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INTERNATIONAL CIVIL AVIATION ORGANIZATION

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ICAO WRC-27 Preparatory Workshop
Agenda item AI 1.13: MSS IMT Allocation for DC

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Workshop on ITU World Radiocommunication Conference 2027
(WRC-27 Workshop)
(Bangkok, Thailand, 24-25 February 2025)

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Presentation Overview

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Background

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Resolution 253 (WRC-23).

resolves to invite the ITU Radiocommunication Sector to complete in time for the 2027 world radiocommunication conference

1 studies on possible allocations to the MSS in the frequency range between 694/698 MHz and 2.7 GHz, taking into account the IMT frequency arrangements addressed in the most recent version of Recommendation ITU R M.1036;

2 studies on spectrum requirements and on technical, operational and regulatory matters related to the implementation of the mobile-satellite service for direct connectivity to the IMT user equipment to complement the terrestrial IMT network coverage.

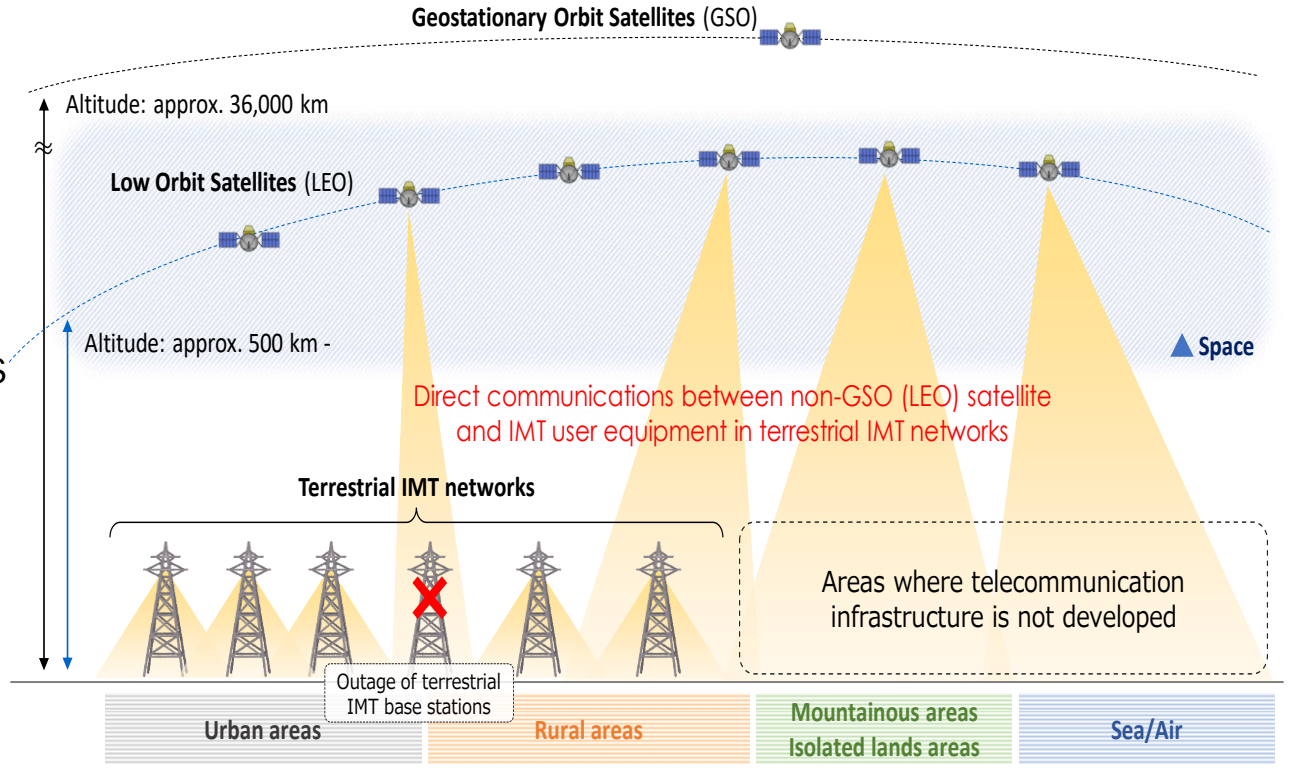
further resolves

1 to conduct studies on sharing and compatibility between incumbent services, including in adjacent frequency bands, ensuring the protection of incumbent services in accordance with the Radio Regulations;

2 to study possible technical and operational measures to ensure that the stations in the MSS do not cause harmful interference to, or claim protection from, stations operating in the mobile service.

DESCRIPTION AND FUNCTIONALITY OF MSS SYSTEMS FOR DC BETWEEN SPACE STATIONS AND IMT USER EQUIPMENT.

