: [https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Pages/Events/2020/Spectrum\\_EUR\\_CIS/Remote.aspx](https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Pages/Events/2020/Spectrum_EUR_CIS/Remote.aspx)

The workshop was supported with **captioning** facility and the edited caption text will be made available soon event page. **Video recordings** of the workshop, as well as this outcome report, are also made available on the website.

### 4. OPENING ADDRESSES AND SETTING THE CONTEXT

#### Opening Ceremony Addresses – Day 1

In his opening speech, **Mr. Mario Maniewicz**, Director of the Radiocommunication Bureau, ITU, welcomed delegates and opened the Regional Seminar reminding that: *“The agreements we reached at the conference [WRC-19] can favourably impact the lives of billions of people around the world, creating a digital landscape for sustainable growth and development.* He also noted that: *“that this seminar is a real example of excellent cross-sectoral collaboration of Radiocommunication and Development Sectors, that continue to support each other in building national and regional human capacities and strengthening enabling role of ICTs, including those relying on wireless systems, to facilitate achievement of Sustainable Development Goals.”*. Finally, Mr Maniewicz concluded remarking that the discussions: *“are of utmost importance and I assure you that you can count on the BR to support your initiatives on spectrum management and activities towards advancing the WRC-23 preparatory process.”*.

Following Mr Maniewicz’ speech, **Dr. Péter Vári**, Deputy Director of the National Media and Infocommunications Authority (NMHH) stated that: *“the role of telecommunication came to the forefront and so far it is clear how important it is for communication and leading other sectors and how it intervenes in other’s lives.”* with reference to the COVID-19 crisis. In this context, Dr. Vári remarked that *“5G is not only important because it has the potential to support millions, the devices, that each of us needs, but also because it has the potential to transform the lives of people around the world.”*

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<sup>1</sup> [https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Pages/Events/2020/Spectrum\\_EUR\\_CIS/Remote.aspx](https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Pages/Events/2020/Spectrum_EUR_CIS/Remote.aspx)

## Keynote Address – Day 2

**Mr. Dan Sjoblom**, Chair of the Body of European Regulators for Electronic Communications (BEREC) opened Day 2 of the event by recalling the memorandum of understanding signed last year by BEREC and the ITU which *"is very important and is also very relevant given the topics that are on for discussion during the sessions today, and there are many sessions, and all of them have a very international scope and importance."* Mr Sjoblom also added that *"the demand for spectrum is, even if we can eventually come back to meeting in physical format again, not going to decrease. We will continue to see increases in the demand of spectrum, even in the longer run, and I think it's very much up to all policymakers to ensure that we adopt the right policies to use this resource wisely, both nationally and of course, even more important internationally so we can connect the world with each other."*

## 5. CONFERENCE SESSIONS

### SESSION 1: WORLD RADIOCOMMUNICATION CONFERENCE 19 AND BEYOND: GLOBAL, REGIONAL, NATIONAL PERSPECTIVES AND PREPARATION FOR WRC-23

**Focus:** Presenting WRC-19 results and implementation plans; challenges and priorities in preparation of WRC-23.

**Moderator:** Mr. Istvan Bozsoki, Head of Telecommunication Networks and Spectrum Management Division, ITU

**Speakers:** [Presentation 1](#), Mr. Philippe Aubineau, Counsellor for the ITU-R CPM, ITU BR; [Presentation 2](#), Mr. Albert Nalbandian, Chairman, WG WRC-23, Regional Commonwealth in the Field of Communications (RCC); [Presentation 3](#), Mr. Alexandre Kholod, Chairman, CPG-23, Conference of European Postal and Telecommunication Administrations (CEPT); [Presentation 4](#), Mr. Khalid Al-Awadi, CPM-19 Chairman and Representative of Arab Spectrum Management Group (ASMG); [Presentation 5](#), Mr. Kezias Mwale, Radiocommunications Coordinator, African Telecommunication Union (ATU)

#### Key points

- WRC-19 identified 17.25 GHz of additional spectrum for IMT (a.i. 1.13), 86% of which is harmonized worldwide, as well as enhanced harmonization of spectrum below 5GHz (a.i. 8); together with sharing of terrestrial IMT with IMT satellite component and with BSS (a.i. 9.1 issues 9.1.1 and 9.1.2); the additional spectrum identified for IMT is one of the main outcomes of WRC-19.
- Other main outcomes include the identification of 5.25 GHz of spectrum for HAPS (a.i. 1.14); a new regulatory framework for non-GSO satellites enabling sharing with GSO satellites and the deployment of mega constellations of non-GSO satellites (a.i. 1.6 and 7 issue A); and new regulatory, operational and technical conditions for earth stations in motion communicating with GSO FSS satellites.
- The agenda for WRC-23 includes four main areas (Fixed, Mobile and Broadcasting; Aeronautical and Maritime; Science; Satellite), as well as a number of other regulatory issues and standing items. The preparatory work has already begun with CPM23-1 as well as within the national and regional preparatory processes.

- WRCs preparations are fundamental from the perspective of the Regional Commonwealth in the Field of Communications (RCC). It is very important to master procedures to address the issues, have allies (depending on the agenda item or even on the single points of discussion), be prepared to compromise and speak good English as some documents are only prepared in English.
- Two important issues to be highlighted are 1) continuing the tendency of separating items (e.g. terrestrial and satellite) when the trend is going towards integration, and 2) the increase of the electromagnetic transmissions with respect to the environment and the lack of competent specialists.
- Following the CPM-23 process, RCC has already begun preparations for the AR-23 and WRC-23 and in February it has prepared a draft plan for the preparation of RCC countries for WRC-23, appointing focal points for agenda items and other issues, as well as developing principles for the preparation of general proposals. The next meeting is scheduled for September 2020.
- CEPT has already started to implement the decisions of WRC-19. The ECC Plenary tasked Working Groups and PT1 to review the outcome of WRC-19, to update the European common allocation table, and to translate the outcomes of WRC-19 such as IMT into ECC procedures as well as incorporate into ECC decisions.
- With regards to the CEPT priorities for WRC-23, the agenda of which follows to a large extent proposals of CEPT, many issues are significant for CEPT members and, therefore, CEPT is equally interested that the conference resolve all the issues raised. The structure of the CEPT CPG sees five project teams that will cover the Conference (PTA, PTB, PTC, PTD and ECC PT1) which are working remotely due to Covid-19 but hope to resume face to face meetings in Q4 2020.
- In the spirit of balancing the certainty for industrial investments and ensure that the world population benefits and takes full advantage of the best technologies that are currently available or will be made available, CEPT calls for an inclusive preparatory process with continuous collaboration across the regional organizations.
- From the perspective of the Arab Spectrum Management Group (ASMG), WRC-19 was a success in that it identified additional IMT spectrum with solutions to the issues in the 26 GHz, it took decision on ESIM to ensure that transport services are connected with GSO satellites, it established regulatory procedures for NGSO mega-constellations, and it encouraged spectrum harmonization for railway radiocommunications.
- In this context, the ASMG issued 48 contributions to the Conference, and it was satisfactory to see that 13 of the WRC-19 conclusions were aligned with the ASMG proposals. Countries such as the United Arab Emirates (UAE) are already working on the implementation of these outcomes.
- ASMG has already begun preparatory work for WRC-23 distributing the agenda items in 5 working groups, among with notably is the new WG for standards in line with what is being done in the European region. ASMG preparatory meetings have already been planned.
- ASMG notes that the UAE are willing to host WRC-23.
- The African Telecommunication Union (ATU) recognizes that in the spirit of compromise, successful outcomes such as the extension of the life of Resolution ITU-R 69, the retention of Resolution ITU-R 64 together with ITU-D, and additional mandatory measures for illegal VSATs were achieved in WRC-19.
- Other key outcomes of WRC-19 from the ATU's perspective were facilitation of new High-Altitude Platform Stations (HAPS) systems, additional spectrum identification for IMT, the

possibility for new usable satellite orbital resources for affected African countries and the possibility to use Fixed Satellite services plan as a group of countries.

