East African Communications Organisation

Communications for all in East Africa

EACO 4th WRC-23 Online Preparatory Meeting

28th February 2022

Chapter 4A - South Sudan

Agenda Item 1.16 (N-GSO ESIMs)
Part A: Description
To study and develop technical, operational and regulatory measures, as appropriate, to facilitate the use of the frequency bands 17.7-18.6 GHz and 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space) by non-GSO FSS earth stations in motion, while ensuring due protection of existing services in those frequency bands, in accordance with Resolution **173 (WRC-19)**;
Part B: Key Elements – the notables
Resolution **173 (WRC-19):** Use of the frequency bands 17.7-18.6 GHz and 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space) by earth stations in motion communicating with non-geostationary space stations in the fixed-satellite service. 1. The purpose of using ESIM communicating with FSS networks in these frequency bands is to serve the growing need for access to broadband connectivity and the need for mobile satellite communication. 2. There are a number of NGSO systems operating or planned to operate in these frequency bands in addition there is growing need for access to broadband connectivity and the need for mobile satellite communication. 3. It is also important to note that some manufacturers of ESIM terminals are developing products that are designed to communicate with both non-GSO and GSO satellites, due to the similarity of their requirements and for reasons of economies of scale. 4. Resolution 173 (WRC-19) resolves to invite ITU-R: i. to study the technical and operational characteristics and user requirements of the different types of earth stations in motion that plan to operate within non-GSO FSS systems in the frequency bands 17.7-18.6 GHz and 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space), or parts thereof; ii. to study sharing and compatibility between earth stations in motion operating with non-

GSO FSS systems and current and planned stations of primary services allocated in the frequency bands 17.7-18.6 GHz and 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space), or parts thereof, to ensure protection of, and not impose additional constraints on, GSO systems and other services, including terrestrial services, in those frequency bands and in adjacent bands, including passive services;

iii. to develop the technical and regulatory provisions for the operation of aeronautical and maritime earth stations in motion with non-GSO FSS systems, taking into account the results of studies under resolves to invite ITU-R 1 and 2;

iv. to ensure that the technical and operational measures and the possible regulatory changes established in accordance with this Resolution shall not affect the relevant provisions related to the protection of GSO networks from non-GSO FSS systems;

5. Operations of ESIMs communicating with GSO space stations in the fixed-satellite service was already addressed in Resolution 156 (WRC-15) for operations with GSO space stations in the 19.7-20.2 GHz and 29.5-30.0 GHz frequency bands and in Resolution 169 (WRC-19) for operations with GSO space stations in the 17.7-19.7 GHz and 27.5-29.5 GHz frequency bands.

6. There are existing regulatory and technical procedures between GSO FSS and NGSO FSS networks apply in the segments of the frequency bands; 17.8-18.6 GHz, 19.7-20.2 GHz, 27.5-28.6 GHz, 29.5-30 GHz which impose EPFD limitation on NGSO FSS space station to protect GSO FSS network.

7. There is no specific regulatory procedure for the coordination of ESIM relative to terrestrial stations for these services in these frequency bands and no methodology on how to protect GSO FSS space stations from ESIMs communicating with non-GSO FSS systems;

8. There is no established and agreed interference management procedure to address the potential interference arising from the use of ESIMs communicating with non-GSO FSS systems referred to in this Resolution, and the responsibility of the entities involved in this operation is not defined;

9. An earlier liaison statement from WP 7C indicated that the introduction of aeronautical and maritime ESIM with NGSO FSS in Ka-band will lead to an increase of the number of FSS beams covering the oceans compared to the current situation. This may in turn lead to an increase in interference to EESS (passive) in the band 18.6-18.8 GHz due to scattering over the oceans of FSS unwanted emissions.

