The Chairman
Malaysian Communications and Multimedia Commission
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Malaysia
(Attention: Spectrum Planning and Assignment Division)

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8 AUGUST 2023

Subject: Inmarsat Response to Proposed Malaysia's Positions for ITU WRC-23 Agenda Items

Dear Sir,

Inmarsat welcomes the opportunity to provide comments to the Malaysian Communications and Multimedia Commission (**MCMC**) in response to its public consultation paper "Proposed Malaysia's Positions for World Radiocommunication Conference 2023 (**WRC-23**) Agenda Items" (the "Consultation Paper"), published on 17th July 2023. Inmarsat provides its comments in **Annex A** and presents its views and proposals in detail for agenda items 1.2, 1.6, 1.11, 1.16, 7 Topic A and J, and 10 in the **Annex B**. We hope that this information will assist the MCMC in developing its positions for WRC-23 agenda items.

We look forward in engaging with MCMC and supplying more information on these agenda items should it be helpful.

Thank you.

Yours sincerely,

Mary Lim
Regulatory and Market Access

Annex A

Agenda Item	Comments and Views on Proposed Malaysia's Positions
Fixed, Mobile and Broadcasting Issues	
1.1	No comment.
1.2	For the band 6425 – 7025 MHz, Inmarsat recommends that Malaysia supports **Method 4A** – no change to the Radio Regulations. This band cannot practically be used by IMT in a manner consistent with protection of FSS usage. Inmarsat provides its detailed views in **Annex B**.
1.3	No comment.
1.4	No comment.
1.5	No comment.
9.1(c)	Inmarsat supports the Malaysia position.
RR No. 21.5	Inmarsat agrees with the Malaysia's view that active antenna system (**AAS**) antennas the "power delivered by the transmitter to the antenna" referred to in RR No. 21.5 should be defined as the TRP of the entire antenna array of active elements AAS antennas. This definition of the "power delivered by the transmitter to the antenna" for AAS antennas should be clarified in RR Article 21. This should apply to all fixed and mobile services, including IMT stations, and in all frequency bands included in Table 21-2. Potential revisions to Article 21 have been developed that would clarify that AAS antennas should use the TRP as the "the power delivered by a transmitter to the antenna of a station" in the application of the RR No. 21.5 limit. The potential changes do not revise RR No. 21.5 itself, in line with the APT preliminary view. We encourage Malaysia to support such a draft PACP based on use of the TRP for stations using AAS antenna at the upcoming APG23-6.
Aeronautical, Maritime and Amateur Issues	
1.6	Inmarsat supports Malaysia's consideration of **Method B**, and recommends that Malaysia to support **Approach C of Method B**.

Agenda Item	Comments and Views on Proposed Malaysia's Positions
	Approach C consists of a new Resolution, and no changes to the Articles of the Radio Regulations. The proposed new WRC-23 Resolution is based on the following elements: • A definition of stations on a sub-orbital vehicle which includes operation when in space and includes space launch vehicles. • The identification of the specific services in which sub-orbital vehicles may operate (aeronautical mobile-satellite (route) service (AM(R)S), the aeronautical mobile service (**AMS**), the mobule satellite service (**MSS**) and radionavigation-satellite service (**RNSS**), and potentially others) and to clarify that stations on sub-orbital vehicles may operate as aircraft stations or earth stations in those services, for all parts of a flight. • The requirement that the operation of stations on sub-orbital vehicles in the above services is under the same conditions as those for conventional stations. • The exclusion of systems in the space operation service from the scope of the Resolution. Inmarsat provides its detailed views in **Annex B**.
1.7	No comment.
1.8	No comment.
1.9	No comment.
1.10	No comment.
1.11	Inmarsat supports Malaysia's position to support **Method A**, and recommends Malaysia to support the revisions to No. 5.375 and No 19.11 provided in the CPM Report as **Alternative A1** and **Alternative B1** for issue A. Inmarsat provides its detailed views in **Annex B**.
9.1(b)	No comment.
Res. 427	No comment.
Science Issues	
1.12	No comment.