- The main priorities for ATU's Secretariat for WRC-23 are agenda item 1.2 on IMT, as coverage remains an issue in Africa, HIBS below 2.7 GHz to foster rural coverage in the continent and the future of the UHF band for Region 1.
- The preparatory work for WRC-23 is being carried out in parallel through African Preparatory Meetings, which takes decisions (APM-23 occur once a year the first of which in August 2020), and within ATU's WRC Preparatory groups, or WG23s, that carry out technical preparatory work for APM.

## SESSION 2: STRATEGIC PLANNING AND POLICIES FOR WIRELESS INNOVATION IN EUROPE AND CIS

**Focus:** Policy best practices facilitating implementation of new technologies.

**Moderator:** Mr. Laszlo Pados, Consultant, National Media and Infocommunications Authority (NMHH), Hungary

**Speakers:** [Presentation 1](#), Mr. Roman Kurdadze, Spectrum Experts Working Group (SEWG) Chair, Eastern Partnership Electronic Communications Regulators Network (EaPeReg); [Presentation 2](#), Mr. Darko Ratkaj, Senior Project Manager, European Broadcasting Union (EBU), [Presentation 3](#), Mr. Dmitry Korzun, Head of the Radio Frequency Spectrum Regulation Department, Ministry of Communications and Informatization of the Republic of Belarus; [Presentation 4](#), Ms. Natalia Vicente, Head of Public Affairs, EMEA Satellite Operators Association (ESOA), [Presentation 5](#), Mr. Pavel Mamchenkov, Spectrum Strategy and Management, Megaphone, Russia.

### Key points

- The SEWG's activities began in 2017 as a partnership commitment in the use of 700MHz and 3400-3800MHz. This remains one of the central discussions among SEWG members as it helps lay out the roadmap for topics pertinent to 5G networks.
- In 2020, the SEWG managed to coordinate national spectrum strategies in the EaP countries.
- The scope of work for 2020-21 continues to deal with questions of supplementary usage and approaches to spectrum, dealing with potential radio frequency bands for the implementation of 5G systems. Attention, in particular, given to 1400MHz frequency band usage-related aspects and 2400 & 2600MHz frequency bands in order to guarantee a harmonized use of 5G frequencies in the EaPeReg region, though still needs further discussion and help from international organizations.
- The scope also acknowledged the issues of emission control as well as the attention to 5G corridors—as, for example, it pertains to tourism. All in all, these new approaches are to be aligned with those of EU countries.
- As the value of Wireless is increasing, the balance between the commercial value of spectrum and its long term societal public value must be addressed, especially in the context of strategic planning and policy regarding public service media (PSM).
- There are three pressing challenges for the PSM: 1) change in audience behaviour (which contributes to the increase of complexity as well as costs), 2) the global competition (increasingly represented by commercial broadcasters, telecom operators, and Internet giants); and 3) the pressure on PSM funding.



- Considering that PSM aims at reaching all members of society with content that is universally available (inclusiveness, affordability, accessibility) and considering that PSMs are investing in technological innovation to fulfil this duty, policymakers and regulators should support such long-term innovation.
- In particular, policy and regulatory support should be given on: non-public 5g networks, integration of terrestrial broadcast and the satellite and 5G ecosystem, arrangements of different bands, as well as other regulatory safeguards for online content distribution.
- With nearly 100% of 3G coverage across Belarus' territory, the country is slightly behind when it comes to LTE, though the prediction that by 2022 most Internet traffic will occur through 4G networks. 5G, on the other hand, is also being examined at the top-level of the government with multiple ministry representatives headed up by the first Deputy Prime Minister, with expected coverage by 2025.
- The plan for 5G includes the use of 700 MHz, 2.6, and 3.6 and 26 GHz. Parallel to these changes in mobile Internet access, trail operations are taking place on a large scale with tests involving 5G networks and respective operators. The country has worked on its own algorithm that helps plan how the introduction of 5G networks will unfold.
- A priority challenge for 5G deployment is the need to harmonize national strategies for present and future plans, set the timelines for 5G deployment with the neighbouring countries, thus discussing it with regional groups such as CEPT and RCC.
- Other challenges are the need to synchronize roadmaps, coverage, and deployment details with countries in the region in order to create nodes of collaboration and network integration as well as the need to determine the requirements for 5G equipment and infrastructure so the networks can deliver what they promise.
- The high total cost of ownership (ICT) between operators and regulators is a factor for 5G. In this context, it is important to consider modern spectrum licensing methods with mixed spectrum releases that include infrastructure sharing provisions, and this may occur in various ways. The scale of 5G requires new models and partnerships to make the deployment of the network economically viable as well as to allow new ways of flexible policy frameworks.
- In the Mixed Spectrum Release Model, there are two distinct components: 1) high population density area with exclusive allocations, and 2) Non-Urban Model with Shared A buffer area in between these two is desirable to be calculated by means of on-line access to a spectrum management tool/database.
- There are also other models of spectrum sharing (such as the High Traffic Demand Priority Access (Hong Kong Model), Technology Innovation Driven Sharing (encompassing Tiered Model and AI Technologies), Club Sharing in Italy, the Three-Sharing Parties of MNOs in China, and 5G joint venture in Russia, which is based on the Spectrum and Infrastructure Sharing as well as Spectrum reallocation to boost economic growth, practicality, and network services.
- Key challenges of TCO of 5G networks could be overcome sharing efforts of MNOs as it pertains to the sharing spectrum, sitting costs (network sharing), and backhauling as well as integrated support by regulators from a regulatory standpoint.
- With the expansion of satellite services and the evolution of satellite operators, we are seeing various forms of innovation across the value chain that respond to the overall greater demand (e.g. different orbital slots, increased payload flexibility, etc.), expanding the overall commercial and services possibilities while forcing operators and regulators to agree on new standards.
- With regard to strategic planning for Europe and CIS, it must be noted that in Europe only there are still 6 million unconnected households and that CIS countries have even a bigger

challenge. With EU rural target of 30 Mbps, it is challenging to reach all through fibre or FWA, thus showing there is no solution that will fit everyone.

- 4G remains incomplete across the region and 5G will require greater investment and partnerships, especially in consideration of vertical integration and still unclear business models. Whatever comes next, it will need a multi-technology approach.
- The COVID-19 situation has proved the increased importance of ensuring complete Internet coverage especially to grant access to remote learning (TV/internet services), welfare, flow of information, the continuity of life amid emergencies, as well as on other solutions that ensure access opportunities for all.
- In terms of digital-strategy and planning, there is a need to look for resilience and it must be built in the planning in view of the increased vulnerabilities as the pandemic has highlighted. Cross sector collaboration, and a multi-technology approach it is going to be key to address all of the challenges.

