Outcomes of the 3rd Annual Spectrum Management Conference for CIS and Central and Eastern Europe

(Minsk, Belarus, 8-11 May 2019)

Farid Nakhli, Programme Officer, ITU Regional Office for CIS

Overview

- IMT standardization in the ITU-R
- WRC-19 preparation
- 3rd Annual Spectrum Management Conference for CIS and Central and Eastern Europe
  - Overview
  - Regional organizations: RCC, CEPT and APT
  - Country cases: UK, Russia, Lithuania, Kyrgyzstan, Romania
  - Industry: GSMA, GSA, ESOA

IMT standardization in the ITU-R

IMT standardization in the ITU-R

IMT standards

- IMT concept
- Technical requirements
- Assessment of technologies
- IMT standards

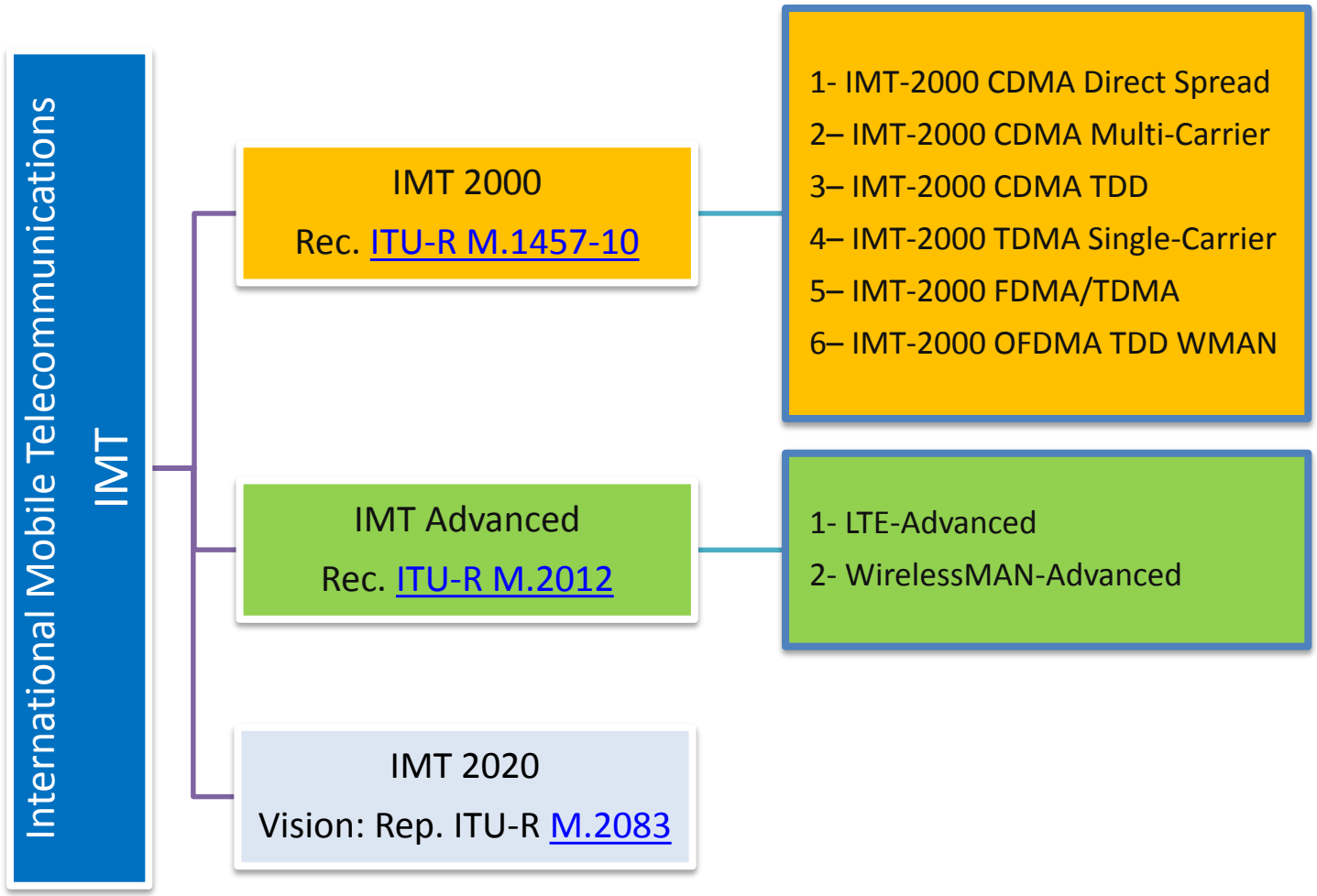
Spectrum for IMT

- Spectrum allocation
- EMC
- Identification of IMT bands

Dissemination of information

- Development of recommendations and reports
- Country cases
- Seminars and conferences

