**OUTCOME REPORT**

ITU REGIONAL
RADIOCOMMUNICATION SEMINAR

ITURRS
ONLINE 2022
EUROPE

30 August - 8 September

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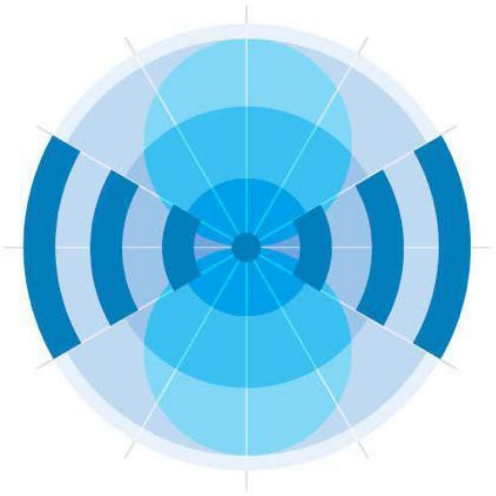

Organized by:

# Report of the ITU Regional Radiocommunication Seminar 2022 for Europe
## 30 August 2022 – 8 September
## Online meeting

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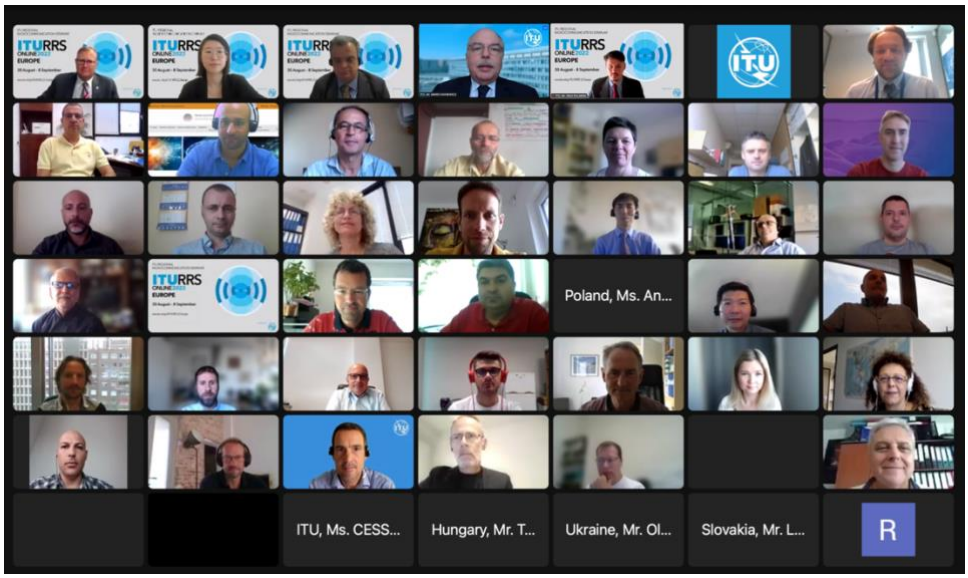
**Introduction**

The ITU Regional Radiocommunication Seminar 2022 for Europe Region was held online on 30 August – 8 September 2022, from 9:00 – 12:15 (UTC+1H), organized by ITU-R sector and co-organized by ITU Office for Europe. The main objective of the Regional Radiocommunication Seminar is to unlock the Spectrum Management and Radiocommunication regulations at the national and international levels. This meeting was an opportunity for national authority regulators, academia, radiocommunication and spectrum practitioners and other relevant stakeholders to grasp the scene of radiocommunication in the Europe region and stimulate interactive exchange and discussion for enabling regulations and environment for further development of the technology.



Virtual group photo

The seminar commenced with welcome remarks by Mario Maniewicz, Director of the Radiocommunications Bureau. He stated approvingly that Europe performed outstandingly in the innovation field and efficiently translated innovation inputs into outputs. Particularly, it has transformed sound policies and regulations, research and development investments, and ICT infrastructure access into knowledge and new technologies. From the standpoint of radio communications, the radio regulations ensure equitable access to spectrum and satellite orbital resources, interference, free operation, and harmonization of radio communication services. The radio regulations provide stability, transparency, and predictability required for long-term investments. He pointed out the importance of rules of new radio communication for European countries since Europe concentrates almost a fourth of the world's countries on the same continent and has neighbors from African and Arab countries, as well as countries from the Commonwealth of Independent States. With so many border, regional and inter-regional agreements, it is critical to ensure radio communication services function free from cross-border interference.

Furthermore, Director Maniewicz renewed the radio communication Bureau would continue to implement the decisions of the World Radiocommunication Conference by updating its processes, software, and other tools to comply with the new regulations and deadlines. He wished a successful seminar and hoped this training session could offer a better position for the attendees to leverage the mechanisms established in the radio regulations, to ensure trans-free operation of radio

communication services, including the allocation of frequencies, definition of power limits, coordination, recording of frequency assignments and monitoring. Moreover, he stressed that enabling policies and regulations would continue to be a pivotal factor in responding to growing social, economic, and environmental demand.

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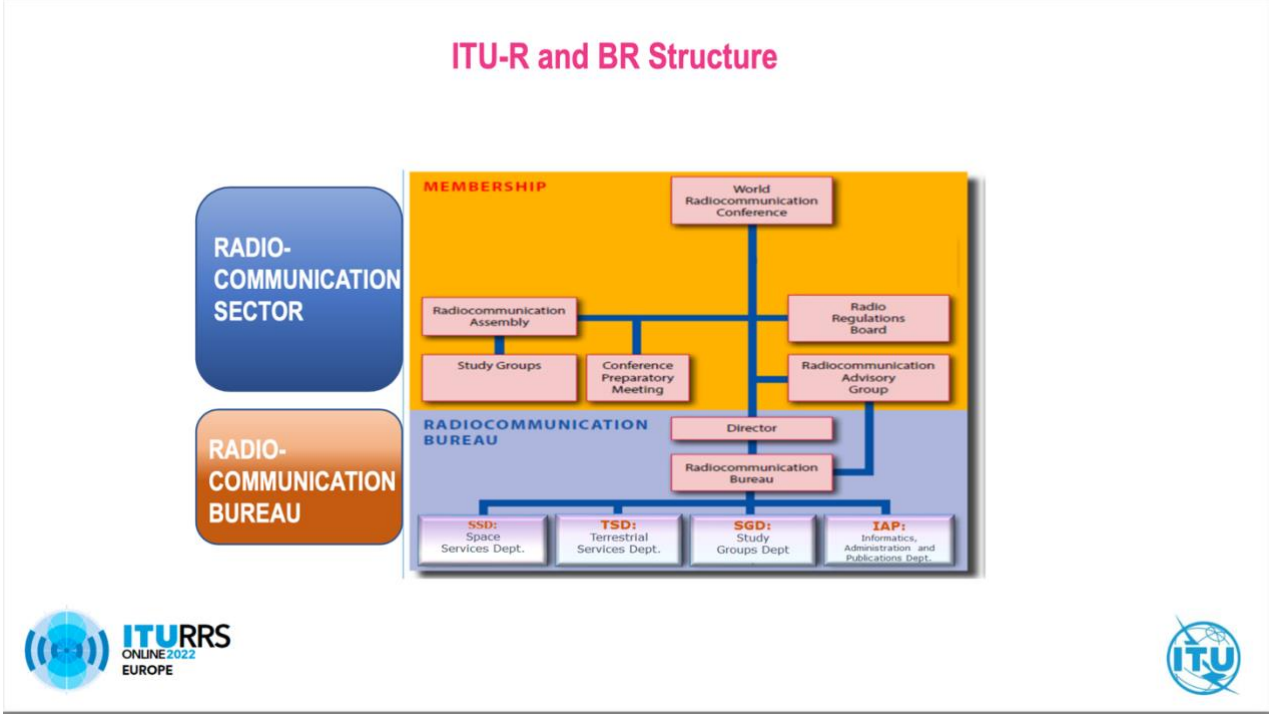
## 30 August - ITU Structure ITU-R at a glance

**Presentation 1: ITU and ITU-R Basics and Facts**

**Speaker: Joaquin Restrepo, Capacity Building Coordinator, Study Groups Department, Radiocommunications Bureau, International Telecommunication Union**

To lay a minimal common background about ITU and Radio Regulation, Mr. Restrepo guided the attendees through the history and structure of ITU while highlighting ITU Radiocommunication Sector (ITU-R) and Radiocommunications Bureau (BR). As the eldest International Organization, ITU was founded on 17 May 1865 by 20 nations, with a focus on telegraphic service, and became the UN agency in 1947; since then, ITU has evolved and found standard rules to standardize equipment and facilitate international connection for operating instructions to all countries. ITU has grown to over 193 member states, 516 sector members, 212 associates, 166 academia members, and over 700 staff from 70 nationalities. Mr. Restrepo introduced a series of the legal framework (the Constitution, the Convention, the Administrative Regulations), ITU-R and BR structure, World Radiocommunication Conferences (WRC), Radiocommunication Assembly (RA)'s duties, Radiocommunication Advisory Group (RAG), Radio Regulations Board (RRB), ITU-R study group. Four departments are within Radiocommunication Bureau, Space Service Department (SSD), Terrestrial Services Department (TSD), Study Groups Department, and Informatics, Administration and Publications (IAP) Department. Moreover, he also pointed out the prominent leading role of World & Regional Radiocommunication Seminars in building capacity related to Spectrum Management.



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## 30 August - ITU-R Study Groups

**Presentation 2: ITU-R Study Groups**
**Speaker: Sergio Buonomo, Chief, Study Groups Department, Radiocommunications Bureau, International Telecommunication Union**

The Study Groups' work is governed by ITU-R Resolutions, in particular Resolution ITU-R 1, and WRC agenda items requesting preparatory studies. There are six study groups and a total of 21 Working Parties at this moment.

SG1: Spectrum Management (WP 1A: Spectrum engineering techniques, WP 1B: Spectrum management methodologies and economic strategies, WP 1C: Spectrum monitoring). SG1 is the largest participation group in terms of national regulators.

SG3: Radiowave propagation (WP 3J: Propagation fundamentals, WP 3K: Point-to-area propagation, WP 3L: Ionospheric propagation and radio noise, WP 3M: Point-to-point and Earth-space propagation) SG3 is a crucial study group related to this sector.

SG4: Satellite Services (WP 4A: Efficient orbit/spectrum utilization for FSS and BSS satellite services, WP 4B: Systems, interfaces, performance availability for FSS, BSS & MSS plus SNG, WP 4C: Efficient orbit/spectrum utilization for MSS and RDSS)

SG5: Terrestrial Services (WP 5A: Mobile> 30MHz, wireless access (fixed service), amateur including satellite services, WP 5B: Maritime mobile & GMDSS, aeronautical mobile & radiodetermination services, WP 5C: Fixed wireless systems, HF other < 30 MHz in fixed & mobile services, WP 5D: IMT systems) SG5 is the largest participation in terms of persons.

SG6: Broadcasting Services. (WP 6A: Terrestrial broadcasting delivery, WP 6B: Broadcast service assembly and access, WP 6C: Content production & quality assessment, Task Group 6/1: WRC-23 agenda item 1.5) SG6 is essential for the new standard television, new audio-visual formats and a new generation of television.

SG7: Science Services (WP 7A: Time signals and frequency standard emissions for terrestrial & satellite, WP 7B: Space radiocommunication applications & research & meteorological satellite, WP 7C: Satellite remote sensing systems, MetAids, weather & research sensors, WP 7D: Radio & radio astronomy sensors Earth- & space-based, including VLBI)

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**30 August**
**Presentation 3: Information Session: Regional Assessment on EMF and Risk Communication Challenges in Europe Region**
**Elind Sulmina, Project Officer, ITU Office for Europe**

To offer a comprehensive overview of the EMF topic in the Europe region, Mr. Sulmina designed this presentation through the lenses of two latest reports "Implementing 5G for Good: Do electromagnetic

fields matter?" and "Regional Assessment on EMF and Risk Communication challenges in Europe region" issued by ITU Office for Europe and other relevant colleagues and divisions of ITU.

Mr. Sulmina briefly introduced the ITU resolutions (Resolution 176, Resolution 72) and ITU-D's role regarding EMF in Resolution 62 (Rev. Buenos Aires, 2017) on 'Assessment and measurement of human exposure to EMFs.'. ITU-D instructs ITU-D Study Group 2 to cooperate with ITU-T Study Group 5 and ITU-R Study Groups 1,4,5 and 6, concentrating on human exposure-related strategies and policies.

Specifically, ITU Office for Europe took the lead in conducting a regional assessment of EMF and risk communication challenges to respond to the increasing attention and concerns. This report was an essential milestone in implementing the ITU Regional Initiative for Europe on "Broadband Infrastructure, broadcasting and spectrum management" agreed by WTDC- 17, and a contribution to Question 7/2 of the ITU-D Study Groups. Through this study, ITU Office for Europe sought to provide ITU Membership and stakeholders a holistic vision regarding current EMF limit levels in the Europe region and risk communication challenges that government ministries and regulators operating in the field of telecommunications are encountering, as well as the overall results of the Member States' inputs and the concrete recommendations to support ITU members' efforts in addressing EMF at the country level.

14 questions in 5 main categories were developed in the format of a questionnaire, focusing on the implementation of the new ICNIRP 2020 Guidelines; identification of ongoing EMF compliance assessment standards; implementation of newly available EMF compliance assessment standards; obstacles to public acceptability of 5G and incidents occurred at the national level relating to EMF in over the course of 2020; and institutional risk communication strategies of EMF.

After analyzing 31 institutions' responses from 29 countries, there are a set of recommendations:

- It is recommended that the European Commission starts revising the EMF Directive 2013/35/EU of the European Parliament and Council recommendation 1999/519/EC to reflect the main changes of the ICNIRP 2020 Guidelines. Considering that the revised ICNIRP 2020 Guidelines include changes for the mmWave spectrum and that 5G networks using mmWave spectrum will soon be ready to deploy.
- It is necessary to simplify procedures and shorten approval time. Since another obstacle to installing antennas/radio base stations seems to be related to the concerns with EMF exposure limits and public acceptability putting pressure on regulators, active communication between regulators and the public is crucial.
- Regulators are recommended to assign a regulatory officer in their office to the major international Standards Development Organizations, to engage in the standardization process and specifically follow up equipment compliance assessment standards progress, get first-hand information and reflect their concerns and needs to the relevant committees.
- a) Regulatory bodies should follow evidence-based EMF protection policies. b) Authorities should be more proactive in conveying information to the general public, including across the Internet and social media, where misinformation spreads. c) Particular attention should be given by authorities to the interplay between misinformation on EMF and other domains, including Covid-19.
- Establish an effective dialogue between all stakeholders concerning the deployment of 5G networks. Consultation with stakeholders, leveraging live or periodic monitoring of EMF levels,

implementing capacity building activities, acknowledgement of scientific uncertainty, and a fair and transparent decision-making process.

To conclude, ITU Office for Europe stood ready to continue supporting ITU-D sector in the Europe region and beyond to advance dialogues among stakeholders to advance a secure and robust implementation of 5G in Europe and elsewhere.

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**30 August**
**Presentation 4: CEPT activities on Spectrum Management**
**Speaker: Peter Faris, European Communications Office (ECO)**

Mr. Faris briefly introduced the history of CEPT. CEPT has evolved from a cooperative and voluntary organization, acting as a coordinating body for European state telecommunications and postal organizations, to a body of policymakers and regulators from previously 19 countries to the current 46 countries. CEPT gathers policymakers and regulators from 46 countries across Europe to promote cooperation between Members, contribute to creating a dynamic European market, and, most importantly, promote harmonization of telecommunication, radio spectrum, and postal regulations.

As the permanent office of the CEPT, ECO supports all three committees' work within the CEPT. There are three working committees: Electronic Communications Committee (ECC), Committee for ITU Policy (Com-ITU), and European Committee for Postal Regulation (CERP). Mr. Faris highlighted ECO's services in providing a specialized forum for CEPT member countries and concerned stakeholders, expert advice and administrative support to the CEPT, in order to deliver its policies and decisions effectively and transparently, as well as the facilities for collaborative work. Furthermore, the ECO conducts consultations, maintains the ECC work programme database, publishes CEPT deliverables, develops and maintains the SEAMCAT Spectrum Engineering tool, and manages the ECC communication and cooperation with all stakeholders.


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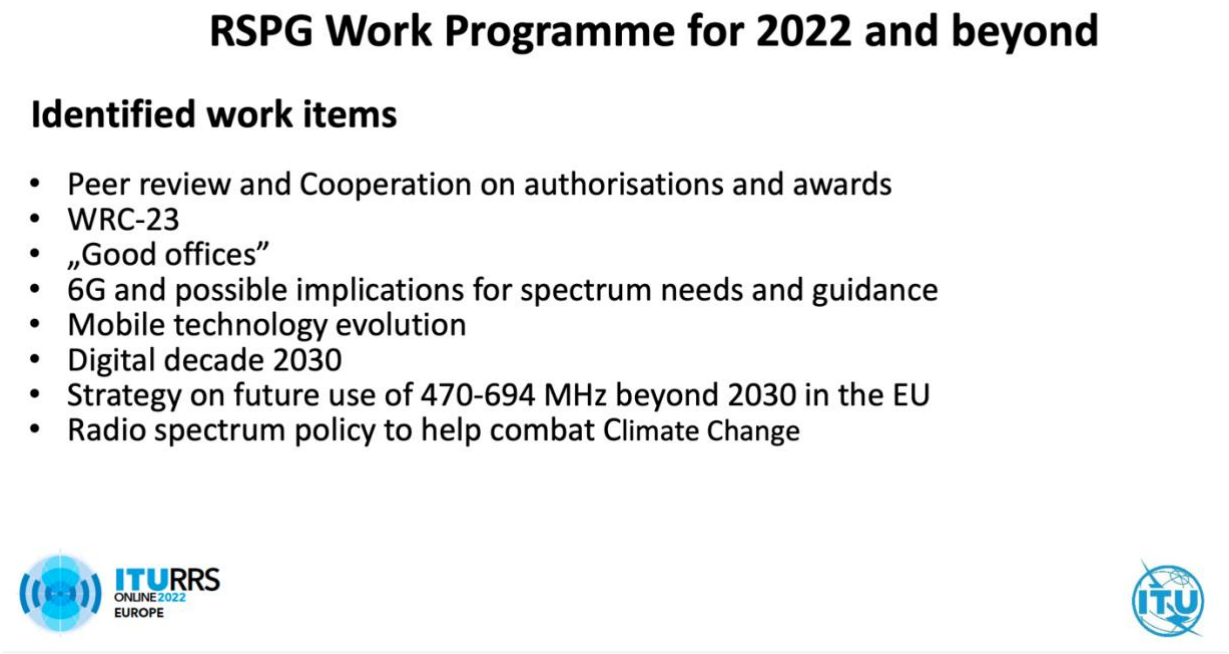
**30 August**

**Presentation 5: RSPG Work Programme for 2022 and beyond**
**Speaker: Aleksander Soltysik, RSPG Vice-Chair**

RSPG is a high-level advisory group that assists the European Commission in developing radio spectrum policy, established under the Commission decision on June 11th, 2019. The RSPG adopts opinions, position papers and reports, as well as statements which aim at assisting and advising the Commission at strategic level on the radio spectrum policy issues, coordination of policy approaches and harmonized conditions where are appropriate to regard the availability and efficient use of radio spectrum necessary for the for the establishment and functioning of the internal market.

Among identified work items on the list of RSPG Work Programme for 2022, Mr. Soltysik mentioned RSPG 's development of 6G. The evolution of the next generation of wireless broadband is well underway, although the commercial launch of 6G is not expected until around 2030. The start of standardization work is expected to have started by 2025. There are many development activities ongoing in Europe as well as in other parts of the world. Within this work item, RSPG will follow, investigate the research and development of 6G and study European 6G test plans and trials. Moreover, RSPG will further investigate and identify early indications of additional spectrum and harmonization needs and potential implications on spectrum regulations for developing 6G road maps later on beyond 2023, which also binds with Mobile technology evolution, the development and mobile evolution technology.




In order to support the European Commission, there is a need for RSPG to contribute from the EU perspective with a strategic vision for sub-700 MHz spectrum use, including an analysis of the latest developments with a review of the background and recommendations of the 2015 RSPG opinion and the considerations of possible post-2030 scenarios.

Finally, RSPG also follows up opinions on climate change by identifying methodologies to assess

the energy efficiency of wireless technologies and collecting practices from the Member States on how energy efficiency is measured and managed nationally, as well as stakeholder workshops.

## 31 August - Radio Regulations (RR)

**Presentation 1: ITU Radio Regulations**

**Speaker: Joaquin RESTREPO, Capacity Building Coordinator, Study Groups Department, Radiocommunications Bureau, International Telecommunication Union**

Mr. Restrepo underlined the difference between the radioelectric and electromagnetic spectrum. The radioelectric spectrum is the lower part of the electromagnetic spectrum used for telecommunications. Spectrum is considered a natural resource and non-replicable. Thus, the quantity of information that can be transmitted is limited, and the "sharing" by stations using the same frequency becomes key. Spectrum management and regulation aim to guarantee the efficient and rational use of spectrum at the national and international levels while preventing and controlling interferences. He also provided examples coming from the principles in the preamble to the Radio Regulations by highlighting Principles No.0.3 and No. 0.4, pointing out that spectrum cannot be limited to a given territory and that international coordination is necessary. He specified that the ITU Radio Regulations was an International Treaty, which was elaborated and revised by administrations and membership only during the World Radio Conferences (WRC) and RR had binding nature for ITU Member states.

He then continued and explained that the Radio Regulations (RR) were divided into four volumes, with 59 articles in volume 1, 23 articles in volume 2, and resolutions and recommendations in volume 3; in contrast, volume 4 contained ITU-R Recommendations incorporated by reference. Moreover, the word "satellite" indicates space services from terrestrial services. He also explained in detail about a series of (RR): radio stations and systems, "allocations" vs. "assignments," "identified" and "designated," "allocation principles," table of frequency allocations, countries footnote format, classes of interferences, and station coordination. He also mentioned the importance of minimizing countries' footnotes to achieve the bands' harmonization. He stated that ITU did not have legal tools to force compliance with RRB decisions regarding RR and spectrum management layers.