### SESSION 3: SPECTRUM MANAGEMENT AND THE FUTURE OF 5G

**Focus:** Technical challenges in implementation of 5G.

**Moderator:** Mr. Joaquin Restrepo, Capacity Building Coordinator; Study Groups Department (SGD), Radiocommunications Bureau (BR), ITU

**Speakers:** [Presentation 1](#), Mr. Victor Strelets, Chairman, ITU-R Study Group 4, Radio Research and Development Institute (NIIR), Russia; [Presentation 2](#), Mr. Morten Friis-Møller, Senior Advisor, Nordic Council; [Presentation 3](#), Mr. Darko Ratkaj, Senior Project Manager, European Broadcasting Union (EBU); [Presentation 4](#), Ms. Aarti Holla, Secretary General, EMEA Satellite Operators Association (ESOA).

#### Key points

- 5G availability can be broken down in high bands, medium bands, and low bands. The use of frequency ranges is a problem that needs to be addressed in the context of Region 1 because the spectrum in the 3.6 - 3.8 GHz range still needs to be discussed in WRC-23.
- Prediction is that only 37% of the global earth territory will be covered by 5G, which explains why it is very important that the development of satellite networks take place to guarantee that white areas are covered, especially in remote areas and in the context of adaptation required by the global pandemic (e.g. remote learning, telemedicine, emergency, etc.).
- Due to the demand and prediction of 5G-enabled services, a breakthrough in satellite communications is expected as a consequence and condition of 5G development. To ensure the secure use of the services as well as protection of the users' activities, only a combination of satellite and land infrastructure will be sufficient in terms of systems development.
- Standardization is set to play a critical role within the context of 5G development for EU and CIS countries. Very different geographical conditions, populations, and service demands will require a standardized approach to allow a cohesive use of the services and devices that are set to enter the commercial market across the region in the years ahead.
- The 5G service impact on green transition, productive competitiveness, and social sustainability depends on a variety of challenges: very little cross-regional collaboration (e.g. countries and cities have individual agendas and goals), test and trials are hampered by low terminal availability, more investment on 5G actually occurs outside the European region

(with attention given to South Korea, China, and the United States), 5G revenue could cannibalize on 4G investments, lack of new business models in practice, and others.

- Because 5G is becoming an innovation platform for stakeholders, stimulating new products and sustainable solutions is critical. Often times, operators push the agenda that needs to be promoted or regulated by the government, but more action is needed.
- A few welcomed actions would include: support the development of a 5G ecosystem in the Nordic-Baltic region and monitor the development and application of 5G-based technologies; create deregulated experimental sandboxes for 5G innovation; consider opportunities for new stakeholders to license spectrum, not only the traditional telecom operators; Create a dedicated Nordic-Baltic funding scheme supporting regional cooperation between digital test environments; Promoting regional use- and showcases.
- Viewing 5G as a communications technology allows for a well-encompassing understanding of its impact and potentials to media organizations. As such, it has potential to be applied not only in content creation/production processes (e.g. news gathering, media file transfer, on-site, live event, etc.) but also in distribution to the final users, with a direct impact on user devices.
- This is because the biggest value of 5G will come from services and applications it enables — and not solely on the infrastructure or technological dimension. Moreover, despite its potential to impact/be impacted by the media sector, 5G will not replace the existing technologies, but rather grow alongside previous media technologies.
- Without further amendments, 5G will not meet all requirements of the media sector, given that most of the current deployments focused eMBB and telco-centric business models. Therefore, going beyond the technical performance, it is possible and desirable to adapt 5G to the needs of media organizations and their audiences who, in turn, may also influence the technological and regulatory solutions for 5G.
- Furthermore, the regulatory framework and access to the spectrum are yet to be established. 5G will not replace the existing technology in the media sector, because these technologies also continue to evolve; in other words, it is vital to look at possible coexistences between 5G and conventional networks, considering the both terrestrial and satellite aspects that make production and circulation of content and media cultures possible.
- Building upon the European Commission view of 5G as a “network of networks,” satellites emerge as essential macro-scale infrastructures capable of coping with the expected paradigm shift brought about by 5G. Satellites can already provide 5G backhaul services for IoT, multicast, and the industry is already working on further applications. After WRC-19, future growth is expected in L, C, Ku, Ka, Q/V bands in order to cater for new applications.
- Satellites are currently gaining more attention as important they will enable 5G use cases for key verticals, in addition to preventing 5G-divide. Current satellite technologies (wide-beams, HTS, and HTS constellations) already provide a range of satellite capabilities capable of supporting 5G deployment needs, meaning that it is important that continued protection of satellite allocations are in place for the continuity of services.
- Operators are exploring opportunities to work with MNOs to assist them in adopting satellite as part of their outreach and solution set when rolling out 5G. From video chat/streaming/internet browsing to multi-connectivity between cellular and satellites, the satellite technology validations hold potential for further advancements in the development, distribution, and access of 5G services.
- Increased demand for video on a global scale helps explain the important role of satellites for the transmission of huge amounts of data meaning that more efficient ways to deliver content

to the edge will be needed with 5G. Satellite overlay can be used to pre-position content for local storage.

- 5G networks should be compatible with the roles of the satellite, embedding satellite into critical parts of terrestrial infrastructures. The integration of 5G and satellites hold promise in achieving an increased subscriber base, business cases for verticals requiring uninterrupted coverage, as well as network efficiencies, and reduced costs.

## Q&A

**Q:** Mr. Visokomogilski, Vladimir - BUL : to Ms Holla Maini, Arti: *Yesterday speaking for the GSR-20 Ms.Holla mentioned satellite connectivity in Mexico for 50 USD cents .My question is what are the services provided for this price?*01:29 PM

**A:** Ms. Holla Maini, Aarti - BEL : Answering to Mr. Visokomogilski, Vladimir: *In Mexico most services from streaming to regular internet usage and even education*

**Q:** Meda, Shefqet - ALB : to Ms. Holla Maini, Aarti: *Do you think regulators and industry have done enough to clarify the population on the advantages of 5G technology including assistance in applications for tracking positive covid persons in the face of untrue information on their risk?*

**A:** Ms. Holla Maini, Aarti - BEL : Meda, Shefqet – ALB: *I think consumers will take it on if and when it is available but not if it comes at excessive cost. Right now MNOs are still looking for the killer app and with the dominance of video over networks and the lack of interest from verticals, this is not obvious at all*

## SESSION 4: ECONOMICS OF SPECTRUM IN THE CONTEXT OF 5G, TENDERING OF 5G FREQUENCIES

**Focus:** Economics of tendering and spectrum allocation and investment gaps in 5G infrastructure: challenges and opportunities.

**Moderator:** Mr. Arseny Plossky, Rapporteur, ITU-D Q4/1

**Speakers:** [Presentation 1](#), Dr. Peter Vari, Deputy Director General, National Media and Infocommunications Authority (NMHH), Hungary; [Presentation 2](#), Mr. Andrei Gavrisi, Director, National Radio Frequency Management Service, Moldova; [Presentation 3](#), Mr. Justin Moore, Head of Spectrum Strategy and Space, Office of Communications (OFCOM), United Kingdom, [Presentation 4](#), Mr. Stephen Pentland, Group Policy & Public Affairs, Vodafone; [Presentation 5](#), Mr. Vadim Poskakukhin, Project Manager, LLC Spectrum Management, Russia.

