
EACO 4th WRC-23 Online Preparatory Meeting

28th February 2022

Chapter 4A - South Sudan

Agenda Item 1.17 (Inter-Satellite Links)
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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
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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.

1. 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).
2. 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.
3. 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.
4. 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).

5. 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.

6. 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 small satellites being launched each year.

7. These 2 scenarios do not preclude the other possible means to assess the quantity of spectrum required by the inter-satellite communication systems.

8. 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.

9. 2 key concepts of operation of the intersatellite communications are under discussion within the Working Party:

i. *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.

ii. *Expanded cone concept* which allow all the operations possible when the space satellites are not located at the same altitude.

Figure 4.3.1-1
The “within the cone of coverage” concept of operations

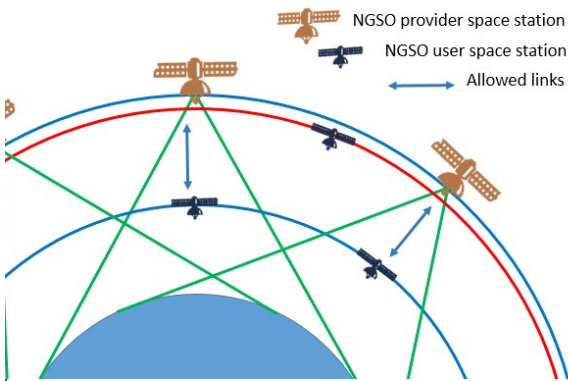
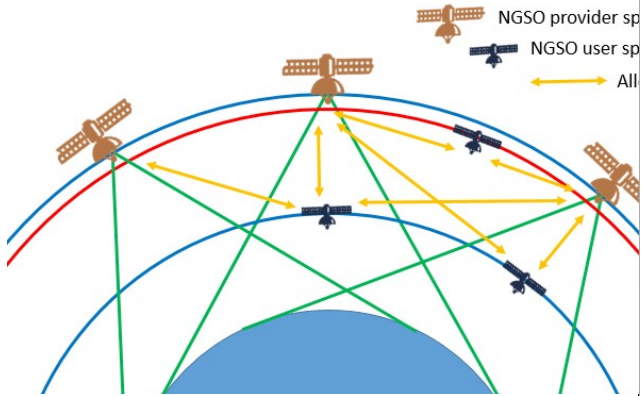


Figure 4.3.1-2
The “expanded-cone” concept of operations



10. Off-axis EIRP values of satellite-to-satellite links

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.

11. 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

Allocation to services		
Region 1	Region 2	Region 3
11.45-11.7 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B (Earth-to-space) 5.484 MOBILE except aeronautical mobile	11.45-11.7 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B MOBILE except aeronautical mobile	
11.7-13.25 GHz		
Allocation to services		
Region 1	Region 2	Region 3
11.7-12.5 FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE 5.492	11.7-12.1 FIXED 5.486 FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.488 Mobile except aeronautical mobile 5.485	11.7-12.2 FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE 5.492
	12.1-12.2 FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.488 5.485 5.489	
	12.2-12.7 FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE 5.492	
	5.487 5.487A	5.487 5.487A
	12.5-12.75 FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B (Earth-to-space) 5.494 5.495 5.496	5.487A 5.488 5.490 12.7-12.75 FIXED FIXED-SATELLITE (Earth-to-space) MOBILE except aeronautical mobile
12.75-13.25	12.5-12.75 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B MOBILE except aeronautical mobile BROADCASTING-SATELLITE 5.493	
FIXED FIXED-SATELLITE (Earth-to-space) 5.441 MOBILE Space research (deep space) (space-to-Earth)		

