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| **C:\Users\User.U-PC\Desktop\Eaco.png*****Communications for all in East Africa*** |
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| **EACO 2nd WRC-23 Online Preparatory Meeting**17th – 19th August 2021 |

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**Chapter 4A - South Sudan**

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| **Agenda Item 1.17 (Inter-Satellite Links)** |
| ***Part A: Description*** |
| *to determine and carry out, on the basis of the ITU‑R studies in accordance with Resolution* ***773 (WRC‑19)****, on the appropriate regulatory actions for the provision of inter-satellite links in specific frequency bands or portions thereof, by adding an inter-satellite service allocation where appropriate;* |
| ***Part B: Key Elements – the notables*** |
| **Resolution 773 (WRC-19):**Study of technical and operational issues and regulatory provisions for satellite-to-satellite links in the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz.According to the ongoing studies, there is actually an increasing usage of small satellite (< 500 kg) for earth exploration and science missions in low Earth orbit (LEO).The forecasts within the timeframe of 2020-2028 expect the followings:* 80 Small Satellite (100-500 kg) missions to be launched every year;
* 15 Large Satellite (>500 kg) missions to be launched every year.

Sometimes, it appears necessary to utilise satellite-to-satellite links, in particular within the fixed satellite service (FSS) allocation, for a variety of applications including, but not limited to, relaying data to Earth using a space station that is operating at an orbital altitude greater than that of the non-GSO space station generating the data. And these demands are increasing.The goal of this Agenda Item is to define the necessary actions (technical and regulatory) to allow non GSO system to communicate with a non GSO satellite or a GSO satellite at a higher altitude using an FSS frequency band (uplink) or a GSO or non GSO satellite to communicate with another non GSO satellite at a lower altitude using an FSS frequency band (downlink).The Key tasks of this Agenda Item are* to develop the technical and operational characteristics of different types of space stations that plan satellite-to-satellite transmissions in the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8 20.2 GHz and 27.5-30 GHz.
* to study the technical and operational characteristics, including spectrum requirements, off-axis e.i.r.p. values and out-of-band emission limits, for transmissions between space stations in these same frequency bands.

2 scenarios have been considered and focussed on to assess the amount of spectrum required and there are:* the number of science missions and the data volume associated;
* the number of smallsats being launched each year.

These 2 scenarios do not preclude the other possible means to assess the quantity of spectrum required by the intersatellite communication systems.Also, the following satellite-to-satellite links have been considered for the studies:* NGSO-to-GSO and GSO-to-NGSO (i.e. MEO-to-GSO or LEO-to-GSO)
* Lower-altitude NGSO to higher-altitude NGSO and higher-altitude NGSO to lower-altitude NGSO
* Space stations at the same altitude are excluded.

2 key concepts of operation of the intersatellite communications are under discussion within the Working Party:* *Within the cone concept* which is guided by the following principles:
	+ Only operations within the cone of [coverage/visibility] of GSO or non-GSO FSS service providers [are/ should be] allowed
	+ Satellite-to-satellite link transmissions [will / should] comply with the same directionality indicators as in the existing FSS allocations (Earth-to-space = from lower altitude to higher altitude space station, space-to-Earth = from higher altitude to lower altitude space station)
	+ Non-GSO user space stations in lower altitude to higher altitude link [will / should] operate in a [similar] manner [that should / resemble] [as] typical earth stations of the intended FSS service provider space station.
* *Expanded cone concept* which allow all the operations possible when the space satellites are not located at the same altitude.