RR and Spectrum Management Layers

| | National | International |
|---|---|---|
| **Legal Framework** | National Spectrum Laws | ITU Radio Regulations, RR |
| **1. Planing** | National table of Frequency Allocations, NFAT | International Table of Frequency Allocations, ITFA (RR, Art. 5) |
| **2. Licensing** | National Spectrun Users Database | Master International Frequency Register, MIFR (RR, Art. 8) |
| **3.a. Monitoring** | National Monitoring System | International Monitoring System (RR, Art. 16) |
| **3.b. Enforcement** | National Regulators | ITU Radiocommunications Bureaux, BR |
| | National Courts | ITU Radio Regulations Board, RRB |

Every SM Layer has both a National and International facet
Every national Layer shall be consistent with the its International pair
*ITU has not legal tools to force compliance of RRB decisions…*

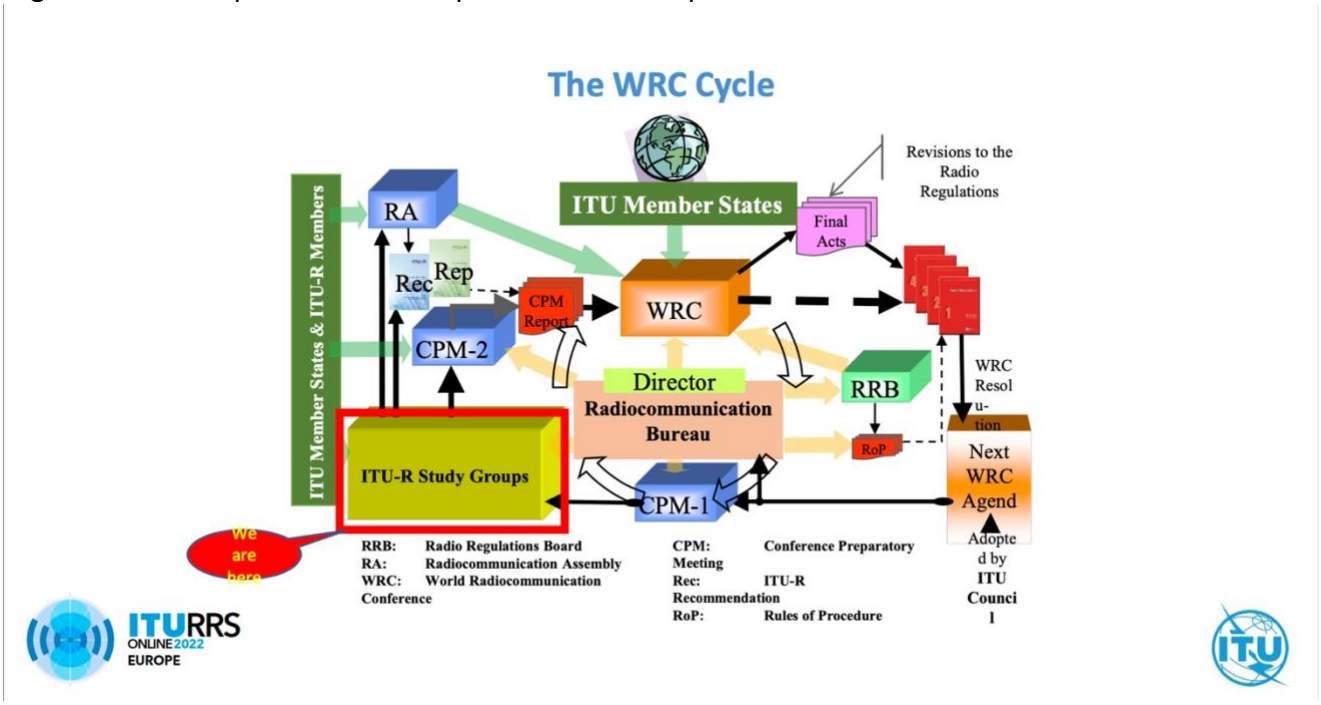
The Rules of Procedure (RoP) complement the Radio Regulations (RR) by clarifying the application of particular regulations or establishing the necessary practical procedures that may not be provided for in the current Regulatory Provisions. Notably, he mentioned reviewing the updated version of the Rules of Procedure during the application. In addition, all national regulators need to be certain that stations have required licenses to operate. "Unlicensed Devices" shall share frequencies in a regime of "non-interference/non-protection basis." Last but not least, he pointed out that microsatellites were subject to international regulations, such as radiocommunication space station was subject to the provisions of the ITU Radio Regulations, and object thrown into space was subject to the provisions of the Space Law Treaties of the Commission for the Peaceful Uses of Outer Space (COPUOS).

## 31 August – World Radio Conference (WRC)

**Presentation 2: ITU World Radio Conferences WRC**
**Speaker: Joaquin Restrepo, Capacity Building Coordinator, Study Groups Department, Radiocommunications Bureau, International Telecommunication Union**

Mr. Restrepo offered a full explanation of World Radio Conferences, from the purpose of ITU WRC, WRC duties, WRC Cycle, WRC Process, to the benefits of the Worldwide or Regional Spectrum Harmonization, WRC Structure, and WRC-23 Process.

The forthcoming WRC-23 will be held in Dubai, UAE, from 11 Nov – 15 Dec 2023. The 2nd ITU Inter-regional Workshop on WRC-23 Preparation will take place in Geneva from 29 Nov – 02 Dec 2022.




## 31 August – WRC-23 Agenda

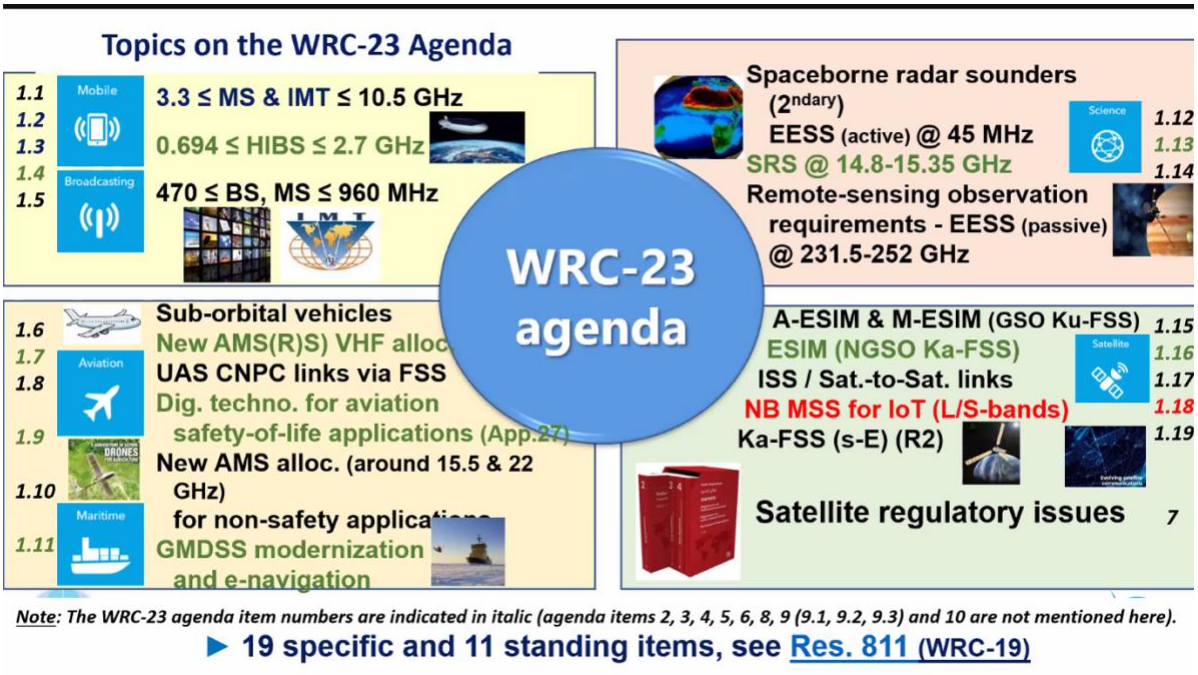
**Presentation 3: Space Issues at WRC-23**
**Speaker: Cessy Karina, Senior Radiocommunication Engineer, International Telecommunication Engineer**

Ms. Karina divided space issues into three main categories: WRC-23 Space Science Issues (Agenda Items 1.12, 1.13, 1.14, 9.1.d), WRC-23 Aeronautical and Maritime Issues (Agenda Items 1.6, 1.7, 1.8 and 1.11), and WRC-23 Satellite Communications Issues (Agenda Items 1.15, 1.16, 1.17, 1.18, 1.19, 7). She also welcomed participants to get involved through the national and regional preparatory process

and encouraged audiences to become ITU Sector Members.

**Aug 31**
**Presentation 4: Terrestrial Issues at WRC-23**
**Speaker: Karlis Bogens, Head of Fixed and Mobile Services Division, International Telecommunication Union**

Based on the WRC-19, 19 specific items and 11 standing items remain under discussion at WRC-23. Mr. Bogens gave the audience a general picture of the Mobile issues, Aeronautical and Maritime issues, and Standing agenda items.



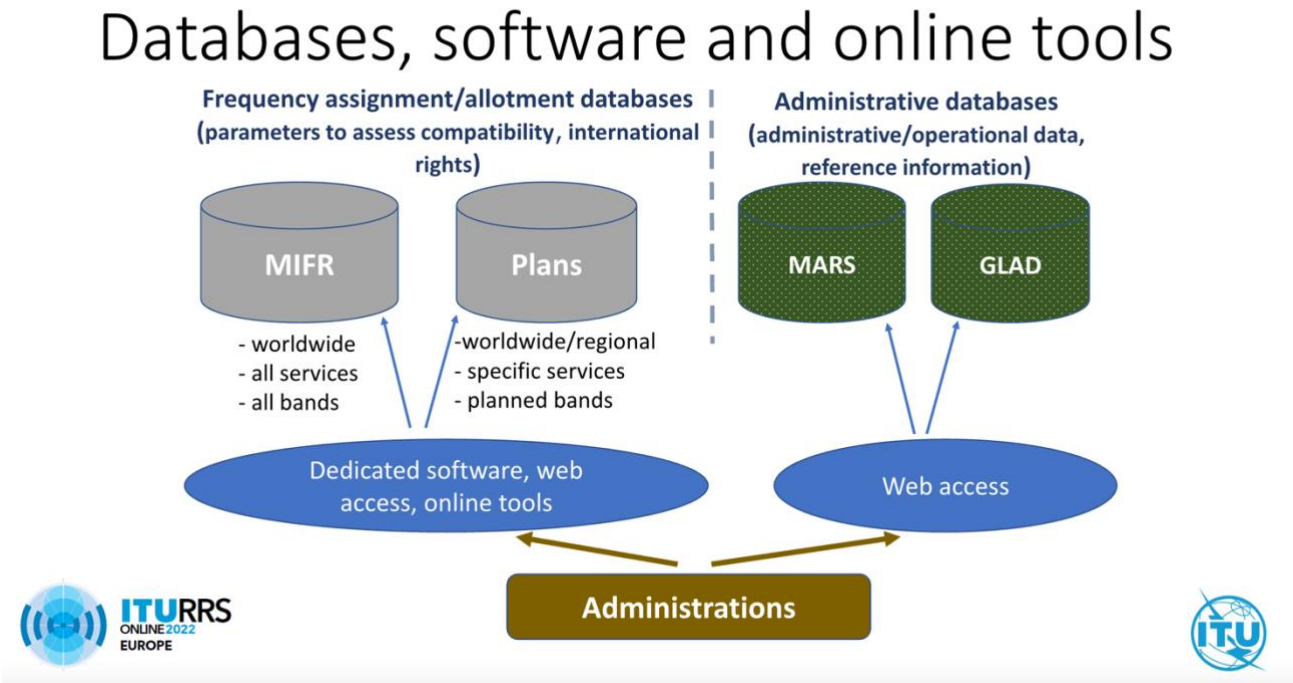
## 1 September - Terrestrial Services

**Presentation 1: Overview of Terrestrial Services**

**Saman Jalayerian, Terrestrial Service Department, Radiocommunication Bureau, International Telecommunication Union**

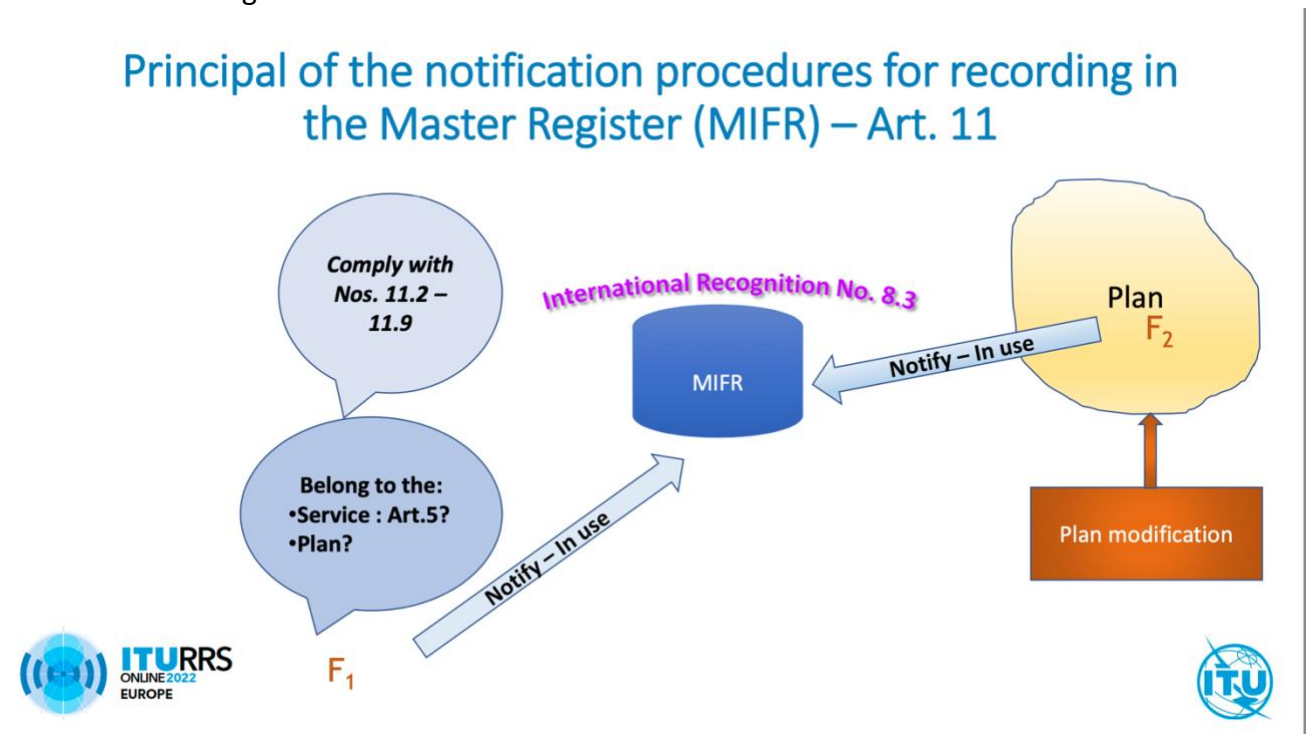
Mr. Jalayerian briefly Introduced the definition of terrestrial services and related main regulatory instruments. Radio Regulations (Allocations, Procedures, Technical limits, Worldwide Plans), and Regional Agreements (Regional Plans, Plan Modification Procedures, Technical Basis) are maintained by ITU. ITU instruments like Rules of Procedure explain some RR provisions and ITU-R Recommendations, which are technical standards that contain system characteristics, channeling arrangements, mitigation techniques, etc. Radio Regulations are the main instruments of the international regulatory framework, based on two main concepts: Blocks of frequency allocations to compatible services (compatible operation of stations; stable planning environment for administrations and industry) and Regulatory procedures (coordination; notification and recording stations in the MIFR; resolving interference, radio monitoring, distress, urgency communications, and etc.), additionally including technical limits on stations, worldwide frequency plans, and resolutions regulating the use of radio services.

He mentioned Frequency Coordination and Frequency Planning as two main approaches to sharing spectrum. For the existing frequency plans for terrestrial services, it includes Worldwide HF allotment plans for maritime mobile and aeronautical mobile services in RR Appendices 25, 26, 27; Regional/sub-regional (concluded under the auspices of ITU): VHF/UHF sound and TV broadcasting: GE84, ST61, GE89, GE06, LF/MF sound broadcasting: GE75, RJ81, RJ88, LF/MF maritime and aeronautical: GE85M, GE85N; Seasonal planning HFBC: ART 12 of the RR and other plans concluded outside ITU: ICAO, IALA. Meanwhile, he also touched upon Master International Frequency Register (MIFR), administration assistance, databases, software, and online tools.



**1 Sep.**
**Presentation 2: Terrestrial Stations Notification of Frequency Assignments for Recording in the Master Register and Plans**
**Speaker: Sujiva Pinnagoda, BR Terrestrial Services Department, International Telecommunication Union**

Ms. Pinnagoda kicked off the presentation by underlining the significance of the Master International Frequency Register (MIFR). Other Administrations shall take into consideration those assignments that are already recorded in MIFR. Notifications have two aspects: the Administration's obligation to apply the provisions of the Radio Regulations as it is an international treaty signed by all ITU Member States and to claim international recognition. Master Register must reflect the exact use of the radio spectrum in the respective territory and the use of various frequency bands; this information is also taken into consideration during World Radiocommunication Conferences (WRC), especially when services are looking for new allocations.




During the presentation, Ms. Pinnagoda elaborated on the following points:

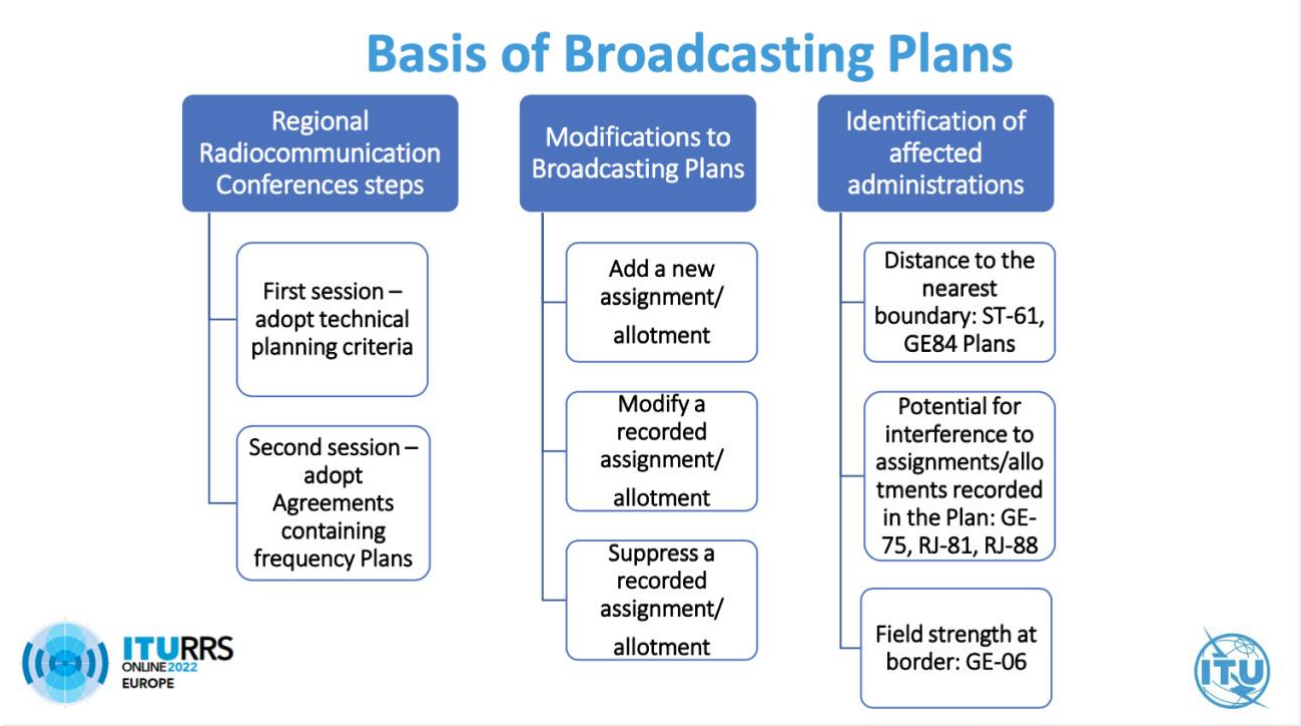
- Principal of the notification procedures for recording in the MIFR – Art.11
- Data items to notify (Record the Master Register, Modify a given plan), Create different notice types to facilitate the notification, Consult the Preface to the BR IFIC.
- Electronic notice file format
- Overview of the Processing: MIFR

Most importantly, she emphasized that the administration could consult the BR IFIC to be aware of what was happening with regard to the use of the radio spectrum by neighboring countries and the follow-up of submissions.

**1 Sep.**
**Presentation 3: Frequency Plans for broadcasting services**
**Evghenii Sestacov, BR/TSD/BCD, International Telecommunication Union**

Mr. Sestacov started with ITU regions' frequency bands allocated to broadcasting service and covered

by a Regional Broadcasting Plan, basis and modifications to broadcasting plans, as well as notification of frequency assignments to Master Register. Due to efficiency and equity, he emphasized the necessity of developing the broadcasting plan. Furthermore, he pointed out that comment confirmation was critical in the context of the Article 4 Plan modification procedure. In terms of Part B publication, an administration must request it. In addition, before the step of Master Register, when the administration proposes to bring into use an assignment, it shall notify its characteristics to the BR in accordance with the provisions of Article 11 of the radio regulations.




**1 Sep.**

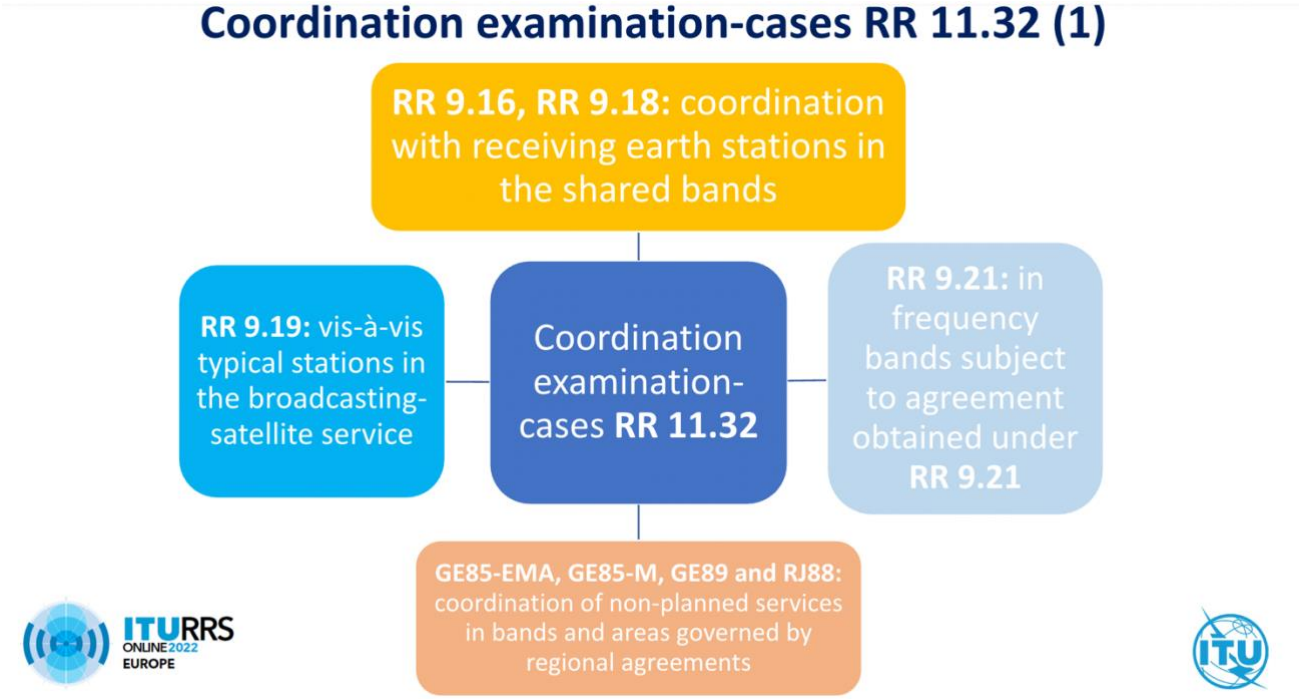
**Presentation 4: Frequency plans and coordination procedures for non-broadcasting services**

**Speaker: Karlis Bogens, Head, Fixed and mobile Services Division, Terrestrial Services Department, Radiocommunication Bureau, International Telecommunication Union**

Mr. Bogens' presentation covered important aspects regarding frequency plans, as well as coordination and examination procedures for non-broadcasting services. Besides broadcasting, the scope of terrestrial services includes fixed service, mobile services, radio navigation services, radiolocation, meteorological aids, standard frequency, and time signal. He differentiated that allotment plans were related to geographic area or country; assignment plans were connected to specific stations. Three worldwide frequency allotment plans are contained respectively in Appendix 25, Appendix 26, Appendix 27 to the Radio Regulations.