Agenda Item	Comments and Views on Proposed Malaysia's Positions
1.13	No comment.
1.14	No comment.
9.1 (a)	No comment.
9.1 (d)	No comment.
Res. 655	No comment.
Satellite Issues	
1.15	No comment.
1.16	Inmarsat supports Malaysia's position to support **Method B**, with the approaches stipulated in **Annex B**.
1.17	Inmarsat supports **Method B** which addresses the regulatory solution for space-to-space links under this agenda for frequency bands 18.1 – 18.6 GHz, 18.8 – 20.2 GHz and 27.5 – 30 GHz. Inmarsat supports the operation of satellite-to-satellite links under new FSS (space-to-space) or inter-satellite service allocations and with a 'slightly expanded cone' concept of operation. We oppose unnecessary restrictions on satellite-to-satellite links such as to not allow NGSO satellites to transmit towards GSO satellites when within the 900-1290 km altitude range, and unnecessarily stringent limits on NGSO-to-GSO links; we support a limit for NGSO-to-GSO links of -15 dBW/Hz or alternatively 54 dBW/14MHz, which our studies show protect NGSO FSS receivers. We also oppose unnecessary limitations on the types of applications that can be provided by satellite-to-satellite links. For protection of NGSO MSS feeder links, we support coordination under Article 9 of Radio Regulation.
1.18	No comment.
1.19	No comment.

Agenda Item	Comments and Views on Proposed Malaysia's Positions	
7	**Topic A**	Inmarsat supports **Method A2** – a new WRC-23 Resolution on implementation of tolerances for certain orbital characteristics of satellites of NGSO FSS/BSS or MSS systems to be referred to in RR No. 11.44C.1, 11.49.s and 11.51. Inmarsat also supports **Option B** – the orbital elements are updated at the notification stage to reflect the final design. Therefore, Option B proposes to apply two sets of tolerances for satellites of certain non-GSO FSS, BSS or MSS systems with regard to changes between coordination and notification filings, as well tolerances, including temporary variation, between notification filings and deployed characteristics. Inmarsat provides its detailed views in **Annex B**.
	Topic B	No comment.
	Topic C	No comment.
	Topic D	No comment.
	Topic E	No comment.
	Topic F	No comment.
	Topic G	No comment.
	Topic H	No comment.
	Topic I	No comment.
	Topic J	Inmarsat supports Method J3 – modify Resolution 76 (Rev.WRC-15) to comply with the aggregate EPFD levels included in the same Resolution through a consultation process/meetings. Inmarsat provides its detailed views in **Annex B**.
	Topic K	No comment.

Agenda Item	Comments and Views on Proposed Malaysia's Positions
General and Regulatory Issues	
2	No comment.
4	No comment.
8	No comment.
10	Inmarsat provides its detailed views in **Annex B**.

Annex B

Agenda Item 1.2

Regarding the frequency band 6425 – 7125 MHz, several ITU-R studies have been carried out in relation to the potential interference from International Mobile Telecommunications (**IMT**) systems to geostationary orbit (**GSO**) satellites; with some studies showing excessive interference into the satellite, while others are showing interference levels below the protection criteria.

The difference between the results of the two sets of studies is very large owing to several factors (different methodology, assumptions and parameters). The use of unrealistic and incorrect parameters and assumptions in some of the studies leads to interference below the protection criteria. On the other hand, studies conducted by Inmarsat and others that are based on realistic parameters, such as actual satellite orbital locations, rural IMT deployment, taking into account interference from the full field of view of the satellite and from non-IMT services also using the band, and using the guidance provided by Study Group 3 on the clutter model, show that use of the band 6425 – 7025 MHz by IMT systems would lead to excessive interference that could make this band unusable for fixed satellite service (**FSS**) uplinks.

Even if any IMT use of the band 6425-7025 MHz is limited to Region 1 countries only, it could impact on FSS satellite services in use in Malaysia and other Region 3 countries, since satellite footprints typically cover large parts of Region 1 and Region 3.