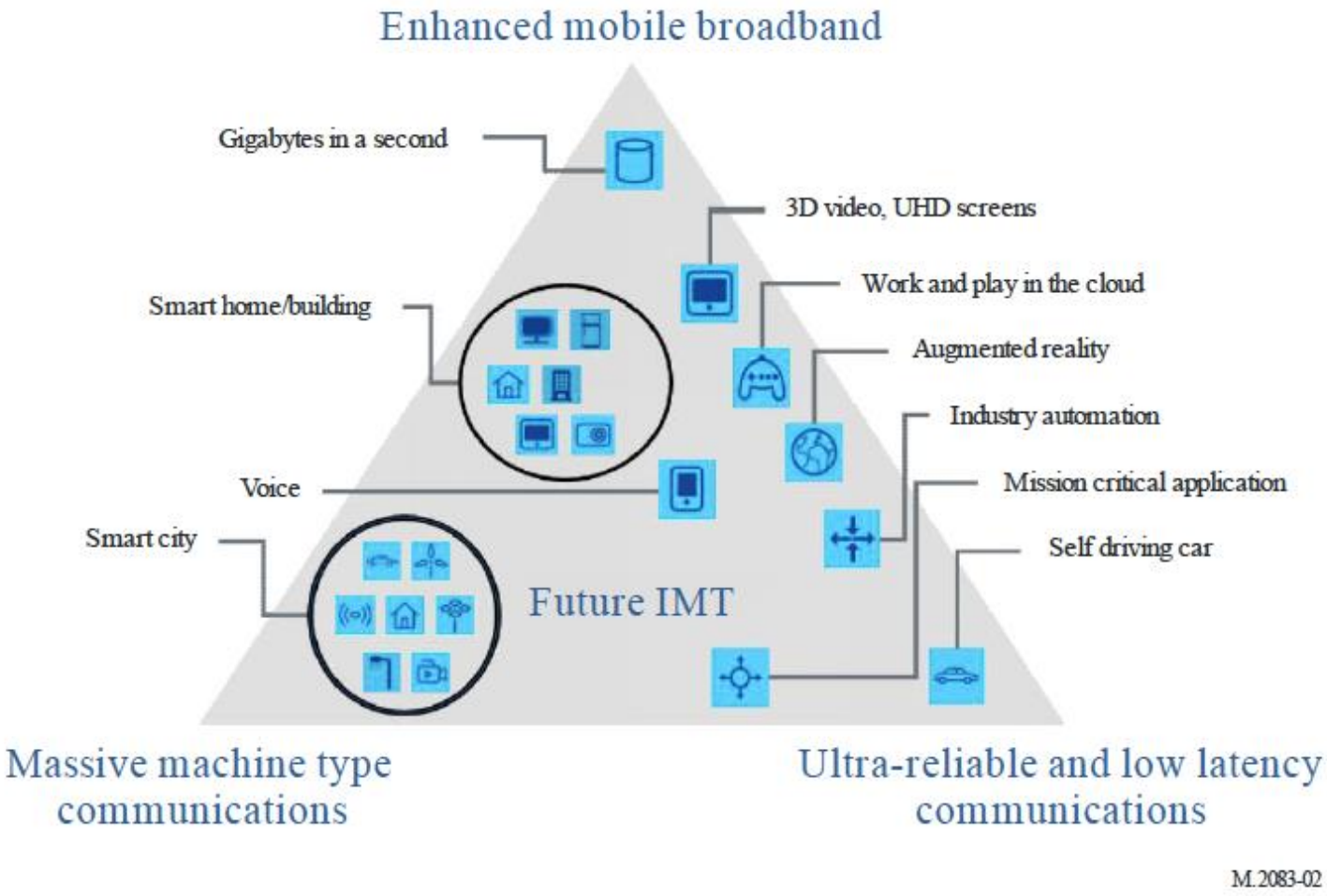
ITU standards for IMT



IMT-2020 standardization

- Detailed studies of IMT-2020 (5G) are ongoing in ITU-R Study Groups, mainly in WP 5D
- ITU published:
  - IMT Vision – Framework and overall objectives of the future development of IMT for 2020 and beyond (M.2083)
  - Minimum requirements related to technical performance for IMT-2020 radio interface(s) (M.2410)
- 2018-July 2019 -> time frame to present candidate radio interface technologies for IMT-2020 to be evaluated by independent experts
- October 2019 -> consolidation of evaluations in WP 5D, consensus seeking and decision making
- 2020 -> detailed specification for IMT-2020
- 2017-2020 technical and market tests of 5G technologies

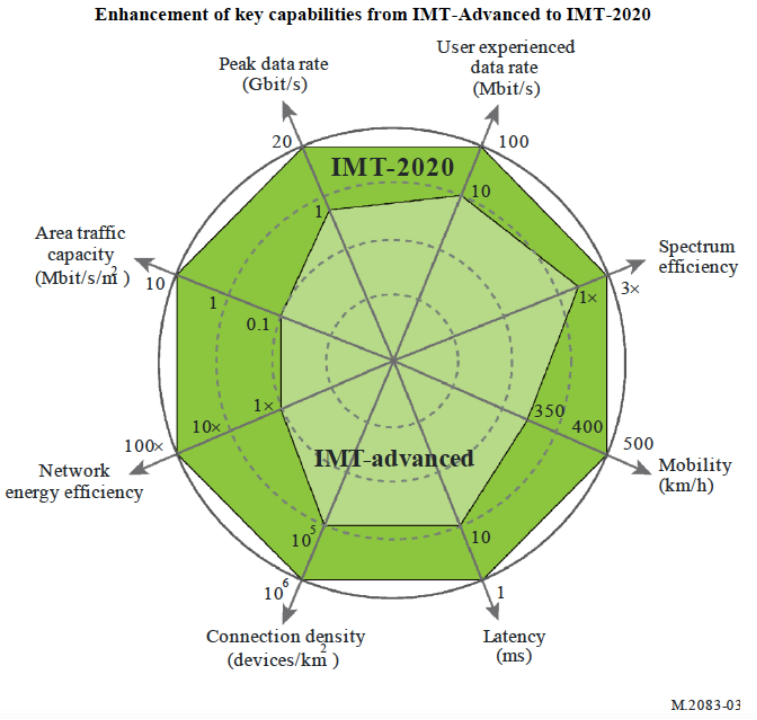
Usage scenarios of IMT for 2020 and beyond

