Information & Communication Technologies Authority

Consultation Ref: ICTA/01/19

CONSULTATION PAPER ON PREPARATIONS FOR THE WORLD RADIOCOMMUNICATION CONFERENCE 2019 (WRC-19)

8 August 2019

Explanatory memorandum

Considering that:

1) the ICT Authority has as one of its functions, under section 18(*p*) of the Information and Communication Technologies Act 2001, to *"allocate frequencies and manage, review, and, where appropriate, reorganise the frequency spectrum"*;
2) the ICT Authority has as one of its objects, under section 16(*g*) of the Information and Communication Technologies Act 2001, to "*further the advancement of technology, research and development relating to information and communication technologies through modern and effective infrastructure taking into account the convergence of information technology, media, telecommunications, and consumer electronics*";
3) The World Radiocommunication Conference 2019 (WRC-19) will be held in Sharm el-Sheikh, Egypt between 28 October to 22 November 2019 in accordance with ITU Council Resolution 1380 (Modified 2017);
4) The WRC-19 will be preceded by the Radiocommunicaton Assembly from 21 to 25 October 2019;
5) The WRC-19 agenda items which are considered of high relevance for Mauritius have been identified by the ICT Authority and are presented in this paper;
6) The Authority is participating in the different preparatory meetings being held at the level of the SADC, Commonwealth, ATU and ITU in view of finalizing the positions of Mauritius and arriving at common positions as far as possible.

The Information and Communication Technologies Authority resolves to:

1) make available for public consultation the Consultation Document Ref: ICTA/01/19;
2) Make available the preliminary positions of Mauritius with respect to selected agenda items which are considered as most relevant to our country;
3) Make available the preliminary SADC positions, as supported by Mauritius, on all WRC-19 Agenda items (Annex 1);
4) invite views, contributions, and comments on the Consultation Document.

GUIDELINES ON RESPONDING TO THIS CONSULTATION

G.1 All comments are welcomed; however it would make the task of analyzing responses easier if comments were referenced to the relevant question numbers from this document.

G.2 You are invited to send your written views and comments on the issues raised in this document to the **Executive Director, ICT Authority, 12th Floor The Celicourt, Celicourt Antelme Street, Port Louis**, or by email to icta@intnet.mu, at latest by 16h00 on 8 September 2019.

G.3 Should you be including confidential information as part of your responses, you are requested to clearly identify the said confidential materials and to place same in a separate annex to your response.

1. Background

The World Radiocommunication Conference (WRC) is a conference held every three to four years with the mandate to review and, if necessary, revise the Radio Regulations.

The Radio Regulations is the international treaty governing the use of the radio frequency spectrum and geostationary-satellite and non-geostationary satellite orbits. The Revisions are made on the basis of an agenda determined by the ITU Council taking into account the recommendations made by previous WRCs.

The second session of the CPM was convened between 18 February 2019 and 28 February 2019 in Geneva, Switzerland for the purpose of preparing the report for the WRC-19. The terms of reference of the CPM includes updating, rationalisation, presentation and discussion of material from Radiocommunication Study Groups, together with consideration of new material submitted to it, including contributions on the review of existing WRC Resolutions, Recommendations and contributions, if available, by Member States with contributions concerning the Agenda for the next and subsequent WRCs.

The report of the CPM to WRC-19 may be downloaded at https://www.itu.int/en/ITU-R/study-groups/rcpm/Pages/cpm-19.aspx.

2. Agenda Items identified as highly relevant for Mauritius

The agenda items for the WRC-19 are divided into six chapters as follows:-

- Chapter 1 – Land Mobile and fixed services
- Chapter 2 – Broadband applications in the mobile service
- Chapter 3 – Satellite services
- Chapter 4 – Science services
- Chapter 5 – Maritime, aeronautical and amateur services
- Chapter 6 – General issues

Out of the 37 agenda items for WRC-19, the following, have been found as being highly relevant for Mauritius:-