Furthermore, interference to satellite uplinks in the band 6425 – 7025 MHz will impact on the L-band mobile satellite service (**MSS**) services provided by Inmarsat that are widely used in and around Malaysia. This is because the Inmarsat system operates feeder uplinks in part of the band 6425 – 7025 MHz, and interference received at the satellite in this band is translated to interference on the L-band user downlinks. Interference to these MSS services could cause severe disruption to important maritime and aviation services, and potentially place lives at risk. Inmarsat GSO satellites serving Malaysian MSS users could receive interference from IMT systems if deployed in some Region 1 countries.

Malaysia has an Appendix 30B allotment in the band 6725 – 7025 MHz that could be rendered unusable by the introduction of IMT in this band.

As mentioned in the Consultation Paper, at the CPM23-2 there was a proposal to identify the frequency band 6425-7025 MHz for some countries in Region 3 for IMT by creating a new ITU Radio Regulation (**RR**) footnote with appropriate conditions, despite that fact that such action would be outside the scope of the agenda item. Naturally, an IMT deployment in Region 3 countries would only exacerbate an already devastating situation from IMT deployment in Region 1.

Inmarsat recommends that Malaysia support **No Change** to the ITU RR for the band 6425 – 7025 MHz regarding possible identification for IMT in Region 1, and opposes IMT identification in this band for any Region 3 countries through a footnote.

It should be noted that many other countries have decided to make the 6425 – 7025 MHz band available for WiFi. This is a better option for administrations that wish to make some of this spectrum available for terrestrial technologies, since it is possible for WiFi to operate in this band under constraints that protect satellite services.

Agenda Item 1.6

Sub-orbital vehicles (**SoVs**) have emerged as a potential future transport trend, for space tourism, transportation or other applications. The suborbital transportation and space tourism market is anticipated to grow at a considerable rate during the forecast period, between 2023 and 2028, the use of SoVs in the Asia Pacific region is projected to grow at a considerable compound annual growth rate (**CAGR**) during this forecast period. Commercial suborbital vehicles may be used for military purposes, allowing the Air Force to enhance survivability via altitude and airspeed, and transporting equipment across Earth via space.

Some examples of use cases of SoVs and sub-orbital launchers in Malaysia:

1. the project SoV equipped with sensors and telemetry to collect atmospheric and ocean data for reserachers working at Ministry of Science, Technology and Innovation (Kementerian Sains, Teknologi dan Innovatif), abbreviated **MOSTI**).
2. Kedah Rocketry Group, an amateur rocketry group based in the state of Kedah in Northwest Malaysia, build and launch indigenous reusable suborbital rocket.
3. Singapore-based equatorial space system carried out its first in-flight proof-of-concept in 2020 at Malaysia.

SoVs are creating a new industry to generate revenue, public opportunity for access to space, new, low cost and reusable technology and materials and also the enhancement of atmospheric studies.

SoVs are intended to operate at higher altitude than conventional aircraft, with a sub-orbital trajectory. Some SoVs are also being developed to fly though the lower levels of the atmosphere, where they are expected to operate in the same airspace as conventional aircraft. SoVs must safely share airspace with conventional aircraft during certain portions of flight. Therefore, there is a need to track SoVs for the entire duration of the flight and for those vehicles to communicate with other airspace users and air traffic control. WRC-23 agenda item 1.6 is intended, among other aspects, to ensure safe integration of SoVs into the airspace used by conventional aircraft and minimise disruption to this controlled airspace during SoV transition.

All SoVs have communication requirements with ground stations and space stations including navigation, telemetry and control. L-band MSS systems such as Inmarsat currently provide safety and non-safety communications to aircraft, that could be extended to provide safety and non-safety communications for SoVs. Inmarsat is also developing new communication systems intended to transmit telemetry data from space launch vehicles to the ground control via the Inmarsat satellites. This provides a cost effective communication service that is currently being developed with several launch operators globally.