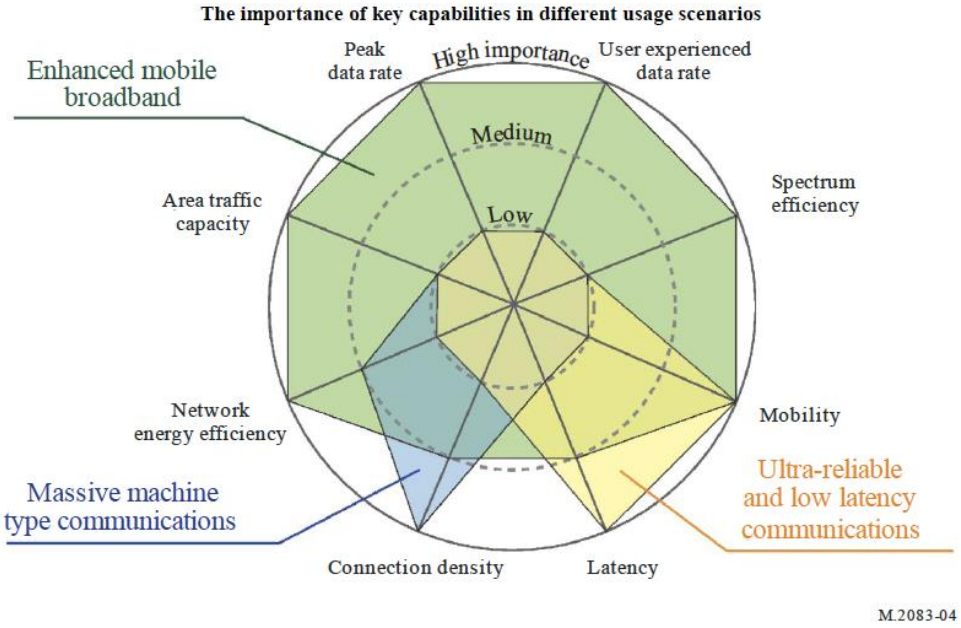


Minimum technical performance requirements

- **Peak data rate:** downlink is 20 Gbit/s and uplink is 10 Gbit/s
- **Peak spectral efficiency:** downlink is 30 bit/s/Hz and uplink is 15 bit/s/Hz
- **User experienced data rate:** downlink is 100 Mbit/s and uplink is 50 Mbit/s
- **User plane latency:** 4 ms for eMBB and 1 ms for URLLC
- **Mobility:** up to 500 km/h
- **Density:** 1 million devices per square kilometer