### Key points

- Having specific objectives and a long-term vision of 5G in Hungary and in the region provides insights on the directions to take. The [National Roadmap](#) from 2017 is such an example—it addressed the future of digital broadcasting and mobile broadband frequency use options in terms of spectrum allocation. This document also included major terrestrial transport paths, EU Rail corridors, as well as 5G auction plans.

- Hungary has three bands which belong to the 5Gs, and the 700 MHz, the 2100 and 2600 MHz, and 3600 MHz. The 2,600 MHz band was unsold because the operators generally use FDD blocks in this band. But 3600 MHz band and the other bands were sold and will ensure deployment of 5G in Hungary.
- Based on the auction network case groups have been launched on i) rail traffic, ii) road traffic, iii) coverage of the population in cities and towns, iv) tourism and v) vertically integrated sectors. These include coverage obligations and specific deadlines. Within this framework there will be a 50% reduction in fees over a ten-year period.
- In this context all applicants are treated equally, and the frequencies are obtainable through this procedure up to September 2034. Refarming is possible on a voluntary base, through agreement between MNO's or by NMHH approval.
- The Republic of Moldova is currently developing the Spectrum Management programme for 2021-25, building upon the previous 2013-2020 programme. This program recognizes the need to harness the available radio spectrum resources as well as the need to continue the application of best practice with reference to the implementation of the EU's Multiannual Policy Program in the field of radio spectrum (Radio Spectrum Policy Program-RSPP, Decision 243/2012 / EU of 14.03.2012); thus, ensuring the possibility of implementing 5G mobile broadband communications services.
- The main focus of the Spectrum Management Program is on frequency bands identified for IMT in the ITU Radio Regulations, particularly designated in Europe for early 5G implementation. Targeted bands are the following: 700 MHz, 3600 MHz, 26 GHz, and also 1500 MHz (L band) and 2300 MHz. The program also targets available spectrum resources from the 450MHz, E900, 2100 MHz and 2600 MHz bands.
- The program has two main stages: 1st stage: consolidation of the current networks (2021-2022 years), some reframing and consolidation activities on the current bands and technologies; 2nd stage: (2022-2025 years), creation of conditions and enabling the environment for implementation of 5G networks.
- The program's major objectives in the long run are to 1) make radio spectrum resources available in amounts capable of meeting the market demand; 2) to achieve predictability of the spectrum management regulatory environment; 3) to attract efficient investments in the national radio communications infrastructure; 4) to create the legal framework for a sustainable development of terrestrial mobile electronic broadband communications and other types of communications for the years 2021-2025; 5) to guarantee technological neutrality and acceleration of the implementation of new technologies and services facilitating market competition; 6) to promote increased use of broadband Internet access services, including in rural areas; 7) and substantially reduce the digital divide between urban and rural areas.
- Spectrum is all about the use and getting the greatest value from that. In the UK, there is a legal duty to ensure the optimal use of the radio spectrum with the ultimate aim furthering the interests of citizens and consumers in the UK to enrich communications.
- Spectrum allocation in the UK depends on what is the geographic use of it, whether it localized, whether it national, whether it indoor or outdoor and then also the economic conditions of whether demand will exceed supply, nationally or in particular locations. With these considerations, it is a licensing regime that is appropriate and can be derived.
- 5G has some particular requirements both technical and in term of deployment requirements, since 5G is a mixture of frequency bands used for different applications. Therefore, each band requires to think about what it could be used for and what might that mean for licensing.

- There are a number of bands that have been awarded particularly in the lower and mid bands for mobile services. 700 MHz (low frequency cells), and 3.6-3.8 GHz are bands being reserved for 5G networks (high frequency cells) for which auctions are being prepared while though there are also some bands that are for shared access 3.8-4.2 GHz.
- Unlike the 2013 4G auction which had a provider's obligation to cover 98% of premises through licensing, 5G auctions will not include coverage obligations as the rural areas will be compensated by a shared rural network agreement with MNOs. So operators will need to grant 90% coverage by 2026, and this has now been implemented by licensed conditions in the mobile network operating licenses and OFCOM will be responsible for ensuring those conditions are complied with.
- In the context of new verticals that could benefit from the use of 5G, OFCOM has now issued shared access licenses that give people the ability to deploy mobile technology, but on a smaller basis. This implies that anyone can request for access to a band that is owned by a mobile operator and used in a particular location and used for a limited period of three years or potentially longer.
- Vodafone emphasizes the focus on digital society resilience. The COVID-19 crisis has confirmed how critical digital networks in achieving societal goals and improving resilience. Therefore, digital networks demand investments in the long run. In the past, most investments were carried out by the private sector, but now the Return on Capital Employed is around 5% for the industry which presents as a challenge. Policymakers should be more aware of this to make sure the investments continue.
- With the best of intentions for the last 25 years, policymakers in Europe have focused on artificially getting mobile consumers the lowest possible price through the maximum mobile network competition, which is the opposite of what we see in the U.S. and some parts of Asia, and this is not sustainable.
- As the average price of 5G equipment is going up, European operators are caught in this crossfire of the trade dispute between the U.S. and China, and some vendors become out of reach. This will be further exacerbated by the COVID crisis.
- In this context, and after 35 years of privatization, policymakers increasingly recognize that there is an investment gap and are starting to address it, especially with investment in passive infrastructure (e.g. Germany).
- Approaches to the auctioning, competition and investments that are spectrum related are starting to change. The main focus in Europe in Europe should be to encourage investment in sustainable and competing digital networks so to ensure that digital solutions deliver societal resilience.
- The current market configuration shows that although mobile broadband continues to provide a lot of economic opportunities, expenses continue to grow as the amount of data traffic increases. Many operators are already at the point where the costs are becoming larger than revenues of the margin. There is a need to maximize the possibilities for operators to invest in new services and the infrastructure to sustain them.
- The mobile communications industry should be evaluated as a means to spur the digital transformation of traditional industries. Optimization of existing business models may help transform MNO into a catalyst for digitalization for traditional industries.
- An additional new spectrum with wide channels is one of the major tools to address the increasing cost of growing traffic delivery. The Mid-band spectrum, at this current point, represents an important frequency for further business models. There is a need for wide

channels, preferably 80 to 100 MHz—likely an achievable goal to outweigh traffic growth by reducing the price of Gbyte delivery.

- Spectrum fees and payments, as other potential non-tax payments, should be adjusted to be less than 10% of MNO revenues or preferably even below 5%, and annual payments are preferred to lump-sum payments, not to stifle investment into new infrastructure and industrial applications development.
- The Session also highlighted the need of assisting non-EU countries in Europe Region in drafting sound 5G strategies and tendering processes.