He highlighted the status of the going study on the RR Appendix 27 (WRC-23 agenda item 1.9). The purpose of replanning the RR AP 27 frequency plan to accommodate digital technologies for commercial aviation safety-of-life applications in existing HF bands allocated to the aeronautical mobile (route) service was to take advantage of the various benefits a modern wideband HF communication system could offer. Furthermore, the compatibility with existing systems within or adjacent to those frequency bands affected needs to be ensured.

Regarding the frequency assignment plans for FXM services, he elaborated on GE85-R1-MAR (plan for maritime mobile service, MF bands) and GE85-EMA (plan for aeronautical radio navigation service, MF bands), which were restricted to Region 1, and GE85-EMA, which was limited to European maritime area 283.5 - 315 kHz. The List of frequency assignments for primary terrestrial services other than broadcasting in the planning area and bands (174-230 MHz/ 470-862 MHz) is governed by the Regional Agreement GE06. Moving into the coordination of FXM assignment, it could be divided into two main parts: mandatory coordination and voluntary coordination. Mandatory coordination cases under RR Article: RR 9.16, RR 9.18, RR 9.19, and RR 9.21. Next, he dived into a detailed examination of FXM assignments under RR Article 11; regulatory examination RR 11.31; other RR provisions; relation between radio services and classes of stations; RR Article 21 power limits on transmitters in fixed and mobile services.




According to Mr. Bogens, more than 60 frequency bands above 100 MHz were allocated equal rights to terrestrial and space services. In order to ensure the Protection of receiving earth stations and BSS typical receiving earth stations from terrestrial transmitters (downlink), coordination and examination are required in those bands.

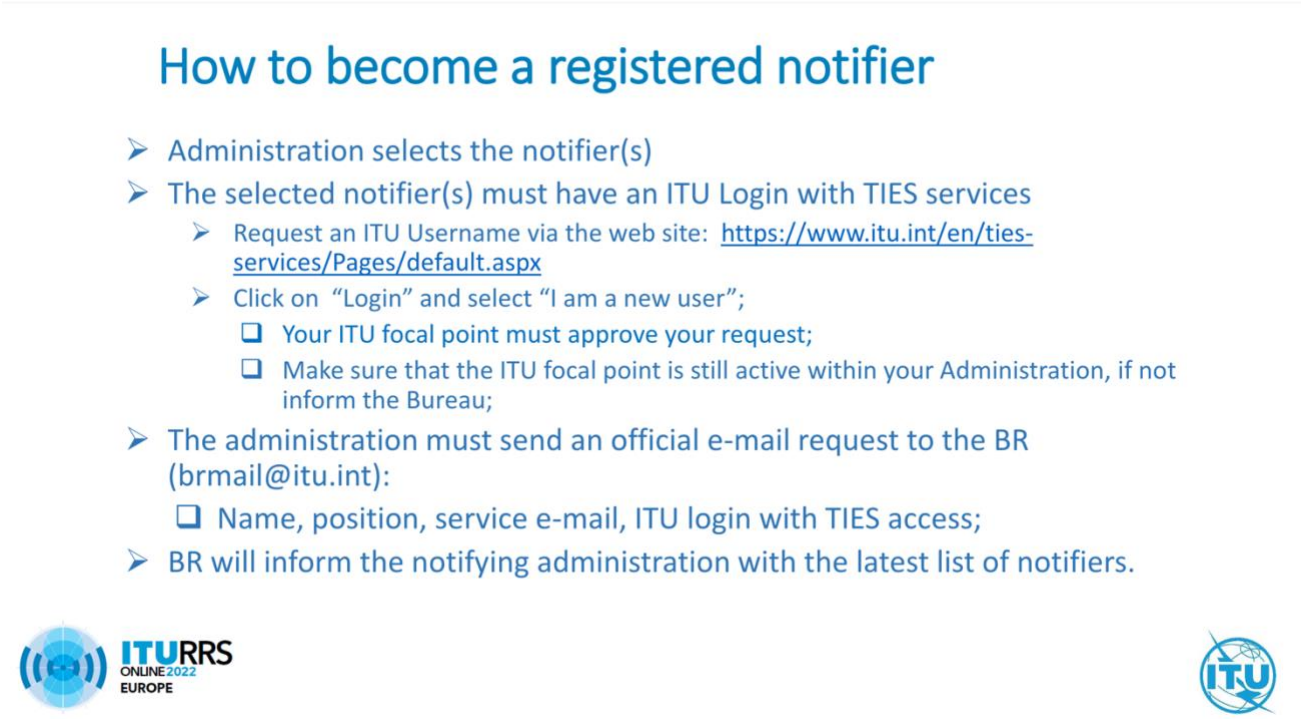
Last but not least, the technical examination applies to AP26 and AP27. He noted that if a notice is in conformity with the technical principles of the allotment plan, but not in conformity with the allotment plan, the compatibility analyses were performed at this examination; AP26 notice was examined concerning the allotments in Part III of AP26 (RR 11.39C); AP 27-notice was examined whether the Protection specified in AP27 was afforded to the allotments in the plan and assignments already recorded in the Master Register with a favorable finding (RR 11.39A).

**1 Sep.**
**Presentation 5: WISFAT**

**Sujiva Pinnagoda, BR Terrestrial Services Department, International Telecommunication Union**

Mrs. Pinnagoda underscored that the Bureau would treat only notice files received via this secured

interface and she strongly recommended validating the notice files using eValidation before submitting notices to the Bureau. She went through in detail how to become a registered notifier and to access WISFAT step by step. She also introduced the ready-to-test web interface WISFAT 2.0, which utilized newer technologies.

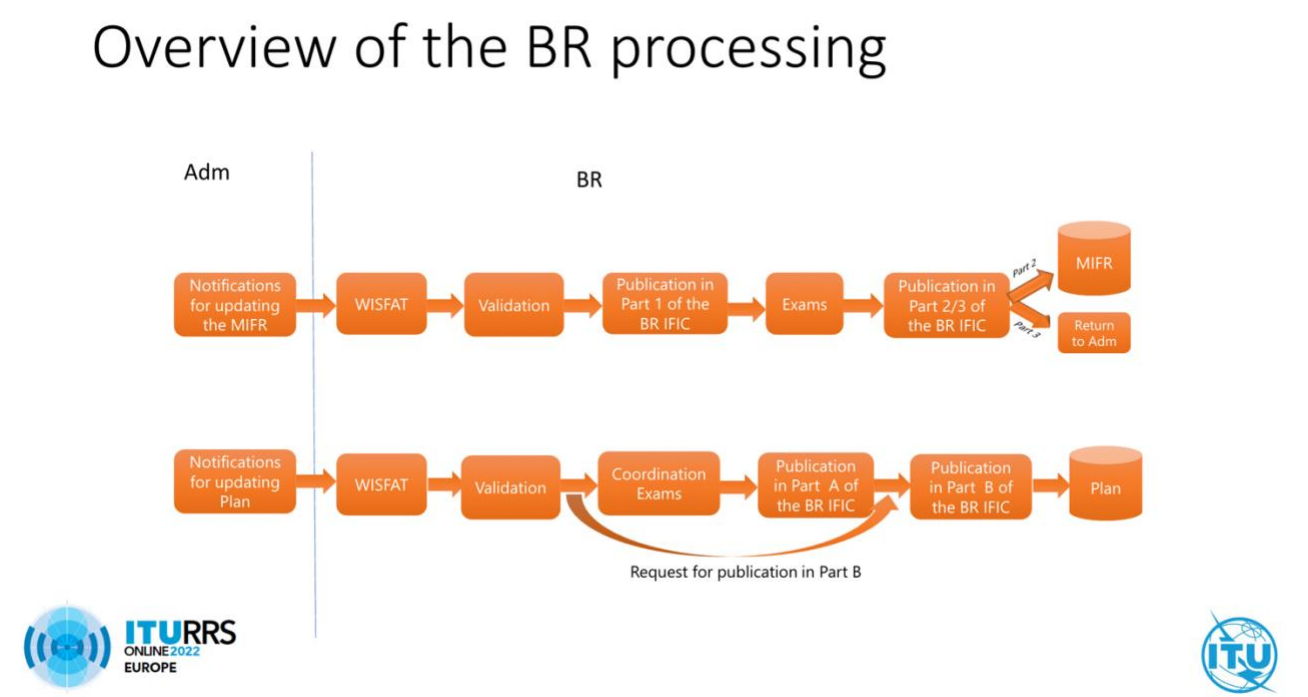



**1 Sep.**

**Presentation 6: BR IFIC (BR International Frequendy Inforamtion Circular) - Terrestrial Services**

**Saman Jalayerian, Terrestrial Service Department, Radiocommunication Bureau, International Telecommunication Union**

Mr. Jalayerian offered an overview of the BR processing. The purpose of the BR International Frequency Information Circular (BR IFIC) purpose is to provide information on the frequency assignments/allotments submitted by administrations to the BR for updating the Master International Frequency Register and Plans.



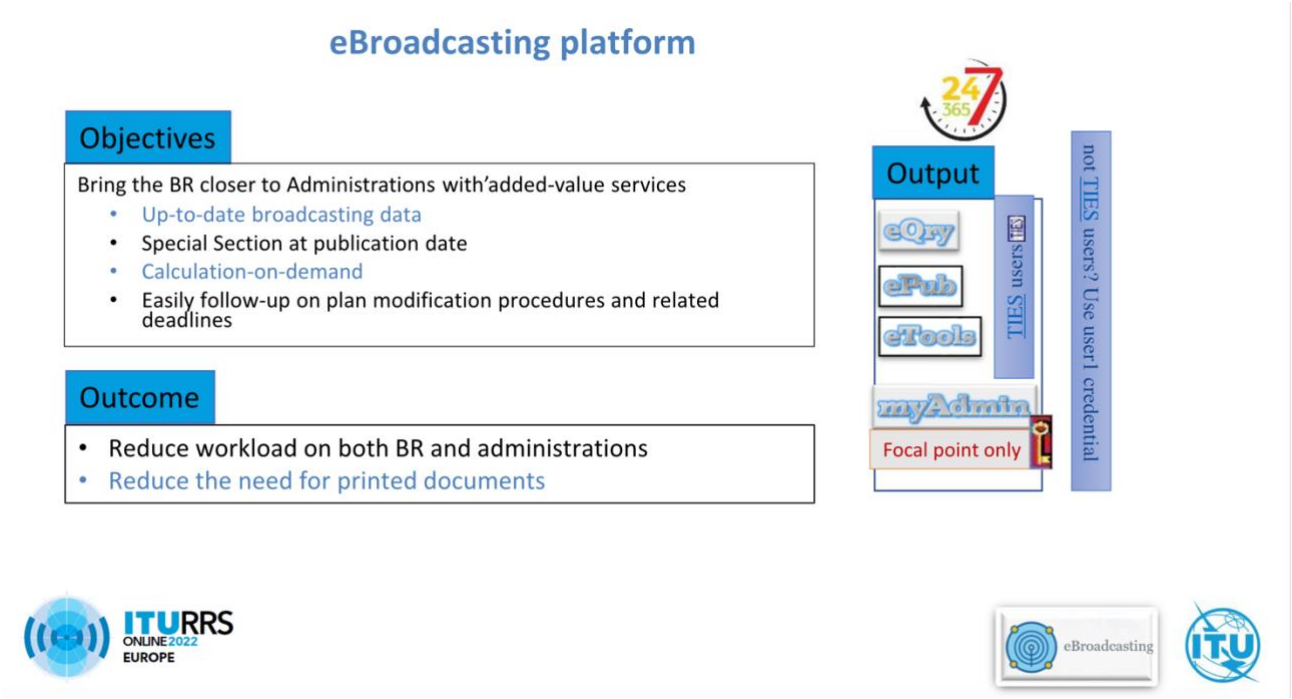

He underlined that The MIFR contained all frequencies used worldwide that have been notified to the ITU and were in conformity with the Radio Regulations. The Bureau keeps the MIFR up-to-date based on the information received from the administration. He also touched upon the BR IFIC database, plans for terrestrial services, software for BR IFIC (TerRaQ, TerRaNotices, BR IFIC DB Manager, Terrestrial BR IFIC Format Converter, fragments of the database (broadcasting and Fix and Mobile), and two documents (Preface to the BR IFIC and General Information "ReadMe").

To sum up, the BR IFIC is a reference publication for Frequency Managers. Assignments recorded in the MIFR with a favorable finding have the right to international recognition (RR8.3). It is essential to consult the BR IFIC regularly to have the acknowledgment of receipt for the notifying administration and coordination with administrations of neighboring countries. Every administration distributes one copy of the BR IFIC free of charge. List (in PDF format) and an extract (in MDB format) of assignments included in the last publication on the ITU website at the following address:
http://www.itu.int/en/ITU-R/terrestrial/brific/Pages/default.aspx

**1 Sep.**
**Presentation 7: e-Terrestrial Platform: Online tools and electronic communication means for terrestrial services**
**Andrea Manara, Broadcasting Service Division, International Telecommunication Union**

Mr. Manara's presentation covered the integrated eTerrestrial platform, eBroadcasting platform for broadcasting services (eQuery ePub, eTools and myAdmin), eMIFR, eValidation for all terrestrial services and future directions.

He announced the new version of integrated eTerrestrial platform planned to be released for WRS-22 (24 to 28 October, 2022). Meanwhile, to achieve the objectives of bringing the BR closer to Administrations with added-value services, eBroadcasting platform was designed to have up-to-date broadcasting data, special section at publication date, calculation-on-demand and easily follow-up on plan modification procedures and related deadlines. Since 2021, online validation has been integrated as the first step of the e-notice submission.




ITU recently conducted GE84Opt, an instrument in planning activities in ATU (2020-2022), to optimize the GE84 plan for African administrations. This tool could identify new frequencies, analyze all neighbors' interference, and get an optimal frequency. The elevation of data can assist the administrations in observing the gap. He also briefly showcased GE06D-related analysis, instrumental tools in planning activities in regional organizations, eTools: ITU-R P series calculations, myAdmin's features, eBroadcasting Email notification services and eMIFR.

Regarding the future directions, integration of eFXMin eTerrestrial, integration of HFBC software in eBroadcasting, development of GE75 what-if studies and display detailed coordination results, and development of more map-centric tools are underway.

## 2 September – Space Services

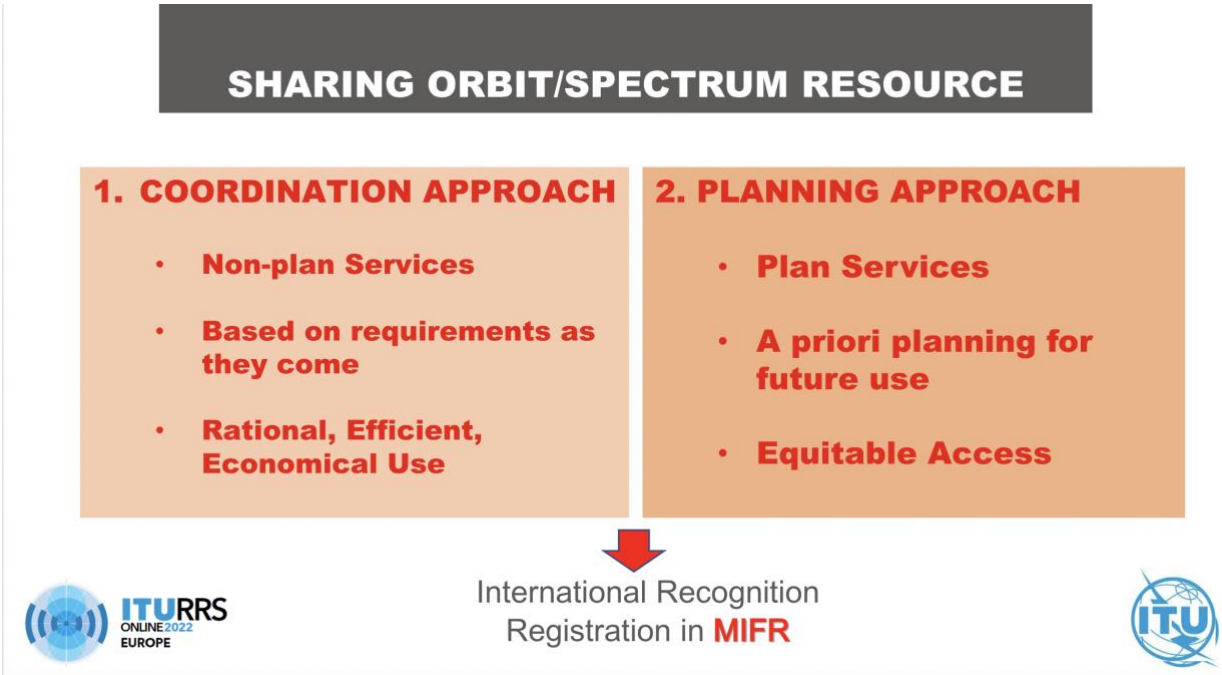
**Presentation 1: Orbit/Spectrum international Regulatory Framework**
**Danny Tham Weng Hoa, BR Space Services Department, International Telecommunication Union**

Mr. Tham introduced the overall international regulatory framework and two approaches to share orbit spectrum. He mentioned there were various types of satellite services operating across a broad range of the spectrum and the satellites could operate in different types of orbits. He reclaimed the role of ITU in radiocommunications; ITU had been developing and updating international regulations on the use of orbit/spectrum, and disseminating information on these regulations, standards, and best practices.

In regard to ITU Constitution (Art.1), ITU shall affect the allocation of bands of the radio-frequency spectrum, the allotment of radio frequencies, and the registration of radiofrequency assignments; for space services, of any associated orbital position in the geostationary-satellite orbit or of any associated characteristics of satellites in other orbits, in order to avoid harmful interference between radio stations of different countries. The legal framework is based on ITU CS/CV, RR, RoP, Recs and ITU CS/Arts. 44 & 45, referring to avoiding harmful interference and to ensure efficient, rational,

equitable economic use. Meanwhile, he pointed out the challenge of efficient radio frequencies and orbit use was on one side the international regulations call for equitable access rational, efficient, economical use operation without harmful interference, and satellites had wide coverage crossing national borders to provide connectivity.

He noted that one of the primary purposes of Radio Regulations was the interference-free operation of radiocommunications. Within the umbrella of the radio regulations, it contains allocation (frequency separation of stations of different services); coordination (between Administrations to ensure interference-free operations conditions); power limits (PFD to protect TERR services/ EIRP to protect SPACE services/ EPFD to protect GSO from Non-GSO); recording (In the Master International Frequency Register; and international recognition and monitoring.




Radio Regulations are intergovernmental treaties governing the use of spectrum/orbit resources by administrations, as well as defining the rights and obligations of Member States in respect of the use of these resources, and providing international recognition in response to a frequency assignment in Master Register (MIFR). Concerning the sharing of orbit/spectrum resources, it exists two mechanisms in radio regulation: coordination approach and planning approach. Notably, he stated that Radio Regulations were constantly being improved.

**2 Sep.**

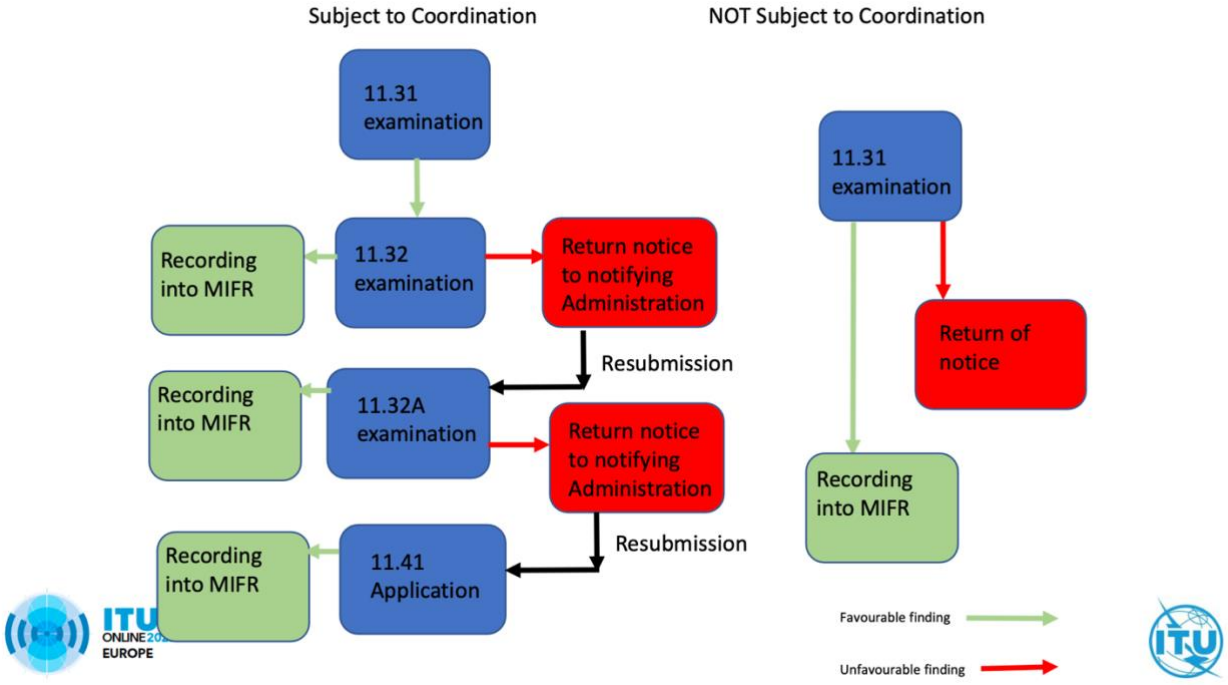
**Presentation 2: Coordination and Notification Procedures of Non-Planned Services**
**Danny Tham Weng Hoa, BR Space Services Department, International Telecommunication Union**

Mr. Tham covered the main elements of the coordination approach, two-stage procedure, examination of coordination request, publication of API and CR, recording in MIFR, due diligence, BR actions at the end regulatory time limit, suspension and maintenance of MIFR (Article 13, 11.41A and 11.41B).

In terms of elements of the coordination approach, he mentioned Procedures (Articles 9&11), Submission format (Appendix 4), Technical & operational limits (Article 5, Articles 21&22, etc.), Criteria and methods to identify coordination requirements (Appendix 5, Appendices 7&8). He

articulated that the two-stage procedure, "not subject to coordination," would start from API notification then get registered to Master International Frequency Register (MIFR). Yet, "subject to coordination" case would have a coordination request followed by a notification and recorded in MIFR.