Chapter	Agenda item	Description
1	1.11	to take necessary actions, as appropriate, to facilitate global or regional harmonized frequency bands to support railway radiocommunication systems between train and trackside within

		existing mobile service allocations, in accordance with Resolution 236 (WRC-15);
	1.12	to consider possible global or regional harmonized frequency bands, to the maximum extent possible, for the implementation of evolving Intelligent Transport Systems (ITS) under existing mobile-service allocations, in accordance with Resolution 237 (WRC-15)
2	1.13	to consider identification of frequency bands for the future development of International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution 238 (WRC-15);
	1.16	to consider issues related to wireless access systems, including radio local area networks (WAS/RLAN), in the frequency bands between 5 150 MHz and 5 925 MHz, and take the appropriate regulatory actions, including additional spectrum allocations to the mobile service, in accordance with Resolution 239 (WRC-15);
	9.1.1	Res. 212 (Rev.WRC-15) − Implementation of International Mobile Telecommunications in the frequency bands 1 885-2 025 MHz and 2 110-2 200 MHz
	9.1.8	Issue 3) in the Annex to Resolution 958 (WRC-15) − Urgent studies required in preparation for the 2019 World Radiocommunication Conference 3) Studiesonthetechnicalandoperationalaspectsofradionetworksandsystems,aswell as spectrum needed, including possible harmonized use of spectrum to support the implementation of narrowband and broadband machine-type communication infrastructures, in order to develop Recommendations, Reports and/or Handbooks, as appropriate, and to take appropriate actions within the ITU Radiocommunication Sector (ITU-R) scope of work.
3	1.4	to consider the results of studies in accordance with Resolution 557 (WRC-15), and review, and revise if necessary, the limitations mentioned in Annex 7 to Appendix 30 (Rev.WRC-15), while ensuring the protection of, and without imposing additional constraints on, assignments in the Plan and the List and the future development of the broadcasting-satellite service within the Plan, and existing and planned fixed-satellite service networks; Resolution 557 (WRC-15) – Consideration of possible revision of Annex 7 to Appendix 30 of the Radio Regulations.
5	1.1	to consider an allocation of the frequency band 50-54 MHz to the amateur service in Region 1, in accordance with Resolution 658 (WRC-15);
	1.8	to consider possible regulatory actions to support Global Maritime Distress Safety Systems (GMDSS) modernization and to support the introduction of additional satellite systems into the GMDSS, in accordance with Resolution 359 (Rev.WRC-15);
	1.9.1	regulatory actions within the frequency band 156-162.05 MHz for autonomous maritime radio devices to protect the GMDSS and

		automatic identifications system (AIS), in accordance with Resolution 362 (WRC-15);
	1.9.2	modifications of the Radio Regulations, including new spectrum allocations to the maritime mobile-satellite service (Earth-to-space and space-to-Earth), preferably within the frequency bands 156.0125-157.4375 MHz and 160.6125-162.0375 MHz of Appendix 18, to enable a new VHF data exchange system (VDES) satellite component, while ensuring that this component will not degrade the current terrestrial VDES components, applications specific messages (ASM) and AIS operations and not impose any additional constraints on existing services in these and adjacent frequency bands as stated in recognizing d) and e) of Resolution 360 (Rev.WRC-15);
	1.10	to consider spectrum needs and regulatory provisions for the introduction and use of the Global Aeronautical Distress and Safety System (GADSS), in accordance with Resolution 426 (WRC-15);
6	9.1.7	Urgent studies required in preparation for the 2019 World Radiocommunication Conference 2) Studies to examine: a) whether there is a need for possible additional measures in order to limit uplink transmissions of terminals to those authorized terminals in accordance with No. 18.1; b) the possible methods that will assist administrations in managing the unauthorized operation of earth station terminals deployed within its territory, as a tool to guide their national spectrum management programme, in accordance with Resolution ITU-R 64 (RA-15).

Question 1: Do you agree that the identified agenda items are the most relevant for Mauritius? Do you wish to suggest any other agenda item which you believe should be followed? Please provide justification for your views.