## Q&A

**Q:** Ms. Meda, Shefqet - ALB : to Dr. Vari, Peter: *Is this amount of spectrum enough for providing 5G services considering that it will not be allocated only to one operator to be fair in the market?*

**A:** Dr. Vári, Péter - HNG : Answer to Ms. Meda Shefqet: *Yes, this amount of spectrum seems to be the 3 winners. We strive to use spectrum efficiently and encourage competition at the same time. Nor should we forget that it is possible to launch a 5G network in other bands as well. Based on technology neutrality.*

**Q:** Ms. Sukhodolskaia, Tatiana - RUS : Dr. Vari: *how was the reserved price defined?*

**A:** Dr. Vári, Péter - HNG : Answer to Ms. Sukhodolskaia, Tatiana: *We analysed data from countries that have already sold these 5G bands. Of course, we also took into account the economic and population data of the given country, and then on the basis of these we calculated the benchmark data for Hungary and determined the reserved prices for each bands (blocks). For example, the starting price of a 5 MHz block in 700 MHz band was HUF 5 billion and reached HUF 13 billion by the end of the auction.*

**Q:** Ms. Sukhodolskaia, Tatiana - RUS : Mr. Moore, Justin: *for what bands do you use such licenses?*

**A:** Moore, Justin - G : Answer to Ms. Sukhodolskaia, Tatiana: *1781.7-1785 / 1876.7-1880 MHz, 2390-2400 MHz, 3.8-4.2 GHz, 24.25- 26.65 GHz.*

**Q:** Sukhodolskaia, Tatiana - RUS : to Mr Vadim Poskakukhin: *Why when talking about mid band the 2,1 GHz, 2,6 GHz, 4,8 GHz are excluded?*

**A:** Vadim Poskakukhin : answering Ms Sukhodolskaia, Tatiana: *Mid-band includes 3.4-4.2 GHz and 4.4-4.99 GHz. If available 2-3 GHz also could be considered as mid-band. It could be 2.3-2.4 GHz band for example.*

## SESSION 5: ELECTROMAGNETIC FIELDS AND 5G IMPLEMENTATION

**Focus:** EMF question of rolling out 5G networks: main issues and debates.

**Moderator:** Mr. Jaroslaw Ponder, Head of ITU Office for Europe, ITU

Speakers: [Presentation 1](#), Mr. Rodney Croft, Chair, International Commission on Non-Ionizing Radiation Protection (ICNIRP); [Presentation 2](#), Ms. Emilie van Deventer, Head of EMF Project, WHO, [Presentation 3](#), Mr. Fryderyk Lewicki, ITU-T SG 5 Chairman, ITU-T SG5 WP1/5; [Presentation 4](#), Mr. Manuel Mielke, Product Manager, Mobile Network Testing, Rohde-Schwarz.

### Key points

- The WHO EMF Project was established in 1996 to investigate the health effects of electromagnetic fields and to also advise national authorities on radiation protection from these fields, thereby responding to Member states' and the public's longstanding concerns.
- WHO draws on the knowledge from over 40 years of research which highlights that at low frequencies we can have induced currents in the body at high enough levels of intensities, whereas at high frequencies, around the GHz, we have heating effects, if the fields are strong enough. What is currently unknown is whether at a low level of intensity these effects have an impact.
- The way in which WHO evaluates risk for health is to look at epidemiological studies or at experimental studies. In addition, WHO is currently reviewing the entire literature with a report due to be published soon, in parallel to the work being done by national authorities considering the great media attention received by 5G and health.
- In February 2020, WHO has launched a [Q&A tool](#) on 5G and EMF highlighting that to date, and after much research performed, no adverse health effect has been causally linked with exposure to wireless technologies, though only a few studies have been carried out on 5G frequencies.
- Recently, a [COVID-19 myth-buster](#) has also been developed by WHO to demystify some false information provided in social media with regard to 5G mobile networks and COVID 19.
- From the perspective of ICNIRP, when it comes to norms and risk communication on EMF it is fundamental to have guidelines in place. Clear and accurate information is central to any such risk communication activity because we know we can operate 5G infrastructure without risk to health, but this is not what the world necessarily thinks.
- The Guidelines which encompass 3G, 4G, 5G, provide exposure levels that if a device complies with will not cause harm. The restriction values are determined by identifying harm thresholds and then reducing them by a factor of 50. Both steps are determined very conservatively so that even above limits, the exposure would not cause harm.
- Changes in the new Guidelines compared to the 1998 Guidelines relevant to 5G include the recommendations for frequencies higher of 6GHz up to 300 GHz, revision of local exposure restrictions above 6 minutes, with changes to the crossover frequency of going from quantity of SAR to the power density and spatial averaging reduced from 20 down to 4 centimetres squared, as well as amendments for local exposure levels under 6 minutes to protect against sequences of pulses or continuous wave exposures.
- Finally, the Guidelines have introduced a number of new reference levels in order to carry out compliance assessments for more exposure scenarios.
- With regards to EMF, frequency is only one factor as the second factor is exposure levels and in there are various reference levels depending on the guidelines considered (ICNIRP 2020, ICNIRP 1998, IEEE C.95.1-2019).
- There is no possibility to leave in an environment without electromagnetic fields. For mobile devices, the most important factor is local exposure, and the widely accepted limit is 2 watts per kilogram.



- Devices and antennas have automatic power control depending on the environment they need to operate in. For example, in a train, much more power is needed comparing to open spaces even in a big city because the metal in the train works as a screen.
- Resolution 176 set the obligation on ITU to work on EMF. ITU-T Study Group 5 under question 3 is specifically working on the topic and has elaborated 11 recommendations during study cycle 2017-2020. Recommendation K-91 is the most important as it references to IEC standards, IEEE guidelines as well as ICNIRP and WHO guidelines. Moreover, question 3 has produced 8 supplements, that are written for the general public in a very simple way, with very simple language and answer many questions.
- Considering 5G and EMF, the transition from previous generation technologies only entails different equipment, with a substantial increase in the number of small cells, variations in the exposure level in space and time, and a substantial increase in simultaneously emitting sources with the result of reducing overall exposures compared to 4G.
- 5G is a new generation of systems, which is dedicated to the more efficient use of energy with lower exposure level around the base station and from devices and is the first system design taking into account all of these factors.
- When it comes to 5G measurements, the only signals we can focus on with a passive calibrated receiver are SSBs, where beams that are transmitted are changing over time and different directions are provided after each other.
- In a code selective EMF, beams transmitted from the keynote can be decoded with a measurement receiver by receiving the direct path of the beams. Once all the beams are decoded one by one, they are summed to get total power of the SSB.
- In the second step of a code selective EMF we have to apply the extrapolation factors including a) extrapolation of SSB power to full 5G NR carrier spectrum, ii) Beam / gain offset between SSB and data beams, and iii) uplink and downlink relation factor in TDD.
- Rhode-Schwarz produces TSMA6 a massive measurement receiver and a directional antenna or omni directional antenna for EMF measurements. The receiver can detect all 5G carriers on-air and then automatically calculate PCIs and SSBs, apply extrapolation factors and derive the total electric field strength (more details in the .ppt). The data is transferred via Bluetooth to Android apps in real time and can be downloaded in .CSV format for study.
- The Session highlighted the need of assistance in capacity building on the EMF at the Country level.