IMT-Advanced vs IMT-2020



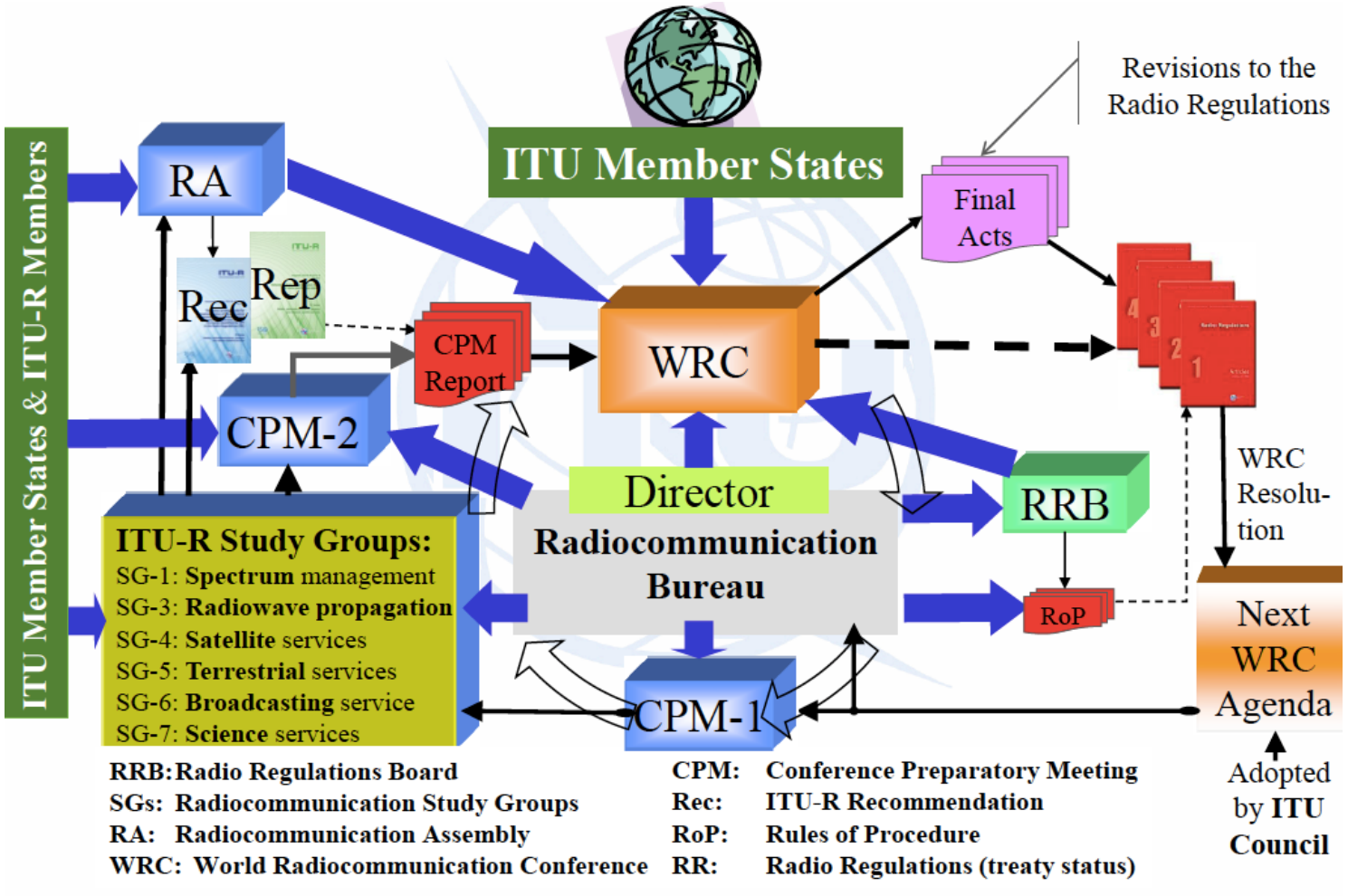


WRC-19 preparation

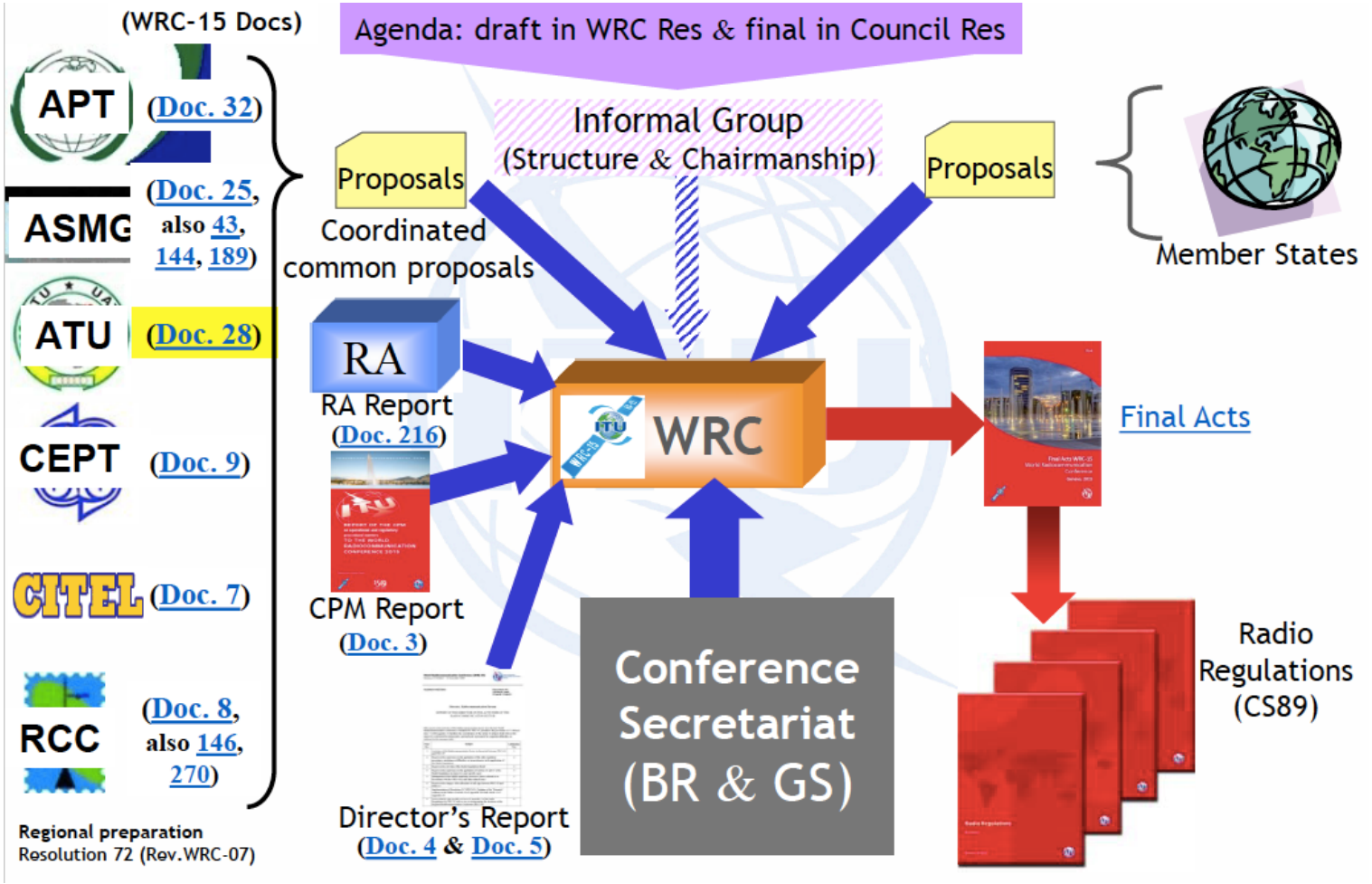
WRC-19


ITUWRC
SHARM EL-SHEIKH2019
28 October - 22 November 2019
Sharm El-Sheikh, Egypt

WRC cycle


ITU Member States & ITU-R Members
RA
Rec
Rep
CPM-2
ITU-R Study Groups:
SG-1: Spectrum management
SG-3: Radiowave propagation
SG-4: Satellite services
SG-5: Terrestrial services
SG-6: Broadcasting service
SG-7: Science services
ITU Member States
CPM Report
WRC
Director
Radiocommunication Bureau
CPM-1
Revisions to the Radio Regulations
Final Acts
RRB
RoP
WRC Resolu-tion
Next WRC Agenda
Adopted by ITU Council
RRB: Radio Regulations Board
SGs: Radiocommunication Study Groups
RA: Radiocommunication Assembly
WRC: World Radiocommunication Conference
CPM: Conference Preparatory Meeting
Rec: ITU-R Recommendation
RoP: Rules of Procedure
RR: Radio Regulations (treaty status)

Overview of preparations



3rd Annual Spectrum Management Conference for CIS and Central and Eastern Europe

3rd Annual Spectrum Management Conference for CIS and CEE

3rd Annual Spectrum Management Conference for CIS and CEE

- **Venue and date:** Minsk, Belarus, 8-11 April 2019
- **Organizers:** ITU and Forum Global
- **Host:** Ministry of Communication and Informatization of the Republic of Belarus
- **Participation:** over 200 delegates from 30 countries, including representatives of ITU, RCC, CEPT and APT

3rd Annual Spectrum Management Conference for CIS and CEE

Issues discussed:

- efficient spectrum usage and further development of terrestrial and satellite radiocommunication in light of WRC-19 preparation
- activities of the ITU Radio Regulation Board dedicated to regulation and usage of radiocommunication systems
- activities of the ITU Radiocommunication Bureau dedicated to ensuring interference free communication
- ITU standards and their application in broadband digital radio systems of different services, including issues of harmonization
- use cases of spectrum usage at national, regional and global levels
- spectrum for perspective radiocommunication systems and technologies (5G, IMT-2020, high-throughput satellite systems, intelligent transport systems, Internet of Things etc.)

3rd Annual Spectrum Management Conference for CIS and CEE

Issues discussed:

- 5G rollout approaches taking into account regional specifics
- spectrum for systems and radio technologies of future smart cities
- spectrum usage by public security and emergency systems
- new technologies of radiocommunication systems control
- approaches, indicators and criteria to assess efficiency of spectrum usage
- studies on how emission associated with 5G rollout influences humans
- ITU-R outcomes related to WRC preparation (WRC-19 CPM Report)

Positions of regional organizations – RCC

presented by

Sergey Pastukh, Vice-Chairman RCC WG on WRC-19

1.13. To consider identification of bands for future development of IMT, including possible additional allocations to the MS on a primary basis

- The RCC Administrations consider that when developing technical conditions and regulatory provisions for the allocation of frequency bands to the MS and their identification for IMT **it is necessary to ensure protection of other services having allocation in the considered and adjacent frequency bands taking into account the need in their development**, first of all for existing systems or those planned to be used by RCC Administrations.
- The RCC Administrations **do not oppose the allocation of the frequency band 24.25-25.25 GHz to mobile, excluding aeronautical mobile, service on a primary global basis**, **as well as the identification of the frequency band 24.25-27.5 GHz for IMT** within land mobile service subject to incorporating the conditions in the Radio Regulations for IMT stations to protect:
  - space stations in the Earth exploration-satellite service (EESS) (passive) in the frequency bands 23.6-24 GHz, 50.2-50.4 GHz and 52.6-54.25 GHz from unwanted emissions of IMT stations;
  - space stations in the fixed-satellite service and inter-satellite service.