- Complement terrestrial IMT network coverage
- The space component, which could be either a GSO satellite or an NGSO constellation
- Use of frequency bands identified for terrestrial component of IMT
- Underserved Areas: rural and remote areas or in natural disaster relief situations and resulting network outages.
- DC-MSS system not serving UEs which are located other territory/ need authorization.
- The MSS system may co-exist with a terrestrial IMT network in complementary way, within a country/ geographical separation, frequency separation or others.



Ref: Annex 3 to Working Party 4C Chair's Report

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Candidate Bands for Study and Detailed list of sharing studies to be conducted

List of IMT candidate frequency arrangements and associated frequency bands

Mobile station transmitter (MHz)	Base station transmitter (MHz)
807-849	852-894
880-915	925-960
832-862	791-821
698-716	716-746
776-798	746-768
698-748	753-803
1 427-1 470	1 475-1 518
1 920-1 980	2 110-2 170
1 710-1 785	1 805-1 880
1 850-1 920	1 930-2 000
1 710-1 780	2 110-2 180
2 000-2 020	2 180-2 200
2010-2025	1880-1920
2 305-2 320	2 345-2 360
2 500-2 570	2 620-2 690

- Identified MSS IMT Frequency band belongs to terrestrial IMT.
- this frequency range is not currently standardized in 3GPP for DL arrangement
- the number of frequency bands is high / not formally closed.
- any added band needs to comply with the latest version of Recommendation ITU-R M.1036.
- the number of bands could be reduced depending on the contributions to the meeting

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ITU-R Activity

Working Party 4C (WP 4C) - Efficient orbit/spectrum utilization for MSS and RDSS

Who (WPxx) may be involved in sharing and compatibility studies ?

Topic	Responsible group	Contributing group
1.13	WP 4C	WP 1A, WP 3L, WP 3M, WP 4A, WP 4B, WP 5A, WP 5B, WP 5C, WP 5D, WP 6A, WP 7B, WP 7C, WP 7D

ITU-R Working Party 5D – IMT Systems.

ITU-R Working Party 5B – Maritime mobile service including the Global Maritime Distress and Safety System (GMDSS); **the aeronautical mobile service and the radiodetermination service**.

WP 4C meeting No. 33 (April 23 – May 2, 2025)

1 Consider the received contributions and LS replies from contributing groups

2 Update working documents for WRC-27 AI 1.13 sharing and compatibility studies, based on input contributions received

3 Finalize the implementation of the WRC decisions as contained in the BR Director's note in paragraph 3

4 Continue implementation of the WRC decisions as contained in the BR Director's note in paragraph 4

5 Finalize characteristics of incumbent systems, including protection criteria, to be used in WRC-27 AI 1.13 sharing studies

6 Finalize the technical and operational characteristics of MSS

7 Initiate development of the draft CPM text

8 Send LS and LS replies to contributing groups as necessary

9 Review and revise work plan as necessary.

Milestones :

Meeting No. 33 (May 2025,)

…….....

…….....

Meeting No. 37 ([2027, TBD])

WRC-27.

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Potential impact on aviation

While the primary focus of this AI 1.13 is on mobile phone connectivity, the aviation might be concerned about potential interference on aeronautical systems operating in in band and adjacent frequency bands.

Key points about WRC-27 AI 1.13 and its relation to aviation:

❑ **Focus on Mobile Satellite Services (MSS):**

This AI is covers exploring the possibility of allocating more spectrum for satellite-based IMT, which could potentially overlap with some bands used by aviation systems.

❑ **Potential Impact on Aviation:**

While the primary goal of 1.13 is not directly affecting aviation, the allocation of new spectrum for MSS could potentially cause interference with existing aeronautical services, if not carefully managed.

❑ **Aviation's Role in the Discussion:**

Although not actively seeking changes through this agenda item, aviation stakeholders are likely to participate in studies related to 1.13 to ensure that any new MSS allocations do not negatively impact their operations.

❑ **No Direct Action Sought by Aviation:**

According to FSMP/ ICAO document, there are no specific WRC-27 AIs where aviation is seeking direct regulatory action, meaning they are primarily focused on monitoring and contributing to studies to safeguard their spectrum usage.

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Potential impact on aviation, Cont'd 1.

- variety of mission-critical operations/ services in 694 - 2 700 MHz frequency bands, including
  - aeronautical mobile telemetry,
  - radionavigation-satellite,
  - AMS,
  - AMSS,

that will make it challenging to adopt an MSS allocation under this agenda item while protecting incumbent users from harmful interference.