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| **Figure 4.3.1-1** **The “within the cone of coverage” concept of operations** | **Figure 4.3.1-2** **The “expanded-cone” concept of operations** |
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Any use of the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz and 18.8-20.2 GHz (space-to-Earth) and 27.5-30 GHz (Earth-to-space) for transmissions between space stations should ensure compatibility with, and impose no additional regulatory or technical constraints on, services to which the frequency bands are currently allocated on a primary basis and services using adjacent frequency bands allocated on a primary basis in accordance with Res. 773(WRC-19).**• Off-axis EIRP values of satellite-to-satellite links**Links between a transmitting non-GSO FSS user space station and a receiving non-GSO or GSO FSS service provider space station are characterised by different propagation losses and off-axis angles than interfered with space stations with respect to links between an earth station and a receiving non-GSO or GSO FSS service provider space station. The picture below represents a scenario, with both VSAT and a non-GSO user space station communicating with a GSO FSS service provider space station. For simplicity, the target GSO FSS service provider space station, the transmitting non-GSO FSS user space station sub-satellite latitude and longitude and the VSAT latitude and longitude are the same. Therefore, they are aligned. In light of these geometry differences, it is important to ensure that adjacent interfered-with space stations are adequately protected. The off-axis e.i.r.p. of the transmitting non-GSO FSS user space stations needs to result in a received power flux density at the GSO arc that is less than or equal to the power flux density that is associated with earth stations in the GSO FSS service provider network. The pfd associated with earth stations in GSO service provider networks is derived based on off-axis e.i.r.p. maximum levels for that Network and/or limits specified in Recommendation ITU-R S.524-9 and in the Radio Regulations, as appropriate.**Out-of-band and spurious emissions of satellite-to-satellite links**Regarding out-of-band emissions and in absence of any limits in the RR, satellite-to-satellite transmissions should comply with the out-of-band emission masks contained in Annex 5 of Recommendation ITU-R SM.1541 or other applicable limits established by national regulations. In terms of permitted levels of emissions in the spurious domain, these emissions would be required to follow the same Appendix 3 requirements for all FSS emissions. |
| ***Part C: Status of the Bands under consideration*** |
| ***PART A – Article 5 of the Radio Regulations***The following table contain the services allocated in the frequency bands 11.7-12.7 GHz, 18.1‑18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz and its adjacent bands for the sharing and compatibility studies.**11.45-11.7 GHz**

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| **Allocation to services** |
| **Region 1** | **Region 2** | **Region 3** |
| 11.45-11.7FIXEDFIXED-SATELLITE(space-to-Earth) 5.484A 5.484B(Earth-to-space) 5.484 MOBILE except aeronauticalmobile | 11.45-11.7 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B MOBILE except aeronautical mobile |

**11.7-13.25 GHz**

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| **Allocation to services** |
| **Region 1** | **Region 2** | **Region 3** |
| 11.7-12.5FIXEDMOBILE except aeronautical mobileBROADCASTINGBROADCASTING-SATELLITE5.492 | 11.7-12.1FIXED 5.486FIXED-SATELLITE(space-to-Earth) 5.484A 5.484B 5.488 Mobile except aeronautical mobile5.485 | 11.7-12.2FIXEDMOBILE except aeronautical mobileBROADCASTINGBROADCASTING-SATELLITE5.492 |
| 12.1-12.2FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.488  |
| 5.485 5.489 | 5.487 5.487A |
| 12.2-12.7FIXEDMOBILE except aeronauticalmobileBROADCASTINGBROADCASTING-SATELLITE5.492 | 12.2-12.5FIXEDFIXED-SATELLITE(space-to-Earth) 5.484BMOBILE except aeronauticalmobileBROADCASTING |
| 5.487 5.487A | 5.487 5.484A |
| 12.5-12.75FIXED-SATELLITE(space-to-Earth) 5.484A 5.484B(Earth-to-space)5.494 5.495 5.496 | 5.487A 5.488 5.490  | 12.5-12.75FIXEDFIXED-SATELLITE(space-to-Earth) 5.484A 5.484BMOBILE except aeronauticalmobileBROADCASTING-SATELLITE 5.493 |
| 12.7-12.75FIXEDFIXED-SATELLITE(Earth-to-space) MOBILE except aeronauticalmobile |
| 12.75-13.25 FIXED FIXED-SATELLITE (Earth-to-space) 5.441 MOBILE Space research (deep space) (space-to-Earth) |