1.13. To consider identification of bands for future development of IMT, including possible additional allocations to the MS on a primary basis

- In order to ensure this protection it is **necessary to limit the emission from IMT base stations in upper hemisphere**, as well as to limit unwanted emissions of IMT stations in frequency bands 23.6–24.0 GHz, 50.2–50.4 GHz and 52.6–54.25 GHz allocated to EESS (passive).
- The RCC Administrations **oppose allocation of the frequency band 31.8-33.4 GHz to mobile service on a primary basis and identification of the frequency bands 31.8-33.4 GHz and 42.5-43.5 GHz, 71–76 GHz and 81–86 GHz for IMT systems**, as the results of ITU-R studies in these bands have concluded that IMT systems are incompatible with the stations of the incumbent services.
- The RCC Administrations **do not support the identification of the frequency bands 45.5–47.0 GHz and 66–71 GHz for IMT systems** until ITU-R concludes the compatibility studies with existing primary radio services.
- Position of the RCC Administrations on **frequency bands 37.0–40.5 GHz, 40.5–42.5 GHz, 47.0–50.2 GHz and 50.4–52.6 GHz will be determined taking into account the need to protect both passive and active services**.
- The RCC Administrations **oppose the consideration of frequency bands not specified in Resolution 238 (WRC-19) for IMT systems in this WRC-19 agenda item**.

9.1.1. Implementation of IMT in the bands 1885-2025 MHz and 2110-2200 MHz

- To facilitate compatibility between IMT terrestrial component (in mobile service) and IMT satellite component (in mobile-satellite service) in **the frequency bands 1980-2010 MHz and 2170-2200 MHz, the RCC Administrations support approval of relevant ITU-R Recommendations and Reports and also relevant RR provisions facilitating such compatibility**.

- The RCC Administrations are of view that **compatibility between IMT terrestrial component (in mobile service) and IMT satellite component (in mobile-satellite service) may be achieved through application of existing provisions of RR Article 9 and introduction of appropriate modifications to RR Appendices 5 and 7 to identify coordination thresholds** between stations in mobile and mobile-satellite services in the frequency bands under consideration.

- The RCC Administrations support adoption of relevant modifications of RR Appendices 5 and 7, based on the materials of Report ITU-R M.2292.

9.1.2. Compatibility of IMT and BSS (sound) in the band 1452-1492 MHz in Regions 1 and 3

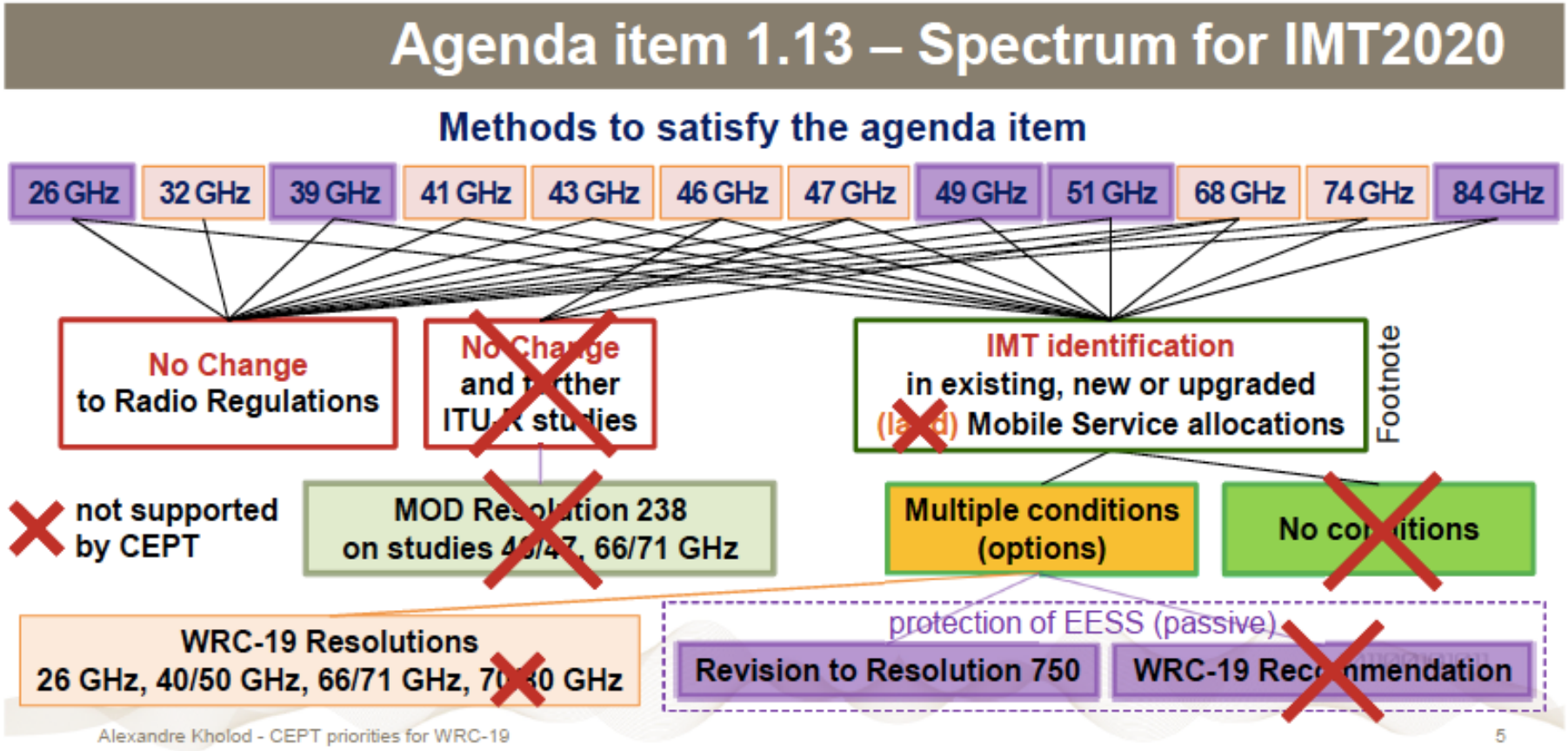
- The RCC Administrations **do not oppose the development of relevant regulatory and technical conditions in order to provide compatibility between IMT and broadcasting-satellite service (sound) in the frequency band 1452-1492 MHz in Region 1** and these conditions shall only be applied in the territory of countries where this band is identified for IMT.
- The RCC Administrations consider that technical conditions and regulatory provisions developed under this issue shall also take into account the need to protect aeronautical telemetry systems in aeronautical mobile service.