2.1 Agenda item 1.11:- *to take necessary actions, as appropriate, to facilitate global or regional harmonized frequency bands to support railway radiocommunication systems between train and trackside within existing mobile service allocations, in accordance with Resolution 236 (WRC-15)*

2.1.1 Summary of issues (Source: CPM Report)

Resolution 236 (WRC-15) invites WRC-19, based on the results of ITU-R studies, to take necessary actions, as appropriate, to facilitate global or regional harmonized frequency bands, to the extent possible, for the implementation of railway radiocommunication systems between train and trackside (RSTT), within existing mobile service allocations.

To address this agenda item, ITU-R has undertaken studies towards the development of two ITU-R Reports and one Recommendation (see section 1/1.11/3 of the CPM report).

Three methods have been proposed to satisfy this agenda item:

–Method A: No change to the RR except suppression of Resolution 236 (WRC15);

–Method B: Add a new Resolution [A111-METHOD B] (WRC-19) specifying frequency ranges for RSTT and referencing the most recent version of Recommendation ITU-R M.[RSTT_FRQ] and consequently suppress the Resolution 236 (WRC-15);

–Method C: Add a new Resolution [B111-METHOD C] (WRC-19) without specifying frequency ranges for RSTT, while referencing the most recent version of Recommendation ITU-R M.[RSTT_FRQ] and consequently suppress the Resolution 236 (WRC-15).

2.1.2 Relevance to Mauritius

This agenda item in relevant to Mauritius as the country is reintroducing railways after their closure in 1964. Nowadays, trains are heavily dependent on railway radiocommunication systems. The system chosen for Mauritius is TETRA based and operates in the 400 MHz frequency band. Currently a number of frequency bands are used around the world for railway communication systems. In Europe for example GSM-R (Global System for Mobile Communications – Rail) systems are used. Global harmonisation has the benefit of reducing manufacturing cost of these systems. Where harmonised frequency bands for railway radiocommunications within the existing mobile service allocation are specified, we have to make sure that the frequency band chosen for rail communication in Mauritius is included as part of the harmonised bands. This will in turn ensure that systems in this frequency band continue to be manufactured, maintained and improved.

2.1.3 Preliminary Position

Method C is advocated. It is considered that specific identification of RSTT frequencies is the Radio Regulations is unnecessary. Referencing the Recommendation ITU-R M.[RSTT_FRQ] where the frequencies are specified is considered to be sufficient.

Question 2: Do you agree that the Preliminary positions for the agenda item summarized in this section? If you do not agree, please provide justification for your views.

2.2 Agenda item 1.12:- *to consider possible global or regional harmonized frequency bands, to the maximum extent possible, for the implementation of evolving Intelligent Transport Systems (ITS) under existing mobile-service allocations, in accordance with Resolution 237 (WRC-15)*

2.2.1 Summary of issues (Source: CPM Report)

There is a need to consider harmonization of frequency bands for the implementation of evolving Intelligent Transport Systems (ITS).

Evolving ITS are being deployed to assist safe driving and to support transportation system efficiency and environmental sustainability. It is recognized that the frequency bands within existing mobile service allocations being used by evolving ITS may also be utilized by other applications and services.

Several ITU-R Reports and Recommendations have been developed in support of this agenda item.

ITU-R studies indicated that some administrations in each of the three Regions have designated the frequency band of 5 850-5 925 MHz, or parts thereof, for the deployment of evolving ITS. Recommendation ITUR M.2121 recommends that several frequency bands within each Region, in whole or in part, be used for current and future ITS applications.
Three methods have been proposed to satisfy this agenda item:

−Method A: No change to the Radio Regulations because ITS continue to operate within existing mobile service allocations and the required harmonization of frequencies for ITS can be achieved through ITUR Recommendations and Reports.

−Method B: No change to the Table of Frequency Allocations in the Radio Regulations, and add a new WRC Resolution to encourage administrations to use 5 850-5 925 MHz, or parts thereof, as global harmonized evolving ITS frequency bands. Other harmonized frequency band(s) for evolving ITS applications refer to the most recent version of Recommendation ITUR M.2121.

−Method C: No change to the Table of Frequency Allocations in the Radio Regulations, and add a new WRC Resolution to encourage administrations to use globally and regionally harmonized frequency bands for evolving ITS applications by referring to the most recent version of Recommendation ITU-R M.2121.