17.7 - 18.4 GHz		
Allocation to services		
Region 1	Region 2	Region 3
17.7-18.1 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.517A (Earth-to-space) 5.516 MOBILE	17.7-17.8 FIXED FIXED-SATELLITE (space-to-Earth) 5.517 5.517A (Earth-to-space) 5.516 BROADCASTING-SATELLITE Mobile 5.515	17.7-18.1 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.517A (Earth-to-space) 5.516 MOBILE
	17.8-18.1 FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.517A (Earth-to-space) 5.516 MOBILE 5.519	
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		
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		
18.6-18.8 EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.517A 5.522B MOBILE except aeronautical mobile Space research (passive) 5.522A 5.522C	18.6-18.8 EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.516B 5.517A 5.522B MOBILE except aeronautical mobile SPACE RESEARCH (passive) 5.522A	18.6-18.8 EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.517A 5.522B MOBILE except aeronautical mobile Space research (passive) 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		
19.7-20.1 FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A Mobile-satellite (space-to-Earth) 5.524	19.7-20.1 FIXED-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 5.529	19.7-20.1 FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A Mobile-satellite (space-to-Earth) 5.524
20.1-20.2 FIXED-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		
Allocation to services		
Region 1	Region 2	Region 3
24.75-25.25 FIXED FIXED-SATELLITE (Earth-to-space) 5.532B MOBILE except aeronautical mobile 5.338A 5.532AB	24.75-25.25 FIXED 5.532AA FIXED-SATELLITE (Earth-to-space) 5.535 MOBILE except aeronautical mobile 5.338A 5.532AB	24.75-25.25 FIXED FIXED-SATELLITE (Earth-to-space) 5.535 MOBILE 5.338A 5.532AB
25.25-25.5 FIXED 5.534A INTER-SATELLITE 5.536 MOBILE 5.338A 5.532AB Standard frequency and time signal-satellite (Earth-to-space)		
25.5-27 EARTH 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		
27-27.5 FIXED INTER-SATELLITE 5.536 MOBILE 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	
29.5-29.9 FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 Earth exploration-satellite (Earth-to-space) 5.541 Mobile-satellite (Earth-to-space) 5.540 5.542	29.5-29.9 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 5.525 5.526 5.527 5.529 5.540	29.5-29.9 FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 Earth exploration-satellite (Earth-to-space) 5.541 Mobile-satellite (Earth-to-space) 5.540 5.542	
29.9-31 GHz			
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 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		5.539
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		
<u>PART B – Draft AfriSAP</u>			
ITU Region 1 allocations and footnotes	Africa Common Allocation(s) and footnotes	Typical Applications	Additional information