Advance Publication Information (API) is a mandatory procedure for all satellite networks not subject to coordination procedure. For NGSO satellite networks, frequency bands/services are not subject to the coordination procedure under Section II of Article 9. For GSO, API is only required when using inter-satellite links of a geostationary space station communicating with a non-geostationary space station which is not subject to the coordination procedure under Section II of Article 9. After submitting a request for coordination AP4 to the Bureau, API is extracted, 7 years regulatory period of bringing into use is set, technical & regulatory exam is carried out, and coordination requirements are identified, and formal data requests and information are indicated in the publication of the coordination request information in the CR/C special section. This is the main difference between setting apart "subject to Res.2 and No.9.53" from "not subject to Res.2 and No.9.53". Under provision 9.35, the Bureau would proceed to 9.36 examination if the finding is favorable. A specific radio regulation provision backs up each form of coordination. He then elaborated the entire process to the final coordination requirement, together with CR/D Publication (No.953A) and CR/E Publication (No.9.42). Furthermore, he stressed that Assignments (final characteristics) must be notified under Article 11 to be recorded in the MIFR for international recognition within the regulatory period.




Additionally, he mentioned about Due Diligence - Resolution 49: To address the problem of orbit and spectrum reservation without actual use (Res 18 of Kyoto PP), which applied to satellite network in the FSS, MSS, and BSS that was subject to coordination Procedure; moreover, information on Identity of the satellite network, Spacecraft and Launch services provider was required to provide. It needs to be aware that not submitting within the regulatory deadline results in the suppression of submissions. CT ITU reminder would be sent out 6 months before the expiry of the 7-year regulatory time limit. Due Diligence – Resolution 552 is similar to Res 49 to some extent, which applies to BSS in R1, R3 21.4-22GHz, but differently, BR would not need to remind and cancel the network.

After recording, Frequency Assignments can be suspended for a period of 3 years under No.11.49. The suspension of use is required to inform the Bureau, no later than 6 months from the date of

suspension. If not, the 3-year suspension period will be reduced by the amount of delay. Frequency Assignments are considered brought back into use only if the conditions of No.11.49.1 are met. Under Article 13, the Bureau is responsible for the maintenance of the MIFR; 11.41A reflects Bureau's initiative to update the coordination status and 11.41B reflects the Administration's initiative to update the coordination status.

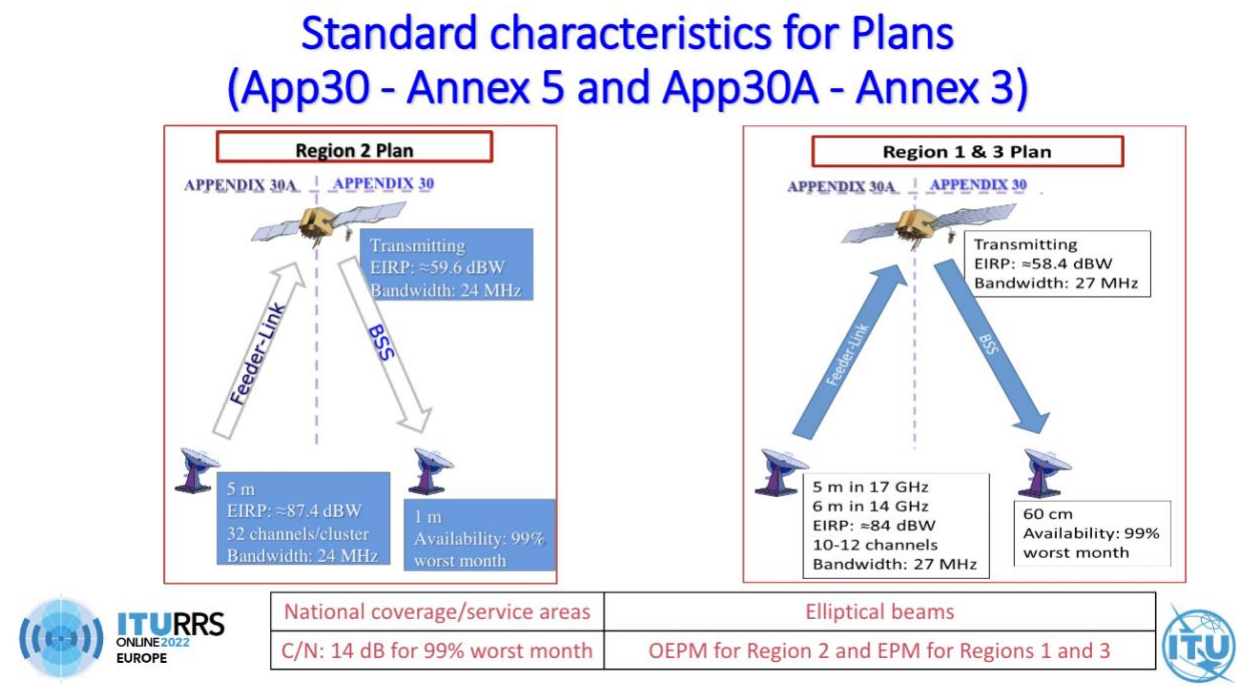
In summary, the following procedures were recommended to follow:

- Inform/publish characteristics
- Fulfill requirements in Radio Regulations
- Negotiate with concerned administrations, reach agreements, and record the coordinated assignments in the MIFR.

**2 Sep.**

**Presentation 3: BSS and associated BSS Feeder-link Plan and List (Volume 2 – Appendix 30/30A - 279 pages)**
**Thong Pham Viet, BR Space Services Department, International Telecommunication Union**

Mr. Viet started with a brief history of BSS plans. Up to now, BSS plans have over 75 years of history since the WARC-77 when the BSS Plan for Regions 1 and 3 was established, and many significant changes to the technical criteria and procedures have been made over the past decades. He emphasized that BSS Plans and feeder-link plans were Regional Plans, and Planning Approach was to ensure equitable access to GSO orbit/spectrum among ITU member states. Administrations in Region 2 are given at least one entry in the Plan at WARC-85. (Planning Approach), and Administrations in Regions 1 and 3 are given 10/12 channels in the PLAN at WRC-2000 (Planning Approach). The remaining part for total capacity is for used and obtained through the application of the Article 4 procedure with a "First-Come First-Served" principle. He stated the main procedures governing the use of BSS and BSS feeder-link plan contained Article 4 and Article 5, Appendix 30 and Appendix 30A. Meanwhile, all assignments in the plan have their standard characteristics; namely, the coverage and service areas are limited to the national territory and corresponding satellite elliptical beams. He also invited the audience to refer to Annex 5 – Appendix 30 for the BSS and Annex 3 – Appendix 30A for BSS feeder link to understand further the characteristics.




Compatibility among assignments in Plan, EPM (Equivalent Protection Margin) criteria is used in Region 1&3, and OEPM (Overall Equivalent Protection Margin) is used in Region 2. In the case of the member states would like to have additional capacity beyond the core/original Plan, it is advised to apply Article 4 Procedures of Appendix 30/30A, and once the procedure is successfully completed, the additional capacity would be recorded in the List in case of Regions 1 and 3 or in Region 2 Plan in case of Region 2. What's worth mentioning is that the Article 4 application has a time limit of an 8-year regulatory period. He then dived into detail about Article 4 in terms of procedures, actions, and publications. Whenever an administration intends to bring into use a frequency assignment to a space station, it shall notify this frequency assignment to the Bureau by applying procedures in Article 5 of Appendices 30 and 30A. Equally important, it is recommended for Administration to check BR publications on every BR IFIC (space services), and to protect then Plan/List from being affected, the Administration shall send comments to the notifying Administration and the Bureau within 4 months from the date of the relevant BR IFIC publication. In Space Operation / TT&C in the guard bands, coordination would be conducted under Article 2A of Appendices 30 and 30A, and notification would be under Article 11 of RR. Article 6 is for the coordination of terrestrial services with the BSS plan.

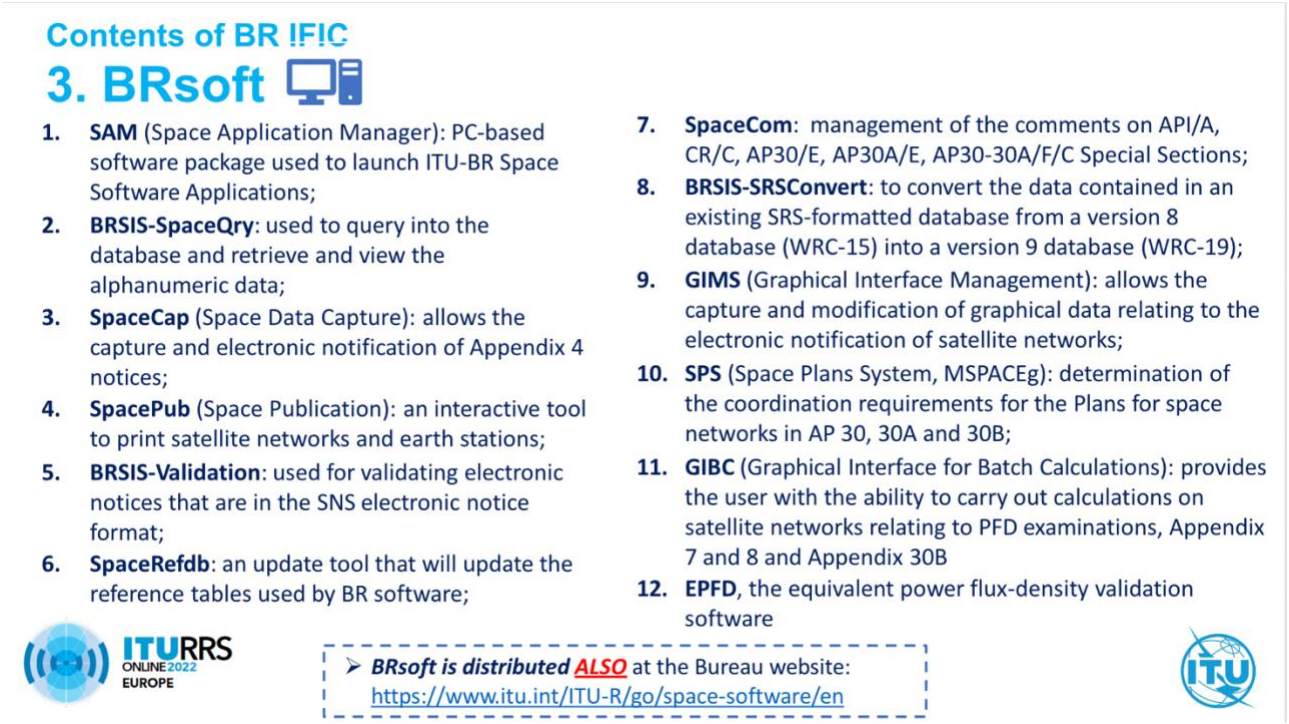
All Plan and List assignment data can be found in the BR IFIC & at the ITU website via http://www.itu.int/ITU-R/go/space-plans/, and contained in the SPS database (SNS format) , including the technical characteristics and reference situation for all Plan. The SPS database is evolving and is updated regularly by the Bureau.

**2 Sep.**

**Presentation 4: Publication Tools: BR IFIC (Space Services) and Preface (Space Services)**
**Koichi Sumiyoshi, Space Services Department, Radiocommunication Bureau, International Telecommunication Union**

Mr. Sumiyoshi briefly touched upon the regulations relating to BR IFIC and six regulatory requirements for information to be published in a BR IFIC, including characteristics of satellite networks, earth stations and radio astronomy stations required in Annex 2 of Appendix 4, findings, comments received from administrations in response to a BR IFIC, bringing into use of assignments and suspension of

assignments. Besides mentioning the main features of the BR IFIC (Space Services) and BR IFIC Publication schedule, he elaborated the contents of BR IFIC in terms of BR IFIC publications, Databases (IFIC,SRS, GIMS, SPS, and SpaceCom), BR Software, IFIC News and SNS Removal, cost recovery invoices status and circular letters relating to Space Services.



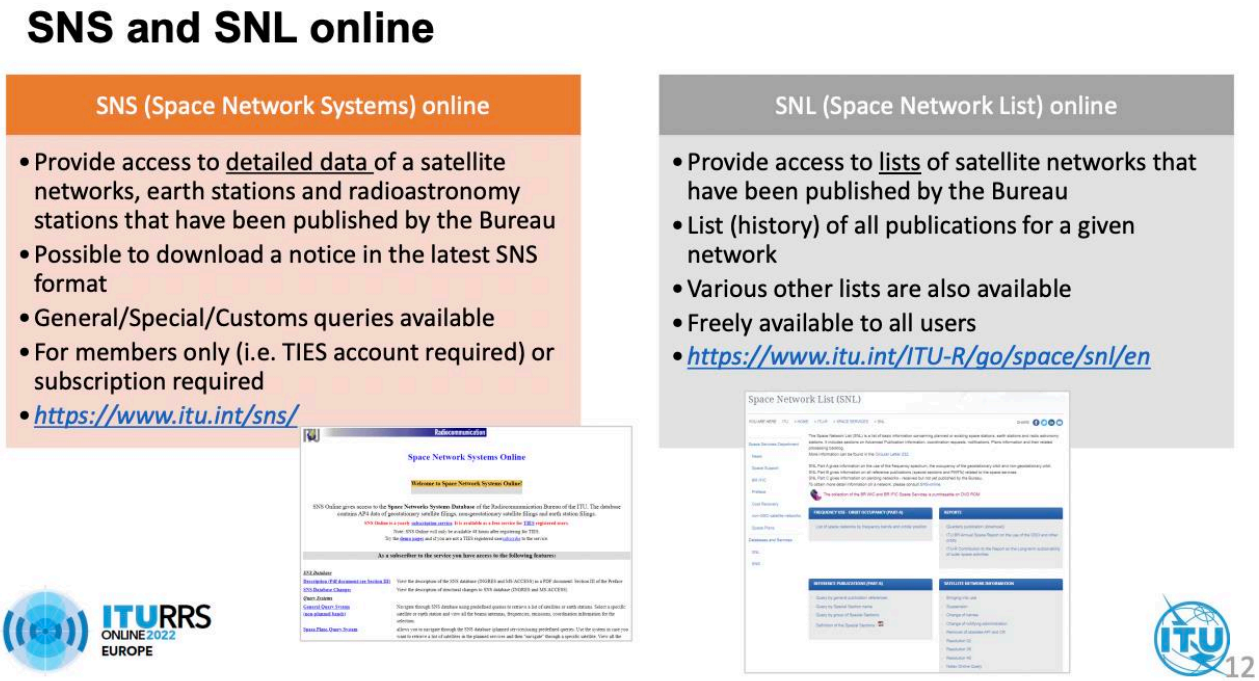

In the second part of the presentation, he focused on the Preface which provided detailed answers to a series of questions on SNS data, special section or Part findings, symbols of intergovernmental satellite organizations, code used for Antenna patterns and etc. Due to the frequent update, he advised the administration always to look for the latest edition and new changes. Moreover, the Preface contains Section I – General, Section II - Description of the BR IFIC and the Space Radiocommunication Stations (SRS) database information, Section III -Description of the Space Networks System (SNS) and Section IV -Reference Tables.

**2 Sep.**

**Presentation 5: Publication Tools: BR Space Service Website**

**Koichi Sumiyoshi, Space Services Department, Radiocommunication Bureau, International Telecommunication Union**

Mr. Sumiyoshi went through each section on the website that provides complementary information and services to the regulatory publications that are distributed in the BR IFIC DVD, containing BR IFIC and Preface, Space Plans, Cost recovery, Space Support, Contact addresses of notifying administrations (Space Services), As received – Res.55 (Rev.WRC-19), SNS and SNL online, and ITU Space Explorer. He also kindly reminded all administrations to make sure that at least one official email address had been communicated to the Bureau and informed the Bureau whenever there was any update about the contact details. Moreover, under Resolution 55 (Rev.WRC-19), all notices are published “As received” within 30 days of receipt and made freely available on the ITU website.




Within the SNL tab, under the column "Confirmed brought into use," indicates the status of the assignments: C (Confirmed), N (Not yet confirmed). If the assignment is not yet confirmed, the column "Date of bringing into use" indicates the foreseen date, and the column "Expiry Date" indicates the date before the assignment has to be brought into use. Furthermore, the column "Date of suspension" indicates the date on which the suspension has begun if the column "Date of resumption" is empty, the network has not resumed its operation. Notably, under provision No.11.49 or § 8.17 of Article 8 of Appendix 30B, a network can be suspended for up to 3 years. In addition, he also briefly mentioned SNL-related Resolution 35, Resolution 40, the ITU Beta version of SpaceExplorer, and non-geostationary-satellite networks.

**2 Sep.**

**Presentation 6: Publication Tools: BR Databases and Software**

**Koichi Sumiyoshi, Space Services Department, Radiocommunication Bureau, International Telecommunication Union**

In this presentation, Mr. Sumiyoshi focused on BR related Databases and Software. First, he introduced three categories of BR databases: Alphanumeric Data (SNS Master, IFICXXX, SRS, Capture, SPS AP30B), Graphical Data (GIMS Database), and Reference Data (Space Reference Database).

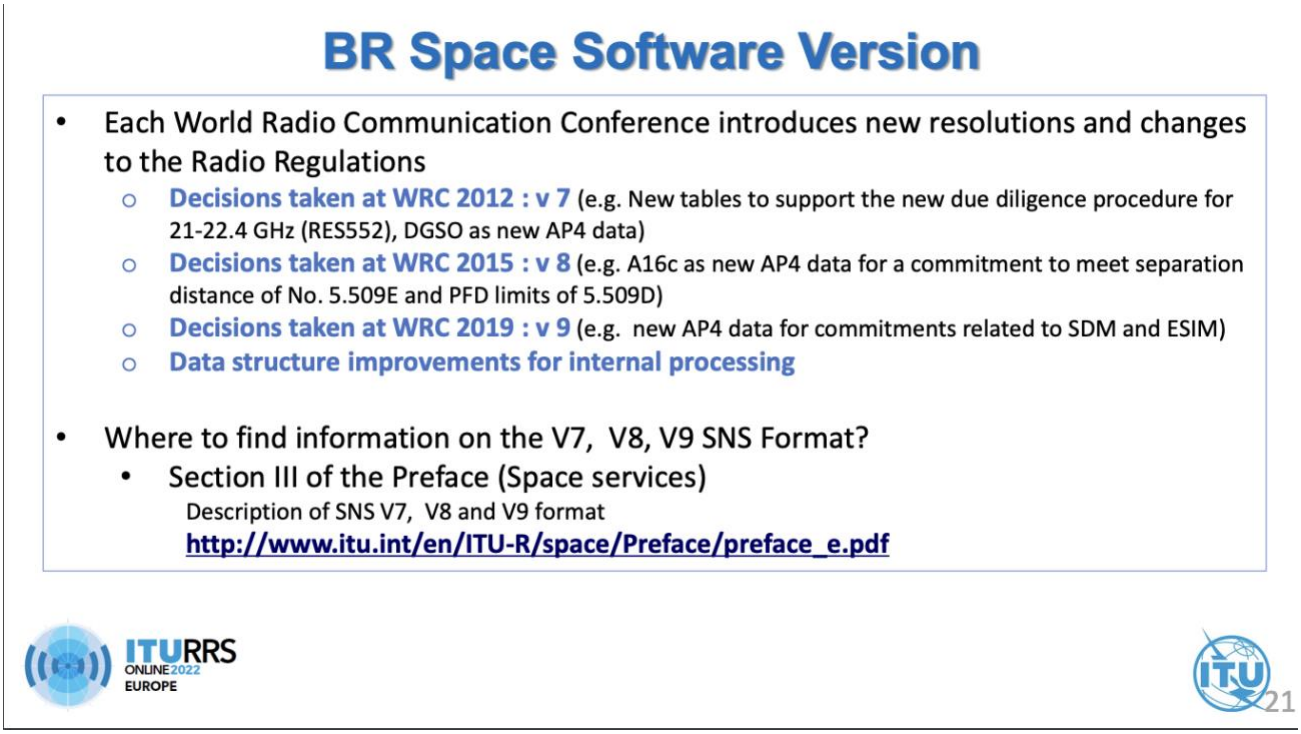
He then briefly introduced each necessary database:

- SNS Master database, including all information in the Master Register and electronic fillings received by the BR
- SRSnnnn.mdb, containing coordination and notification related to Space Radiocommunication Stations recorded in the Master Register
- IFICnnnn.mdb , including Part IS, Part IIS, Part IIS, Special Sections.
- SPS_ALL_IFICnnnn.mdb, containing technical characteristics and reference situations for networks of the planned space services under Appendices 30/30A and due diligence (Resolution 49)
- 30B_nnnn database, containing technical characteristics and reference situations for networks

and space services under Appendix 30B and due diligence (Resolution 49).

- Graphical data, including GIMS Database (Graphical data for GSO and Non GSO Satellites) and ESCC database (Master Repository for Earth Station Coordination Contours).
- Space Reference Database, which ensures all BR software uses the same reference data.
- BR SNS Format Databases

Through BR Space Software and Databases, it could streamline the implementation of the Radio Regulations and Rules of Procedure, preparation of the electronic fillings compliant with the RR, and procedure of the electronic filings submitted to the BR. Regarding Space Services Data Entry Software, there are SpaceCap (Enter/Capture AP4 data into SNS V9 formatted database), GIMS (Enter/Capture AP4 graphical data into GIMS mdb), SpaceVal (Validate AP4 data and check for presence of required AP4 graphical data), SpaceCom (Enter/Capture comments). On the side of Data Query, there are four software available: SpaceQry, SNS Online, SpacePub and GIMS. Furthermore, GIBC (Graphic Interface for Batch Calculations) provides Space Services Tech Examination function for PFD-Space and Terr., AP7, AP8, PFD AP30/30A, AP30B, and SPS (the Space Plans Software including "MSPACEg") provides determination of the coordination requirements for the Plans for space networks in Appendices 30, 30A of the Radio Regulations.




BR Space Software is frequently updated; it is advised to download the latest version from the BR website or from BRIFIC (Space) DVD. He noted that more web applications and services would be released, such as ITU Space Explorer, IFIC Online, and SpaceCom Online, and better integration of web applications of e-Submission, e-Communication, SNS Online, SNL, As-received and Satellite Name Changes, to offer more valuable contents.