10. *The WP4A SWG dealing with WRC-23 AI 1.16 met four times and considered the fifteen documents attributed to the group and came up with the following way forward to progress the work under this agenda item was so agreed:*

   i. *Establishment of a CG, for which the SWG drafted applicable ToR* (see Annex 33).
   ii. *Produced a document titled "Working document on WRC-23 agenda item 1.16 [NON GSO_ESIM]"* (see Annex 16) *which is the result of the compilation of the relevant parts of the input contributions submitted to this meeting with those parts submitted to previous meetings.*

   iii. *Developed a working document towards draft CPM text and draft new Resolution for WRC 23 agenda item 1.16",* (see Annex 26) *containing draft CPM text to be used for this agenda item including a draft new Resolution that may be considered to address the issues studied under WRC-23 agenda item 1.16.*

11. *However, the draft CPM text and draft new Resolution need careful review, consolidating compatible proposals and identifying options on those topics where consensus does not seem to be achieved at this time.*

Part C: Status of the Bands under consideration

PART A – Article 5 of the Radio Regulations

Frequency range (GHz)	ESIM direction of transmission	Service Allocation		Existing provisions in the RR relevant to sharing between non-GSO FSS and other allocated services
		Terrestrial Services	Space Services	
17.7-17.8	space-to-Earth	FIXED		Article **21**
		MOBILE		Article **21**
			GSO FSS (space-to-Earth)	Article **22**, No. **22.2**
			GSO FSS (Earth-to-space)	Article **22**, No. **22.2**
			BSS	Article **22**, No. **22.2**
			Non-GSO FSS (space-to-Earth)	**9.12**
17.8-18.4	space-to-Earth	FIXED		Article **21**
		MOBILE		Article **21**
			GSO FSS (space-to-Earth)	Article **22** (epfd↓ Table **22-1B**)
			GSO FSS (Earth-to-	Article **22** ($epfd_{is}$ Table **22-**

			space)	**3**)
			Non-GSO FSS (space-to-Earth)	**9.12**
			Meteorological satellite service	**5.519**
18.4-18.6	space-to-Earth	FIXED		Article **21**
		MOBILE		Article **21**
			GSO FSS (space-to-Earth)	Article **22** (epfd↓ Table **22-1B**)
			Non-GSO FSS (space-to-Earth)	9.12
18.6-18.8			EESS (passive) SRS (passive)	**5.522B**, **21.16.2**
18.8-19.3	space-to-Earth	FIXED		Article **21**
		MOBILE		Article **21**
			GSO FSS (space-to-Earth)	**9.12A**
			Non-GSO FSS (space-to-Earth)	**9.12**
19.7-20.2	space-to-Earth		GSO FSS (space-to-Earth)	Article **22** (epfd↓ TABLE 22-1C)
			Non-GSO FSS (space-to-Earth)	**9.12**
			MSS	
27.5-28.5	Earth-to-space	FIXED		
		MOBILE		
			GSO FSS (Earth-to-space)	Article **22** (epfd↑, Table **22-2**)
			Non-GSO FSS (Earth-to-space)	**9.12**
28.5-28.6	Earth-to-space	FIXED		
		MOBILE		
			GSO FSS (Earth-to-space)	Article **22** (epfd↑, Table **22-2**)
			Non-GSO FSS (Earth-to-space)	**9.12**
			Earth exploration-satellite service	
28.6-29.1	Earth-to-space	FIXED		
		MOBILE		
			GSO FSS (Earth-to-space)	**9.12A**
			Non-GSO FSS (Earth-	**9.12**

			to-space)	
			Earth exploration-satellite service	
29.5-30	Earth-to-space		GSO FSS (Earth-to-space)	Article **22** (epfd↑, Table **22-2**)
			Non-GSO FSS (Earth-to-space)	**9.12**
			Earth exploration-satellite service	
			MSS	

PART B – Draft AfriSAP

ITU Region 1 allocations and footnotes	Africa Common Allocation(s) and footnotes	Typical Applications	Additional information