- Studies should take into consideration the protection of the in-band aeronautical services additionally allocated by footnote in the RR. in-bands services.
- For 1 427-1 518 MHz, Article 21 of the RR: Terrestrial and space services sharing frequency bands above 1 GHz should be considered.

Frequency bands	Incumbent service	Additional allocation in certain bands for certain countries
694/698-960 MHz	AMS, ARNS	**No. 5.312** : 645-862 MHz, 726-753 MHz, 778-811 MHz, 822-852 MHz, to ARNS on a primary basis **No. 5.318** : 849-851 MHz and 894-896 MH, to AMS on a primary basis.
1 427-1 518 MHz	AMS	**No. 5.342** : 1 452-1 492 MHz; on a primary basis **No. 5.343** : 1 435-1 535 MHz; has priority **No. 5.346**: 1 452-1 492 MHz, to AMS, used for aeronautical telemetry. **No. 5.341C** : 1 429-1 452 MHz and 1 492-1 518 MHz; **No. 5.346A** : 1 452-1 492 MHz, to AMS.
2 500-2 690 MHz	MSS(s-E)	**No. 5.415A** : 2 520-2 535 MHz to AMSS (space-to-Earth) for operation limited to within their national boundaries

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Potential impact on aviation, Cont'd 2.

- CAO civil aviation safety systems in Immediate adjacent-band to the IMT frequency in 694/698 MHz - 2.7 GHz, on a primary basis.
- Studies should focus on those frequency bands identified for the terrestrial component of IMT.
- Satcom systems in 1525 – 1559 and primary surveillance and weather radars in 2700 – 2900 could be most impacted.
- In view of the footnotes related to aeronautical systems in-band additionally allocated 1 427-1 518 MHz and the of Satcom criticality systems in 1 427-1 518 MHz, it is not desirable to allocate the 1 427-1470 MHz & 1 475-1 518 MHz to the IMT MSS.

Mobile station transmitter (MHz)	Base station transmitter (MHz)	ICAO spectrum	ICAO use
807-849	852-894		
880-915	925-960		
832-862	791-821		
698-716	716-746		
776-798	746-768		
698-748	753-803		
		960 – 1 164	Airborne collision avoidance system (ACAS), automatic dependent surveillance – broadcast (ADS-B), distance measuring equipment (DME), L-band digital aeronautical communication system (LDACS), multilateration (MLAT) systems, secondary surveillance radar (SSR) & universal access transceiver (UAT)
		1 164 – 1 215	Distance Measuring Equipment (DME) & global navigation satellite systems (GNSS)
		1 215 – 1 300	Global navigation satellite systems (GNSS) & primary surveillance radar
		1 300 – 1 370	Primary surveillance radar
1 427-1 470	1 475-1 518		
		1 525 – 1 559	Satellite communication
		1 559 – 1 626.5	Global navigation satellite systems (GNSS)
		1 610 – 1 626.5	Satellite communication
		1 626.5 –1 660.5	Satellite communication
1 920-1 980	2 110-2 170		
1 710-1 785	1 805-1 880		
1 850-1 920	1 930-2 000		
1 710-1 780	2 110-2 180		
2 000-2 020	2 180-2 200		
2010-2025	1880-1920		
2 305-2 320	2 345-2 360		
2 500-2 570	2 620-2 690		
		2 700 – 2 900	Primary surveillance and weather radar