Positions of regional organizations – CEPT

presented by

Alexandre Kholod, Vice-Chairman ECC CPG

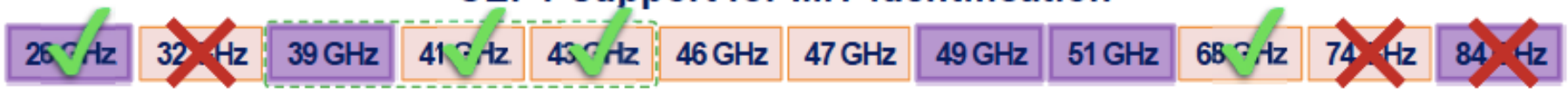
Positions of regional organizations – CEPT



Positions of regional organizations – CEPT

Agenda item 1.13 – Spectrum for IMT2020

CEPT support for IMT identification



24.25-27.5 GHz

- Protection of “passive” band: **-42 dBW/200 MHz** (BS) and **-38 dBW/200 MHz** (UE)

40.5-43.5 GHz

- CEPT recognizes the potential for the **37-43.5 GHz** band to become a 5G tuning range

66-71 GHz

- Sharing between IMT 5G and **Multiple Gigabit Wireless Systems** (WiGig)

Positions of regional organizations – APT

presented by

Kyu-Jin Wee, Chairman APG

Agenda Item 1.13 (IMT)

- APT Preliminary View supports
  - **24.25-27.5 GHz** and to revise Table 1-1 of Resolution 750 (Rev.WRC-15), but the unwanted emission level was not agreed
  - **NOC for 31.8-33.4 GHz**
  - **37-40.5 GHz, 40.5-42.5 GHz and 42.5-43.5 GHz, or portions thereof, for IMT**
- Issues for Consideration at Next APG Meeting
  - Unwanted emission level to protect EESS(P)
- Definition of TRP in Radio Regulations
  - APG Task Force on TRP will discuss TRP
- Protection of FSS
  - In Band power limits and some operational condition
  - Article 21.5, the value of +10dBW was introduced in the Second Space Conference in 1971
- IMT in Mobile Service(MS) or in Land Mobile Service(LMS)?
  - APG has not received views to support LMS

Country case – United Kingdom

presented by

Chris Woolford, Director, International Spectrum Policy, Ofcom

Country case – United Kingdom

Summary and next steps

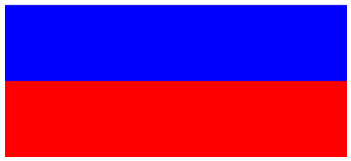
- Auctioned 3.4-3.6 GHz in 2018
- Plan to publish statement on 3.6-3.8 GHz and 700 MHz auction this year, with the aim to have the auction concluded by Spring 2020
- Plan to publish our decision and enable shared access in 3.8-4.2 GHz later this year
- Continue to make spectrum available through innovation and trial licenses in mmWave
- Have made 66-71 GHz available on licence-exempt basis

Expect to see MNOs in the UK launch 5G services this year

Country case – Russia

presented by

Valery Tikhvinskiy, Deputy General Director on Innovation Technologies, JSC National Research Institute of Technologies and Communications (NIITC)



Frequencies for IMT-2020/5G

Полосы частот	694-790 МГц	3,4-3,8 ГГц	4,8-4,99 ГГц	24,25-29 ГГц
Рекомендуемая полоса непрерывного спектра на одного оператора связи при условии, что каждый оператор развивает свою сеть	Будет определена по мере перевода систем ЦТВ в нижние полосы частот	50 МГц	100 - 200 МГц	> 200 МГц
Страны, где уже прошли аукционы по распределению РЧС для 5G	Италия, Швеция	Англия, Чехия, Ирландия, Корея, Италия, Испания, Финляндия, Австралия	--	Италия, Корея
Объем спектра, приобретенного одним оператором по итогам аукциона	20 МГц	20 - 130 МГц	--	200 - 800 МГц
Средняя удельная стоимость по результатам аукциона, руб./МГц/чел	47,32	3,26	--	0,26
Особенности использования для РФ	Требуется проведение мероприятий: - по конверсии и перераспределению частот; - выводу РЭС ЦТВ в другие диапазоны частот.	--	Требуется проведение мероприятий по конверсии и перераспределению частот; С 2019 г. возможно развитие сетей 5G по локально-территориальному принципу	
Предложения по торгам в РФ	Принятие Решения ГКРЧ о технологической нейтральности	--	Консорциум	400 МГц (27,1-27,5 ГГц) - конкурс, Другие полосы – аукцион

5G rollout concept

Единый инфраструктурный оператор сети связи 5G (в форме консорциума) в диапазоне 1 - 6 ГГц

В связи с проблематичностью выделения чистого РЧС, достаточного для работы сетей нескольких независимых операторов, предлагается организовать консорциум с участием всех заинтересованных компаний.

Пилотные проекты по развитию сетей 5G в диапазоне 24 - 29 ГГц

Пилотные проекты реализуются по локально-территориальному принципу.