11.45-11.7 GHz FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B (Earth-to-space) 5.484 MOBILE except aeronautical mobile	11.45-11.7 GHz FIXED FIXED-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 GHz FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE 5.492 5.487 5.487A	11.7-12.5 GHz FIXED MOBILE except aeronautical mobile BROADCASTING BROADCASTING-SATELLITE 5.492 5.487 5.487A	Fixed Links Broadcasting satellite systems	This band is available for BSS in accordance with Appendix 30 of ITU RR. Refer to Annex C.
12.5-12.75 GHz FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B (Earth-to-space) 5.494 5.495 5.496	12.5-12.75 GHz FIXED-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 Applications NGSO FSS Fixed links	Article 9.12 applies Res. 155 (WRC - 15) applies
12.75-13.25 GHz FIXED FIXED-SATELLITE (Earth-to-space) 5.441 MOBILE Space research (deep space) (space-to-Earth)	12.75-13.25 GHz FIXED FIXED-SATELLITE (Earth-to-space) 5.441 MOBILE Space 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.497 The band 12.75-13.25 GHz is part of the APP30B Plan (FSS Earth-to-space); refer to Annex C. Article 9.12 applies Res. 172 (WRC-19) applies
17.7-18.1 GHz FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.517A (Earth-to-space) 5.516 MOBILE	17.7-18.1 GHz FIXED FIXED-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 GHz FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B 5.517A (Earth-to-space) 5.520 MOBILE 5.519 5.521	18.1-18.4 GHz FIXED FIXED – SATELLITE (space-to-Earth) 5.484A 5.517A (Earth-to-space) 5.520 MOBILE 5.519	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 GHz FIXED FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B 5.517A MOBILE	18.4-18.6 GHz FIXED FIXED – SATELLITE (space-to-Earth) 5.484A 5.517A MOBILE	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.
18.6-18.8 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) 5.517A 5.522B MOBILE except aeronautical mobile Space research (passive) 5.522A 5.522C	18.6-18.8 GHz EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED – SATELLITE (space-to-Earth) 5.517A 5.522B MOBILE except aeronautical mobile Space 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 GHz FIXED FIXED-SATELLITE (space-to-Earth) 5.516B 5.517A 5.523A MOBILE	18.8-19.3 GHz FIXED FIXED-SATELLITE (space-to-Earth) 5.517A 5.523A MOBILE	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.
19.3-19.7 GHz FIXED FIXED-SATELLITE (space-to-Earth) (Earth-to-space) 5.517A 5.523B 5.523C 5.523D 5.523E MOBILE	19.3-19.7 GHz FIXED FIXED – SATELLITE (space-to-Earth) (Earth-to-space) 5.517A 5.523B 5.523C 5.523D 5.523E MOBILE	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 GHz FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A Mobile-satellite (space-to-Earth) 5.524	19.7-20.1 GHz FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A Mobile-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 GHz FIXED-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	20.1-20.2 GHz FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B 5.527A MOBILE-SATELLITE (space-to-Earth) <u>5.524</u> [AddA16] 5.525 5.526 5.527 5.528	ESIM (under the FSS)	Res.143 applies for HDFS Res 156 (WRC-15) applies for ESIM.
20.2-21.2 GHz FIXED-SATELLITE (space-to-Earth) 5.484A 5.484B 5.516B MOBILE-SATELLITE (space-to-Earth) Standard frequency and time signal-satellite (space-to-Earth) 5.524	20.2-21.2 GHz FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) Standard Frequency and Time Signal-Satellite (space-to-Earth) <u>5.524</u> [AddA16]	Fixed Satellite Systems	
27-27.5 GHz FIXED INTER-SATELLITE 5.536 MOBILE 5.338A 5.532AB	27-27.5 GHz FIXED INTER-SATELLITE 5.536 MOBILE 5.338A 5.532AB	IMT (24.25-27.5 GHz)	Res. 242 (WRC-19) applies
27.5-28.5 GHz FIXED 5.537A FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.517A 5.539 MOBILE 5.538 5.540	27.5-28.5 GHz FIXED <u>5.537A</u> [SpNt2] FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.517A 5.539 MOBILE 5.538 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 links Res 169 (WRC-19) applies for ESIM.

28.5-29.1 GHz 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	28.5-29.1 GHz FIXED FIXED-SATELLITE (Earth-to-space) 5.484A 5.516B 5.523A 5.539 5.517A MOBILE Earth exploration-satellite (Earth-to-space) 5.541 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 links Res 169 (WRC-19) applies for ESIM.
29.1-29.5 GHz 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	29.1-29.5 GHz 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	Fixed links 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 169 (WRC-19) applies for ESIM.
29.5-29.9 GHz FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.527A 5.539 Earth exploration-satellite (Earth-to-space) 5.541 Mobile-satellite (Earth-to-space) 5.540 5.542	29.5-29.9 GHz FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.427A 5.539 5.527A Earth exploration-satellite (Earth-to-space) 5.541 Mobile-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 GHz 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	29.9-30 GHz FIXED-SATELLITE (Earth-to-space) 5.484A 5.484B 5.516B 5.427A 5.539 5.527A 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[AddA14]	ESIM (under the FSS)	Res.143 applies for HDFS. Res 156 (WRC-15) applies for ESIM.

