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RR-20 APAC
"Outcome on Key Issues for the Satellite Industry @ WRC-19 Agenda"

30 October 2020

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WRC-19 Satellite Overview

3 categories of Agenda Items:

- **Defend** existing satellite spectrum
- **Study** regulatory/flexibility aspects for satellite services
- **Obtain** new satellite spectrum

Defend Existing Satellite Spectrum

- ✓ AI 1.8: GMDSS
- ✓ AI 1.14: HAPS
- ✓ AI 1.13: New spectrum for IMT/5G
- ✓ AI 1.16: New spectrum for RLAN

Study Regulatory Flexibility

- ✓AI 1.4: Review Ku-band (BSS) orbital position restrictions
- ✓AI 1.5: ESIMs in Ka-band
- ✓AI 1.6: NGSOs in Q/V bands
- ✓AI 7: Coordination Procedures
- ✓AI 9.1.3: NGSOs in C band
- ✓AI 9.1.7: Unlicensed earth stations

Obtain Satellite Spectrum

- ✓ AI 9.1.9: New spectrum for FSS

AI: 1.5 ESIMs in the FSS Ka-band

WRC23 Agenda Item 1.5: *to consider the use of the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) by earth stations in motion communicating with geostationary space stations in the fixed-satellite service and take appropriate action, in accordance with Resolution* ***158 (WRC-15)***

Important Background:

- **Outcome WRC-15:** established ESIM within the Fixed Satellite Service (FSS) allocation for the 19.7–20.2 GHz and 29.5–30 GHz band segments.
- **Outcome WRC-19:** recognized the role of ESIM in meeting the demand for global mobile broadband communications.
- **Outcome WRC-19:** directed that ESIM also be considered for operation within the adjacent 17.7-19.7 GHz and 27.5-29.5 GHz band segments

- ✓ **WRC-19** established ESIM within the Fixed Satellite Service (FSS) Allocation for the 17.7-19.7 GHz and 27.5-29.5 GHz band segments.
- ✓ **WRC-19** recognized the ability of nations to authorize ESIM within their borders.

AI: 1.5 ESIMs in the FSS Ka-band

Objective: Make full band available for ESIMs in 17.7-19.7/27.5-29.5 GHz

- ✓ **Success:** Full band made available for GSO-ESIMs as part of the FSS, as per ITU footnote 5.517A
- ✓ ESIMs may operate in the full 2 GHz as of July 1, 2020.
  - ❖ The BR will provide additional information on aeronautical ESIM characteristics to the Director's Report for WRC-23.
- ✓ Approved use of GSO-ESIMs for gate to gate, pier to pier, and ubiquitous terrestrial operations.
- ✓ For the rare cases in which ESIM operations could affect cross-border terrestrial operations (e.g., co-frequency, line of sight cases), WRC-19 adopted certain technical provisions.
- ✓ This outcome provides a good platform for administrations to authorize GSO-ESIMs across the full Ka-band and within the FSS allocation.

AI: 9.1.7 Unauthorised Earth Stations

Objective: to prevent illegal operation of earth stations in country

- ✓ This issue was resolved early in the WRC Conference due to positive collaboration.
- ✓ A new Resolution was adopted to meet the concerns of administrations that had raised this issue.
- ✓ The Resolution now includes for all stakeholders to be more cooperative and work together to minimise this issue by asking:
  - the satellite operators to be cooperating with Administrations; and
  - for administrations to publicise national earth station licensing procedures.
- ✓ Overall, a very positive outcome for all concerned parties

AI 1.13 Additional Spectrum for IMT

WRC-15 – Future Agenda → WRC-19

AI 1.13

To consider identification of frequency bands for the future development of IMT including possible additional allocations, in accordance with Resolution 238

Candidate IMT Identifications (GHz)	Candidate IMT Identifications in new MS Allocations (GHz)
24.25–27.5	31.8–33.4
37.0–40.5	40.5–42.5
42.5–43.5	47.0–47.2
45.5–47	
47.2–50.2	
50.4–52.6	
66.0–76.0	
81.0–86.0	

- 36 GHz of spectrum have been identified at WRC-15 as candidate bands for further studies for 5G/IMT.
- Sufficient spectrum from which to find "more" spectrum for IMT/mobile/5G
- Important to consider ONLY these bands, which were identified on the basis of global consensus at WRC-2015.
- Global harmonization of spectrum is key to the development of satellite and terrestrial wireless telecommunications