**17.7 - 18.4 GHz**

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| **Allocation to services** |
| **Region 1** | **Region 2** | **Region 3** |
| 17.7-18.1FIXEDFIXED-SATELLITE(space-to-Earth) 5.484A 5.517A(Earth-to-space) 5.516MOBILE | 17.7-17.8FIXEDFIXED-SATELLITE(space-to-Earth) 5.517 5.517A(Earth-to-space) 5.516BROADCASTING-SATELLITEMobile5.515 | 17.7-18.1FIXEDFIXED-SATELLITE(space-to-Earth) 5.484A 5.517A(Earth-to-space) 5.516MOBILE |
|  | 17.8-18.1FIXEDFIXED-SATELLITE(space-to-Earth) 5.484A 5.517A(Earth-to-space) 5.516MOBILE5.519 |  |
| 18.1-18.4 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B 5.517A (Earth-to-space) 5.520 MOBILE 5.519 5.521 |

**17.7-21.2 GHz**

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| **Allocation to services** |
| **Region 1** | **Region 2** | **Region 3** |
| 18.4-18.6 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B  5.517A  MOBILE |
| 18.6-18.8EARTH EXPLORATION-SATELLITE (passive)FIXEDFIXED-SATELLITE(space-to-Earth) 5.517A 5.522B MOBILE except aeronauticalmobileSpace research (passive) | 18.6-18.8EARTH EXPLORATION-SATELLITE (passive)FIXEDFIXED-SATELLITE(space-to-Earth) 5.516B 5.517A 5.522B MOBILE except aeronautical mobileSPACE RESEARCH (passive) | 18.6-18.8EARTH EXPLORATION-SATELLITE (passive)FIXEDFIXED-SATELLITE(space-to-Earth) 5.517A 5.522B MOBILE except aeronauticalmobileSpace research (passive) |
| 5.522A 5.522C | 5.522A | 5.522A |
| 18.8-19.3 FIXED FIXED-SATELLITE (space-to-Earth) 5.516B 5.517A 5.523A  MOBILE |
| 19.3-19.7 FIXED FIXED-SATELLITE (space-to-Earth) (Earth-to-space) 5.517A 5.523B 5.523C 5.523D 5.523E MOBILE |
| 19.7-20.1FIXED-SATELLITE(space-to-Earth) 5.484A 5.484B 5.516B 5.527AMobile-satellite (space-to-Earth) | 19.7-20.1FIXED-SATELLITE(space-to-Earth) 5.484A 5.484B 5.516B 5.527AMOBILE-SATELLITE(space-to-Earth) | 19.7-20.1FIXED-SATELLITE(space-to-Earth) 5.484A 5.484B 5.516B 5.527AMobile-satellite (space-to-Earth) |
| 5.524 | 5.524 5.525 5.526 5.527 5.528 5.529 | 5.524 |
| 20.1-20.2FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A  MOBILE-SATELLITE (space-to-Earth) 5.524 5.525 5.526 5.527 5.528 |
| 20.2-21.2 FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) Standard frequency and time signal-satellite (space-to-Earth) 5.524 |