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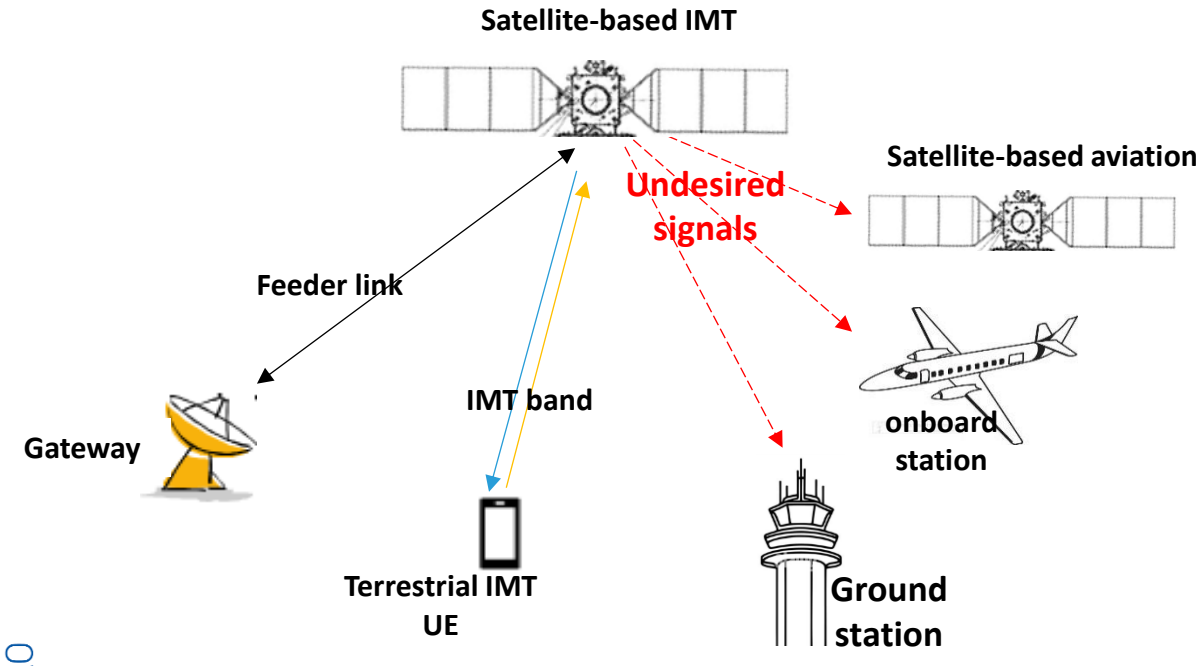
Potential impact on aviation, Cont'd 3.

Interference scenario from the envisaged IMT MSS systems into the incumbent aeronautical systems



- Undesired signals may impact aeronautical systems and may be in-band, out-of-band, or spurious emissions (Rec. ITU-R SM.328-11, Rec. ITU-R SM.329-13).
- Studies should be limited to the impact of satellite operations in the space-to-Earth direction.
- The user equipment (UE) would remain the same and regulatory changes to the terrestrial component of IMT are out of scope of the agenda item.
- Space stations would be a complementary service to existing IMT terrestrial operations, any regulatory considerations for the MSS could be considered on a secondary basis.

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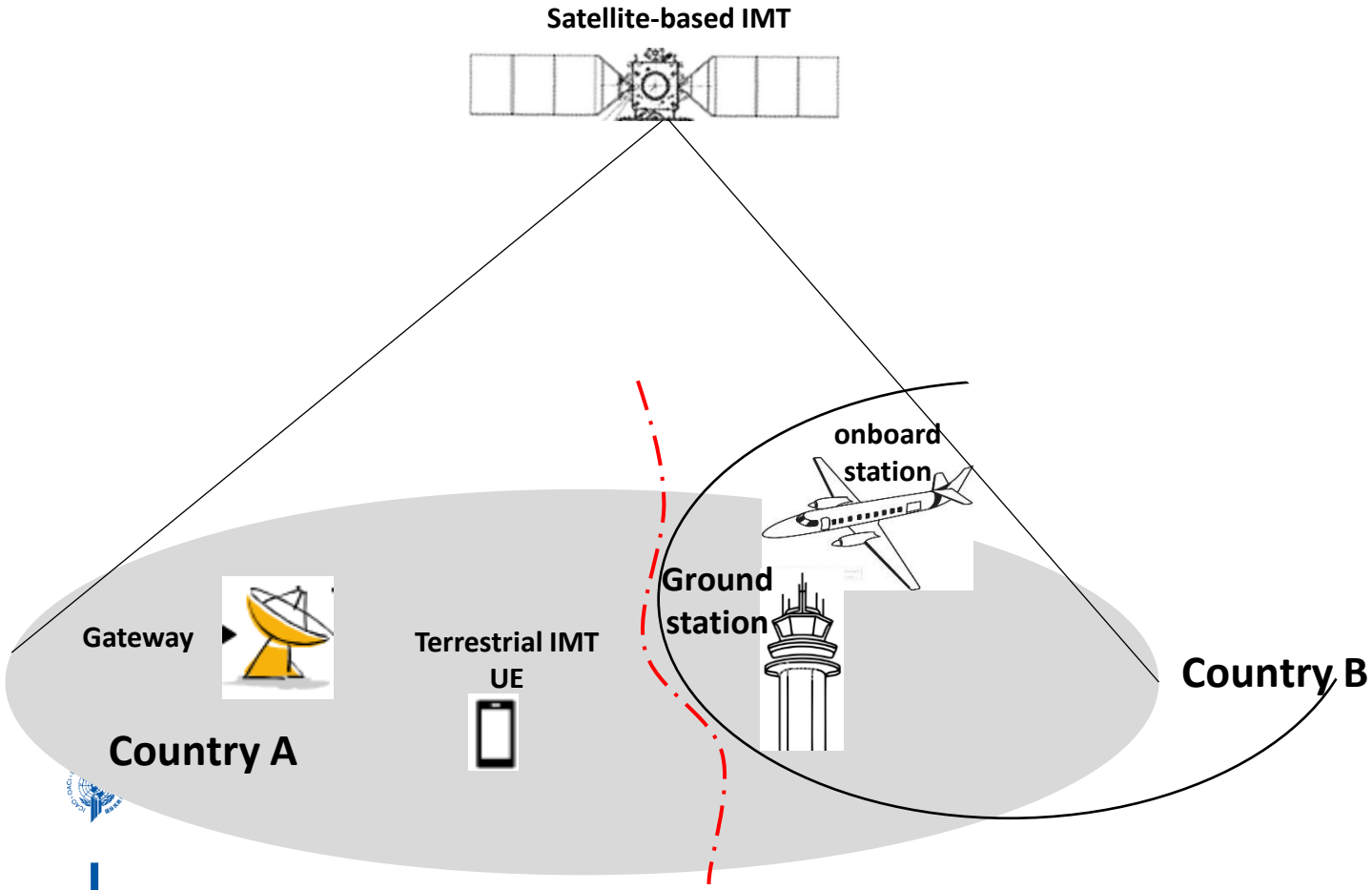
Potential impact on aviation, Cont'd 4.