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AI 1.13: Outcome

Frequency Bands Identified:

- ✓24.25-27.5 GHz (Globally)
- ✓37-43.5 GHz (Globally)
  - ❖ noting some regions (e.g. CEPT) will only use part of the range for IMT
- ✓66-71 GHz (Regions 1 and 3)
  - ❖ shared with e.g. MGWS (Multiple Gigabit Wireless Systems)
- ✓45.5-47 GHz
  - ❖ (5.F113 >50 countries – No EACO Member States)
- ✓47.2-48.2 GHz
  - ❖ (5.H113 Region 2 and >60 countries including EACO Member States)

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AI 1.13: Outcome

✓ Protection of EESS (pas) at 23.6-24 GHz:

- -33 dB(W/200 MHz) (BS) and -29 dB(W/200 MHz) (UE) in the band 24.25-27.5 GHz until 1 Sept 2027
- -39 dB (W/200 MHz) (BS) and -35 dB (W/200 MHz) (UE) in the band 24.25-27.5 GHz after 1 Sept 2027. Systems deployed by this date may continue to operate at the initial levels

✓ Protection of FSS/ISS (26 GHz, 40 GHz and 48 GHz):

- Geostationary (GSO) orbital avoidance and IMT BS antenna pointing below the horizon
- Continued protection of existing FSS earth stations and possibility to deploy new FSS earth stations.

✓ Protection of EESS (pas) at 36-37 GHz:

- Unwanted (-43 dB(W/MHz) and -23 dB(W/GHz) within the 36-37 GHz frequency band) and recommended emission power (-30 dB(W/GHz) levels adopted.

Frequency Bands NOT APPROVED:

- 31.8-33.4 GHz;
- 50.4-52.6 GHz;
- 71-76 GHz;
- 48.2-50.2 GHz;
- 47-47.2 GHz;
- 81-86 GHz

AI: 1.4 Annex 7 to Appendix 30

Goal: Improve, if and where possible, efficiency in AP30 implementation

Background : to consider the results of studies and review / revise if necessary, the limitations mentioned in Annex 7 to Appendix 30 (Rev.WRC-15), while ensuring the protection of, and without imposing additional constraints on, assignments in the Plan and the List and the future development of the broadcasting-satellite service within the Plan, and existing and planned fixed-satellite service networks;

Historically the limitations were developed to facilitate the sharing of the band 11.7 – 12.7 GHz across the different regions taking into account state-of-the-art at the time. Satellite technology has developed further, and removal of some or all of these limitations could provide for more efficient overall use of the band. However Some operational networks which have been developed within the ecosystem of the current limitations may need specific protection should the current limits be relaxed.

ESOA position was :

1. Relaxation/Removal of certain limitations so as to allow for a better and more efficient overall use of the AP30 bands, taking into account the protection of existing operation services and applying the appropriate regulatory measures to ensure their protection.

2. ESOA considers that Method C of the CPM text includes the necessary regulatory measures to take into account concerns of all interested parties and encourages Administrations to take an active position to defend Method C internationally.

AI: 1.4 Outcome

WRC-19 adopted 3 new Resolutions:

- ✓ **RESOLUTION 558 (WRC-19): Use only coordination arc and EPM criteria to protect certain 40/45 cm assignments from certain new Article 4 networks in the band 11.7 – 12.2 GHz. (downlink) & 14.5 – 14.8 GHz/17.3 – 18.1 GHz (feeder-link).**
- ✓ **RESOLUTION 559 (WRC-19): Special procedure to be applied by certain administrations with the aim to find new Plan assignments with better EPM values.**
- ✓ **RESOLUTION 768 (WRC-19): Use of test-points instead of grid points to protect certain new BSS networks from certain new FSS networks.**
- ✓ **Orbital limitations in Annex 7 to Appendix 30 in Regions 1 and 3 and in Region 2 were suppressed.**

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Outcome on 1.5 GHz IMT/MSS Interference

RA19 & WRC19 encouraged administrations to protect MSS, require ITU-R to provide guidance