**27-29.9 GHz**

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| **Allocation to services** |
| **Region 1** | **Region 2** | **Region 3** |
| 24.75-25.25FIXEDFIXED-SATELLITE(Earth-to-space) 5.532BMOBILE except aeronautical mobile5.338A 5.532AB  | 24.75-25.25FIXED 5.532AA FIXED-SATELLITE(Earth-to-space) 5.535MOBILE except aeronautical mobile5.338A 5.532AB  | 24.75-25.25FIXEDFIXED-SATELLITE(Earth-to-space) 5.535MOBILE5.338A 5.532AB  |
| 25.25-25.5 FIXED 5.534A INTER-SATELLITE 5.536 MOBILE5.338A 5.532AB  Standard frequency and time signal-satellite (Earth-to-space) |
| 25.5-27EARTH EXPLORATION-SATELLITE (space-to-Earth) 5.536B  FIXED 5.534A INTER-SATELLITE 5.536 MOBILE 5.338A 5.532AB  SPACE RESEARCH (space-to-Earth) 5.536C Standard frequency and time signal-satellite (Earth-to-space)5.536A |
| 27-27.5FIXEDINTER-SATELLITE 5.536MOBILE 5.338A 5.532AB | 27-27.5 FIXED 5.534A FIXED-SATELLITE (Earth-to-space) INTER-SATELLITE 5.536 5.537 MOBILE 5.338A 5.532AB  |
| 27.5-28.5 FIXED 5.537A FIXED-SATELLITE (Earth-to-space) 5.484A 5.516xB 5.517A 5.539  MOBILE 5.538 5.540 |
| 28.5-29.1 FIXED FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.517A 5.523A 5.539 MOBILE Earth exploration-satellite (Earth-to-space) 5.541 5.540 |
| **29.1-29.5** FIXED FIXED-SATELLITE (Earth-to-space) 5.516B 5.517A 5.523C 5.523E 5.535A 5.539 5.541A  MOBILE Earth exploration-satellite (Earth-to-space) 5.541 5.540 |
| 29.5-29.9FIXED-SATELLITE(Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 Earth exploration-satellite(Earth-to-space) 5.541Mobile-satellite (Earth-to-space) | 29.5-29.9FIXED-SATELLITE(Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 MOBILE-SATELLITE(Earth-to-space)Earth exploration-satellite(Earth-to-space) 5.541 | 29.5-29.9FIXED-SATELLITE(Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 Earth exploration-satellite(Earth-to-space) 5.541Mobile-satellite (Earth-to-space)  |
| 5.540 5.542 | 5.525 5.526 5.527 5.529 5.540  | 5.540 5.542 |

**29.9-31 GHz**

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| **Allocation to services** |
| **Region 1** | **Region 2** | **Region 3** |
| 29.9-30 FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539  MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (Earth-to-space) 5.541 5.543 5.525 5.526 5.527 5.538 5.540 5.542 |
| 30-31 FIXED-SATELLITE (Earth-to-space) 5.338A MOBILE-SATELLITE (Earth-to-space) Standard frequency and time signal-satellite (space-to-Earth) 5.542 |

***PART B – AfriSAP***

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| **ITU Region 1 allocations and footnotes** | **Africa Common Allocation(s) and footnotes** | **Typical Applications** | **Additional information** |
| 11.45-11.7 GHzFIXEDFIXED-SATELLITE (space-to-Earth) 5.484A 5.484B (Earth-to-space) 5.484 MOBILE except aeronautical mobile | 11.45-11.7 GHzFIXEDFIXED-SATELLITE (space-to-Earth) 5.484A 5.484B (Earth-to-space) 5.484 MOBILE except aeronautical mobile | Fixed links - 11 GHz (10.7-11.7 GHz)Fixed-satellite downlinks (PTP/VSAT/SNG)DTH Applications under the FSS | ITU-R F 387 applies |
| 11.7-12.5 GHzFIXEDMOBILE except aeronautical mobileBROADCASTINGBROADCASTING-SATELLITE  5.4925.487 5.487A | 11.7-12.5 GHzFIXEDMOBILE except aeronautical mobileBROADCASTINGBROADCASTING-SATELLITE 5.4925.487 5.487A | Fixed LinksBroadcasting satellite systems | This band is available for BSS in accordance with Appendix 30 of ITU RR. Refer to Annex C. |
| 12.5-12.75 GHzFIXED-SATELLITE (space-to-Earth) 5.484A 5.484B (Earth-to-space)5.494 5.495 5.496 | 12.5-12.75 GHzFIXED-SATELLITE (space-to-Earth) 5.484A 5.484B (Earth-to-space)5.494[AddA22] 5.495[AddA2] | FSS uplinks (VSAT/SNG) (12.5-12.75 GHz)Aeronautical Earth Stations/ ESV/ESIM ApplicationsNGSO FSSFixed links | Article 9.12 appliesRes. 155 (WRC – 15) applies |
| 12.75-13.25 GHzFIXEDFIXED-SATELLITE (Earth-to-space) 5.441MOBILESpace research (deep space) (space-to-Earth) | 12.75-13.25 GHzFIXED FIXED-SATELLITE (Earth-to-space) 5.441MOBILESpace research (deep space) (space-to-Earth) | Fixed links - 13 GHz (12.75-13.25 GHz) | Channelling plan for 13 GHz band in accordance with ITU-R Rec. F.497The band 12.75-13.25 GHz is part of the APP30B Plan (FSS Earth-to-space); refer to Annex C.Article 9.12 appliesRes. 172 (WRC-19) applies |