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 **5.517A** (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.
18.8-19.3 GHz FIXED FIXED-SATELLITE (space-to-Earth) 5.516B 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.
19.7-20.1 GHz FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B 5.527A Mobile-satellite (space-to-Earth) 5.524	**19.7-20.1 GHz** FIXED-SATELLITE (space-to-Earth) 5.484A 5.516B 5.527A Mobile-satellite (space-to-Earth) 5.524**[AddA16]**	ESIM (under the FSS)	**Res.143 applies for HDFFS** Res 156 (WRC-15) applies for ESIM.
20.1-20.2 GHz FIXED-SATELLITE (space-to-Earth) 5.484A 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 5.516B 5.527A **MOBILE-SATELLITE (space-to-Earth)** **5.524[AddA16] 5.525 5.526 5.527 5.528**	ESIM (under the FSS)	**Res.143 applies for HDFFS** Res 156 (WRC-15) applies for ESIM.
27.5-28.5 GHz FIXED 5.537A	**27.5-28.5 GHz** **FIXED 5.537A[SpNt2]**	**Fixed links – 28 GHz (27.5-29.5**	**Channelling plan in accordance**

Part D: Conclusions of the Results of Studies if any

F. Some of the key elements for the studies include:

i. User requirements of the different types of NGSO ESIMs.

ii. Technical and operational requirements of ESIMs operating with NGSO FSS space stations.

iii. Sharing with terrestrial services (fixed and mobile services).

iv. Sharing with space services.

2. Major Regulatory difference between NGSO and GSO is that NGSO FSS systems are subject to No. 22.2 where applicable and must protect GSO space stations.

3. NGSO FSS employs GSO exclusion angles for Zones where NGSO cannot transmit if they are within a certain geometric configuration in relation to the GSO arc.

4. *The following were some of the notables from the preliminary results of studies at the last WP4A Meeting:*

i. A number of studies have been carried out to estimate the conditions under which terrestrial services (FS and MS) could be protected from the permissible interference caused by aeronautical and maritime ESIMs. For the former, all studies propose the adoption of pre-determined pfd limits on the ground, while for the latter they propose a minimum distance from the coastline along with a maximum rise in spectral density towards the horizon as relevant measures to be included in a WRC Resolution. This issue requires more work and analysis by WP 4A.

ii. A number of studies have been carried out to identify whether limits to OOB emissions from satellite transmitters in bands adjacent to the 18.6-18.8 GHz band are needed to protect the EESS (passive) operating in that band. Some studies conclude that such limitations are not needed while other studies conclude that they are. This issue requires more work and analysis by WP 4A.

iii. There seems to be a convergence on the fact that some guidance could be offered to administrations wanting to operate non-GSO ESIM on how to protect secondary terrestrial services operating in the 29.5-30.0 GHz in the territories of those administrations mentioned in RR No. 5.542.

Part E: Options and Associated Implications

Method A: No changes to the Radio Regulations and suppression of Resolution 175 (WRC-19).

Method B: Add a new footnote in RR Article 5 that refers to a new WRC Resolution with

technical, operational and regulatory conditions for the operation of maritime and aeronautical ESIMs while ensuring protection of allocated services and consequential suppression of Resolution 173 (WRC-19).

Additional methods may be developed in the future subject to outcome of studies.

Part F: Proposed EACO Preliminary View and or Position

EACO is invited to support studies towards development of regulatory framework for the use of the frequency bands 17.7-18.6 GHz and 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space) by non-GSO FSS earth stations in motion while ensuring the following:

1. Protection of the incumbent services in the concerned frequency bands and in adjacent bands.

2. No additional restrictions are imposed on earth stations of GSO FSS operating in the same band and in adjacent bands and other services, including terrestrial services, in those frequency bands and in adjacent bands, including passive services.

3. Non-GSO ESIM operating in the frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz and 19.7-20.2 GHz (see No 5.524) shall not claim protection from terrestrial services to which the frequency band is allocated and operating in accordance with the Radio Regulations

4. for the protection of space services, non-GSO ESIM characteristics shall remain within the envelope characteristics of typical earth stations associated with the non-GSO satellite system with which these ESIM communicate.

5. For the protection of GSO FSS networks operating in the 17.8-18.6 GHz, 19.7-20.2 GHz, 27.5-28.6 GHz and 29.5-30.0 GHz, the relevant EPFD limits in Nos. 22.5C, 22.5D and 22.5F shall apply.

6. ESIMs have the capability to restrict operations to territories of those administrations where authorization for such operations has been granted.