- ✓ **RA-19 adopted Recommendation ITU-R M.1036-6 (on IMT frequency arrangements), which noted:**
  - Studies are still ongoing to provide technical measures for adjacent band compatibility
  - A number of possible measures to facilitate adjacent band compatibility," including "additional frequency separation below 1 518 MHz"
  - Administrations are "encouraged to take into account the results of the compatibility studies" to address IMT-MSS coexistence, including through protections for MSS "around seaport and airports, etc."
- ✓ **WRC-19 adopted Res. 223 (Rev. WRC-19):**
  - There is a need to ensure the continued operations of the MSS
  - ITU-R is to complete the studies to provide IMT/MSS coexistence measures "including guidance on the implementation of frequency arrangements for IMT deployment"
  - Study results should be contained in one or more "ITU-R Recommendations and Reports"
- ✓ **Administrations should urge ITU-R WP 5D and WP 4C to complete work on the ITU-R Recommendation on L-Band IMT/MSS Coexistence that protects current/future MSS throughout 1518-1559 MHz**
  - IMT could harm critical MSS operations
  - IMT in L-Band could be delayed or deployed with non-harmonized characteristics

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Key WRC-23 Agenda Items

- Agenda Item 1.2: IMT in 3/6/7/10 GHz - Res. 245 (WRC-19)
- Agenda Item 1.3: Mobile Service in 3600-3800 MHz in Region 1 - Res. 246 (WRC-19)
- Issue 9.1 c): IMT in bands of the Fixed Service (FS) - Res. 175 (WRC-19)
- Article RR21.5: Applicability of RR21.5 to IMT stations (WRC-19 doc. 550)

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WRC-23 Agenda Item 1.2

Agenda Item 1.2: *to consider identification of the frequency bands 3 300-3 400 MHz, 3 600-3 800 MHz, 6 425-7 025 MHz, 7 025-7 125 MHz and 10.0-10.5 GHz for International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution 245 (WRC-19);*

Responsible Group: Working Party 5D

Contributing Group for FSS: Working Party 4A

Resolution 245 (WRC-19) calls for studies for the terrestrial component of IMT in the bands:

- 3 300-3 400 MHz and 3 600-3 800 MHz (Region 2);
- 3 300-3 400 MHz (amend footnote in Region 1);
- 6 425-7 025 MHz (Region 1);
- 7 025-7 125 MHz (globally);
- 10 000-10 500 MHz (Region 2).

ESOA position on the band 6425-7125 MHz:

Considering that many countries rely heavily on C-band satellite services offering vital services which in many cases cannot be reliably provided or provided at all by other means, and that existing studies between FSS and IMT have demonstrated that sharing is not feasible: in the bands 6 425-7 025 MHz in Region 1 and 7 025-7 075 MHz globally.

WRC-23 Agenda Item 1.2

Background:

C-band downlink

Existing studies between IMT and FSS in the band 3 600-3 800 MHz 6425 MHz and studies to be done under AI1.2.

	IMT-Advanced (4G)	IMT-2020 (5G)
ITU	Report ITU-R S.2368	To be done under AI1.2
CEPT	ECC Report 100	ECC Reports 254 and 281

C-band uplink

Existing studies between IMT and FSS in the band 5925- and studies to be done under AI1.2:

	IMT-Advanced (4G)	IMT-2020 (5G)	WIFI in 6 GHz
ITU	Report ITU-R S.2367	To be done under AI1.2	No studies
CEPT	No studies	No studies	ECC Report 302