**2 Sep.**

**Presentation 7: Online Tools: e-Submission, e-Communications and SIRRS**

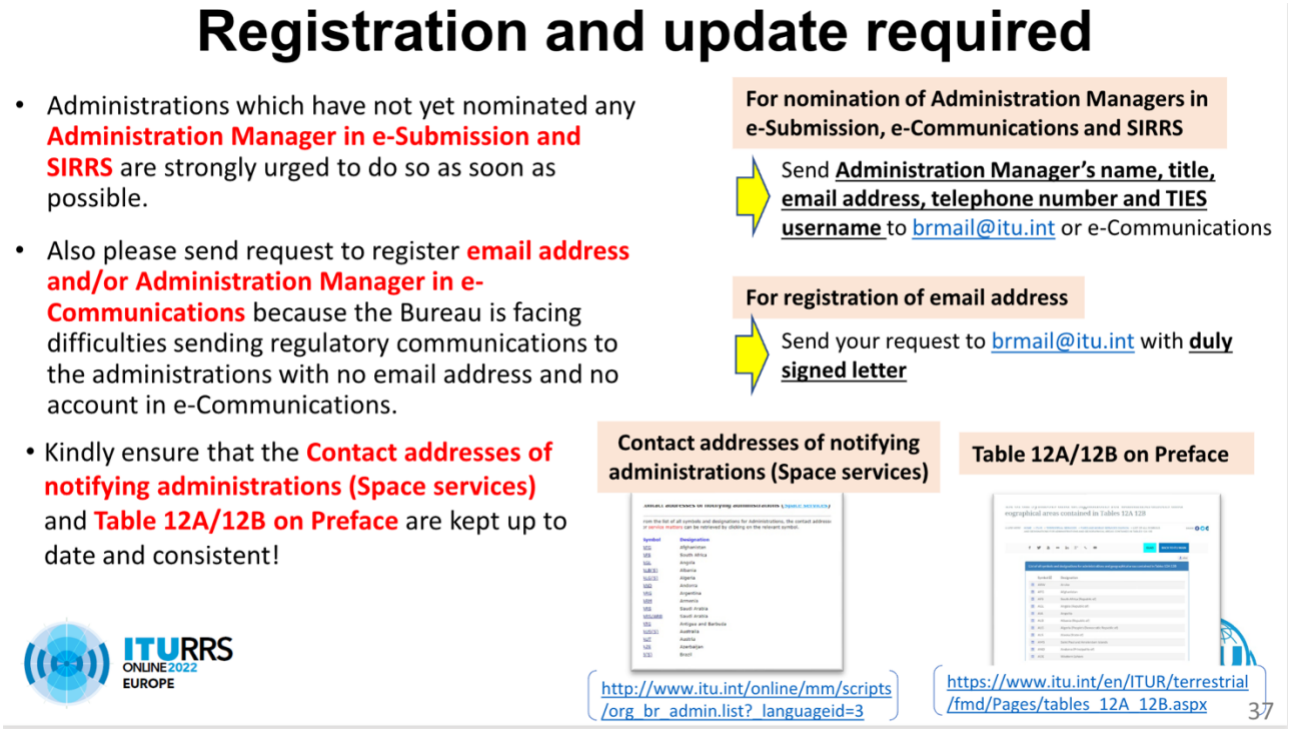
**Koichi Sumiyoshi, Space Services Department, Radiocommunication Bureau, International Telecommunication Union**

Mr. Sumiyoshi started with the introduction of e-Submission, a web-based secure paperless online system for Administrations and satellite operating agencies to submit all satellite network filings and SpaceCom comment files. Online submissions from Administrations to the Bureau through e-Submission became mandatory as of 1 August 2018. All filings under Art. 9 and 11, Appx. 30, 30A and 30B and Res. 49 (Rev.WRC-15), 552 (Rev.WRC-15) and 553 (Rev.WRC-15) of the RR, or their comments related to a BR IFIC, shall be submitted using e-Submission. Besides the procedure from Administration to BR, he briefly touched on layout and functionalities and types of notices via the e-Submission platform. Importantly, he mentioned the resubmission of a notification notice for a space station would not be considered receivable from 1 July 2022 if it was not submitted through the e-Submission system, and for both notifications and resubmissions received from 1 July 2022, Information provided in cover letters relating to the status of coordination agreements would not be taken into account in the examination of the notices.

Furthermore, he also reminded the administrations of the following: 1. not to mistake Due Diligence information of the Planned band for the Non-Planned band; 2. withdraw the former SpaceCom file in submitting another SpaceCom file to the same IFIC; 3. submit diagrams in GIMS file for submissions of API and Notification; 4. confirm submission to the BR after a validation process; 5. Update email addresses for TIES accounts; 6. remember to attach supplemental Information together with the SNS file submission; 7. the Administrations of Member States and Intergovernmental Satellite Organizations who have not yet nominated any Administration Manager or IGSO Manager are strongly urged to do so as soon as possible. Operating Agencies are also strongly encouraged to be included in the system as well.

In addition, Mr. Sumiyoshi elaborated the e-Communications as an online communication platform to allow Administrations and the Bureau to send and receive administrative correspondence related to space services through overall system workflow, basic layout, useful functions, and operation. He emphasized that Administrations which had not registered users on the system were urged to nominate one or more Administration Manager(s) to the Bureau to use “e-Communications”, and the Bureau encouraged Administration to indicate their willingness to use “e-Communications” as the only means of communications and to discontinue the traditional means of communication from Administrations. 5.Administrations registered on the system are strongly requested to access e-Communications to check/read the incoming correspondence regularly.

Moreover, he briefly mentioned SIRRS (Satellite Interference Reporting and Resolution System) , the online application has been developed by the Radiocommunication Bureau in response to Resolution 186 of ITU Plenipotentiary Conference 2014, with the aim to facilitate Administrations and space stakeholders to report a case of harmful interference affecting space services, to request assistance from the BR, to be informed in case a radio station under your jurisdiction is causing harmful interference to space services of other Administrations, and to exchange all necessary Information among the concerned parties involved in the case. He shared the registration status of European Administrations on online tools to remind Administrations to complete the registration and update.



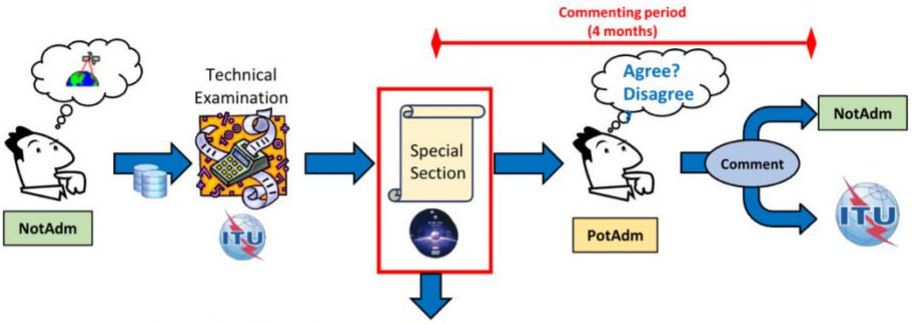

**2 Sep.**

**Presentation 8: Commenting on Special Sections**

**Patrizia Russo, Space Services Department, Radiocommunication Bureau, International Telecommunication Union**

Ms. Russo explained the general concepts of the Comment. To protect administrations' present and future radiocommunication services against potential interference as well as to exclude the territory of an administration from the service area, it is critical for all administrations to comment, even if they are not responsible for any satellite networks and even if they are not identified as potentially affected in the corresponding Special Section, within 4 months from the date of publication of the Special Section regarding the interference. However, when an administration that has been identified as potentially affected does not reply within the 4-month commenting period, there are two approaches: Implicit agreement and Explicit agreement.

## General commenting workflow




### Special Sections subject to comments:

| | Non-Planned Services | | Planned Services | | | | |
|---|---|---|---|---|---|---|---|
| | | | Appendices 30 and 30A | | | | Article 6 of Appendix 30B |
| | Sub-section IA of Article 9 | Section II of Article 9 | Article 4 of AP30/30A | | Article 2A of AP30/30A | | |
| Regions | All | All | Regions 1&3 | Region 2 | Regions 1&3 | Region 2 | All |
| Special Section | API/A | CR/C | AP30/E (Part A) AP30A/E (Part A) | AP30-30A/E (Part A) | AP30-30A/F/C | AP30-30A/F/C | AP30B/A6A |

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NotAdm : Notifying administration (administration responsible of the incoming satellite network)

PotAdm : Potentially affected administration

Moreover, according to different provisions, commenting on special sections varies in terms of commenting approach, how to comment, summary of comments and BR assistance procedure. Please kindly find a summary table of comment**s** on special sections below for reference.

## Commenting on Special Sections

| Special Section | Region | Identification (provisions) | Comments submitted under | Commenting approach | How to comment | Summary of comments (Special Section) | BR Assistance procedure |
|---|---|---|---|---|---|---|---|
| API/A | All | - | No.9.3 | Implicit agr. | SpaceCom | API/B | - |
| CR/C | All | 9.7, 9.7A, 9.7B AP30#7.1, AP30A#7.1 RS539, RS33#3 | No.9.52 | Explicit agr. | Corresp. | - | Nos.9.60-9.62 |
| | | 9.11 9.11A (9.12, 9.12A, 9.13, 9.14) 9.21/A, 9.21/B, 9.21/C, RS33#2.1 | No.9.52 | Implicit agr. | SpaceCom | CR/D | - |
| | | - | No.9.41 | Implicit agr. | SpaceCom | CR/E | - |
| AP30/E (Part A) AP30A/E (Part A) | 1 & 3 | All | § 4.1.7, 4.1.9, 4.1.10 of AP30/30A | Explicit agr. | Corresp. | - | § 4.1.10a - 4.1.10d |
| AP30-30A/E (Part A) | 2 | All | § 4.2.10, 4.2.13, 4.2.14 of AP30/30A | Implicit agr. | SpaceCom | AP30-30A/E (Part D) | - |
| AP30-30A/F/C | 1 & 3 | AP30#4.1.1D | § 4.1.7, 4.1.9, 4.1.10 of AP30 | Explicit agr. | Corresp. | - | § 4.1.10a - 4.1.10d |
| | | 9.7 AP30#7.1, AP30A#7.1 | No.9.52 | Explicit agr. | Corresp. | - | Nos.9.60-9.62 |
| AP30-30A/F/C | 2 | AP30#4.2.3D | § 4.2.10, 4.2.13, 4.2.14 of AP30 | Implicit agr. | SpaceCom | AP30-30A/F/D | - |
| | | 9.7 AP30#7.1, AP30A#7.1 | No.9.52 | Explicit agr. | Corresp. | - | Nos.9.60-9.62 |
| AP30B/A6A | All | AP30B#6.5 | § 6.10 of AP30B | Explicit agr. | Corresp. | - | § 6.13-6.15 |
| | | AP30B#6.6 | - | Explicit agr. | Corresp. | - | - |

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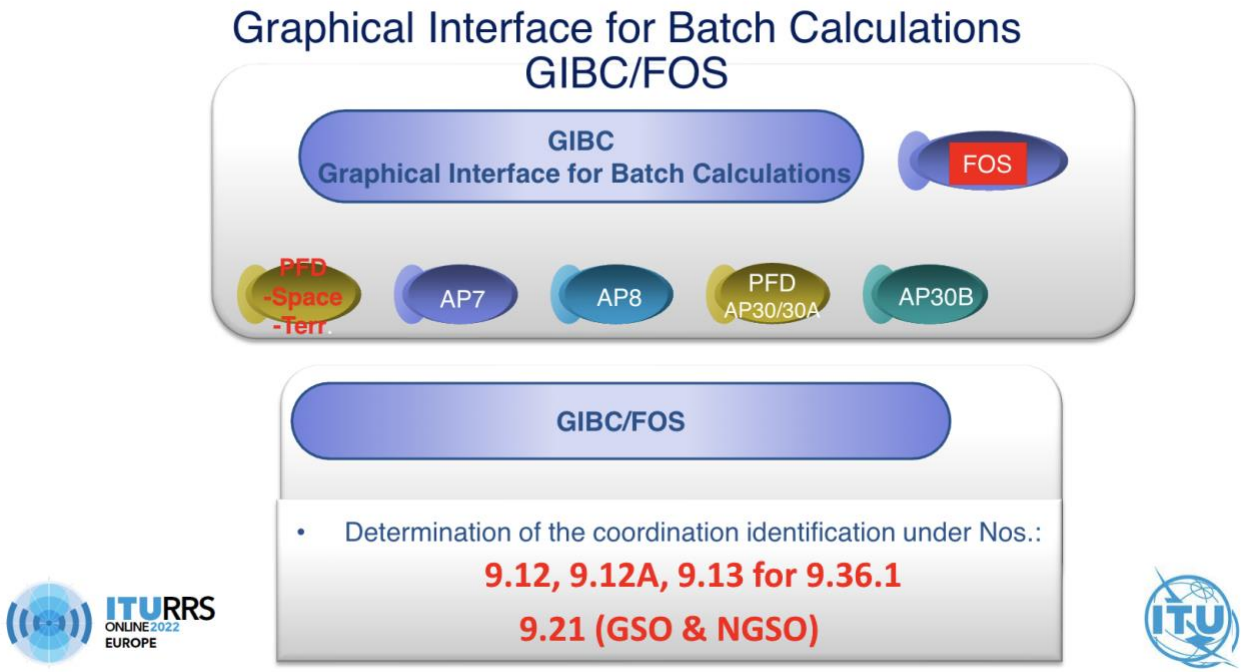
**2 Sep.**

**Presentation 9: SPACECOM to Accommodate 9.36.1 (WRC-19) GIBC/FOS**

**Patrizia Russo, Space Services Department, Radiocommunication Bureau, International Telecommunication Union**

After WRC-19, the Bureau has identified satellite networks/systems for information only and confirmation of identification for 9.12, 9.12A and 9.13. Consequently, Ms. Russo mentioned some modifications had been made in SPACECOM, such as the additional box which lists the potentially affected networks to select and leave comments. Next, she introduced the GIBC Frequency overlap (FOS) tool, which were specially developed to determine the coordination requirements under No. 9.12, 9.12A and 9.13 based on frequency overlap and to produce the list of affected satellite networks or systems under No.9.36.1. Tools are available on the ITU website and in the BR IFIC (Space Services) 2978/23.08.2022.




Ap 5 Table 5-1 includes each provision, forms of the condition, frequency bands, thresholds, and the calculation method to perform coordination. Specifically, for NGSO systems, Rop Table 9.11A-1 offers all cases where the NGSO systems have to coordinate with other systems. She then presented the output example of GIBC/FOS, with the summary for provision with the list of potentially affected administrations and the details of affected satellite networks.

## 5 September – Terrestrial Services Tutorials

**Tutorial 1: Notification for Fixed and Mobile Stations**
**Speaker: Sujiva PINNAGODA, BR Terrestrial Services Department, International Telecommunication Union**

Ms. Pinnagoda started the presentation with quickly browsing the Radiocommunication sector webpages and specifically the three groups of notices VHF/UHF Broadcasting, Fixed and Mobile, and LF/MF Broadcasting under "Guidance for Notification for Terrestrial Services page". For transmitting stations (T11, T12, T14), all the administrative and technical information of the transmitting station are displayed on the first screen; antennas and receiving stations information are under the "Operation" section. On the contrary, for receiving station (T13), all the administrative and technical information of the receiving station on the first screen, and antennas and location of the transmitting stations are listed under the "Operation" section. Each notice must be uniquely identified by description of a data item as assigned frequency, geographical coordinates, class of station, bandwidth code, emission class and hours of operation; namely, these data items could not be repeated, if not, an existing notice or assignment would be replaced by the new coming. Unique identification code given by the administration is for assignments which are outside GE06D.

Importantly, Bureau Assign ID and Site name are NOT identifying elements, but they could be notified in the remarks field as additional information, in case of modification, suppression and/or withdrawal. Moreover, she demonstrated the detailed steps to open the notifications through the Wizard and TecRaNotices. After completing the notices, she started the eValidation of Terrestrial Frequency assignment by uploading the saved notice file and filling in all the required information. She also pointed out that WISFAT was only accessible to registered users and "Test" needed to be included in the submission to indicate the test version.

**5 Sep.**

**Tutorial 2: Notification for Broadcasting Stations**
**Speaker: Sujiva PINNAGODA, BR Terrestrial Services Department, International Telecommunication Union**

Contrary to Fixed and Mobile Stations, identifying data items are much less, only Assigned frequency (MHz) and Geographical Coordinates. Then, she started using the Wizard to make an example of a Digital Television Broadcasting Station for recording in the Regional Plan GE06D. Within fragment of GE06D, "Apply 4.1.2.5 procedure" means once the administration gets all coordination agreement without objection and passes the coordination period, then it would get published in Part B. She also displayed the process of generating TB notice, and at the same time, she differentiated "Suppression" and "Withdrawal." If the assignment which the administration would like to remove what was already recorded either in the Master Register or in the plan, then the action "Suppress" needs to be selected; on the other hand, if the assignment is still under process, the action "Withdraw" needs to be selected. Furthermore, she also provided following exercises: Modification of the GE84 plan, Request for publication in Part B of the GE 84 Special Section, Request to Suppress a frequency assignment, Request to register an assignment in the Master Register with all technical characteristics as recorded in the plan for a station in operation, Modification of an assignment which is recorded in the Master Register. To clarify, according to the Radio Regulation, Bureau would not filter and classify the information received by the Bureau, and whatever Bureau received would go to publication.

**5 Sep.**

**Tutorial 3: Coordination of Terrestrial Services (except broadcasting)**
**Speaker: Chungsang RYU, Terrestrial Service Department, Radiocommunication Bureau, International Telecommunication Union**

Mr. Ryu briefly introduced general aspects of the coordination of Terrestrial services in terms of Interference, Permissible interference, Accepted interference and Harmful interference. He elaborated the following Articles' procedures of coordination and respective coordination criteria. As Article 9.18 n) states for any transmitting station of a terrestrial service in the bands referred to in No. 9.17 (above 100MHz allocated with equal rights to space and terrestrial services) within the coordination area of an earth station, in respect of this earth station, with the exception of the coordination under Nos. 9.16 and 9.19. Moreover, Article 9.18 is on a Bi-lateral basis without BR's involvement and BR checks in the examination procedure, if required agreements have been obtained or not. 9.19 o) for any transmitting station of a terrestrial service or any transmitting earth station in the fixed-satellite service (Earth-to-space) in a frequency band shared on an equal primary basis with the broadcasting satellite service, with respect to typical earth stations included in the service area of a space station in the broadcasting-satellite service. Article 9.19 is also on a Bi-lateral basis without BR's involvement, and BR checks after the publication of the assignment in Part 1 of BR IFIC if required agreements have been obtained or not. 9.21 p) for any station of a service for which the requirement

to seek the agreement of other administrations is included in a footnote to the Table of Frequency Allocations referring to this provision. Notably, under No. 5.341A 1429-1452 MHz, 1492-1518 MHz, even countries are located in XR1 but not within 450km from countries listed in No.5342 (ARM, AZE, BLR,KGZ,RUS,UKR,UZB) are exempted from 5.341A. Similarly, under 5.346, frequency band 1452-1492 MHz, XR1 countries (IRQ) within 670 km from countries listed in No. 5342 (ARM, AZE, BLR, KGZ, RUS, UZB, UKR).

He also highlighted coordination under other provisions, such as mandatory coordination required by Worldwide Plans, Mandatory coordination required by Regional Plans, and Agreements required by some WRC Resolutions. In the end, Mr. Ryu also invited the audience to browse the coordination procedure section under the Fixed and Mobile Service Division on the ITU website to grasp the coordination procedure RR 9.21.

To summarize,

- The radio signal spillover is unavoidable at the border area
- Mandatory (Article 9 and Worldwide or Regional Plans) or Voluntary (Article 6) coordination is required.
- The best solution is to agree on preference channeling arrangements between the administrations concerned.
- For frequencies not having channeling arrangements, the practical solution is to coordinate between administrations taking into account the agreed criteria and methods guided by ITU-R Recommendations.
- In accordance with No. 6.7 of Article 6 (special agreement) of Radio Regulations, two or more Member States coordinate the use of individual frequencies in any of the frequency bands covered by Article 5, before notifying the frequency assignments concerned, they shall inform the Bureau of such coordination in all appropriate cases.

**5 Sep.**
**Tutorial 4: Use of Terrestrial BR IFIC software tools**
**Saman JALAYERIAN, Terrestrial Service Department, Radiocommunication Bureau, International Telecommunication Union**

Mr. Jalayerian guided the audience step by step to access BR IFIC Package in DVD format and online. By running the executive BR IFIC file and accepting the license, the administrations and the subscribers would have access to the publication, including Publication (Latest Publication and MIFR & Plans), Software (TerRaQ and TerRaNotices) and Documentation (Information Note and Preface).
Under the “Latest Publication” section, two tabs are worth paying attention to. One is Current BR IFIC General Statistics: Notifying Administrations and the other tab is Current BR IFIC General Statistics: Concerned Administrations. Especially regarding Concerned Administrations, the Administrations need to verify whether they are affected, provide feedback to the BR and take related actions.

By clicking “TerRaQ”, the complete information can be accessed. He demonstrated how to use the General-Purpose Query through a series of filters. On the BR IFIC page, publication notice, using the BR IFIC with other BR tools, BR IFIC download, and MIFR (Terrestrial Services) online query are accessible.

**5 Sep.**
**Tutorial 5: ITU Maritime Service Publications and MARS (Maritime mobile Access and Retrieval**

**System)**
**German Medici, Terrestrial Service Department, Radiocommunication Bureau, International Telecommunication Union**

Mr. Medici started the conversation by briefly introducing the different types of stations in the Maritime Services. As he mentioned, ITU maritime database contained more than 900,000 vessels; almost 680,000 stations were notified with an MMSI; around 42000 stations were notified with satellite communication terminal numbers; more than 2,350 coast stations, around 100 SAR aircraft stations; more than 2500 automatic identification system (AIS) Aids to Navigation stations (AtoNs) and more than 600 accounting authorities' contact details.

ITU shares information with stations through List IV (List of Coast Stations and Special Service Stations RR 20.7), List V (List of Ship Stations and Maritime Mobile Service Identity Assignments RR 20.8), Manual for Use by the Maritime Mobile and Maritime Mobile-Satellite Services (Maritime Manual) (RR 20.14) and the online information system Maritime mobile Asses and Retrieval System (RR 20.14A). Under the tab "Radiocommunication" and then from the Terrestrial menu, MARS could be selected. He then demonstrated exercises of retrieving ship station, coast station and accounting authority information via MARS. Moreover, he also emphasized that under RR provision 20.16, Administrations shall take all appropriate measures to notify the Radiocommunication Bureau immediately of any changes in the operational information contained in List IV (Coast stations) and List V (Ship stations), in view of the importance of this information, particularly concerning safety.

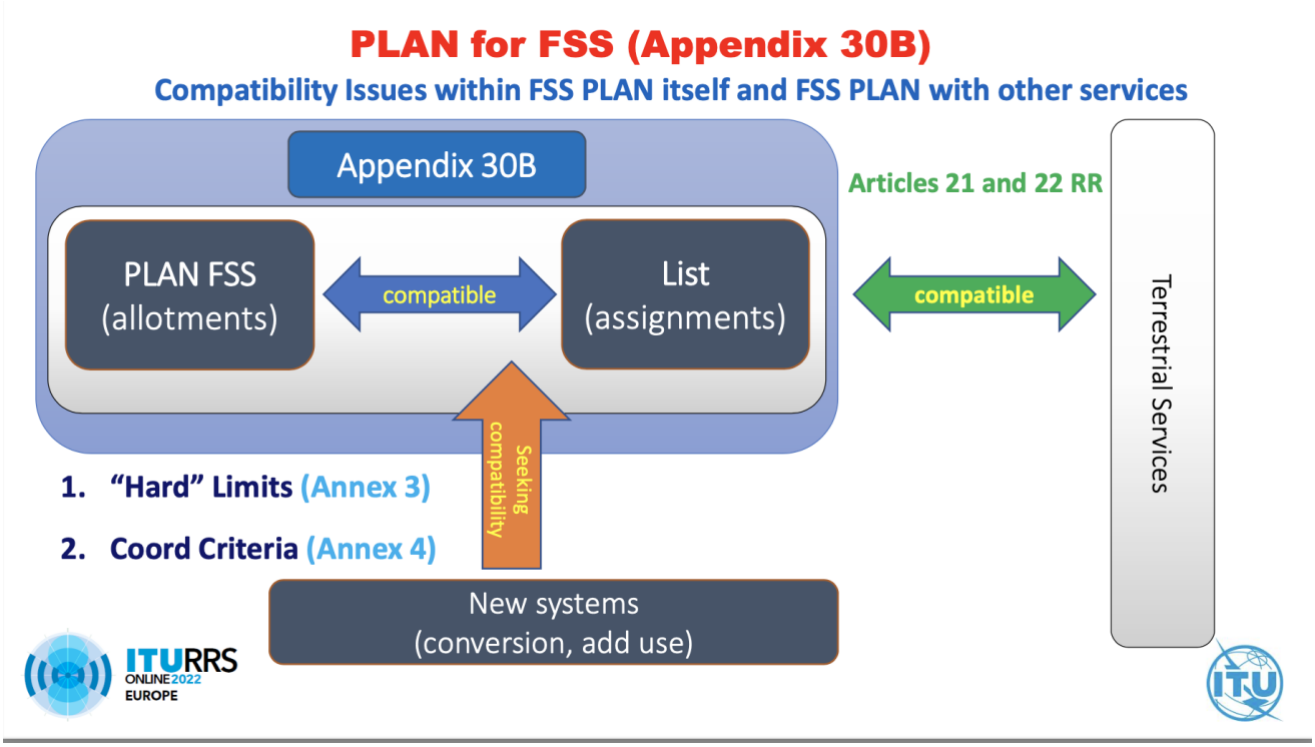
Referring to the detailed process, ITU first receives the data notified by Administrations, then ITU validates the data in case of any anomalies or inconsistencies and it would be reverted to administrations for clarification and finally recorded in the ITU maritime database. In the context of ship station notification, he went through paper format, electronic format, mandatory fields, and other recommended fields considering information that may be useful for Rescue Coordination Centre (RCC). Notably, suppose there is no data to notify in a field; in that case, the corresponding column should still figure in the spreadsheet and send the notification via the official point of contact registered in ITU. Furthermore, there are two notification options on the website to send to ITU concerning coast stations: one is by completing the downloaded notification forms in MARS and the other method is Data for Review. Last but not least, he restated that accurate notified information was a key factor for saving lives at sea as well as providing ship and shore-based information that facilitated communications for global commercial shipping.