## Q&A

**Q:** Seakale, Helen Nakiguli - UGA : *When will the new ICNIRP 2020 guidelines be effective for use?*

**A:** Croft, Rodney - AUS : *They were released in March and so are available for use now. These are freely available at [www.icnirp.org](http://www.icnirp.org)*

**Q:** MCNEILL, Julian - INT : *Ms Van Deventer and Mr Croft, in your experience what are the country priority needs (Member States' perspective) when it comes to the EMF? clear information? expertise?.*

**A:** Sekasala, Helen Nakiguli - UGA : *answering to MCNEILL, Julian: i think in my country, its mainly clear information*

**A:** van Deventer, Emilie - SUI : *answering to MCNEILL, Julian: I agree that from many member states' perspective, clear information is important*

**A:** Croft, Rodney - AUS : answering to MCNEILL, Julian: *I would agree that countries appear to be looking primarily for clear information that they can communicate.*

## SESSION 6: NEW AVENUES IN THE SPECTRUM MANAGEMENT AND BROADBAND MEASUREMENT METHODS AND TOOLS

**Focus:** Discussion on new spectrum management methods and experience with broadband measurement tools.

**Moderator:** Mr. Albert Nalbandian, Chairman, WG WRC-23, Regional Commonwealth in the Field of Communications (RCC)

**Speakers:** [Presentation 1](#), Mr. Philippe Aubineau, Counsellor for ITU-R Study Group 1, ITU BR; Presentation 2, Mr. Dan Sjoblom, Chair, Body of European Regulators for Electronic Communications (BEREC); [Presentation 3](#), Mindaugas Zilinskas, Deputy Director, Communications Regulatory Authority (RRT), Lithuania.

### Key points

- ITU-R studies on spectrum management and summary of important products such as ITU-R Recommendations, Reports and Handbooks, and Technical bases for WRCs (references can be found in the presentation). A stable and predictable regulatory environment in these areas is needed for future investments as well as for collaborative actions between regulators and operators.
- ITU-R Study Groups include: SG1: spectrum management; SG3 radio-wave propagation; SG4 satellite services; SG 5 Terrestrial services; SG6 Broadcasting service; SG7 Science Services. SG1 addresses a variety of topics in spectrum management such as economic aspects, digital dividend, dynamic access, EMC/EMI, spectrum monitoring, as well as many others.
- With regard to ongoing work on spectrum management, studies on Question ITU-R 241/1 (approved in August 2019) on methodologies for assessing or predicting spectrum availability are being carried out. This will address larger and more complex spectrum management data in the viewpoint of data science and may require advanced data analysis methods including machine learning. This may improve overall spectrum utilization.
- Spectrum monitoring issues are also being addressed with regards to population coverage measurement, EMF measurements, measurement of harmful interference and performance evaluation. This may lead to a revision of the ITU-R Handbook on Spectrum Monitoring.
- ITU-R provides the possibility for many stakeholders to contribute to these activities directly through the Study Groups. It is not only the administration that can contribute, but also all the different stakeholders, as sector members, associate and academia.
- BEREC tends not to duplicate the work done by other international organizations in terms of spectrum management (e.g. ITU, ENISA, Radio Spectrum Policy Group, etc). However, BEREC recognizes the importance of close cooperation between different regulatory bodies and associations of bodies on a global, regional, and national levels.
- The role that BEREC can play in broadband markets and the spectrum management areas is to support legislators and other authorities in understanding a little bit the consequences of posting or increased levels of requirements and regulations. BEREC's activity in parallel to what proposed by other European countries helps keep a consistent application of regulation when it comes to the market.

- With regard to broadband measurement In March 2020, BEREC published guidelines setting out a number of Quality of Service (QoS) measurement parameters, including for end users with disabilities, in line with art. 104 of the European Electronic Communications Code (EECC).
- BEREC also holds interests in 5G, launching a report in 2019 on the impact of 5G on regulation and the role of regulation in enabling 5G ecosystems. That report was a result of many conversations with stakeholders. The report relied on a horizon scanning exercise, and it looked like important things like new value chains emerging from the changing business models, infrastructure sharing, exposure to EMF, electromagnetic fields, and so on.
- In Lithuania, licenses for UMTS were given from 2006 up to 2011-12, a period with significant development of networks in Lithuania. Starting in 2012, the regulator started publishing the coverage maps of all operators. Within two years, full coverage of 3G throughout the country was achieved by all operators.
- Transparency played an important role in turning the licensing, monitoring, and network development into practice. Mobile Internet speed monitoring played a role in safeguarding the same competition levels among private stakeholders within the context of 4G, which has nearly 99% coverage of the territory. Through special equipment, the coverage maps also included downlink speed for all operators.
- Official public information derived through drive-tests across the country, currently shows maps for speed coverage and speed—data speed—showing operators across the country for all that is possible: for all mobile generations, starting from 2G, 3G, 4G.
- Rural areas were also included, and operators supplied throughout the map for two loads: for 10% load, and 50% load. Results of the data collection/visualization came out in the CEPT report (report 321) on measuring and evaluating the quality of service mobile, Internet service quality. In general, they received positive results of comparisons when the network is loaded about 50% of their capacity.

## Q&A

**Q:** Vári, Péter - HNG : to Mr. Zilinkas. *First of all, thank you your excellent presentation. I have a question about the near future. Is there any plan to switch off the old technologies? 2G or 3G? New technologies (4G, 5G) could also use the bands which are currently used by old technologies.*

**A:** Mr Zilinkas – LTU: answering to Vári, Péter: *Concerning the switch off the old technologies – our operators are already considering to switch off 3G and to use 2.1 GHz band for 4G. 2G is still not under such consideration because of quite intensive use it for IoT. But now LTE has been started to use more and more intensively for IoT, so we could expect the same result as for 3G in near future.*

## SESSION 7: DIGITAL BROADCASTING: NEW SERVICES AND BEYOND

**Focus:** Challenges and opportunities for digital broadcasting in the age of 5G.

**Moderator:** Mr. David Wood, Consultant, Technology and Innovation, European Broadcasting Union (EBU), [Presentation](#)

**Speakers:** [Presentation 1](#), Mr. Ruoting Chang, Counsellor, ITU-R Study Group 6, ITU; [Presentation 2](#), Mr. Roberto Hirayama, Rapporteur, ITU-D Q2/1; Presentation 3, Mr. Peter MacAvock, Senior Manager of Delivery and Services, European Broadcasting Union (EBU); [Presentation 4](#), Mr. Aleksandar

Mastilovic, Director of Telecommunications, Communications Regulatory Agency (CRA), Bosnia & Herzegovina.