Interference scenario from IMT MSS systems in country A on aeronautical systems in country B



- AI 1.13 will define technical conditions for MSS systems using IMT frequency band in order to protect the incumbent services in the neighbouring countries, including IMT TN and aeronautical systems.
- When not authorized in country B, emissions from MSS Direct to Cellular should be limited.
- The number of commercial Satellite-based IMT network may impact further the protection of aeronautical systems.
- Extensive debate on terrestrial IMT protection (pfd, epfd, aggregation of interference) at the WP 5D. Material might be useful to assess aeronautical systems protection.
- Contribution regarding sharing and compatibility studies would be sent to ITU-R WP 4C.

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Technical Characteristics of aeronautical systems operating in the 960-1 215 MHz frequency band/ AI 1.13.

ICAO Proposal:

Liaison Statement to ITU-R Working Parties 4C and 5B	Proposed technical parameters to consider in studies for possible new allocations to the mobile-satellite service involving aeronautical systems operating in the 960-1 215 MHz frequency band	Document 4C/107. 26 August 2024.

ITU-R WP 5B output:

Replay Liaison Statement to Working Party 4C	Relevant technical information for sharing studies under WRC-27 agenda item 1.13	Document 4C/216 29 November 2024

ITU-R WP 4C output:

Document under development by Working Party 4C	Working Document sharing and compatibility studies in relation to WRC-27 Agenda Item 1.13	Document 4C/204. 21 October 2024

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ICAO position on ITU-R WRC-27 Agenda Item 1.13

ICAO identified a list of civil aviation safety systems in the range 694 – 2 700 MHz and adjacent to it. A State letter, sent to Administrations, contains the ICAO position on ITU-R AIs

ICAO :

- opposes any new allocations made, or regulatory actions taken, under Resolution 253 (WRC-23) that overlap the frequencies used by civil aviation systems operating in parts of the frequency range 694 – 2 700 MHz.

- asks for making sure thatthe results of this agenda item for bands adjacent to aeronautical systems operating in parts of the frequency range 694 – 2 700 MHz would not reduce the protection of, or impose additional regulatory or technical constraints, on the multiple civil aviation systems operating in parts of the frequency range 694 – 2 700 MHz, or the primary surveillance and weather radar adjacent to the upper end of 694 – 2 700 MHz frequency range.

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Conclusion

- The goal of the MSS services envisaged byWRC-27 agenda item 1.13 is to complement terrestrial IMT network coverage by directly connecting MSS space stations and IMT User Equipment (UE).
- Activities under AI1.13 should be limited to frequency bands with mobile allocations already identified for IMT in the frequency range between 694 MHz and 2.7 GHz.
- The envisaged IMT DC-MSS needs to :
  - Provide insurance for the protection of aeronautical systems to IMT adjacent bands.
  - Not provide coverage within the territory of an administration that has not authorized the service.
- ITU-R WP 5 D and WP 4C are the appropriate groups to receive contributions from States / aeronautical stakeholders.
- ICAO/ FSMP continue to monitor WPs activity related to AIs that could impact aeronautical and provide information when necessary ITU-R WPs and States Civil Aviation authority.
- State are encouraged to promote ICAO positions on the relevant WRC-27 AIs by engaging with their national spectrum regulator and seeking support from their National Radiocommunication Authority on these items.

Thank You

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