## 6 September – Space Services Tutorials

### Tutorial 1: Plan for the Fixed-Satellite Service (Appendix 30B) Status of AP30B FSS allotment (Europe Countries)

**Alexander Klyucharev, BR/SSD/ Space Notification and Plans Division, International Telecommunication Union**

Mr. Klyucharev mentioned that FSS had been established more than 30 years ago. Plan for FSS (Appendix 30B) is a worldwide plan; namely, exact frequency bands are used across three ITU Regions. Compared with the BSS plan, the FSS plan is a plan for allotments. FSS plan must be developed based on the Standard Parameters (EIRP, noise temperature, Earth station characteristics, the carrier-to-noise (C/N) ratio, etc.), as well as overall single entry (C/I ≥25 dB) and overall aggregate (C/I ≥ 21 dB) interference.




Moreover, he pointed out the compatibility issues within FSS Plan and FSS Plan with other services, as well as the difference between non-plan and regulatory procedures within the FSS Plan. According to the Radiocommunication Bureau Notes subject of AP30B/A6A/XXX publications relevant to conversion, the subject network is submitted for the conversion of an allotment into an assignment within the envelope characteristics of the initial allotment. In accordance with the decision of the 53rd meeting of the Radio Regulations Board, the agreements of the administrations whose networks are identified as being affected under § 6.5 of Article 6 of Appendix 30B are not required. The subject network is submitted to convert an allotment currently in the Appendix 30B Plan into an assignment. As a consequence, in accordance with note 8 to §6.23 of Article 6 of Appendix 30B, the allotment will be removed from the Plan once the assignment is entered in the List of Appendix 30B.

Furthermore, he demonstrated detailed steps to check the "health" of national FSS Plan allotment and briefly reported the current national FSS Plan allotment status in Europe. He concluded that there were two main reasons for referencing national allotments. First, the administrations had not made comments within established regulatory time, and the second reason was that it was difficult to guarantee the new member states may have a national allotment with a reference situation during the additional planning exercise. He recommended for future protection of its national FSS Plan allotments; the Administration needs to make comments when the Administration was identified as potentially affected by the BR in relevant AP30B/A6A/XXX publications. He also mentioned the application of §6.16 AP30B could not guarantee the protection of the Administration Allotments in the Plan, or Assignments in the List, or Assignments of previously examined networks.

**6 Sep.**

**Tutorial 2: Filing Preparation and Submission: Capture, cloning and validation**
**Gordon Jones, BR Space Services Department, International Telecommunication Union**

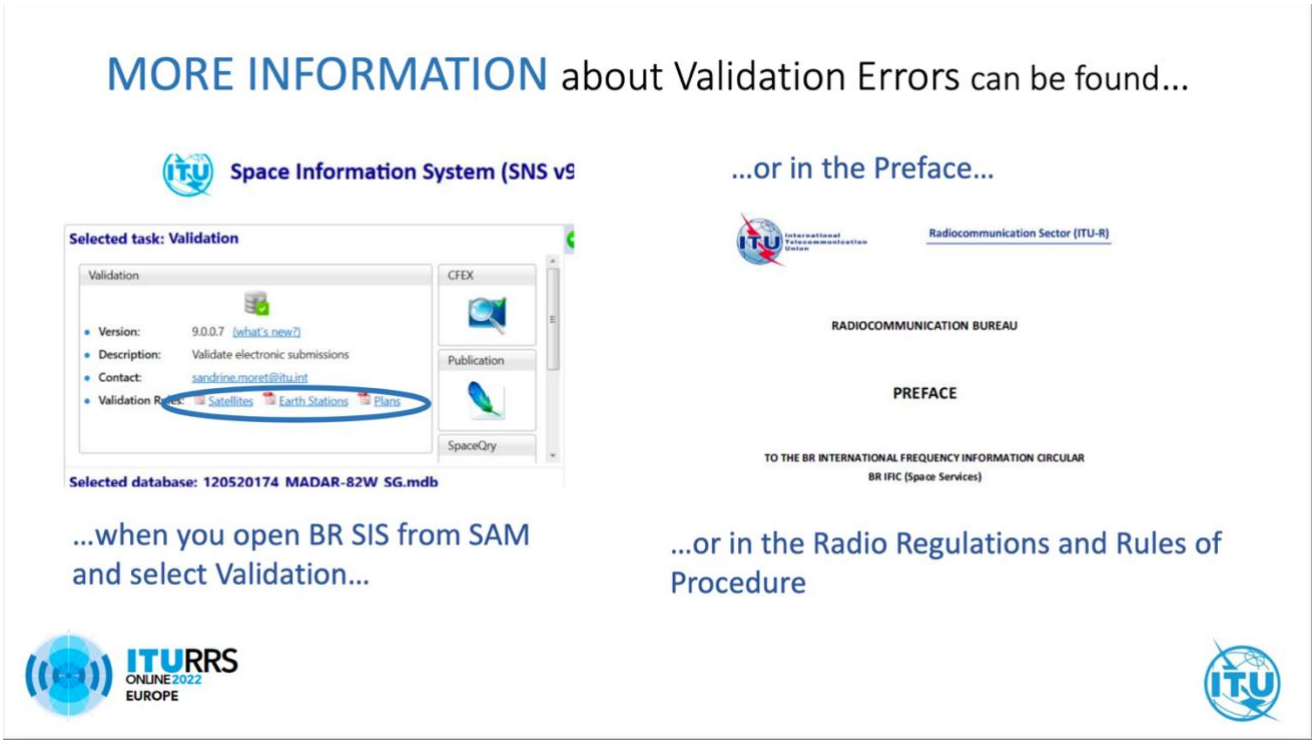
First of all, Mr. Jones explained the basic terminology. Filing for submission refers to preparing a database file (mdb) and any relevant wording documents. The main data for most submissions contains an mdb file with a predefined internal data structure called SNS. Spacecap and Graphic

Interface are used accordingly to capture SNS data and graphic mdb file, together with the use of BR SIS Validation, and then for final uploading and submission.

Due to the complex linking between the table and the SNS Data structure, BR recommends using Spacecap to capture data to avoid conflict between the tables. Moreover, instead of copying the previous submission, he advised downloading the published special section from the IFIC DVD, and then cloning it to be more efficient in reducing the processing time from the BR side.

Then he clearly demonstrated the following steps:

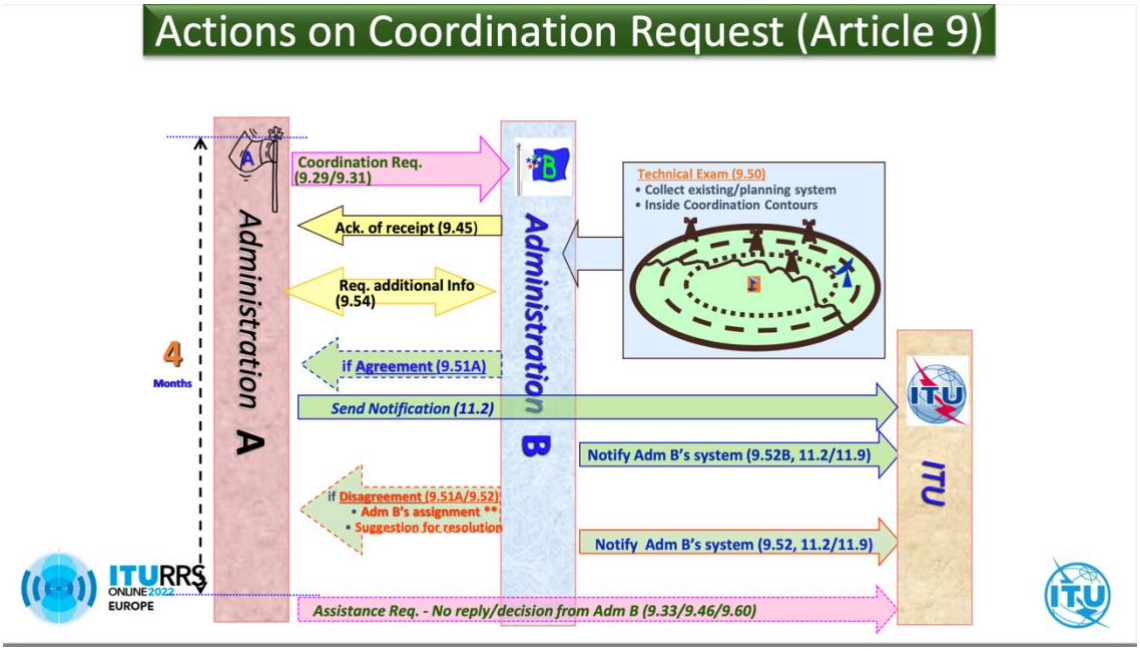
- How to streamline the process of capturing the data by using an existing notice to create a notice
- Check associated graphic data by using BR SIS validation program and cross-validation
- Correct common errors
- Clone a published notice to create a “MOD” to modify a previously submitted notice.



**6 Sep.**
**Tutorial 3: Earth Stations Coordination and Notification**
**Mehtap Dufour, BR Space Services Department, International Telecommunication Union**

Ms. Dufour designed her presentation into three building blocks Frequency Study (Article 5 Frequency Allocation, Article 9: Coordination Provisions Article 9, Article 9.15, Article 9.17, Article 9.17A, Article 9.21), Coordination (Appendix 4: Coordination Data (AP4-Annex 2), Appendix 7: Coordination Contour Diagram) and Notification (Submission of AP4 data to the Bureau). Through diving deep into these building blocks, she also touched upon the following points:

- Preparation of Coordination Data
- Earth Stations Coordination Data Capture
- Generate coordination contours
- Determination of Coordination Area
- Submission of Earth Stations for Notification
- Common Errors of the Submission of Earth Stations for Notification
- Actions on Coordination Request

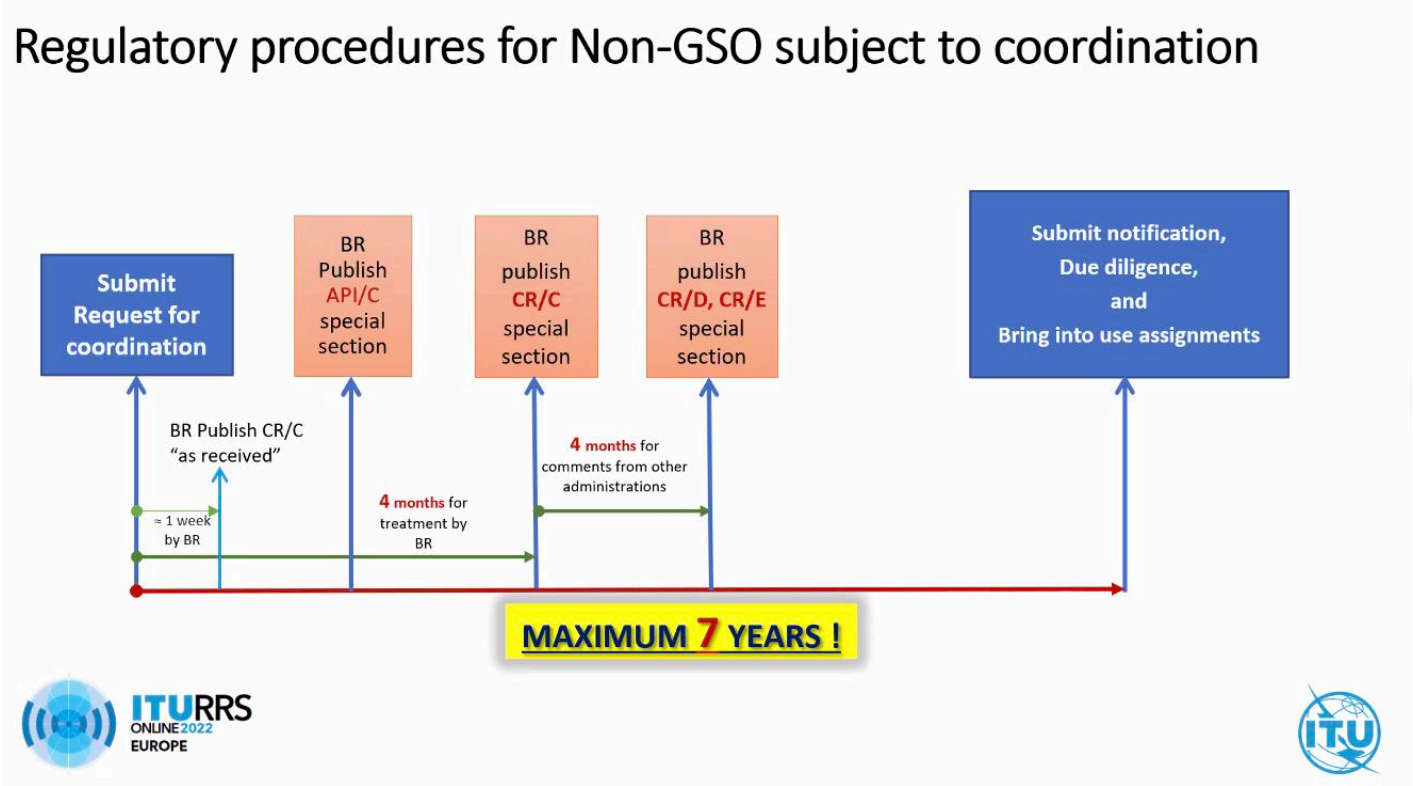



**6 Sep.**
**Tutorial 4: Non-geostationary Satellite Systems and Networks**
**Cessy Karina, BR SSD SSC, International Telecommunication Union**

The rapid increase of non-geostationary satellite projects, especially satellite mega- constellations in the low Earth orbits (LEO), represents an important innovation in satellite technology and leads to an increase in the number and complexity of NGSO satellite networks submitted to the Radiocommunication Bureau. Ms. Karina guided us to have a better understanding of Non-GSO Satellite Systems and Networks with the explanation in detail:

- Examples of Non-GSO
- Advantages and disadvantages of Non-GSO
- Two main Regulatory Procedures for non-geostationary satellite networks: Not subject to

coordination, and Subject to coordination
- Short-Duration Mission Regulations (SDM)
- Non-GSO Applications and regulations
- Conformity with the provisions of the Radio Regulations (No.9.35)
- Protection of GSO
- Coordination between FSS with respect to Large Earth Station (No. 9.7B)
- Coordination between non-GSO and terrestrial services (9.14, 9.21/C)
- Further evolution of regulations
- Milestone based approach adopted by WRC-19 (Resolution 35 – deployment milestones)
- Modification of NGSO (Guiding Principle – RoP on No.9.27)
- How to measure increase of interference
- Submission of multiple orbital configurations
- Equivalent Power-Flux Density (EPFD) and EPFD limits validation tools



**6 Sep.**
**Tutorial 5: Carrier to Interference (C/I ratio) GSO vs GSO Calculation Basics**
**Danny THAM Weng Hoa, BR Space Services Department, International Telecommunication Union**

Behind every satellite filing, Mr. Tham mentioned that there were link budgets that contained the power level of the signals and the gain and loss of the signal encountered while ensuring the C/N objective of the link was met. C/N ratio has two components, C is the carrier power taking into account gains and losses, and N is the noise power derived by kTB (k, Boltzmann constant= -228.6 dBW/K/Hz). He also guided the audience to see the formula and how to calculate C/I Up, C/I Down, and the Margin. C/I required is a single-entry interference protection criterion, and it could be found §3.1 of Section B3 of Rules of Procedure.

To summarize, to find C/I Required, it needs to find C/N from Appendix 4 data, find carrier type from emission and C/I Required from Table 2 in Section B3 of Rules of Procedure. However, he also mentioned the adjustment factor (dB), which C/I could be presented as C/I = C/Ib - Ia, C/Ib stands for Basic calculated C/I (dB), and Ia stands for Interference adjustment factor (dB). A positive or zero margin indicates no harmful interference, while a negative margin indicates potential for harmful interference.

C/I methodology is more complex than delta T/T and more detailed. The Bureau uses it for No.11.32A examination, and widely accepted for assessment for interference, especially between geostationary satellite networks, and used by Administration to coordinate their satellite networks.

**6 Sep.**
**Tutorial 6 - ECO tools EFIS and DoCDB: Europe's Radio Spectrum**
**Robin Donoghue, Spectrum Management, ECO**

Mr. Donoghue noted that the ECO uploaded the information relevant to any ECC deliverable (ECC Decisions, ECC Recommendations etc.), but the most important information was national implementation or national restrictions appropriate to any ECC Deliverable by the CEPT Administrations. Each CEPT Administration has five separate logins: EFIS, EFIS technical accounts (Fixed Service, PMSE, Short Range Devices), and DocDB. Besides simple search criteria of interest and the relevant Frequency Tables, EFIS can also be searched for relevant ECC Decisions, ECC Recommendations, or European Commission Decisions. Besides elaborating on the ECA Table, he underlined the Document Database (DoCDB) was the only space to find every ECC Decision, ECC Recommendations, ECC Reports, CEPT Reports, ECO Reports, which also has copies of the RSC Decisions from the Commissions website. A landing page for every deliverable is provided, including the current version (files), often in PDF and Word format, earlier (revised) versions, the list of relevant frequency ranges and equipment standards, and most crucially, the national implementation status. Finally, he guided the audience through the CEPT website and demonstrated how to use the aforementioned searchable databases under the ECO page.

## 7 September – Spectrum Management Forum

**Opening Remarks**
**Jaroslaw Ponder, Head of ITU Office for Europe**

Mr. Ponder first summarized the three building blocks that had formed this informative Regional Radiocommunication Seminar for Europe. With the first block, the ITU Radio sector provided the audience with a comprehensive understanding of the ITU-R structure and working methods in terms of the radio regulations, ITU-R study groups, terrestrial services, and the WRC. On the other hand, thanks to the informative two-day's tutorials, the audience had learned how to prepare and submit filling procedures pertaining to broadcasting stations, maritime services, mobile stations, fixed stations, and many more. The first and second parts presented a balanced theoretical and practical insight into ITU-R. To continue, with the third and last building block, which focused on the Forum on Spectrum Management, the audience would learn more about the tool for the National Table for Frequency Allocation (NTFA), followed by the session on the "Evolution of 5G in Europe" with speakers from ITU, CEPT, GSMA, GSA, GSOA.

Last but not least, he briefly introduced that ITU, ROHDE & SCHWARZ, ATDI, LS TELCOM, TCI/SPX would address the subject of "Modern Spectrum Management and Monitoring" with a particular European perspective on the next day. This would be followed by a round table composed of CEPT, GSMA, GSOA, EBU and ICAO on the WRC-23 Agenda Challenges with a European regional scope.

In conclusion, he wished this Forum would be the bridging platform for us to exchange on the future of Spectrum Management in the Europe region, to define the common challenges we share, and to determine opportunities and solutions coming from the Europe region. He counted on the proactive participation from all the European administrations and looked forward to a fruitful and open discussion among all invited participants.

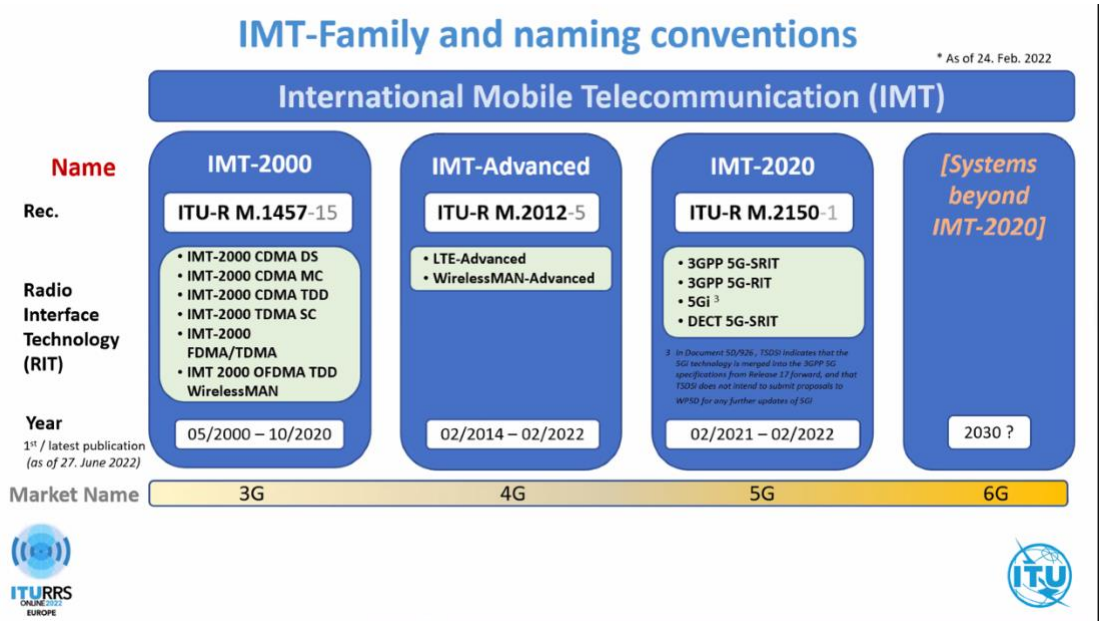
## 7 September - NTFA

**Presentation 1: Radio Regulations Software and Tools**
**Bachar Abouchanab, Terrestrial Applications Software Division (ITU/BR/IAP/TAS), International Telecommunication Union**

During the presentation, Mr. Abouchanab presented two main tools in radio regulations. The first tool is the ITU Radio Regulations: Navigation Tool and how to navigate the complex corpus of RR and related texts easily, and secondly, the Software Tool for the Analysis of Article 5 Table of Frequency Allocations and how to extract and modify a National Table of Allocations. He walked the audience through how to use these two stand-alone tools to browse, search and access the needed information, recommendations, and data. Finally, he also touched upon package updates on data and software.