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| 17.7-18.1 GHzFIXEDFIXED-SATELLITE (space-to-Earth) 5.484A 5.517A (Earth-to-space) 5.516MOBILE | 17.7-18.1 GHzFIXEDFIXED-SATELLITE (space-to-Earth) 5.484A 5.517A (Earth-to-space) 5.516 | Fixed links - 18 GHz (17.7-19.7 GHz)ESIM (under the FSS) Broadcasting satellite systems feeder links  | Channelling plan for 18 GHz band in accordance with ITU-R Rec. F.595 Annex 1 Res 169 (WRC-19) applies for ESIM. |
| 18.1-18.4 GHzFIXEDFIXED-SATELLITE (space-to-Earth) 5.484A 5.516B 5.517A (Earth-to-space) 5.520MOBILE5.519 5.521 | 18.1-18.4 GHzFIXED FIXED – SATELLITE (space-to-Earth) 5.484A 5.517A (Earth-to-space) 5.520MOBILE5.519 | Fixed links - 18 GHz (17.7-19.7 GHz)ESIM (under the FSS)  | Channelling plan for 18 GHz band in accordance with ITU-R Rec. F.595 Annex 1 Res 169 (WRC-19) applies for ESIM. |
| 18.4-18.6 GHzFIXEDFIXED-SATELLITE (space-to-Earth) 5.484A 5.516B 5.517AMOBILE | 18.4-18.6 GHzFIXED FIXED – SATELLITE (space-to-Earth) 5.484A 5.517AMOBILE | Fixed links - 18 GHz (17.7-19.7 GHz)ESIM (under the FSS | Channelling plan for 18 GHz band in accordance with ITU-R Rec. F.595 Annex 1Res 169 (WRC-19) applies for ESIM. |
| 18.6-18.8 GHzEARTH EXPLORATION-SATELLITE (passive)FIXEDFIXED-SATELLITE (space-to-Earth) 5.517A 5.522B MOBILE except aeronautical mobileSpace research (passive)5.522A 5.522C | 18.6-18.8 GHzEARTH EXPLORATION-SATELLITE (passive)FIXED FIXED – SATELLITE (space-to-Earth) 5.517A 5.522BMOBILE except aeronautical mobileSpace research (passive)5.522A 5.522C[UseC5] | Fixed links - 18 GHz (17.7-19.7 GHz)ESIM (under the FSS)  | Channelling plan for 18 GHz band in accordance with ITU-R Rec. F.595 Annex 1 Res 169 (WRC-19) applies for ESIM. |
| 18.8-19.3 GHzFIXEDFIXED-SATELLITE (space-to-Earth) 5.516B 5.517A 5.523AMOBILE | 18.8-19.3 GHzFIXEDFIXED-SATELLITE (space-to-Earth) 5.517A 5.523AMOBILE | Fixed links - 18 GHz (17.7-19.7 GHz)ESIM (under the FSS)  | Channelling plan for 18 GHz band in accordance with ITU-R Rec. F.595 Annex 1Res 169 (WRC-19) applies for ESIM. |
| 19.3-19.7 GHzFIXEDFIXED-SATELLITE (space-to-Earth) (Earth-to-space) 5.517A 5.523B 5.523C 5.523D 5.523EMOBILE | 19.3-19.7 GHzFIXEDFIXED – SATELLITE (space-to-Earth) (Earth-to-space) 5.517A 5.523B5.523C 5.523D 5.523EMOBILE | Fixed links - 18 GHz (17.7-19.7 GHz)ESIM (under the FSS)  | Channelling plan for 18 GHz band in accordance with ITU-R Rec. F.595 Annex 1 Res 169 (WRC-19) applies for ESIM.  |
| 19.7-20.1 GHzFIXED-SATELLITE(space-to-Earth) 5.484A 5.484B 5.516B 5.527AMobile-satellite (space-to-Earth)5.524 | 19.7-20.1 GHzFIXED-SATELLITE(space-to-Earth) 5.484A 5.484B 5.516B 5.527AMobile-satellite (space-to-Earth)5.524[AddA16] | ESIM (under the FSS) | Res.143 applies for HDFS. Res 156 (WRC-15) applies for ESIM. |
| 20.1-20.2 GHzFIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527AMOBILE-SATELLITE (space-to-Earth)5.524 5.525 5.526 5.527 5.528 | 20.1-20.2 GHzFIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527AMOBILE-SATELLITE (space-to-Earth) 5.524[AddA16] 5.525 5.526 5.527 5.528 | ESIM (under the FSS) | Res.143 applies for HDFSRes 156 (WRC-15) applies for ESIM. |
| 20.2-21.2 GHzFIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516BMOBILE-SATELLITE (space-to-Earth)Standard frequency and time signal-satellite (space-to-Earth)5.524 | 20.2-21.2 GHzFIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) Standard Frequency and Time Signal-Satellite (space-to-Earth) 5.524[AddA16] |  Fixed Satellite Systems |  |