30-31 GHz FIXED-SATELLITE (Earth-to-space) 5.338A MOBILE-SATELLITE (Earth-to-space) Standard frequency and time signal-satellite (space-to-Earth) 5.542	30-31 GHz FIXED-SATELLITE (Earth-to-space) 5.338A MOBILE-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

1. 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.
2. From the result of the studies carried out under AI 1.17 there has been new terms which have been defined such as: User space station, Service provider space station, Cone of coverage of a service provider, within the cone of coverage concept and Expanded-cone concept.
3. *The SWG on WRC-23 AI 1.17 held five meetings at the last WP4A meeting. All documents received from the membership or from other WPs were reviewed and all relevant information contained in these contributions were incorporated in the WD related to WRC-23 AI 1.17*
4. *The main part of the WD contains all information which could be used to develop the draft CPM text including summary of each sharing study with all incumbent services. Annex 1 contains all characteristics and sharing criteria for each incumbent service. Annex 2 and Annex 3 contain all details of each sharing study considering the “within the cone” or “expanded-cone” concept of operation, respectively.*
5. *Several contributions proposing to revise the draft CPM text were received. All relevant information contained in these contributions were incorporated in the WD related to draft CPM text for WRC-23 AI 1.17 (see [Annex 27](#)).*
6. *This document was not reviewed in detail at the meeting and as such there is no agreement on the content of the document by WP 4A. The document will require considerable development and while there is the beginnings of a draft WRC Resolution with the draft CPM text, this Resolution will also require considerable discussion.*
7. *Due to limited time available at this meeting to review the documents related to WRC-23 AI 1.17, the meeting agreed to extend the mandate of the CG#3, created by the first meeting of WP 4A in this study cycle. According to the ToR agreed by the meeting (see [Annex 35](#)), the CG#3 shall mainly focus on the consolidation of the WD related to WRC-23 AI 1.17 and on the draft CPM text*

<i>Part E: Options and Associated Implications</i>

Methods related to “Within the cone of coverage” concept

The frequency band 11.7-12.7 GHz

Method A1W: No changes to the Radio Regulations and suppression of Resolution 773 (WRC-19).

The frequency band 18.1-18.6 GHz and 18.8-20.2 GHz

Method A2W: No changes to the Radio Regulations and suppression of Resolution 773 (WRC-19).

Method B2W: Addition of a new footnote to FSS allocations in RR No. 5 in the frequency ranges 18.1-18.6 GHz and 18.8-20.2 GHz. The footnote will refer to a new WRC Resolution with technical conditions and regulatory provisions for the non-GSO user space stations satellite-to-satellite transmissions. A direct consequence of the New Resolution would be the suppression of Resolution 773 (WRC-19).

The frequency band 27.5-30 GHz

Method A3W: No changes to the Radio Regulations and suppression of Resolution 773 (WRC-19).

Method B3W: Addition of a new footnote to FSS allocations in RR No. 5 in the frequency range 27.5-30 GHz. The footnote will refer to a new WRC Resolution with technical conditions and regulatory provisions for the non-GSO user space stations satellite-to-satellite transmissions. A direct consequence of the New Resolution would be the suppression of Resolution 773 (WRC-19).

Methods related to “Expanded-cone” concept

The frequency band 11.7-12.7 GHz

Method A1E: No changes to the Radio Regulations and suppression of Resolution 773 (WRC-19).

Method B1E: This method proposes to allow the satellite-to-satellite links, with the “expanded cone” concept, with the adequate limits to ensure that sharing and compatibility with relevant services is possible.

The frequency band 18.1-18.6 GHz and 18.8-20.2 GHz

Method A2E: No changes to the Radio Regulations and suppression of Resolution 773 (WRC-19).

Method B2E: This method proposes to allow the satellite-to-satellite links, with the “expanded cone⁴” concept, with the adequate limits to ensure that sharing and compatibility with relevant services is possible.

The frequency band 27.5-30 GHz

Method A3E: No changes to the Radio Regulations and suppression of Resolution 773 (WRC-19).

Method B3E: This method proposes to allow the satellite-to-satellite links, with the “expanded cone⁴” concept, with the adequate limits to ensure that sharing and compatibility with relevant services is possible.

Part F: Proposed EACO Preliminary View and or Position

EACO is invited to;

1. 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.
2. 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).
3. 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 while following up studies on the “expanded cone” concept of operation
4. 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.
 - The 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.

Part G: Recommendations and way forward

1. It is recommended that EACO supports and closely follow ongoing studies on this agenda item at the ITU-R
2. EACO 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:
 - i. impose any restrictions on the GSO and NGSO satellites
 - ii. 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.