**Presentation 2: IMT-related activities in ITU-R**
**Uwe Löwenstein, Counsellor ITU-R Study Group 5, Radiocommunication Bureau, ITU**

Mr. Löwenstein addressed the brief introduction of the IMT-Family and naming conventions, the currently available spectrum for IMT, and the IMT Process, which applied to 5G and systems beyond IMT 2020.



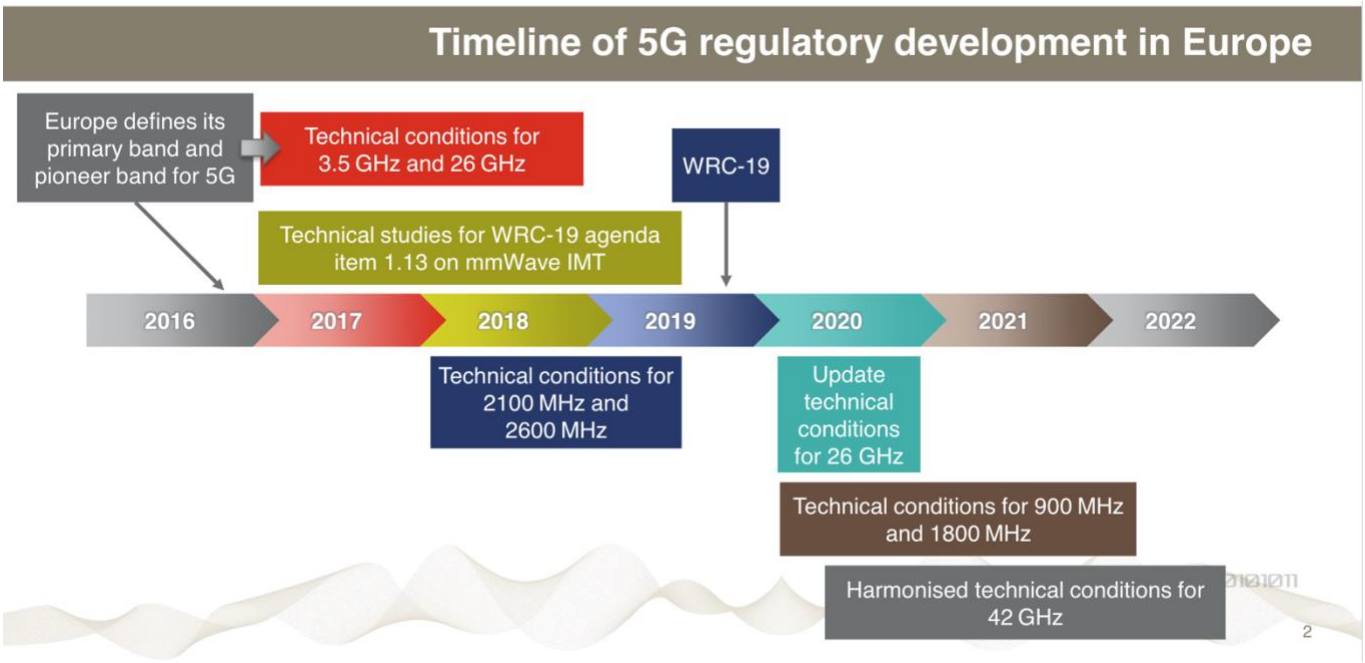

It is essential to grasp the basic understandings of the IMT generations (IMT-2000, IMT-Advanced, IMT-2020, Systems beyond IMT-2020). More interestingly, he touched upon the following:

- Frequency bands identified for IMT Globally and per region
- WRC-23 Fixed, Mobile and Broadcasting Issues (AI 1.1, AI 1.2, AI 1.3, AI 1.4, AI 1.5)
- IMT-Process: Timeline for IMT-2020
- IMT-Process: for "Systems beyond IMT-2020" (WRC-23, Requirements and Evaluation criteria, Evaluation and Consensus building, Recommendations)
- Draft New Report - Technology trend: Emerging services and applications, technology trends and enablers, technologies enhance the radio interface, technology enablers to enhance radio network
- New vision for "IMT for 2030 and beyond"
- Workshop on "IMT for 2030 and beyond" (ITU-R WP 5D internal)

## 7 September - Evolution of 5G in Europe

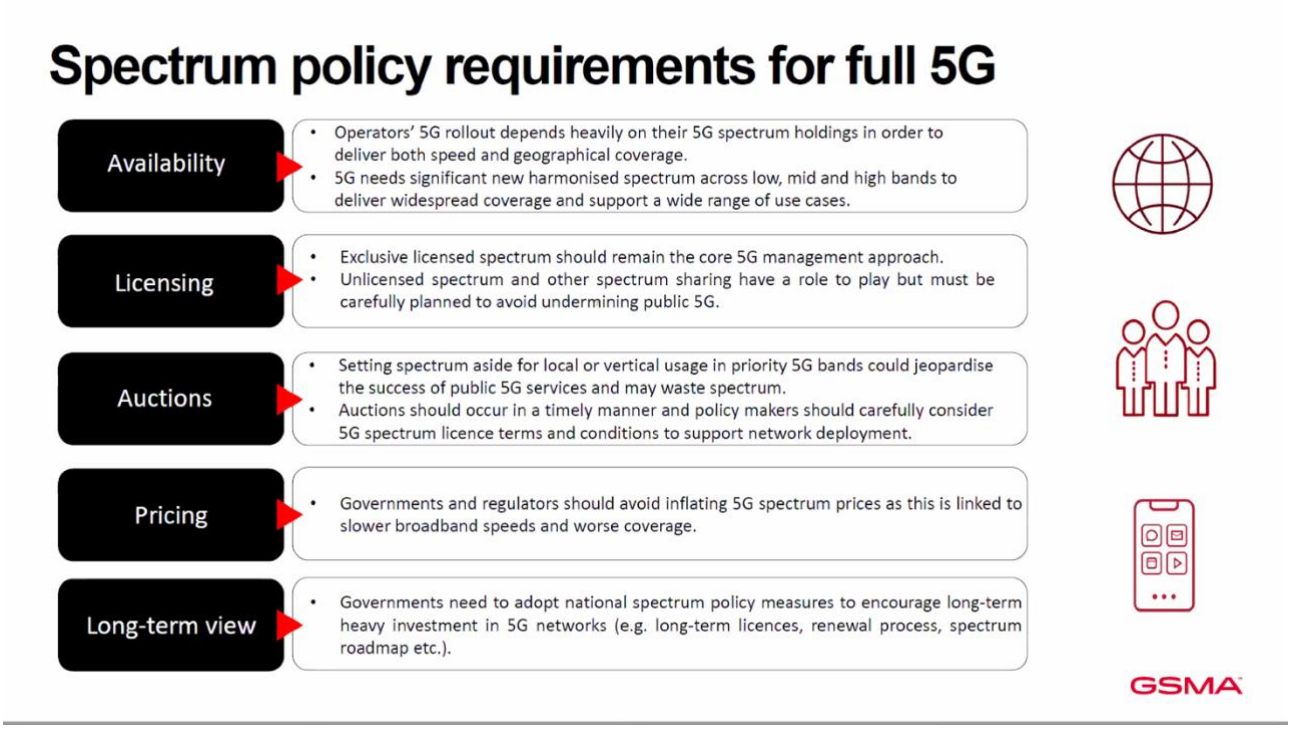
**Presentation 3: Evolution of 5G in Europe**
**Steve Green, Chair, CEPT ECC PT1**

Mr. Green started the presentation by elaborating on the timeline of 5G regulatory development in Europe, from Europe defining its primary band and pioneer band for 5G in 2016 to the current harmonization phase in 2022 and beyond. What's worth mentioning, CEPT has been developing a harmonization decision for mobile/fixed communication networks in the 40.5-43.5 GHz band, planned for publication in November 2022.




**Presentation 4: Evolution of 5G in Europe**
**Emma O'Toole, Senior Manager, Spectrum, GSMA**

Ms. O'Toole started with the current stage of accelerating 5G deployment in Europe. According to GSMA intelligence, most European countries (34 out of 50) had deployed commercial 5G. Moreover, she mentioned that 5G would take over 3G in Europe in 2023 and close the gap with 4G to single digits by 2025, as well as the consistent regional development of 5G in Europe. Last, Ms. O'Toole briefly stated the spectrum policy requirements for Full 5G.



**Presentation 5: Evolution of LTE to 5G in Europe**
**Joe Barrett, President GSA, General Services Administration (GSA)**

Mr. Barrett started the presentation with a brief introduction about GSA and the GAMBoD data, including devices, networks, chipsets, technology, spectrum, and operators. A wide range of 5G devices was announced, extending far beyond mobile. According to Mr. Barrett, each IMT generation enriched the user experience, and extreme connectivity and immersive augmented experiences would be expected in the 6G. In addition, the GSA database continued to track the 5G ecosystem, global 5G network launch status, and countries/territories with commercial 5G FWA networks. Looking into the spectrum, he pointed out that C-band was more established in terms of deployment and licensing in Europe.

**Presentation 6: Satellites in the 5G/6G Ecosystem**
**Patrick VAN NIFTRIK, Chair ITU WG, Global Satellite Operations Association (GSOA)**

Instead of the perception that satellites were used in isolation, Mr. Van Niftrik highlighted the reality that Satellites and terrestrial are often used in a complementary fashion. He also pointed out the tremendous changing landscape of the satellites and terrestrial (GEO systems, MEO constellations, LEO constellations for broadband underway) over the past decades. Concerning GSOA's vision, he underlined the importance of integrating the satellite industry into terrestrial networks and compliance with standards for end customers' connectivity. Additionally, on the direct access capabilities & IoT side, 3GPP's Release 17 had the technical requirement for MSS chipsets to support the development of satellite direct-to-cell phone capabilities. Notably, satellite operators are actively testing the 5G NTN Protocol stack and the 3GPP's Release 18 is in progress. In the last section of his presentation, he highlighted Working Party 4B: Satellites in Next Generation Access Technologies and the latest update and development of the working party.

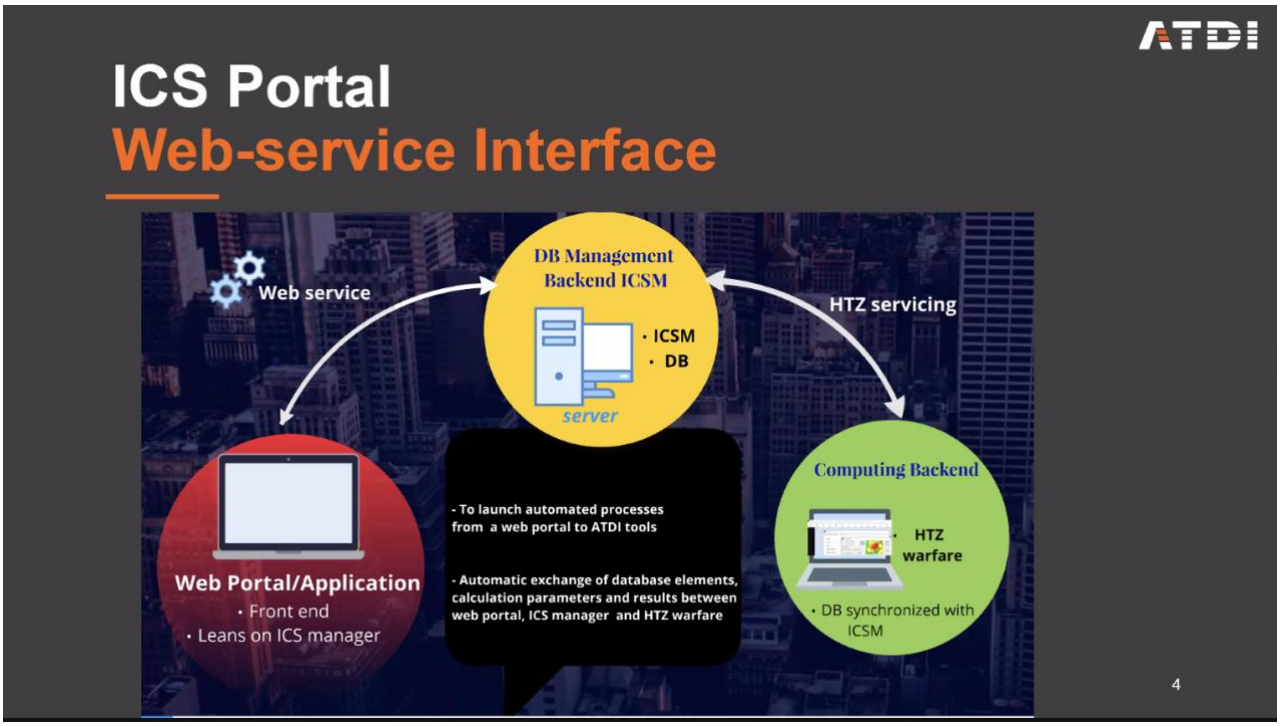
## 8 September - Modern Spectrum Management and Monitoring

**Presentation 1: Modern Spectrum Monitoring**
**Philipp Strobel, Product Manager Spectrum, Monitoring Solutions, Rohde & Schwarz**

Mr. Strobel raised the awareness on today's challenges in modern spectrum monitoring as following: more sources of RF interference, more wideband broadcast signals, wide bandwidth of modern communication standards and limited access to emitters of interest. In order to response to these challenges, various specialized tools and software are designed and more flexible monitoring stations are created. Regardless of the concrete 6G standards at present, it is certain that spectrum monitoring for 6G would face the challenges, such as extended frequency range up to 100 GHz and beyond, 6G signals will be up to 2 GHz and wider, and a higher modulation depth than 5G.

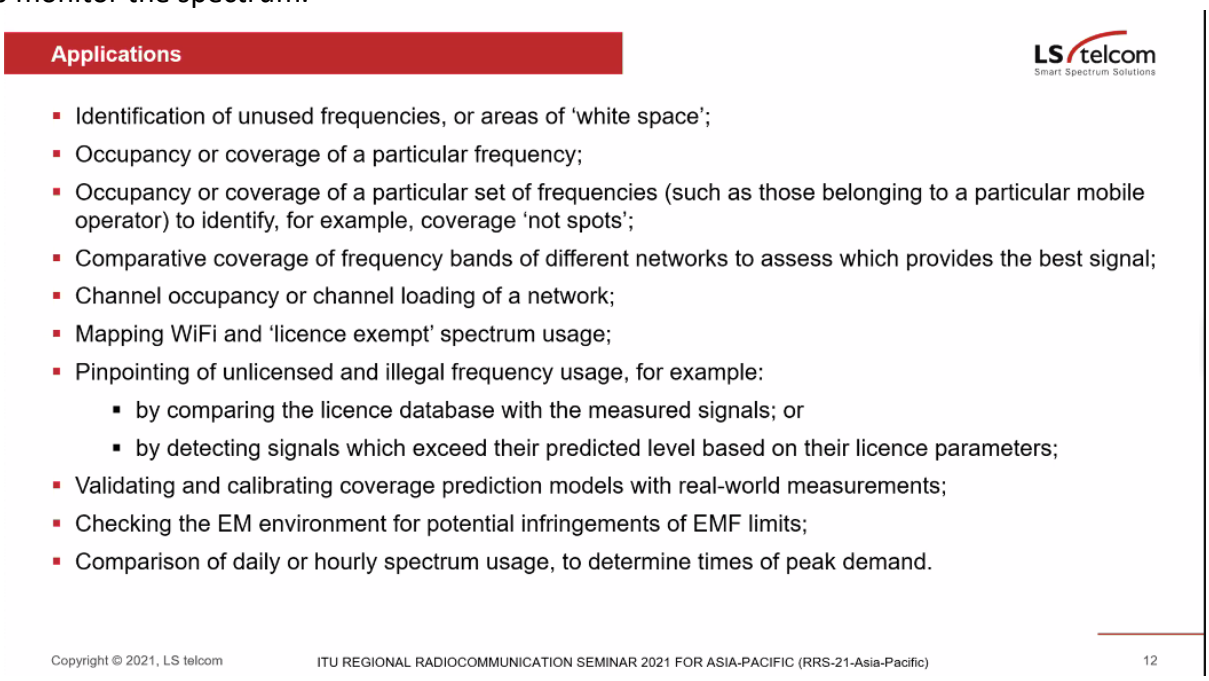
**Presentation 2: ICS Portal: ATDI's solution for online spectrum management**
**Samar Kaddouri, ATDI**

Ms. Kaddouri presented ICS Portal, a web-service interface, a gateway for external licenses to manage their own self-care to register applications and follow up the assessment status. This website portal is interoperability and compatible with other ATDI solutions, blackened by ICSM data management and interfaced with HTZ warfare. Thus, it allows **the** automatic exchange of database elements, calculation parameters and results between **the** web portal, ICS manager and HTZ warfare. She then showcased the ICS Portal solution video briefly.




**Presentation 3: Modern Spectrum Management and Monitoring**
**Richard Womersley, LSTELCOM**

Given the growing demand for the limited radio spectrum resources, Mr. Womersley underscored that regulators were looking at increasingly sophisticated ways to find opportunities for sharing between users. With the advent of spectrum monitoring capabilities (data capture), big data (data storage), and intelligent algorithms (data mining), he mentioned that it was now possible to implement far more innovative approaches to enabling shared access to the spectrum whilst also increasing the accuracy of knowledge concerning the radio environment. The following applications help monitor the spectrum.

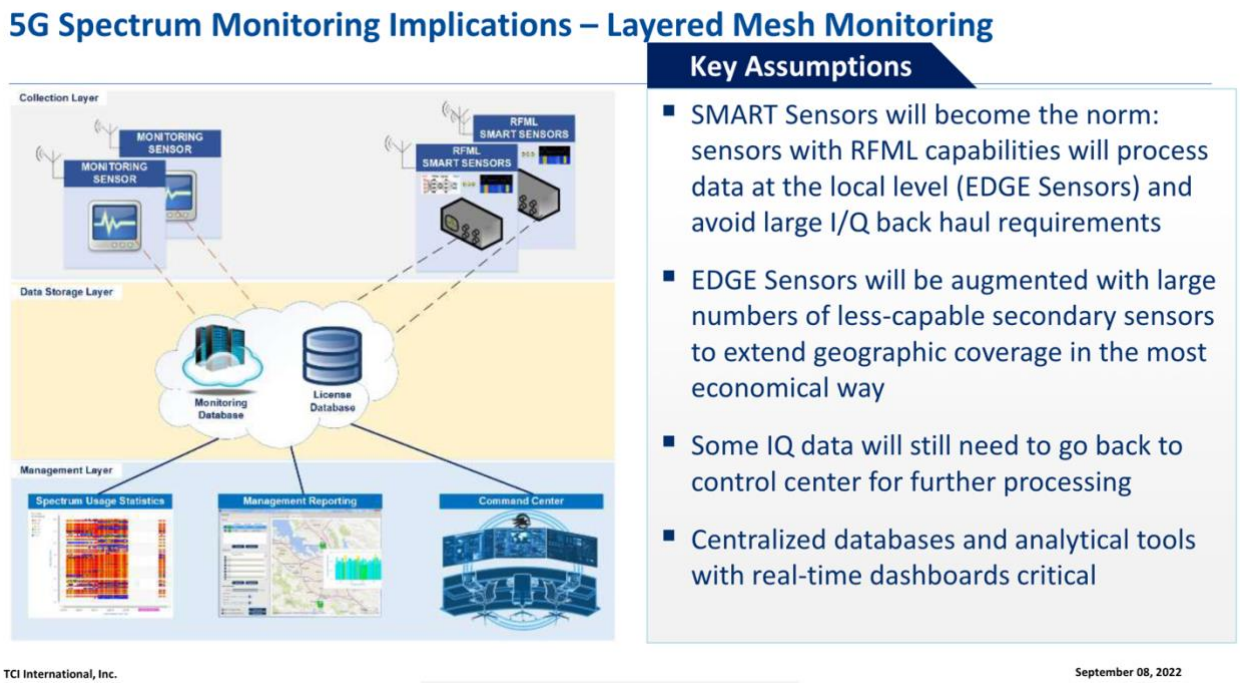


He concluded that safe and well-informed spectrum sharing was possible through intelligent processing of monitoring information. Current spectrum-sharing techniques use a bottom-up approach based on old-fashioned compatibility analyses and a static view of spectrum utilization options. On the other hand, a top-down approach based on actual spectrum occupancy opens new opportunities for sharing whilst fully protecting incumbent users.

**Presentation 4: Spectrum Monitoring Evolution: 5G and beyond**
**Aleksandar Smokvarski, MScEE, Regional Business Development Director, TCI International, Inc.**
**5G Spectrum monitoring implications: Artificial Intelligence, layered mash monitoring, big data**

Mr. Smokvarski reflected on the fact that the RF spectrum would continue to have high-power emitters, but there would be much more low-power/ directional emitters in the 5G environment. Thus, he pointed out that monitoring solutions must be modular and scalable to provide economical solutions for national monitoring networks operating at the local level, and over a much larger range of frequencies.

He mentioned that the meshed monitoring network would become common in the 5G world. Moreover, he foresaw Artificial Intelligence, particularly in the form of Radio Frequency Machine Learning (RFML), would become necessary to handle the large volume of 5G signals. Regarding 5G spectrum monitoring implications, layered mesh monitoring became essential. SMART Sensors would become the new norm; EDGE Sensors would be augmented with large numbers of less-capable secondary sensors to extend geographic coverage in the most economical way; some IQ data would still need to go back to the control center for further processing, centralized databases and analytical tools with real-time dashboards would be critical.




In regard to 5G spectrum management implications, he touched on the utilization of big data by increasing the automatic collection of measuring data from the monitoring stations and developing intuitive mapping tools to visualize current and historical spectrum usage, showing coverage areas, interference areas, and unused frequencies. In addition, since modern spectrum management systems/databases hold much information about spectrum users, frequencies, licenses, fees, interference complaints, etc, it is essential to integrate with spectrum management databases in the

spectrum management.