### Key points

- Beyond covering all aspects of spectrum relating to broadcasting, ITU-R Study Group 6 (ITU-R SG6) is a little bit unique in ITU-R as it covers all aspects of the broadcasting industry, from production to delivery to audiences; it also supports the move from analogue to digital broadcasting in the developing world.
- Due to its nature in shaping the global standards for broadcasting, Study Group 6 also plays a big role in shaping emerging technologies. The ITU-R SG6 can be dissolved into three major focus areas: 1) terrestrial broadcasting delivery; 2) Broadcasting service assembly and access; and 3) Program production and quality assessment.
- For the terrestrial broadcasting delivery, first generation of DTTB (Rec.ITU-R BT.1306) & second generation DTTB (Rec. ITU-R BT.1877) recommendations have been produced. Recommendations are also produced in the context of digital sound broadcasting below 30 MHz (Rec. ITU-R BS.1514) and between 30 and 3000 MHz (Rec. ITU-R BS.1114), as well as multimedia broadcasting (Recommendation ITU-R BT.2016)
- Ongoing studies are focusing on advanced network planning and transmission methods for enhancements of DTTB, methods for introduction of new systems, technologies and applications in DTTB service, and co-existence calculations for digital terrestrial television broadcasting using Monte Carlo. Simulations. Studies are also focusing on the preparation for the WRC-23 (particularly for the agenda item 1.5)
- With regard to broadcasting service assembly and access, digital Interfaces (Rec. ITU-R BT.2077 & Rec. ITU-R BT.2133) and Audio Metadata and File formats (ITU-R BS.2076 & ITU-R BS.2088), Integrated Broadcast-Broadband Systems (Rec.ITU-R BT. 2075), Global Platform for Broadcasting (Rep. ITU-R BT.2400), accessibility (Rep. ITU-R BT.2342 & Rep. ITU-R BT.2448) are matters where recommendations have been produced.
- Ongoing studies are focusing on transmission method for non-PCM audio signals and data over digital audio interfaces for programme production and exchange, Practical implementation of broadcast emission systems using Audio codecs as specified in ITU-R BS.1196 and ITU-R BS.1548 for ITU advanced sound systems, Interactive Control Extension for the Audio Definition Model Use of Interoperable Mastering Format for the supply of non-live content to a Global Platform for broadcasting Technologies applicable to Internet Protocol (IP) interfaces for programme production.
- For program production and quality assessment recommendations have been produced on Advanced Sound Systems (Rec ITU-R BS.2051, (Rec. ITU-R BS.2127), Sound and Image Quality Evaluation Methods (ITU-R BT. 500) as well as Recs. BS.2132, BS.2126, BS.1770, BT.2124, Artificial Intelligence (Report ITU-R BT.2447).
- Some ongoing studies on new topics include measurement algorithm for monitoring and managing the brightness of high dynamic range television; requirements and Applications for Mean Image-Level meters for monitoring and managing the brightness of HDR-TV; and sound test materials for advanced sound systems.
- Broadcasting services are evolving and undergoing fast-paced transformation both in how broadcasting is received, how the services are being deployed how users are interacting with new applications and content.
- New services and applications require a change in business models in order to successfully distribute content. As a result, such new trends are no longer just restricted to the

broadcasting environment, but increasingly becoming intertwined with the developments in broadband networks as well as the interaction and convergence between these two.

- Question 2/1 in ITU-D is analysing how strategies and regulations need to evolve and how the new services impact and how we plan, how we implement broadcasting services and applications overall, also in the perspective of achieving SDGs and bridging the digital divide.
- Carriers, Internet enterprises and terminal vendors represent major forces in today's TV industry and broadcasting. The development strategies and paths of these three forces are different, however, the final competition focuses on the user's attention and time.
- Such scenario points to the advantages of radio and television networks, broadband networks and satellite coverage to construct a multi-network converged, manageable, controllable, and reliable broadcast TV and broadband media network.
- Broadcasters need to optimize traditional broadcast and TV service through consolidation, co-investment and infrastructure sharing, which are key trends to reduce costs and allow for massive investments in network deployment and content delivery in the context of establishing a global broadcasting strategy.
- A deliverable for 2020 for Question 2/1 which considers the digital transition more specifically and new services and applications.
- Traditional distribution model was based on the flow from AV media services to the audience, passing through broadcast infrastructural apparatuses. This means that service tended to be closely linked to access network, while the audience could be divided into demographics, as one single device was set in a single location (TV set in a living room).
- Distribution, however, is changing at a fast speed, as there are new transformations in addition to the traditional linear radio & TV distribution model (enabled by broadcast technologies). New actors and services are now much more personalized, data-driven, hybrid, cross-platform and Multiview, while increasingly becoming readily available on-demand, hybrid, social media platforms, all of which are possible because of broadband networks.
- This creates an interesting scenario because all the investment money is going into broadband/OTT systems, whereas all the money is still being made by broadcast systems.
- EBU emphasizes that it is only through intelligent cooperative hybrid broadcast/broadband networks highly resilient networks and high throughput networks with optimum coverage can be achieved. In fact, this has been recently reinforced due to the COVID-19 pandemic and the consumption patterns linked to users' devices. In other words, EBU is facilitating and working toward this hybrid cooperative network future with the utmost speed across different networks serving different types of devices.
- OTT services, over-the-top services or multimedia broadcasting over the Internet, is a critical challenge at the moment from a regulatory standpoint as often internet streaming is not recognized as a broadcasting service.
- In 2016, BEREC classified these services, the two groups, as a first step in regulation for broadcasting on the Internet, so we have the two groups and we have identified some OTT services that qualify as a service when they compete to the conventional broadcasting services.
- From the position of the national regulator, CRA realized that broadcasting becomes just one service on the Internet—it is a trend actually to have all services or IPV platforms. In the future, it will be vital not to think of Internet access separated from broadcasting; therefore, alliances and actions are needed in order to build some kind of regulation to protect the conventional broadcasters.

- In CRA's viewpoint, insecurity is currently present due to the lack of certainty over how they should prepare the regulation. Attention is being given to standardizations and Working Groups around the world to try to predict the ground, but it is not clear in which direction regulators should emphasize in order to build an affirmative regulation framework to allow local markets to develop.
- The emergence of 5G may help provide some guidance on this topic. 5G is also designed to be the technological way for the MNOs to deliver, for the first time, the broadcast services and therefore share multimedia content with users.
- Most regulators end up incapable of regulating contents or direct influence distribution models that are broadband enabled because the services provided are offered from another country. It could be something that regulators may observe as a challenge for the future on a global level, and the intervention from ITU may be necessary.

## Q&A

**Q:** Mazar, Haim - F : *How ITU-D and ITU-R promotes digital to analog switch in the developing world?*

**A:** BOZSOKI, ISTVAN - INT : *answering to Mazar, Haim: We are doing seminars, workshops on the transition, there were re-planning exercises in AFR, ARB and Central-American countries. In addition, we are assisting in developing road-maps for the transition and also during Q2/1 we are promoting BDT and BR works.*

**A:** CHANG, Ruoting - INT : *answering to Mazar, Haim: R sector has been providing required technical advice, solutions and other assistance on the switch of A to D for the developing countries in cooperation with D sector.*

**Q:** Renner, Rodine S. - GMB : *Should Online TV be licensed and regulated, considering that online TV providers are competing licensed terrestrial TV who pay license fees in Advertisement, news content on the ground, etc.? What is your take on this issue and if yes, online TV should be regulated and pay license fees, what should be the difference in terms of license obligation with terrestrial license TV Content Providers? Thanks.*

**A:** Hirayama, Roberto Mitsuke - B : *answer to Renner, Rodine S.: Dear Rodine, your question is very relevant and different countries have different approaches; however, a level playing field is beneficial to all actors. However, some claim that one need to deregulate a little the licensed TV to accomplish that. But this is a matter for each regulatory agency in each country to address.*

## SESSION 8: INTERNATIONAL FREQUENCY COORDINATION: PROCESSES, RESULTS AND TASKS: REGIONAL AND SUB REGIONAL PLATFORMS FOR COORDINATION OF SPECTRUM ISSUE