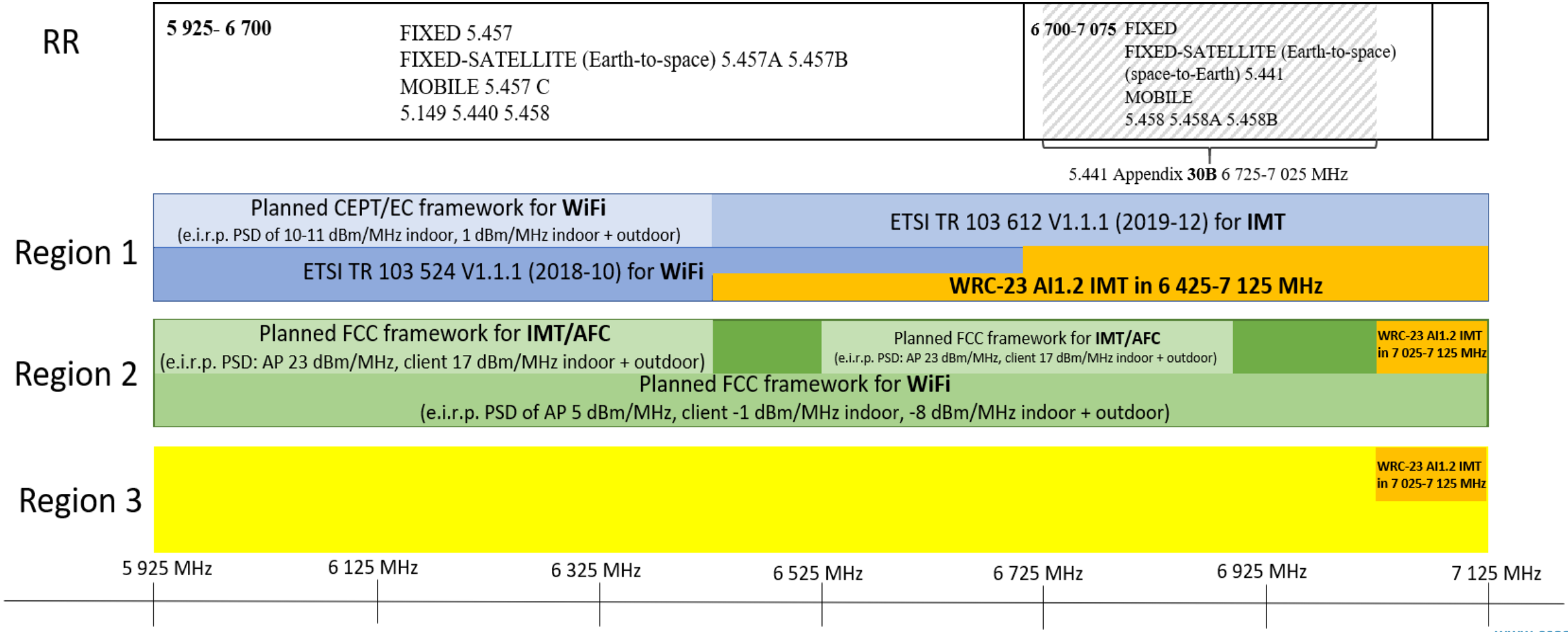
In the range 6425-7125 MHz, one should differentiate the following sub-bands:

- 6425-6725 MHz: this band is allocated to the FSS globally (earth-to-space) and is not subject to a Plan. The band is used for uplinks by large numbers of GSO FSS networks covering all Regions. Use includes feeder links for MSS systems.
- 6725-7025 MHz: this band is subject to the FSS plan (AP30B), there are no existing studies with IMT/5G.
- 6 700-7 025 MHz: this band is allocated to the FSS globally (space-to-earth), limited to feeder links for non-geostationary satellite systems of the mobile-satellite service and is subject to coordination under No. **9.11A.**
- 7025-7075 MHz: this band is allocated to the FSS globally (earth-to-space) and is not subject to a Plan.
- 7075-7125 MHz: there is no FSS allocation, so no direct impact.

Existing studies related to IMT-Advanced (Report ITU-R S.2367) show very little potential for IMT operations while protecting FSS uplinks (indoor use only, EIRP limit necessary).

WRC-23 Agenda Item 1.2

Background (cont'd):



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WRC-23 Agenda Item 1.3

Agenda Item 1.3 *to consider primary allocation of the band 3 600-3 800 MHz to mobile service within Region 1 and take appropriate regulatory actions, in accordance with Resolution* ***246 (WRC-19)***

Responsible Group: Working Party 5A

Contributing Group for FSS: Working Party 4A

Resolution 246 (WRC-19)