However, there is an absence of international regulation for SoVs, which is a problem in its own right, but also inhibits the development of national authorisation frameworks. Currently there is no defined international demarcation at ITU between the Earth's atmosphere and the space domain and this creates a lack of clarity for stations onboard SoVs.

There are existing radiocommunication services that are currently used by aviation systems, and which have been identified as being required for stations onboard SoVs. These are the aeronautical mobile-satellite (route) service (**AM(R)S**), the aeronautical mobile service (**AMS**), the MSS and radionavigation-satellite service (**RNSS**).

Method B of the CPM Report consists of a new Resolution and no change to the Articles of the ITU Radio Regulations, to clarify the status of stations onboard the SoVs and to establish conditions for coexistence with other services and applications.
With respect to the different Approaches of Method B, Inmarsat is of the view that:

- Approach A does not propose any new regulations to address the requirement of SoVs outside of current aviation systems and hence those requirements could only operate under RR No. 4.4.
- Approach B and Approach C, on the other hand, are both intended to accommodate all SoV communication requirements (safety and non-safety). The main difference between Approach B and Approach C is that Approach B would allow (in theory) all space and terrestrial services to be used for SOVs, rather than specified, named, services which are already being used by aircraft, as in Approach C. Approach B would introduce some inconsistencies in the RR, for example allowing the fixed service to be used to accommodate future SoVs requirements. In Inmarsat's view, Approach C sets the right balance, maintaining consistency with service definitions but allowing additional frequency bands to be used to support SOVs requirements.
- Approach D, similar to Approach C, identifies specific services in which SoVs may operate (AM(R)S, MSS, RNSS, and potentially others), but applies RR No. 4.4 for these specific services used by the stations onboard SoVs beyond the major portion of the atmosphere, meaning the SoV effectively operates outside ITU Regulations when in space, and has no rights to protection from interference from other systems or services. Approach C, on the other hand, would ensure that stations on SOVs have the same rights to protection from interference as conventional aircraft.

In line with Method B, a new WRC Resolution would provide a regulatory framework or guideline for the operation of radiocommunications on SoVs, to facilitate the growth of SoVs in Malaysia, and ensure safety of sub-orbital vehicles and other services. With the Malaysian Space Board fully launched in early 2023 to enforce the Malaysian Space Board Act 2022, gazetted on 25 January 2022, Malaysia could develop greater capabilities in collaboration with neighbouring countries.

Therefore, Inmarsat recommends that Malaysia to support **Approach C of Method B**:

(i) A definition of stations on a sub-orbital vehicle which includes operation when in space and includes space launch vehicles.
(ii) The identification of the specific services in which sub-orbital vehicles may operate (AM(R)S, AMS, MSS, RNSS) and to clarify that stations on sub-orbital vehicles may operate as aircraft stations or earth stations in those services, for all parts of a flight.
(iii) The requirement that the operation of stations on sub-orbital vehicles in the above services is under the same conditions as those for conventional stations.
(iv) The exclusion of systems in the space operation services from the scope of the Resolution.

Agenda Item 1.11 Issue A

As a part of the GMDSS modernisation (Issue A), there is a need to consider possible revisions to the RR for the frequency band 1645.5 – 1646.5 MHz. This band is allocated to the MSS (Earth-to-space) and is currently limited in the RR to use of satellite emergency position indicating radio beacon (**EPIRB**) operating with MSS networks. This band has remained unused for many years and the 1.6 GHz band EPIRB service has now been officially withdrawn from the GMDSS by the International Maritime Organisation (**IMO**).

Therefore, Inmarsat supports the Malaysia's position to support **Method A**, and recommends that Malaysia to support the revisions to No. 5.375 and No. 19.11 as provided in the CPM Report as **Alternative A1 and Alternative B1.** These revisions will allow the use of this frequency band 1645.5 – 1646.5 MHz for GMDSS and general maritime communications from earth stations operating in the GMDSS. This method will allow the band to be use by the maritime community for GMDSS and non-safety satellite communications, ensuring the band is efficiently used. The IMO also supports the retention of this band for GMDSS and other communications.