For all Methods, Resolution 237 (WRC-15) should be suppressed.

2.2.2 Relevance to Mauritius

Intelligent Transport Systems are developing rapidly and being deployed in a number of countries with the aim of improving the efficiency of transport in a number of situations including automatic incident detection and traffic management. It is expected that these systems will be increasingly adopted in Mauritius especially given the efforts being made by the authorities to improve on road safety and reduction of road accidents. Under the European harmonisation framework, frequency bands 5855 – 5925 MHz and 63 – 64 GHz have been designated for ITS.

2.2.3 Preliminary Position

Either Method A or Method C as a second option. As for Agenda item 1.11, it is believed that it is not necessary to have specific ITS frequency band(s) identified in the Radio Regulations. Harmonisation for ITS may be achieved through the development of non-mandatory ITU-R Recommendations.

Question 3: Do you agree that the Preliminary positions for the agenda item summarized in this section? If you do not agree, please provide justification for your views.

2.3 Agenda item 1.13:- *to consider identification of frequency bands for the future development of International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution 238 (WRC-15)*

2.3.1 Summary of issues (Source: CPM Report)

IMT systems are now being evolved to provide diverse usage scenarios and applications such as enhanced mobile broadband (eMBB), massive machine-type communications (mMTC) and ultra-reliable and low-latency communications (URLLC) requiring larger contiguous blocks of spectrum than currently available as described in Recommendation ITU-R M.2083.

It is important to note that the properties of higher frequency bands, such as shorter wavelength, would better enable the use of advanced antenna systems, including multiple-input and multiple-output (MIMO) and beam-forming techniques in supporting eMBB.

Resolution 238 (WRC-15) calls for studies to determine the spectrum needs for the terrestrial component of IMT in the frequency range between 24.25 GHz and 86 GHz, as well as sharing and compatibility studies, taking into account the protection of services to which the frequency band is allocated on a primary basis, for the frequency bands:

– 24.25-27.5 GHz, 37-40.5 GHz, 42.5-43.5 GHz, 45.5-47 GHz, 47.2-50.2 GHz, 50.4-52.6 GHz, 66-76 GHz and 81-86 GHz, which have allocations to the mobile service on a primary basis; and

– 31.8-33.4 GHz, 40.5-42.5 GHz and 47-47.2 GHz, which may require additional allocations to the mobile service on a primary basis.

2.3.2 Relevance to Mauritius

This agenda item, which is expected to be the most followed item for this conference, is of prime importance for Mauritius as well as for all ITU Member States. The importance is two-fold, firstly, this agenda item is paving the way for the fifth generation of mobile networks. Secondly several of the proposed bands under this agenda item are already allocated to services, including Earth Exploration Satellite Service (EESS). These services may be adversely impacted by the operation of mobile service in these frequency bands. EESS plays a vital role in collecting environmental information for weather forecasting and monitoring, severe

weather and disasters as well as climate change. This information is of great importance for island economies such as Mauritius. Hence, while formulating our position for this agenda item, we have to ensure that adequate spectrum is made available for the deployment of 5G while at the same time ensuring that vital services are not affected.

2.3.3 Preliminary Positions

Table 1 below summarises the issues for each frequency band under consideration under this agenda item, provides the preliminary positions of Mauritius (in line with SADC positions) as well as the changes if any which have been brought to the methods after CPM-2.