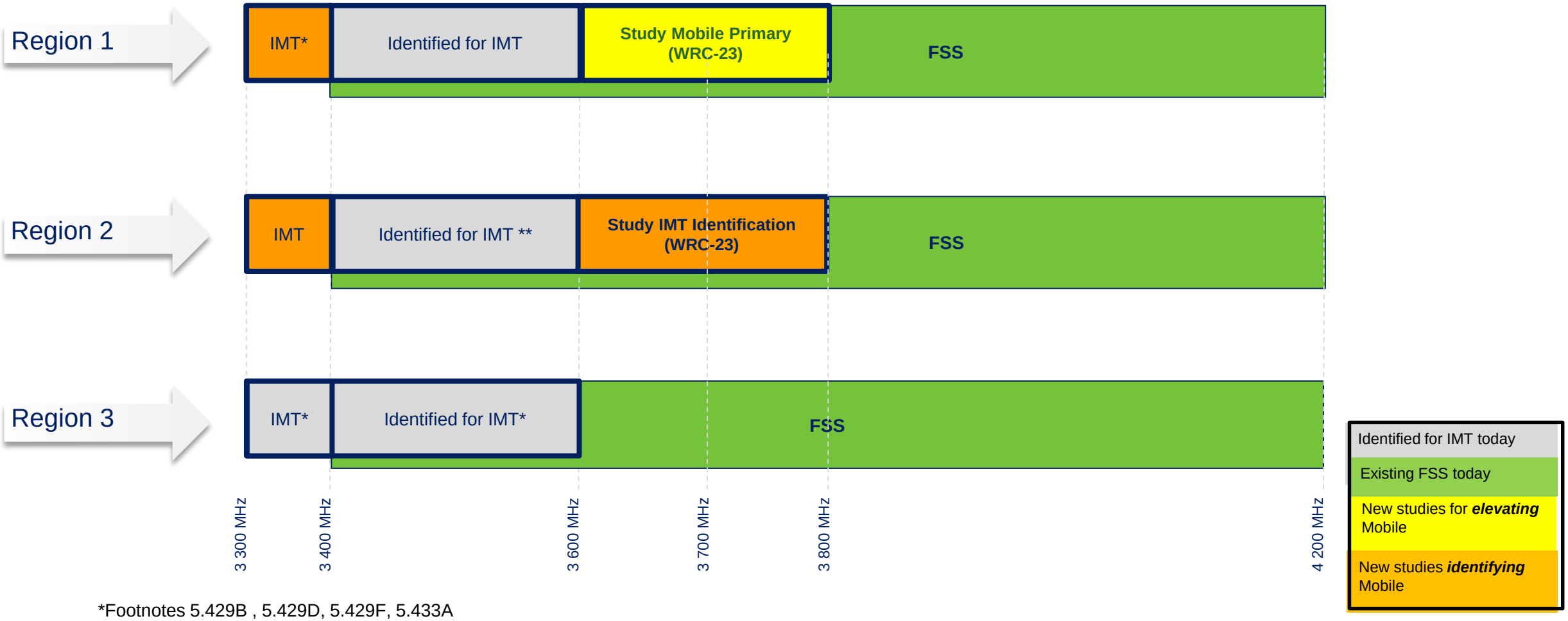
Resolves to invite ITU-R

"to conduct sharing and compatibility studies in time for WRC-23 between the mobile service and other services allocated on a primary basis within the frequency band 3 600-3 800 MHz and adjacent bands in Region 1, as appropriate, to ensure protection of those services to which the frequency band is allocated on a primary basis, and not impose undue constraints on the existing services and their future development,"

Resolves to invite WRC-23

"based on the results of studies in resolves to invite ITU-R, to consider possible upgrade of the allocation of the frequency band 3 600-3 800 MHz to the mobile, except aeronautical mobile, service on a primary basis within Region 1, and to take appropriate regulatory actions,"

C-band Status Post WRC-19



*Footnotes 5.429B , 5.429D, 5.429F, 5.433A

** Footnote 5.434

WRC-23 Agenda Item 1.3

Background

Existing studies between IMT and FSS in the band 3600-3800 MHz and studies to be done under AI1.3:

	IMT-Advanced (4G)	IMT-2020 (5G)	Mobile Service
ITU	Report ITU-R S.2368	To be done under AI1.2	To be done under AI1.3
CEPT	ECC Report 100	ECC Reports 254 and 281	ECC Reports 254 and 281

ESOA position:

Considering that many countries rely heavily on C-band satellite services offering vital services which in many cases cannot be reliably provided, or provided at all, by other means, and that existing studies between FSS and IMT have demonstrated that sharing is not feasible in the same geographical area.