Agenda Item 1.16

Inmarsat supports the development of regulations for earth stations in motion (**ESIMs**) operating in non-GSO (**NGSO**) FSS systems. NGSO ESIMs will need to share the same frequency bands as GSO FSS satellite networks and not to cause excessive interference to them. Inmarsat is currently operating GSO systems in these bands within the Global Xpress network and plans to operate non-GSO ESIMs in the future.

Inmarsat supports the following approaches:

- To protect GSO FSS satellite networks, NGSO satellite systems serving ESIMs should operate within the envelope of typical earth stations within the NGSO system with which the ESIMs communicate. NGSO ESIMs should not cause more interference and shall not claim more protection than typical earth stations in the NGSO system
- NGSO ESIMs should meet the Article 22 equivalent power flux density (**EPFD**) limits in the applicable bands. For operation in the 17.7-17.8 GHz frequency band, NGSO ESIMs shall meet the Article 22 EPFD limits specified for the adjacent frequency band above 17.8 GHz.
- For the protection of terrestrial systems, similar regulatory provisions and the same PFD and distance limits for the protection of terrestrial services to those adopted for GSO ESIMs in ITU-R Resolutions 156 (WRC-15) and 169 (WRC-19) should be applied to NGSO ESIMs. Furthermore, the methodology to calculate the compliance with the PFD limits for the protection of terrestrial services should be similar to the methodology for GSO ESIM operation under ITU-R Resolution 169 (WRC-19). However, the timelines and availability of the two methodologies should not be linked together.

Agenda Item 1.17

Inmarsat supports the operation of satellite-to-satellite links under new FSS (space-to-space) or inter-satellite service allocations and with a ‘slightly expanded cone’ concept of operation. We oppose unnecessary restrictions on satellite-to-satellite links such as to not allow NGSO satellites to transmit towards GSO satellites when within the 900-1290 km altitude range, and unnecessarily stringent limits on NGSO-to-GSO links; we support a limit for NGSO-to-GSO links of -15 dBW/Hz or alternatively 54 dBW/14MHz, which our studies show protect NGSO FSS receivers. We also oppose unnecessary limitations on the types of applications that can be provided by satellite-to-satellite links. For protection of NGSO MSS feeder links, we support coordination under Article 9 of RR.

Agenda Item 7 Topic A

There is a growing concern that unrestrained launch and operation of hundreds of thousands of satellites in low Earth orbit (**LEO**) can cause potential harm to the rational, equitable, and efficient use of spectrum and orbital resources. Member States are struggling to harness the potential benefits of LEO satellites while ensuring sustainable and equitable access to outer space.

Large orbital tolerance values will fill up the LEO space with just one or two systems and will not allow others to share the same limited NGSO orbital resources. It will also change the interference environment vis-à-vis other NGSO systems, GSO networks and terrestrial networks. Further, it can invite misuse of the ITU Radio Regulations by bringing into use multiple orbits with a single satellite.

A new ITU-R Resolution should be developed to address these aspects. The new ITU-R Resolution should specify that it does not address issues regarding the physical aspects of space like collision risk and safety of space which are out of scope of the ITU. The ITU only deals with the use of radio frequencies and interference management.

Furthermore, to facilitate equitable access to LEO space and to not change the interference environment significantly, the tolerance should be as narrow as possible (e.g., +/- 5 km) which, according to real data of operating NGSO systems can be easily met for both Apogee and Perigee.

Agenda Item 7 Topic J

In addition to the RR Article 22 NGSO EPFD limits that establish the level of interference that a single NGSO system may contribute into GSO networks, Resolution 76 provides the aggregate level of interference that all NGSO systems, in the aggregate, may produce. WRC-23 is considering how to enforce this aggregate limit.

Inmarsat supports consultation meetings to begin as soon as possible after WRC-23. Until new methodologies are developed within ITU, administrations should use existing methodologies provided in ITU-R Recommendation S.1588, or other approaches, to calculate the aggregate EPFD during these consultation meetings. In case aggregate EPFD limits are exceeded, the EPFD from individual systems must be reduced equitably.