Part G: Recommendations and way forward

1. Follow-up the studies under this agenda item and to ensure the protection of incumbent services in the frequency bands and adjacent band services.

2. Support that Appropriate examination methods for any measures to be taken by the Bureau for non-GSO ESIM to comply with resolutions dealing with this Agenda Item should be established in order to ensure the protection of terrestrial services and space services once the result of ITU-R studies is available.

3. EACO member states are encouraged to actively participate at the Working group meetings and contribute to studies on this agenda item to ensure all the pertinent aspects that are critical for the continent are taken into consideration and a satisfactory final position is achieved on this agenda item.

Part G: Other Regional Groups and International

Organisations Preliminary Views or Positions

APT:

- APT members are encouraged to follow the relevant WP4A meetings and submit contributions if necessary for consideration at the next APG meeting.

ASMG:

- Follow and support the studies to ensure that necessary protection is provided for terrestrial services in those frequency bands and adjacent bands
- Ensure that no additional restrictions are imposed on earth stations of GSO FSS operating in the same band since there is no regularity provisions in the Radio regulations in these bands to protect the GSO from NGSO.
- The necessary regulatory procedures including the technical and operational procedures to ensure the protection the existing services in these band.

CEPT:

- Support the development of a regulatory framework for the operation of ESIM communicating with non-GSO satellite system in the FSS in the frequency bands 17.7-18.6GHz, 18.8-19.3GHz and 19.7-20.2GHz (space-to-Earth) and 27.5-29.1GHz and 29.5-30GHz (Earth-to-space). The technical and operational requirement for the use of non-GSO ESIM shall ensure the protection of GSO systems and other services operation in the same frequency bands and in adjacent bands.

- Is of the view that non-GSO ESIM operation in the frequency bands 17.7-18.6GHz and 18.8-19.3GHz(space-to-Earth) shall not claim protection from terrestrial services having allocations in the same frequency bands and operating in accordance with the Radio Regulations.

- Is of the view that the protection of GSO networks in the fixed-satellite service operating in the frequency bands 27.5-28.6GHz and 29.5-30GHz from non-GSO ESIM can be achieved by complying with EPFD limits referred to in No.**22.5D**. The protection of GSO networks and non-GSO systems in the FSS operating in the frequency band 28.6-29.1GHz shall be achieved on the basis of coordination agreement between administrations and operators in accordance with No.**9.11A**.

CITEL:

- Some administrations support studies on the technical and operational characteristics of ESIMs and sharing and compatibility studies to develop technical and regulatory provisions for the operation of ESIM with non-GSO FSS systems in accordance with Resolution 173 (WRC-19) with a view to ensuring the protection of and not impose additional constraints on existing services, including terrestrial services and GSO FSS, in those frequency bands and in adjacent bands, including passive services.

- An administration is of the view that the studies that were conducted in preparation of WRC-15 and WRC-19 to support the deployment of GSO ESIM in the Ka-band and that led to the provisions included in Resolution 156(WRC-15) and Resolution 169(WRC-19), respectively, have many similarities with those that are being carried out under Resolution 173(WRC-19). Therefore, this administration believes that WRC-23 should aim to establish for non-GSO ESIM the same technical, operational and regulatory provisions as those applicable to GSO ESIM operation in the same bands, to the extent possible and pending the results of the studies.

RCC

The RCC Administrations are considering the following requirement for non-GSO FSS ESIMs in the bands

17.7-18.6/18.8-19.3/19.7-20.2GHz (s-to-E) and 27.5-29.1/29.5-30 GHz (E-t-s):

- In the bands 17.7-18.6/18.8-19.3/19.7-20.2GHz (s-to-E) non-GSO ESIMs shall not claim protection from terrestrial services operation in accordance with the RR.
- RR provisions for protection of GSO network from non-GSO FSS shall not be affected;
- ESIMs should operate within the envelope of typical ES's published in the BR IFIC;
- ESIMs should not be used for safety-of –life applications;

Measures to exclude unauthorized use of ESIMs in the territory of States that have not granted relevant authorizations are needed.