- Подача заявок
- Конкурс

Выделение частот для сетей связи 5G

2019 год (пилотные зоны) – конкурс.
Далее - аукцион

Ключевые события

- Выделение РЧС для опытных зон сетей 5G (12.2018) - Решение ГКРЧ
- Утверждение Концепции создания и развития сетей 5G (03.2019) – Постановление Правительства РФ
- Выделение полос радиочастот для сетей 5G (10.2019) – Решение ГКРЧ
- План мероприятий по конверсии радиочастотного спектра (03.2020) – Решение ГКРЧ
- Создание пилотных проектов в 5 отраслях экономики (до 12.2020)

Этапы перехода от сети LTE к 5G

1. Строительство базовых станций 5G и подключение их к существующей опорной сети 4G
2. Строительство опорной сети 5G на базе организации совмещенной сети 4G/5G
3. Модернизация базовых станций 4G подключение их к совмещенной опорной сети 4G/5G
4. Переход к единой опорной сети 5G

Country case – Lithuania

presented by

Mindaugas Žilinskas, Deputy Director, Communications Regulatory Authority

Country case – Lithuania

- to speed up coordination of frequencies with neighboring countries and to conclude cross border coordination agreements for the 5G pioneer bands at first
- to start preparation of auction conditions in 5G pioneer band: 700 MHz, 3400-3800 MHz and 26,5-27,5 GHz
- to relocate television in 700 MHz band, currently used radio relay links in the bands 3600- 3800 MHz and 26.5-27.5 GHz to other frequency bands

Country case – Kyrgyzstan

presented by

Zamir Mabetaliev, Deputy Director, State Agency of Communication

Country case – Kyrgyzstan

- Since 2017 commercially attractive spectrum is being distributed through auctions
- Latest decisions were to put 470-694 MHz and bands in 2.3 GHz to 6 GHz range for auction
- Spectrum in 694-790 MHz is allocated to radio broadcasting and mobile services on a primary basis
- In 2018 Administration of Kyrgyzstan decided to reserve available spectrum in 694-790 MHz, 3600-3640 MHz and 3680-3800 MHz until the end of WRC-19 for prospective use for 5G
- Administration of Kyrgyzstan started to free 694-790 MHz band from radio broadcasting service

Country case – Romania

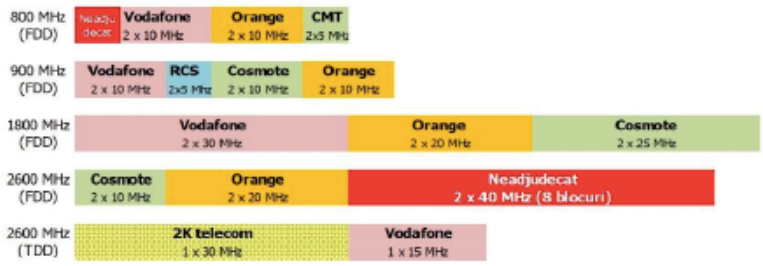
presented by

Inga Popovici, Legal adviser, National Authority for Management and Regulation in Communications of Romania (ANCOM)

Country case – Romania

2012 Spectrum auction

4G — **2012**
Largest spectrum auction in Romania for mobile networks



COMPLEXE OBJECTIVES

among which a strong concern for the mitigation of territorial imbalances (coverage of white/grey spaces)

Coverage obligations

- ✓ For **672 «white spaces»** - localities without access to 3G and mobile networks (HSPA, HSPA+ or LTE)
- ✓ Ensure coverage with mobile communications services with a downlink end-to-end data transfer rate of at least 384 kbps, by means of their own wireless access networks, including by means of the 3G network provided in the 2100 MHz band

5G — **2019**
ANCOM will make available additional spectrum resources for the implementation of the 5G technologies

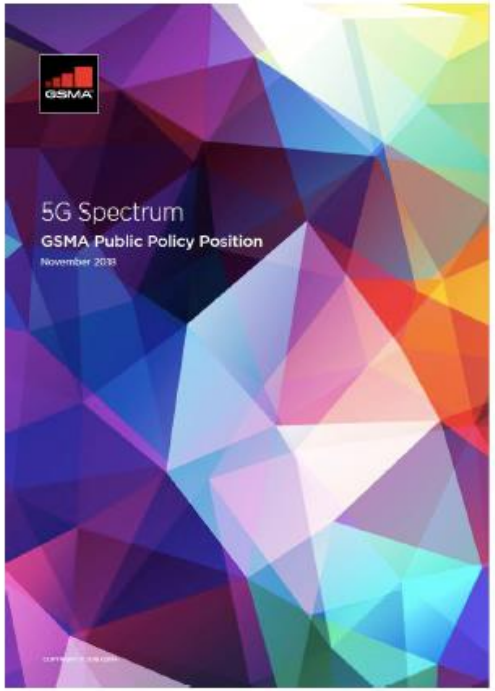
Industry – GSMA

presented by

Konstantin Savin, Senior Technology Manager

Industry – GSMA

5G spectrum positions



1. 5G needs new harmonised and contiguous spectrum (80 to 100 MHz of in mid-bands and around 1 GHz in mmWaves)
2. Across three ranges: below 1 GHz, between 1 and 6 GHz, and above 6 GHz
3. WRC-19 is vital to realising the 5G vision
4. Inflated spectrum prices should be avoided
5. Exclusive licensing should remain the core approach
6. Setting spectrum aside for verticals in prime bands could jeopardise the success of public 5G
7. Regulators must consult 5G stakeholders to ensure the success of spectrum awards
8. Governments and regulators need to adopt policies to encourage long-term heavy investments in 5G networks