**Focus:** Cross-border collaboration examples and best practices.

**Moderator:** Mr. Farid Nakhli, Programme Coordinator, Regional Office for CIS, ITU

**Speakers:** [Presentation 1](#), Mr. Albert Nalbandian, Chairman, WG WRC-23, Regional Commonwealth in the Field of Communications (RCC); [Presentation 2](#), Mr. Tamas Unger, Expert on International

Frequency Coordination, Harmonized Calculation Method, National Media and Infocommunications Authority (NMHH), Hungary; [Presentation 3](#), Mr. Eric Fournier, Representative, Radio Spectrum Policy Group; [Presentation 4](#), Ms. Natalija Varagic, Group Coordinator, Republic Agency for Electronic Communications (RATEL), Serbia

### Key points

- When it comes to the spread of radio waves, there are no national borders, which implies a joint and common use of the spectrum when in coordination. In all the countries that share borders with neighbours, it is critical that regulators achieve a regional-level coordination. Provisions of radio regulation are, including the rules, are of extreme importance and being developed by the RCC.
- Technical frequency assignments, in particular, demands more attention as it impacts how operators offer products and services. In the ITU's fundamental documents, there are special sections which are dealing with notifications, frequency assignments, terrestrial, space services.
- In the RCC, one of the Working Groups working on spectrum management is dealing with the issues and developing the guiding documents that provide a general agreement on technical fundamentals with recommendations on the coordination of the planned frequency assignments in the bandwidth which touches on radio commission services and terrestrial services 470, 862 MHz as well as the recommendation and coordination of the frequency assignments in band frequencies, 29.7.
- Harmonized Calculation Method (HCM) Agreements contain well defined MFCN processes, ensure the operation of stations without interference by ensuring harmonized calculations based on the same algorithm and same spatial data in every country.
- In the case of Hungary, which is in the HCM agreement, challenges may occur due to regulatory inconsistencies (as EU member but at the same time located at the edge of the EU) and this may create problems with different services at the border. There are special agreements besides the HCM agreement aiming to guarantee equal access to the spectrum irrespectively to implementation of new technologies.
- Hungary has various examples of arrangements in the 700, 800, 900, 1500, 1800, 2100, 2600, 3500 MHz as well as 26 GHz that have been concluded with its seven neighbouring countries.
- RATEL manages radio frequencies usage and coordinates frequency for terrestrial and satellite radio services in accordance with international agreements and have signed 50 technical agreements over the past 15 years.
- The Republic of Serbia signed three regional Conference final acts. Geneva 75 (GE75) for medium waves (525.5-1605 kHz), GE84 for FM radio stations (87.5-108 MHz) and GE06 for digital broadcasting so T-DAB and DVB-T (170-230 MHz and 470-862 MHz). As a result of RATEL's participation in many bilateral, multilateral meetings with neighbouring countries, RATEL managed protocols that dealt with issues of frequencies or stations.
- Regarding broadcasting RATEL, actively participated in the work of South European Digital Dividend Implementation Forum (SEDDIF), with the goal to establish a multilateral frequency coordination group regarding the VHF band. Moreover, over the last year for broadcasting service, RATEL performed almost 500 coordination requests with neighbouring and other countries.
- With regard to MFCN, Serbia still did not sign the HCM agreement but coordination between neighbours such as Hungary is under way. Moreover, RATEL is in the process of preparing for

signing the technical procedure on frequency coordination in the frequency bands 876-880/921-925 MHz for GSM-R with Hungary, Croatia, Romania.

- For fixed-satellite service, Serbia has a shared allotment in the AP30B Plan with Bosnia & Herzegovina, North Macedonia, Montenegro and Slovenia whereas for broadcasting satellite service Serbia has a frequency assigned in the AP30/30A Plan. Serbia is currently undertaking requests through ITU procedures to modify the assignments under the rules agreed in WRC-19.
- Mobile satellite service coordination is carried out in accordance with Article 9.11 of radio regulation, ITU R Resolution 716 and Footnote 5.389A of radio regulation and RATEL also coordinates a specific radar with neighbouring countries.
- In the last 15 years, RATEL representatives have signed around 50 different technical agreements and protocols with the aim to coordinate radio stations for different radio services in different frequency ranges. Currently, RATEL is in the process of preparing for signing the technical procedure on frequency coordination for GSM R with Hungary, Croatia, Romania and to participate in future meetings of the multicountry T DAB group in order to coordinate T DAB frequency assignments.
- Article 28 of the European Electronic Communications Code (EECC) sets an obligation for member states to cooperate on cross-border frequency issues and mandates the RSPG to address any problem or dispute.
- In this regard, Radio Spectrum Policy Group (RSPG) has undertaken actions in actions the 700 MHz band to ensure availability, address intra-EU difficulties and identifying issues with countries outside the EU. Cross-border agreements have been achieved, but authorization has been delayed due to Covid-19. On EU borders there is still some degree of uncertainty.
- Cross-border coordination in the 3.4-3.8 GHz band presents the issue of interference from bay station to bay station that can be a distance up to a kilometre. To avoid this bay-station to bay-station interference, there is a need to have synchronization between networks in different countries. Synchronization means avoiding that bay station may transmit at the same time as a bay station in the neighbouring country would receive to avoid the interference from bay station to bay station.
- To achieve this full synchronization, the same infrastructure must be used and this is a challenge at the EU level. RSPG is launching a questionnaire on the matter to increase the awareness about this problem, identify the source of it, and this may facilitate greater synchronization.

## Q&A

**Q:** Dr Vári, Péter - HNG : *Dear Tamas Unger, What is your experience, what could be the biggest problem in cross-border coordination, especially with non-EU countries?*

**A:** Unger, Tamas - HNG : *@Vári, Péter - HNG: I think the biggest problem in cross-border coordination is the unharmonized spectrum usage, and the coexistence of different systems (governmental and commercial, MFCN and radars, MFCN and DVB-T), and to find the appropriate FS triggers between them.*



## CLOSING CEREMONY

**Dr. Peter Vari**, Deputy Director, National Media and Infocommunications Authority (NMHH) of Hungary, remarked that the event clarified the impact of near future technologies and the common goals behind them, which is not easy as technology develops at a fast pace.

Dr. Vari thanked the ITU team and experts for the excellent organization and colleagues in NMHH that facilitated making the country virtual host of the event and encouraged ITU to continue the initiative, perhaps next year in person in Hungary.

**Mr. Jaroslaw Ponder**, Head of Regional Office for Europe, ITU, and Chair of the event, thanked all participants and speakers and briefly summarized the excellent content emerged through the various sessions. He emphasized *“a lot of synergies and actions taken in both regions as well as some differences”* and the need for ITU *“to help in different countries in overcoming some challenges related to the implementation of the 5G”* such as in the case of the EMF.

Mr Ponder also invited participants to send their proposals after the seminar on what could be the role of the ITU development sector in assisting the countries: *“ITU-D might be of use and help in assisting the countries hand in hand with the radiocommunication sector”* such as for example on EMF, 5G strategies and tendering processes, broadcasting, international frequency coordination or other matters.

Finally, Mr. Ponder thanked Mr. Mario Maniewicz, BR Director and Madam Doreen Bogdan Martin, Director of the BDT, for the *“great support given to the organization of this meeting which was co-organized by both offices, the Office of Europe and the CIS with the support of the BR”* as well as Dr Vari and the National Media and Infocommunication Authority of Hungary for *“longstanding support of ITU in field of spectrum.”*