In evaluation of aggregate EPFD, multiple filings of the same NGSO system should be treated as a single system and the consultation meetings should allow active participation of GSO network operators.

Agenda Item 10

Proposals for new WRC-27 agenda items are gradually taking shape and hence now is a good time to start developing a position on the proposals. Inmarsat provides its views on some proposed new agenda items below.

Agenda Item 10: WRC-27 proposed new agenda item IMT for 2030 and beyond

Some APT Members submitted proposals to APG23-5 for a new WRC-27 agenda item to consider IMT identification in the frequency ranges 7.125 – 24.25 GHz and 92 – 275 GHz.

There is little technical justification provided on the need for another agenda item in seeking additional spectrum for IMT, and no justification showing the existing IMT spectrum is not sufficient. Furthermore, a total of 17.25 GHz spectrum identified for IMT at WRC-19 has yet to be utilised as of today in most countries. It is important to note that the frequencies between 7.125 and 24.25 GHz are highly occupied and used by incumbent services such as satellites.

If an IMT agenda item is indeed to be considered, Inmarsat recommends Malaysia to oppose the inclusion of 10.7 – 14.8 GHz (Ku-band satellite) and 17.3 – 21.2 GHz (Ka-band satellite) since these are the core satellite bands used for providing global satellite connectivity for the unserved and underserved residential and enterprise markets as well as aviation, maritime, utilities and broadcasting industries. Furthermore, parts of these ranges also overlap with the planned bands set out in Appendixes 30, 30A and 30B of the Radio Regulations.

Agenda Item 10: WRC-27 proposed new agenda item IMT identification at band 6425 – 7025 MHz in Region 3

Some APT Members submitted proposals to APG23-5 for a new WRC-27 agenda item to consider IMT identification in the frequency band 6425 – 7025 MHz.

This band is allocated to several other services, including the FSS. MSS systems use part of this band for their feeder links, an application of the FSS. There are existing operational FSS and MSS networks in this band with coverage over the Asia Pacific region, including Malaysia, which require protection from interference from terrestrial services.

As referred to above under agenda item 1.2, several ITU-R studies have been carried out in relation to the potential interference from IMT systems to GSO satellites. Therefore, using the band 6425 – 7025 MHz by IMT systems would lead to excessive interference that could make this band unusable for FSS uplinks. Interference to satellite uplinks will impact on the L-band MSS services provided by Inmarsat that are widely used in and around Malaysia, in particular to support aircraft operations and maritime safety communications. Therefore, Inmarsat recommends that

Malaysia should not support to any new agenda item to consider band 6425 – 7025 MHz in Region 3.

Agenda Item 10: WRC-27 proposed new agenda item to review the ITU RR Article 22

Article 22 of the ITU RR establishes the basis for NGSO & GSO sharing of the same frequencies, under rules that have been in place for about 20 years. This includes rules that define the permissible level of interference that NGSO systems may generate into GSO networks in the form of EPFD limits. EPFD accurately represents the total interference, varying in time, received by a GSO earth station and a GSO satellite from an NGSO system consisting of multiple, moving satellites and tracking earth stations. Article 22 ensures efficient and fair use of the GSO/Non-GSO shared Ku- and Ka-band frequencies. NGSO systems can operate across a wide swath of orbital space around the world without adversely affecting use of the GSO orbit. GSO networks are constrained to operating in the limited orbital region above the equator. Article 22 ensures that NGSO interference into the numerous GSO networks operating above the equator is kept to permitted levels.

New and innovative Ku- and Ka-band GSO networks and services (including those to be deployed in the next few years) are being developed in reliance on Article 22 EPFD limits.

The Article 22 framework does not "overprotect" Ku- and Ka-band GSO networks from NGSO interference. The Article 22 EPFD framework was developed using appropriate ITU-Recommendations (ITU-R S.1323) which took into account both long term and short-term protection requirements of many reference GSO networks and their characteristics.