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| 27-27.5 GHzFIXEDINTER-SATELLITE 5.536MOBILE 5.338A 5.532AB | 27-27.5 GHzFIXED INTER-SATELLITE 5.536MOBILE 5.338A 5.532AB | IMT (24.25-27.5 GHz) | Res. 242 (WRC-19) applies |
| 27.5-28.5 GHzFIXED 5.537AFIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.517A 5.539 MOBILE5.538 5.540 | 27.5-28.5 GHzFIXED 5.537A[SpNt2]FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.517A 5.539 MOBILE5.538 5.540 | Fixed links – 28 GHz (27.5-29.5 GHz)ESIM (under the FSS) | Channelling plan in accordance with ITU-R Rec. F.748 Annex 2 (Note: In this recommendation, this band is known as 28 GHz)Res.143 applies for HDFS.The band 27.5-30 GHz may be used by the FSS for BSS feeder linksRes 169 (WRC-19) applies for ESIM. |
| 28.5-29.1 GHzFIXEDFIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.517A 5.523A 5.539 MOBILEEarth exploration-satellite (Earth-to-space) 5.5415.540 | 28.5-29.1 GHzFIXED FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.523A 5.539 5.517AMOBILEEarth exploration-satellite (Earth-to-space) 5.5415.540 | Fixed links – 28 GHz (27.5-29.5 GHz)ESIM (under the FSS) | Channelling plan in accordance with ITU-R Rec. F.748 Annex 2 (Note: In this recommendation, this band is known as 28 GHz)Res.143 applies for HDFS.The band 27.5-30 GHz may be used by the FSS for BSS feeder linksRes 169 (WRC-19) applies for ESIM. |
| 29.1-29.5 GHzFIXEDFIXED-SATELLITE (Earth-to-space) 5.516B 5.517A 5.523C 5.523E 5.535A 5.539 5.541A MOBILEEarth exploration-satellite (Earth-to-space) 5.5415.540 | 29.1-29.5 GHzFIXED FIXED-SATELLITE (Earth-to-space) 5.516B 5.517A 5.523C 5.523E 5.535A 5.539 5.541AMOBILEEarth exploration-satellite (Earth-to-space) 5.5415.540 | Fixed linksESIM (under the FSS) | Channelling plan in accordance with ITU-R Rec. F.748 Annex 2 (Note: In this recommendation, this band is known as 28 GHz)Res 169 (WRC-19) applies for ESIM. |
| 29.5-29.9 GHzFIXED-SATELLITE (Earth-to-space) 5.484A5.484B 5.516B 5.527A 5.539Earth exploration-satellite (Earth-to-space) 5.541Mobile-satellite (Earth-to-space)5.5405.542 | 29.5-29.9 GHzFIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.427A 5.539 5.527AEarth exploration-satellite (Earth-to-space) 5.541Mobile-satellite (Earth-to-space)5.540 5.542[AddA14] | ESIM (under the FSS) | Res.143 applies for HDFS.Res 156 (WRC-15) applies for ESIM. |
| 29.9-30 GHzFIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539MOBILE-SATELLITE (Earth-to-space)Earth exploration-satellite (Earth-to-space) 5.541 5.5435.525 5.526 5.527 5.538 5.540 5.542 | 29.9-30 GHzFIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.427A 5.539 5.527AMOBILE-SATELLITE (Earth-to-space)Earth exploration-satellite (Earth-to-space) 5.541 5.5435.525 5.526 5.527 5.538 5.540 5.542[AddA14] | ESIM (under the FSS) | Res.143 applies for HDFS.Res 156 (WRC-15) applies for ESIM. |
| 30-31 GHzFIXED-SATELLITE (Earth-to-space) 5.338AMOBILE-SATELLITE (Earth-to-space)Standard frequency and time signal-satellite (space-to-Earth)5.542 | 30-31 GHzFIXED-SATELLITE (Earth-to-space) 5.338AMOBILE-SATELLITE (Earth-to-space) Standard Frequency and Time Signal-Satellite (space-to-Earth) 5.542[AddA14] |  |  |