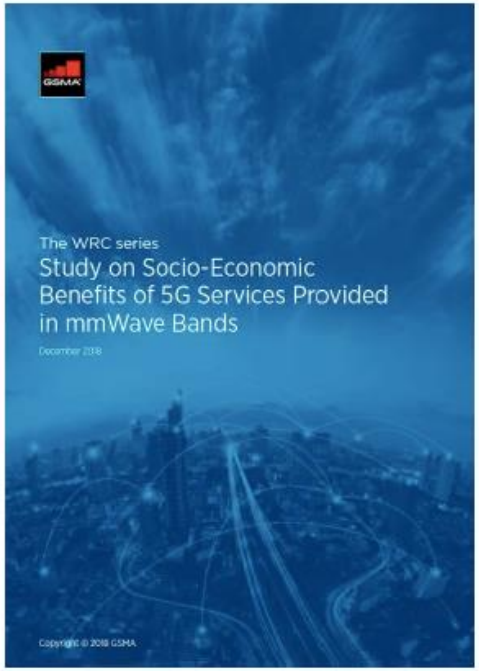
Industry – GSMA

WRC-19 AI 1.13 – The Key Bands

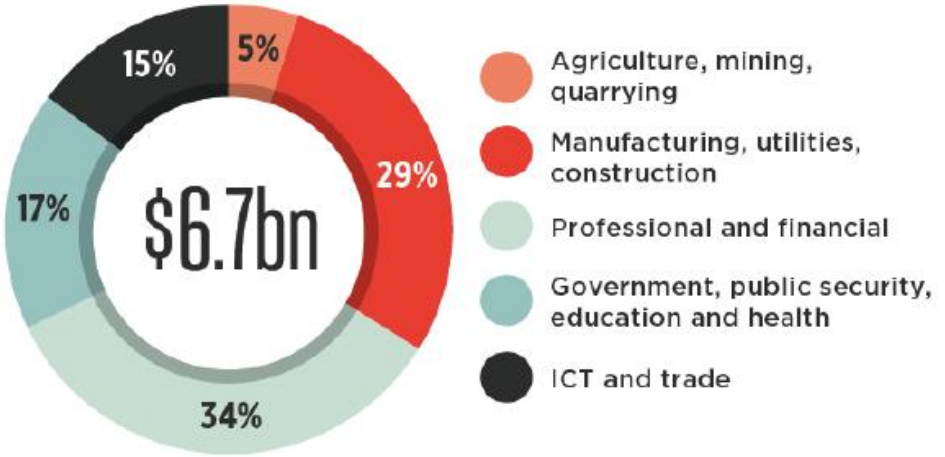
26 GHz (24.25-27.5 GHz)	40 GHz (37-43.5 GHz)	66 GHz (66-71 GHz)
EESS (passive) -32 to -35 dB(W/200MHz)	EESS (passive) Res 752 applies Active band	Flexible use for 5G systems
FSS / ISS sharing studies show significant protection margin	FSS sharing is a national issue	Enabling both IMT and non-IMT technologies

Industry – GSMA

Why we need mmWave spectrum for 5G



For countries in the RCC region, mmWave 5G is estimated to increase GDP by $6.7 billion



Industry – GSA

presented by

Dmitry Laryushin, Lead coordinator CIS region

Industry – GSA

- WRC-19 agenda item 1.13: **Consider identifying for IMT the 24.25-27.5 GHz and 37-43.5 GHz frequency ranges at WRC-19**
  - Protection of incumbent services is important
  - However, adopting overly restrictive measures would prevent the use of spectrum in an efficient manner
- Other WRC-19 agenda items: Any WRC-19 decisions on agenda items 1.5 and 1.14 should ensure protection of IMT/Mobile Services
- Help us realize the 2025 vision - governments are encouraged to make spectrum available for 5G NR within the low, mid and high ranges, by 2020, with the appropriate amount of contiguous spectrum per network, as well as provide regulatory conditions that facilitate cost-effective 5G usage in a timely manner

Industry – ESOA

presented by

Ivan Zaitsev, Global Spectrum & Policy Regulator

ESOA
EMEA SATELLITE OPERATORS ASSOCIATION

Industry – ESOA

Consider only candidate bands for IMT under AI 1.13 (Res. 238)

26 GHz (24.25 - 27.5 GHz) Candidate Band for Global Harmonisation	➢ Support IMT globally, with protection for FSS ➢ Appropriate shared basis for coordinated FSS earth stations, including the possibility for future gateways
28 GHz NOT on the shopping list!	➢ Many satellite networks extensively use 28GHz globally ➢ US position comes from a historically different approach to this band
37 – 40.5 GHz No Change in Regions 1 and 3 . 37-40 GHz possible for Regional Harmonisation in Region 2 only	➢ NOC in Regions 1 and 3 ➢ Need to preserve spectrum for other services, including HDFSS spectrum for satellite terminals
40.5-43.5 GHz Possible Regional Harmonisation for IMT in Regions 1 and 3	➢ OK for IMT in Regions 1 and 3, with protection for FSS ➢ Appropriate shared basis for coordinated FSS earth stations, including the possibility for future gateways
45.5-52.6 GHz No Change	➢ No change, since already significant amounts of spectrum are supported for IMT at 26 GHz (globally), 40.5-43.5 GHz (R1 & R3), and 66 GHz (globally).
66 - 71 GHz & above Candidate Band for Global Harmonisation	➢ Support for IMT globally ➢ Close to 57-66 GHz: already designated / used for WiGig

3rd Annual Spectrum Management Conference for CIS and CEE

The conference participants noted:

- complex approach used to discuss considered issues with involvement of wide range of experts
- high scientific and technical level and practical value of presentations and discussions
- that spectrum provision is one of key aspects of ICT infrastructure for digital economy and contributes to the implementation of the UN Sustainable Development Goals
- when implementing new technologies and systems one needs to consider protection of existing systems
- need to implement radio technologies that enable development of 5G/IMT-2020, IoT/M2M and ITS, taking into account the need to harmonize spectrum and ensure cross-border coordination

3rd Annual Spectrum Management Conference for CIS and CEE

The conference participants noted:

- that harmonious development of new radio technologies is only possible when there is balance of interests between ensuring required quality of digital services provided to citizens and economic efficiency
- need to continue to develop methods and criteria of integral assessment of efficiency of spectrum usage
- that it is reasonable and practically valuable to organize conferences and other events dedicated to usage of spectrum and satellite orbits by radiocommunication systems
- that this conference was relevant and timely, and its outcomes can be used by expert in their professional activities, including preparation to WRC and other ITU forums

Thank you for your attention

Farid Nakhli,
Programme Officer
ITU Regional Office for CIS
farid.nakhli@itu.int