**Presentation 5: ITU-D Future Networks and Spectrum Management: Overview of Spectrum Activities at BDT**
**Walid MATHLOUTHI, Head of Infrastructure, International Telecommunication Union**

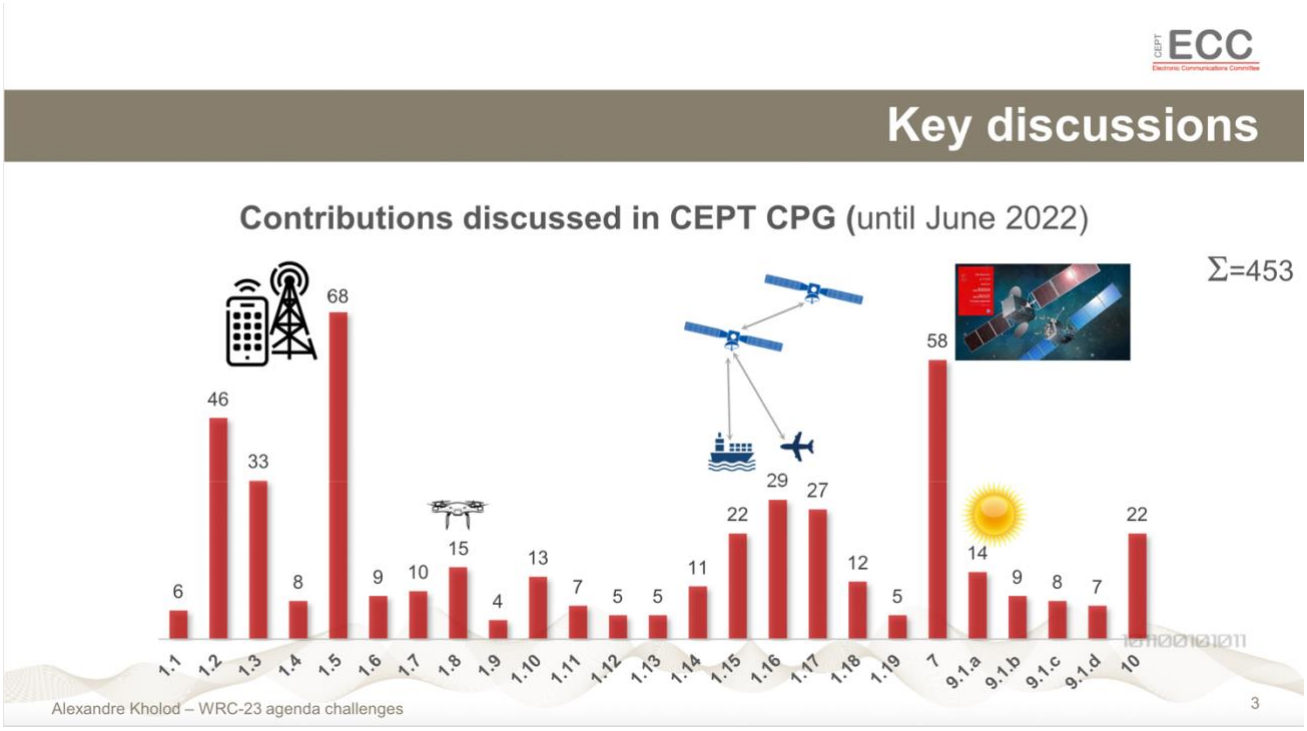
Mr. Mathlouthi presented the ITU spectrum management system for developing countries (SMS4DC). SMS4DC is a software designed by ITU based on ITU recommendations. SMS4DC aims to assist the administrations of developing countries in undertaking their spectrum management responsibilities more effectively. SMS4DC covers terrestrial fixed, mobile, sound and television broadcasting services in bands above 30 MHz, including GE-06, as well as frequency coordination of Earth stations. SMS4DC Version 5.2 with updated features is under test and scheduled to be released by Oct 2022.

Moreover, he highlighted ITU's ongoing efforts on Digital Switch Over (DSO) and Analogue Switch Off (ASO). As of 198 Records as of 7/07/2022; 19 countries have updated their DSO/ ASO status. This exercise enables ITU administrations to benefit from the state-of-the-art DVB technologies (technical, policy, and economic aspects including capacity building) and information on the digital Terrestrial Television broadcasting transition. Furthermore, it is imperative now to address the question of how to allocate the 'digital dividend' resulting from the spectrum efficiencies gained by this process in the frequency bands currently allocated to broadcasting. Even though he pointed out there remained some key credentials and policy challenges, most countries in the Europe region had completed the transition.

## 8 September - WRC-23 Agenda Challenges: Regional Scope

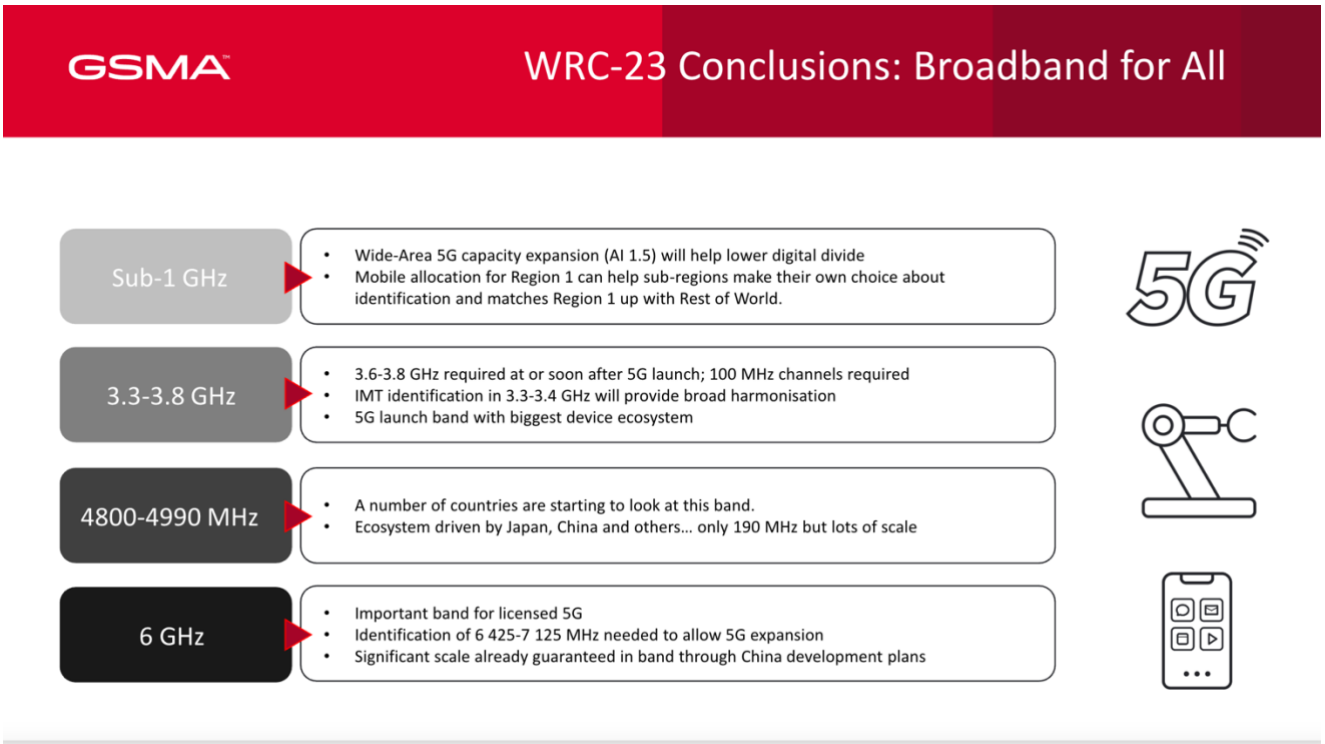
**Presentation 1: Alexandre Kholod, Chairman CEPT CPG**
**Federal Office of Communications, Switzerland**

Mr. Kholod offered an overview of principal themes and key discussions at WRC-23. According to the contributions received, agenda item 1.5, agenda item 7, and agenda item 1.2 were the top three agendas discussed most in CEPT CPG (until June 2022). He highlighted several key agenda challenges, such as the UHF band had undergone a "salami slicing" by various conferences since 2000, and whether WRC-24 will manage to make a long-term decision. In addition, he referred to the 6GHz band and whether WRC-23 would agree on an IMT identification. Moreover, on communication with geostationary (a.i. 1.15) and non-geostationary (a.i. 1.16) satellites, whether WRC-23 would harmonize Ku- and Ka-bands for GSO and NGSO ESIMs. Regarding unmanned aircraft systems (1.8), it remains under question whether WRC-23 would manage to establish clear rules (safety, interference) for UAS or not.



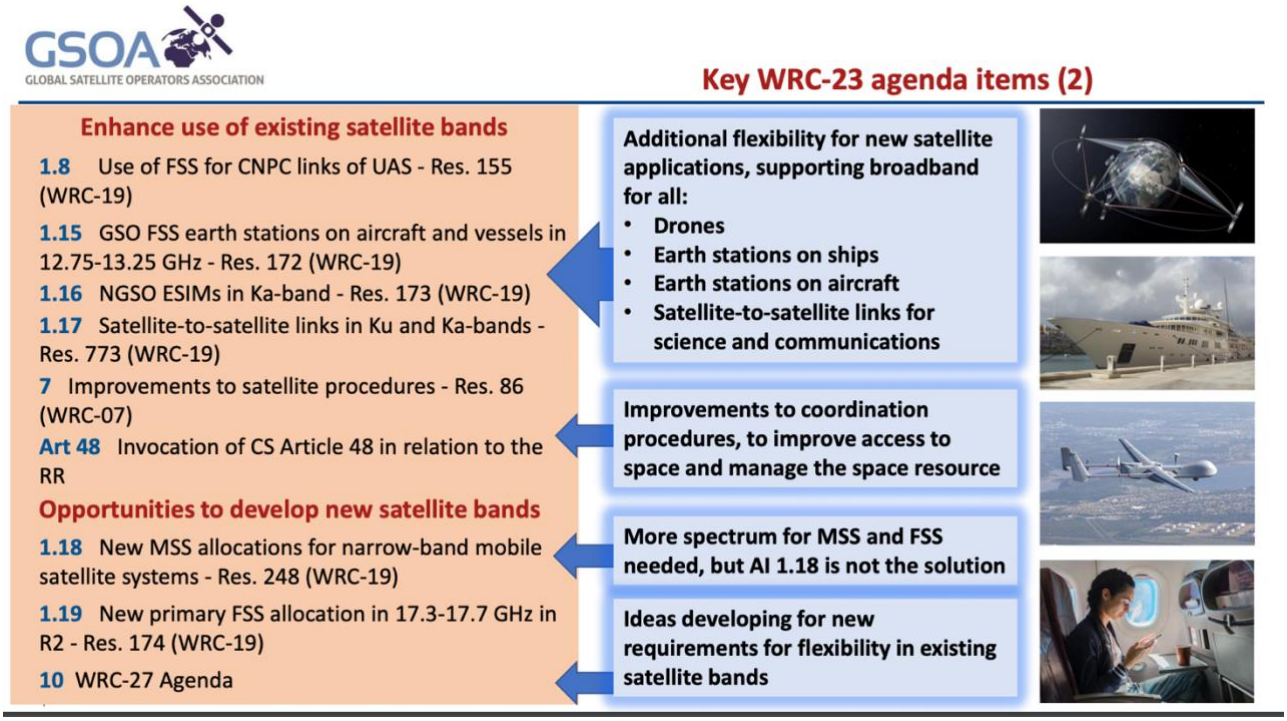

**Presentation 2: WRC-23 Defining Future Connectivity**
**Luciana Camargos, GSMA**

Even though 93% of the world's population is covered by Mobile Broadband, more people are not connected to the Internet, 3.9 billion people in comparison to 3.2 billion people who live within mobile broadband coverage. Referring to the Socio-Economic Benefits of Mid-band 5G GSMA Intelligence 2022, 5G can impact the global economy in 2030 by $961 billion, but the current spectrum constraints could restrict value. Furthermore, according to GSMA's latest report, "The 6 GHz IMT Ecosystem", 93% of those surveyed identify 6GHz as very or extremely important to the future of their IMT networks. It should not be surprising that 80% of the surveyed operators feel it is very or extremely likely that they will deploy the band for IMT services. According to the existing cases, 73% of operators say eMBB is a planned 6 GHz IMT use case, and 47% of operators cited Fixed Wireless Access (FWA). FWA certainly has a role in diversifying operator revenues and helping to close the digital divide to enable 6 GHz. As Ms. Camargos noted, the low-band spectrum is the cornerstone of digital equality and a driver of broad and affordable connectivity.


GSMA
WRC-23 Conclusions: Broadband for All
Sub-1 GHz
Wide-Area 5G capacity expansion (AI 1.5) will help lower digital divide
Mobile allocation for Region 1 can help sub-regions make their own choice about identification and matches Region 1 up with Rest of World.
3.3-3.8 GHz
3.6-3.8 GHz required at or soon after 5G launch; 100 MHz channels required
IMT identification in 3.3-3.4 GHz will provide broad harmonisation
5G launch band with biggest device ecosystem
4800-4990 MHz
A number of countries are starting to look at this band.
Ecosystem driven by Japan, China and others… only 190 MHz but lots of scale
6 GHz
Important band for licensed 5G
Identification of 6 425-7 125 MHz needed to allow 5G expansion
Significant scale already guaranteed in band through China development plans
5G

**Presentation 3: The Path towards WRC-23 – Progress, Challenges, and Opportunities in Europe and across Region 1**
**Álvaro de Vega, GSOA**

Mr. De Vega articulated the key WRC-23 agenda items which create threats to satellite services.
1. The greater use of 5G could lead to loss of more C-band spectrum providing services to European citizens:
   - Space station protection needed in FSS 6425-7025 MHz
   - Possible loss of utility of the planned FSS C-band (AP30B)
   - MSS feeder link earth station protection needed
   - Compatibility with earth station use needed in 3.6-3.8 GHz in Europe, Region 1 and Region 2
2. Possible foot in the door of IMT in additional bands used by satellite services.
3. Existential threat to satellite services in several frequency bands.

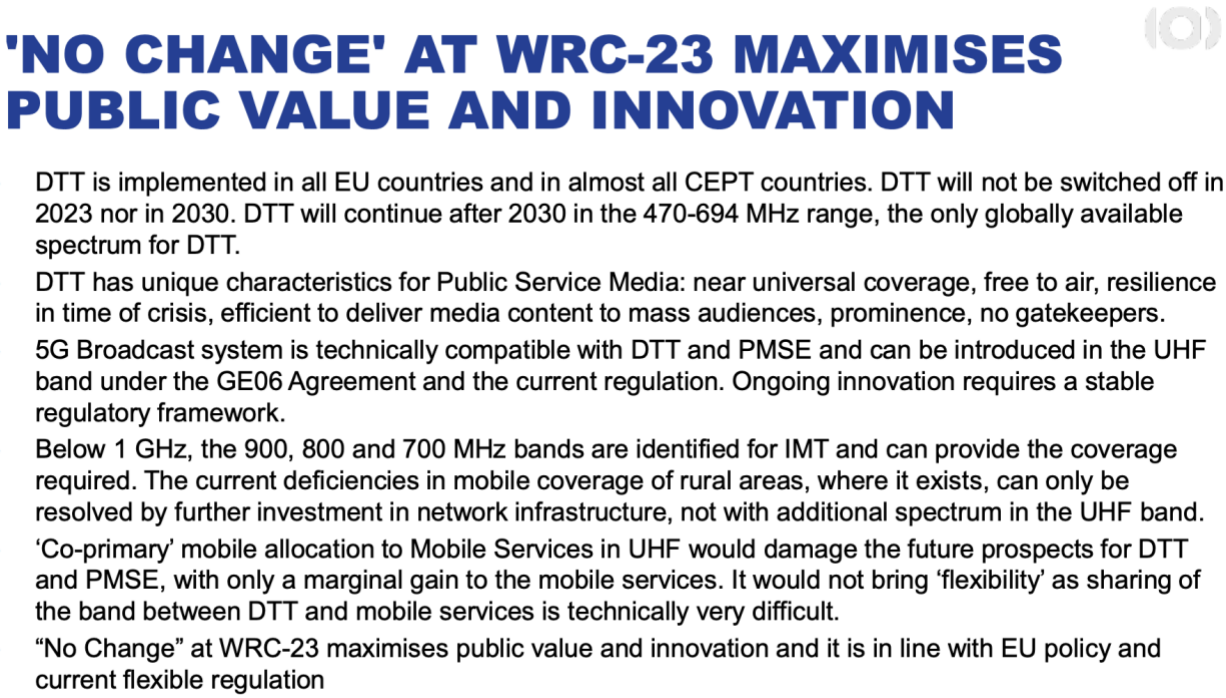



In conclusion, Mr. De Vega emphasized that decisions should be made on a sound technical basis, and the tendency to require more checks by the ITU BR. On the Upper 6 GHz band, he also posed the question of how Europe will approach the WRC, given the lack of a preference towards terrestrial use (FS, IMT or WiFi). What's more, regarding the use of IMT in satellite uplink bands (AI 1.2 and Art 21.5), satellite services are at stake. Note the international framework for similar situations has failed in the past – in parts of the 2 GHz band and 2.5 GHz band.

**Presentation 4: WRC-23 Agenda Challenges for Broadcasters**
**Elena Puigrefagut, EBU T&I, Senior Project Manager**

As the world's leading alliance of Public Service Media, the European Broadcasting Union EBU is composed of 113 member organizations in 56 countries, with a potential audience of 1.07 billion people. Ms. Puigrefagut noted that DTTB in the UHF band was crucial for Public Service Media and audio PMSE in the UHF band was critical for content production and the cultural and creative industry sector. Concerning the future of the UHF band in Region 1, she mentioned the necessity to examine the current spectrum use and future spectrum needs for all services in the band 470-960 MHz, and to investigate if the band 470-694 MHz can be shared between the existing and the candidate new

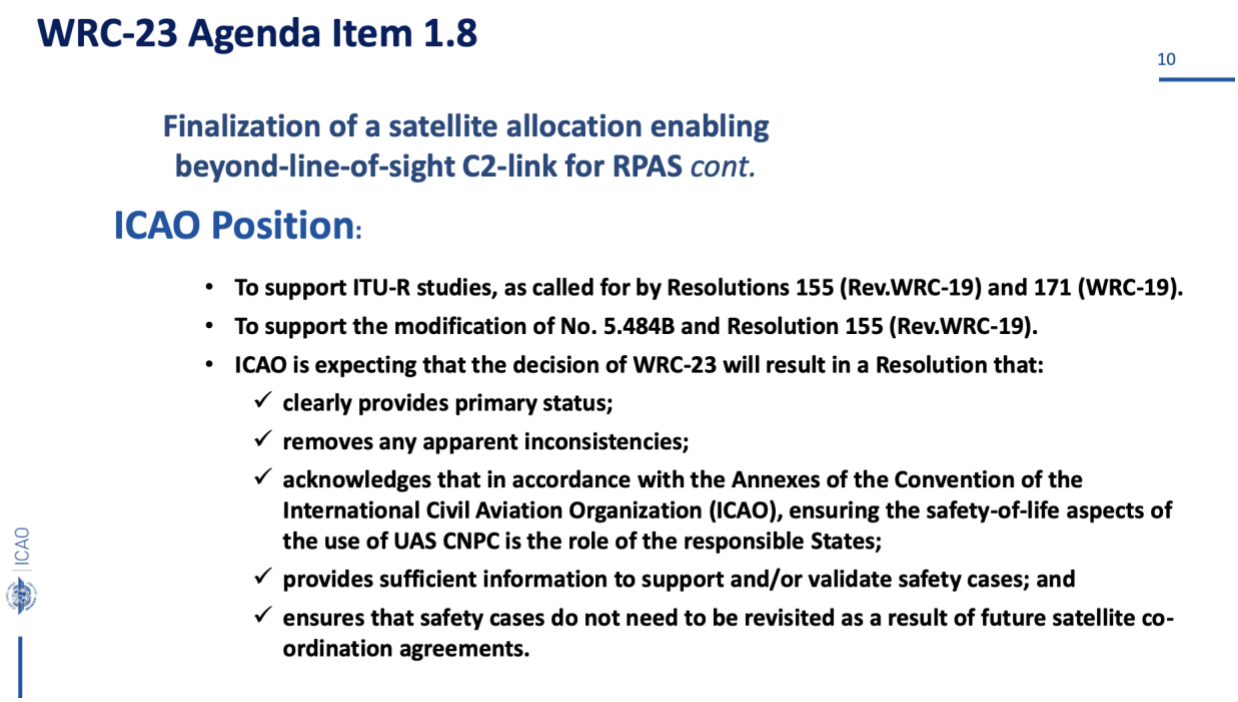
services, as well as, to consider potential changes to the Radio Regulations based on those studies. Furthermore, the sharing studies showed that sharing with IMT might not be viable everywhere due to the large separation distances required (e.g., around 100-300 km for IMT sharing with DTT). Results confirmed by real interference cases. Additionally, difficulties in understanding the assumptions and methodologies used by certain studies showed shorter separation distances required. Since the assumptions and methodologies for these studies have not been disclosed, it is unclear what the results represent.




At the end of the presentation, she addressed other challenges for broadcasters related to WRC-23 AI 1.2 & 1.3 - C-Band, and WRC-23 AI 9.1c.

**Presentation 5: Main Aviation Issues at WRC-23**
**Loftur Jónasson, Chief – CNS and Spectrum (CNSS) - International Civil Aviation Organization ICAO**

Aeronautical radiocommunication and radio navigation are prerequisites for accurate navigation, landing guidance, situational awareness, weather radar, and reliable communications with air traffic control for a safe flight. Mr. Jónasson focused on three core parts: Spectrum use by sub-orbital vehicles, potential facilitation of aeronautical VHF over satellite, finalization of a satellite allocation enabling beyond-line-of-sight C2-link for RPAS in WRC-23 agenda. Particularly, agenda items 1.6, 1.7, 1.8, 1.9, 1.10, and 9.2 related to aviation are seeking action by the WRC, and agenda items 1.1, 1.2, 1.3, 1.4, 1.11, 1.13, 1.15, 1.16, 1.17, 4, 8, and 9.1 topic b could potentially affect aviation use of spectrum. To further articulate, he explained the ICAO position on the WRC-23 agenda items 1.6, 1.7,and1.8.




More detailed document about ICAO Position for ITU WRC-23 is available at:
https://www.icao.int/safety/fsmp/documents/itu-wrc23

**Closing Remarks**
**Elind Sulmina, Project Officer, ITU Office for Europe**

Mr. Sulmina delivered the closing remarks on behalf of Mr. Jaroslaw Ponder, Head of the ITU Office for Europe. He thanked the audience for participating in this important seminar, all the speakers for their relevant contributions, and ITU-R as well as ITU-D for technical knowledge and practical training they have provided for Europe region. There were more than 350+ Stakeholders, 60+ Countries and 40+ Administrations from the Europe Region and beyond who have joined the seminar over the past two weeks. He also attributed thanks to Mr. Joaquin Restrepo for coordinating this successful seminar, as well as Mr. Mario Maniewicz Director of the Radiocommunication Bureau of ITU and Mr. Jaroslaw Ponder, Head of the ITU Office for Europe.

He recapped multiple subjects of the forum: it gave the audience a chance to analyze the role of the evolution and the deployment of 5G in Europe, the importance of modern spectrum management and monitoring, and the WRC challenges from a European standpoint. The audience learned the tools used in the context of the National Frequency Allocations Tables (NFAT), the regulatory basis and how 5G has been paved in Europe. Moreover, GSMA provided figures and technology trends, GSA additionally shared insights in the ecosystem of 5G devices and reminded us of the fixed wireless aspects of 5G, while GSOA introduced the satellite aspects and the potential future of the IMT next generation. Furthermore, he underlined many global leading actors' efforts in modern spectrum management and monitoring. ROHDE & SCHWARZ was developing future solutions to spectrum management; ATDI presented the ICS portal as an online spectrum management solution; LS TELCOM zoomed in on spectrum sharing through data capture, storage, and mining; TCI/SPX articulated key 5G spectrum management implications with the facilitation of AI and big data; and ITU BDT presented the ITU Spectrum Management System for Developing Countries (SMS4DC).

Finally, on the topic of WRC-23 challenges, CEPT posed a series of questions on IMT identification agreement, harmonization of Ku-and Ka-bands for GSO and NGSO ESIMs. Moreover, GSMA presented the outlook of the future of connectivity and broadband of 6GHz for licensing 5G; GSOA presented its perspective on trends and issues for WRC-23 and the importance of enhancing the use of existing satellite bands and the opportunities to develop new satellite bands; EBU highlighted the importance of UHF band to public services media; and ICAO pointed out some of the most pressing aviation issues on aeronautical radiocommunication and radio navigation, which will be for sure addressed during WRC-23.