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| ***Part D: Conclusions of the Results of Studies if any*** |
| Studies are initiated in ITU-R and are ongoing. Initial study documents were presented at the last WP4A meeting although they could not be discussed exhaustively due to time limitations but were forwarded to the next WP4A meetings. **A draft working document, including three Annexes and a draft CPM text are under development by WP4A but are not yet completed and not totally agreed. Some key concepts and assumptions have been made but required further discussion.** The links for these documents are listed as below:[https://www.itu.int/dms\_ties/itu-r/md/19/wp4a/c/R19-WP4A-C-0392!N24!MSW-E.docx](https://www.itu.int/dms_ties/itu-r/md/19/wp4a/c/R19-WP4A-C-0392%21N24%21MSW-E.docx) [https://www.itu.int/dms\_ties/itu-r/md/19/wp4a/c/R19-WP4A-C-0392!N33!MSW-E.docx](https://www.itu.int/dms_ties/itu-r/md/19/wp4a/c/R19-WP4A-C-0392%21N33%21MSW-E.docx) As a result of the studies carried out under AI 1.17 there has been new terms which have been defined;* User space station:

Every space station transmitting in the FSS allocation (Earth-to-space) towards space stations at higher altitudes and receiving in the FSS allocation (space-to-Earth) from space stations at higher altitudes* Service provider space station:

every space station transmitting in the FSS allocation (space-to-Earth) towards space stations at lower altitudes and receiving in the FSS allocation (Earth-to-space) from space stations at lower altitudes.* Cone of coverage of a service provider:

the conical volume of space defined by a cone whose apex is at the service provider space station and whose base does not extend beyond the edge of coverage of the Earth as viewed by the service provider space station. * Within the cone of coverage concept:

This concept of operation involves communications between a non-GSO user space station and the service provider space station(s) when a non-GSO user space station is inside the cone of coverage of the service provider space station(s).* Expanded-cone concept:

This concept of operation involves communications between a non-GSO user space station and the service provider space station(s) both when a non-GSO user space station is inside and outside the cone of coverage of the service provider space station.Some of the aspects under studies in the various frequency bands under consideration include;* Sharing with the fixed-satellite service
* Sharing with the broadcasting-satellite service (BSS)
* Sharing with the mobile-satellite service
* Sharing with the meteorological-satellite service
* Sharing with HAPS downlinks
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| ***Part E: Options and Associated Implications***  |
| The Options and Methods to address the agenda item are yet to be determined subject to the outcomes of studies that will inform the possible regulatory action to be taken to satisfy the agenda item. |
| ***Part F: Proposed EACO Preliminary View and or Position***  |
| * Support ongoing sharing and compatibility studies at the ITU-R on technical and operational characteristics, including spectrum requirements, off-axis e.i.r.p. values and out-of-band emission limits aimed towards the development of technical and regulatory actions for inter-satellite links in the frequency bands under consideration in this agenda item.
* Follow up the sharing and compatibility studies between satellite-to-satellite links and other services in the same bands and adjacent bands to develop technical conditions and regulatory provisions for the use of satellite-to-satellite operations in the 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz frequency bands in accordance with Resolution 773 (WRC-19).
* In case of enabling the operation of satellite-to-satellite links within the fixed-satellite service (FSS) allocation in the 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz bands, or parts thereof.
* A regulatory framework should be developed to ensure protection of existing services in the same frequency bands and adjacent bands.
* Support allocation of satellite-to-satellite transmissions within current FSS allocation, with same directional designators as in FSS, i.e. Earth-to-space and space-to-Earth.
* Avoid, if possible, a new ISS allocation in these core FSS bands (Note: avoiding a new allocation when/if possible is a standard ITU practice and it has always been encouraged)
* Support the “within the cone of coverage” concept of operation, which allows satellite-to-satellite transmissions to be granted regulatory recognition under the current FSS allocation, without the need for a new inter-satellite service allocation