ESOA could not support an IMT identification for this band in Region 1, which is not in the scope of the agenda item.

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Reality of current & future use of C-band must guide Regulators decision

C-BAND FSS IS CRITICAL

- **REACH:** facilitate intercontinental communications
- **ECONOMICS:** 100s of thousands of installed earth stations
- **RESILIENCE:** propagation and coverage characteristics

BALANCE NEEDS OF STAKEHOLDERS

- **MARKETS:** not take a wholesale approach, each region is different
- **HARMONIZE:** at the extent you can
- **LICENSE**: there is a gap between the spectrum assigned and the one yet to be licensed

OTHER MID-SPECTRUM OPTIONS

- **RE-FARMING:** Re-use 2G and 3G spectrum
- **2.3 GHz & 2.6 GHz:** provides capacity & coverage
- **3.4-3.6 GHz:** spectrum can be shared between MNOs

TECHNICAL CONSIDERATIONS

- **IDENTIFY:** know where the earth stations are
- **Filters:** All earth stations must be fitted with bandpass filters
- **Guard band:** Needed for the filter to work
  - **OOBE**: Impose strict OOBE limits on 5G

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MNOs have alternatives to C-Band

- RE-FARMING: 2G and 3G networks will be decommissioned over the coming years
- Using 2G and 3G spectrum is more cost effective than acquiring additional spectrum

- SPECTRUM SHARING: Exclusive spectrum licensing leads to massive inefficiency
- Sharing infrastructure and spectrum leads to higher efficiency and lower opex for MNOs

- MILLIMETER WAVE: Using mmW in high density areas (26 GHz)
- Deployment of small cells using mmW in ultra-dense urban areas so as to provide massive increases in capacity

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WRC-23 Issue 9.1 c)

Issue 9.1 c) *Study the use of International Mobile Telecommunication system for fixed wireless broadband in the frequency bands allocated to the fixed services on primary basis, in accordance with Resolution* ***175 (WRC-19)***

Responsible Groups: Working Parties 5A and 5C

Contributing Group for FSS/BSS: Working Party 4A

Resolution 175 (WRC-19)

"c) that the ITU-R Handbook on "Fixed Wireless Access" addressed the use of International Mobile Telecommunication (IMT) systems for Fixed Wireless Access, and **Recommendation ITU-R M.819** contains specific requirements pertaining to fixed wireless access,"

resolves to invite ITU-R

"to conduct any necessary studies on the use of International Mobile Telecommunication systems for fixed wireless broadband in the frequency bands allocated to the fixed service on primary basis, taking into account the relevant ITU-R studies, Handbooks, Recommendations and Reports,"

Background:

Proposal coming from the ASMG region.

WRC-23 Issue 9.1 c)

ESOA Position:

- The results of studies under this Topic will only be reflected in the Report of the Director of the Radiocommunication Bureau and may lead to possible updates of existing ITU-R publications, e.g. Handbook on Land Mobile, Volume 1: Fixed Wireless Access and relevant Recommendations of ITU-R F-Series
- Note that in line with guidelines of CPM23-1 (CA/251), only a short summary of the results for Chapter 5 of the CPM Report should be developed under this topic, there should be no related Methods and Regulatory or Procedural considerations

RR21.5 IMT stations (WRC-19 doc. 550)

RR21.5 and IMT stations: *"ITU-R is invited to study, as a matter of urgency, the applicability of the limit specified in No.* ***21.5*** *of the Radio Regulations to IMT stations, that use an antenna that consists of an array of active elements, with a view to recommend ways for its possible replacement or revision for such stations, as well as any necessary updates to Table* ***21-2*** *related to terrestrial and space services sharing frequency bands. Furthermore, the ITU-R is invited to study, as a matter of urgency, verification of No.* ***21.5*** *regarding the notification of IMT stations that use an antenna that consists of an array of active elements, as appropriate."* ***(WRC-19 doc. 550)***

Responsible Group: Working Party 5D

Contributing Group for FSS/BSS: Working Party 4A

Background

The matter which was raised in the context of WRC-19 AI1.13 is whether RR21.5 applies to IMT stations and which power limits apply to IMT stations.

ESOA position

RR21.5 power limits should apply to all IMT stations in bands listed in Table 21-2 consistently with the intention of the provision – to protect satellite reception.

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Questions

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