Item	Agenda 1.13 Frequency Bands	Summary of issues	Preliminary Position Mauritius
A	24.25 - 27.5 GHz	EESS and IMT compatible (spatial separation required). Required separation distance with SRS earth stations are quite significant (23.8-92 km) low feasibility. RAS and IMT, separation distance 17-22.5 km in suburban environment and 30 to 52 km in urban. FSS (space station receive) and IMT feasible. FSS (Earth Station) to IMT (receive) require a separation distance bet 100m to 10km. ISS (space station and IMT feasible but may require eirp mask definition. EESS (Passive) in adjacent band is a major issue. (See Res. 750). To decide on the level of unwanted emissions to protect EESS (passive). FS and IMT compatible.	Method A2 Atl2 -SADC supports Method A2, Alternative 2, Condition A2a (protection measures for the EESS (pas) in the 23.6-24 GHz frequency band): Option 1, with the following power limits: BS: -32 dBW/200 MHz UE: -28 dBW/200 MHz For the other services, Mauritius supports no additional conditions: o Condition A2b: EESS(pas) in the 50.2-50.4 GHz and 52.6-54.25 GHz frequency bands: Option 3 o Condition A2c: earth stations in the SRS/EESS in the 25.5 – 27 GHz band: Option 5 o Condition A2d: transmitting earth stations in the FSS (Earth-to-space) at known locations: Option 4 o Condition A2e: ISS and FSS (Earth-to-space) receiving space stations: Option 9 o Condition A2f: Radio Astronomy: Option 3 o Condition A2g: Protection of Multiple services: Option 5
B	31.8 - 33.4 GHz	Compatibility between IMT and RNS not feasible. Compatibility between SRS (deep space)(space-to-Earth) and IMT is feasible. EESS (passive) in adjacent band and IMT appears complicated. RAS in adjacent and IMT is complicated.	NOC (Method B1)
C	37 - 40.5 GHz and 40.5 - 42.5 GHz	FSS/BSS/MSS (SE) and IMT is not feasible. SRS and IMT, Studies do not give conclusive results. EESS (Passive) in adjacent band is a major issue. FS and IMT is feasible. RAS and IMT is feasible.	Method C2 alt2 (37 - 40.5 GHz) identify the band for IMT without additional conditions and Method D2 alt2 (40.5 - 42.5 GHz)(i.e. upgrade MS allocation from secondary to primary with no conditions

E	42.5 - 43.5 GHz	IMT and GSO FSS space station (receive) feasible. IMT and non-GSO FSS space station (receive), may result in interference. FSS earth station to IMT (receive) - sharing may or may not be feasible and could be dealt with on a case-by-case basis. FS and IMT feasible. RAS and IMT, feasible with separation dist.	Method E2 alt2, No additional conditions
F	45.5 - 47 GHz	no studies performed in ITU-R	Method F4, Alt 2 *(identification of the frequency band for the terrestrial component of IMT and removing the band from 5.553)*
G	47 - 47.2 GHz	no studies performed in ITU-R	Method G3, Alt 2 *(allocate the band to the MS (except aeronautical mobile) and identify the band for the terrestrial component of IMT)*
H	47.2 - 50.2 GHz	FSS (Earth-to-space) and IMT, interference may occur in certain circumstances requiring mitigation techniques to be implemented. For cases of FSS ES interfering into IMT a separation distance between 160 m and 5000 m is required. FSS/BSS/MSS (space to Earth) and IMT not feasible. EESS (passive) and IMT, there are compatibility issues.	Method H2, Alt 2: identification of the frequency band 47.2 – 50.2 GHz for terrestrial component of IMT. Condition H2a: Option 2 for protection of EESS(passive) in the 50.2 – 50.4 GHz band and introduction of mandatory limits on unwanted emissions (Table 1-1 of Res. 750) taking into account 5.340.1. The following protection values are supported: -32 dB (W/200 MHz) for BS -28 dB (W/200 MHz) for UE For the other services, Mauritius supports no additional conditions.
I	50.4 - 52.6 GHz	FSS (Earth-to-Space) and IMT, separation distances required for compatibility. EESS (Passive) in adjacent band is a major issue.	Method I2, Alt 2: identification of the frequency band 50.4 – 52.6 GHz the terrestrial component of IMT with no restriction to Land Mobile Service. Condition I2a: Option 2: unwanted emissions to protect EESS (passive) to be confirmed for the band 52.6 – 54.25 GHz noting 5.340.1 and the unwanted emission values stipulated for band H. For other services, Mauritius supports no additional conditions.
J	66 - 71 GHz	IMT and ISS feasible without additional technical or regulatory constraints. MSS (earth-to-space) and IMT. No protection criteria for MSS was available. Interference levels from IMT ranged between -347 dB(W/MHz) to -179 dB(W/MHz)	Method J2 Alt2: identification of the frequency band for terrestrial component of IMT with no restrictions to Land Mobile Service. The following conditions are supported by Mauritius: Condition J2a-opt 1 for including coexistence techniques between IMT and Multi Gigabit Wireless Systems (MGWS) and other wireless access systems (WAS) and inviting ITU-R to develop necessary reports/ recommendations, Condition J2b (View 1) where studies contributed to CPM19-2 clearly indicate that no conditions are necessary to protect MSS in the band 66-71 GHz and Condition J2c: Option 3 indicating that no conditions are necessary for protection of multiple services.