Encourage execution of sharing studies on the “expanded cone” concept of operation. |
| ***Part G: Recommendations and way forward*** |
| It is recommended that ATU supports and closely follow ongoing studies on this agenda item at the ITU-RATU Member states should actively participate and contribute to the studies and discussions to ensure that adjacent GSOs and NGSOs stations are protected as well as protection of terrestrial stations from off-axis emissions. |
| ***Part G: Other Regional Groups and International Organisations Preliminary Views or Positions*** |
| **APT:** APT Members support ITU-R studies on the sharing and compatibility as well as to develop technical conditions and regulatory provisions for the use of satellite-to-satellite operations in the 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz frequency bands in accordance with Resolution **773 (WRC-19)**, as such the use shall ensure protection of primary services allocated in the bands and in the adjacent bands.**ASMG:** * Follow up studies and that the studies should be done on real registered NGSO constellation
* The inter satellite link should not:
1. impose any restrictions on the GSO and NGSO satellites
2. impose any restrictions on existing services
* The transmission between two satellites will have the same protection levels for GSO, NGSO satellites and existing services as been stipulated in the Radio Regulations

**CEPT:** * CEPT supports the development of a regulatory framework to enable the operation of satellite‐to‐satellite links within the fixed‐satellite service (FSS) allocation in the 11.7‐12.7 GHz, 18.1‐18.6 GHz, 18.8‐20.2 GHz and 27.5‐30 GHz bands, or parts thereof, while ensuring protection of existing services in the same frequency bands and adjacent bands.
* CEPT supports that the introduction of satellite‐to‐satellite transmissions must ensure the same level of protection for GSOs and non‐GSOs as currently provided in the RR and must not impose new constraints on GSOs and NGSOs to protect satellite‐to‐satellite links from interference.
* CEPT supports that the introduction of satellite‐to‐satellite transmissions must ensure the same level of protection for terrestrial services as currently provided in the RR and must not impose new constraints on terrestrial services to protect satellite‐to‐satellite links from interference.

**CITEL:** * Some administrations support studies under the terms of Resolution 773 (WRC-19) to consider technical and regulatory provisions to allow satellite-to-satellite links in the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz. These Administrations support confining studies to links that operate in the same direction of transmission as provided for in the current allocations and confined to satellite located on different orbits.

**RCC** * The use of satellite-to-satellite links in the bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz, and 27.5-30 GHz may impose severe constraints on the use of the existing and future systems/ networks of FSS, interalia, over the national territories.
* Support the studies of technical and operational characteristics, including spectrum requirements, off-axis e.i.r.p. values and out-of-band emission limits, for transmissions between space stations in the bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz.
* Support studying sharing and compatibility between satellite-to-satellite links, intending to operate between space stations in the bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz, and current and planned stations of the FSS and other existing services allocated in the same frequency bands and in adjacent bands. The results of these ITU-R studies should be agreed by Member States by consensus.

Technical conditions and regulatory provisions should be developed for different types of space stations for satellite-to-satellite operations in the bands 11.7-12.7 GHz, 18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz, or portions thereof, including new ISS allocations. |