Inmarsat recommends that Malaysia oppose the proposal to review the Article 22 EPFD framework. Ensuring opportunities for competition and innovation requires that we maintain a known interference environment. Billions of dollars have been invested in existing and planned Ku- and Ka-band GSO-based networks and services in reliance on the existing EPFD framework specified in Article 22.

Agenda Item 10: WRC-27 preliminary agenda item 2.2

"to study and develop technical, operational and regulatory measures, as appropriate, to facilitate the use of the frequency bands 37.5-39.5 GHz (space-to-Earth), 40.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) by aeronautical and maritime earth stations in motion communicating with geostationary space stations in the fixed-satellite service, in accordance with Resolution 176 (WRC 19);

Resolution 176 (WRC 19) – Use of the frequency bands 37.5-39.5 GHz (space-to-Earth), 40.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space)

by aeronautical and maritime earth stations in motion communicating with geostationary space stations in the fixed-satellite service."

Inmarsat does not oppose this proposal, however, it is important that regular GSO FSS operations are adequately protected.

Agenda Item 10: WRC-27 preliminary agenda item 2.4

"*the conditions for the use of the 71-76 GHz and 81-86 GHz frequency bands by stations in the satellite services to ensure compatibility with passive services in accordance with Resolution 776 (WRC 19);*

Resolution 776 (WRC 19) – Conditions for the use of the frequency bands 71-76 GHz and 81-86 GHz by stations in the satellite services to ensure compatibility with passive services
In preparation for WRC 23, no studies have been performed on the technical conditions for satellite services in the frequency band 81-86 GHz in order to protect the Earth exploration-satellite (passive) and the space research (passive) services in the frequency band 86-92 GHz. There have been no studies performed on the technical conditions for satellite services regarding protecting the radio astronomy service in the co-primary (81-86 GHz) and adjacent frequency bands (76-77.5 GHz, 79 81 GHz, and 86-92 GHz).

Recommendation ITU R RS.1861-1 contains up-to-date technical and operational characteristics of Earth exploration-satellite service (passive) systems, including in the 86-92 GHz band.

Report ITU R RA.2510-0 includes technical and operational characteristics of radio astronomy stations in these frequency bands."

Inmarsat recommends that Malaysia to keep a neutral position until there is a better definition of this new agenda item.

Agenda Item 10: WRC-27 preliminary agenda item 2.8

"to study the technical and operational matters, and regulatory provisions, for space-to-space links in the frequency bands [1 525-1 544 MHz], [1 545-1 559 MHz], [1 610-1 645.5 MHz], [1 646.5 1 660.5 MHz] and [2 483.5-2 500 MHz] among non-geostationary and geostationary satellites operating in the mobile-satellite service, in accordance with Resolution 249 (WRC 19);

Resolution 249 (WRC 19) – Study of technical and operational issues and regulatory provisions for space-to-space transmissions in the Earth-to-space direction in the frequency bands [1 610-1 645.5 and 1 646.5-1 660.5 MHz] and the space-to-Earth direction in the frequency bands [1 525-1 544 MHz], [1 545-1 559 MHz], [1 613.8-1 626.5 MHz] and [2 483.5-2 500 MHz] among non-geostationary and geostationary satellites operating in the mobile-satellite service."

Inmarsat is of the view that there is no need to change the ITU RR since intersatellite link (**ISL**) are able to operate under the current regulatory regime, operating under the RR No. 4.4 conditions. However, if there is a new agenda item for inter-satellite links in C-band, then a similar agenda item for L-band ISL should also be adopted, to ensure a similar regulatory environment for C-band and L-band.

Further, if an agenda item for MSS allocations does proceed, then both extended L-band and standard L-band frequencies at least should be included (i.e. 1518 – 1544 MHz, 1545 – 1559 MHz, 1626.5 – 1645.5 MHz, 1646.5 – 1660.5 MHz, 1668 – 1675 MHz). Other MSS frequency bands may also be included if supported by others.

If the agenda item is progressed, it is important that conditions are included in the associated Resolution for study of C-band FSS allocations to ensure that space-to-space links shall not constrain regular FSS operations.