K	71 - 76 GHz	IMT and FS, separation distance (720m) required to ensure protection criteria are met. Sharing is feasible. IMT and RLS, protection of automotive radars required. Maximum unwanted emission levels have been defined for the IMT BS and MS by study A. IMT to FSS Earth Stations showed requirement for separation distance of 250m around FSS earth station	NOC (Method K1)
L	81 - 86 GHz	IMT and EESS (passive) is an issue requiring definition of levels of unwanted emission to protect EESS (passive). FS, feasible with separation distance. RAS(in-band) feasible with separation distance. RAS (adjacent band), feasible with separation distance. IMT and RLS, protection of automotive radars required. Maximum unwanted emission levels have been defined for the IMT BS and MS by study A. IMT to FSS Earth Stations showed requirement for separation distance of 250m around FSS earth station	NOC (Method L1)

Question 4: Do you agree that the Preliminary positions for the agenda item summarized in this section? If you do not agree, please provide justification for your views.

2.4 Agenda item 1.16:- *to consider issues related to wireless access systems, including radio local area networks (WAS/RLAN), in the frequency bands between 5 150 MHz and 5 925 MHz, and take the appropriate regulatory actions, including additional spectrum allocations to the mobile service, in accordance with Resolution 239 (WRC-15)*

2.4.1 Summary of issues (Source: CPM Report)

RLANs have proven to be a success in conjunction with other fixed and mobile networks at providing affordable and ubiquitous broadband wireless access to the Internet. Introduced by some administrations in the 2.4 GHz band and subsequently expanded into some of the 5 GHz frequency bands, RLANs, specifically Wi-Fi devices, now carry approximately half of all global

Internet Protocol (IP) traffic[1]. In fact, mobile carriers have increased their reliance on Wi-Fi offload, voice-over-Wi-Fi, and similar technologies[2]. As technology evolves to meet increasing performance demands and traffic on broadband WAS increases, the use of wider bandwidth channels in order to support high data rates creates a need for additional spectrum.

RR No. 5.446A specifies that the use of the bands 5 150-5 350 MHz and 5 470-5 725 MHz by the stations in the mobile, except aeronautical mobile, service shall be in accordance with Resolution 229 (Rev.WRC-12).

Since WRC-03, the demand for mobile broadband applications especially for WAS/RLANs has been growing rapidly. Resolution 239 (WRC-15) states "that the results of ITU-R studies indicate that the minimum spectrum need for WAS/RLAN in the 5 GHz frequency range in the year 2018 is estimated at 880 MHz; this figure includes 455-580 MHz already utilized by non-IMT mobile broadband applications operating within the 5 GHz range resulting in 300-425 MHz additional spectrum being required".

One issue WRC-15 examined was the possibility of additional global allocations to the mobile service (MS) for terrestrial mobile broadband applications, including in the 5 GHz range, to facilitate contiguous spectrum for WAS/RLAN. This is to enable the use of wider channel bandwidths to support higher data throughput. The studies performed by ITU-R in preparation for WRC-15 indicated that if the WAS/RLAN mitigation measures were limited to the regulatory provisions of Resolution 229 (Rev.WRC-12), sharing between WAS/RLAN and the Earth exploration-satellite service (EESS) (active) systems in the frequency band 5 350 to 5 470 MHz may not be feasible, as well as being insufficient to ensure protection of certain radar types in this frequency band. For these cases, sharing may only be feasible if additional WAS/RLAN mitigation measures are implemented. However, no agreement was reached on the applicability of any additional WAS/RLAN mitigation techniques (see Section 1/1.1/3.2.11 of the Report of the CPM to WRC-15).

No agreement was reached on the conclusions of the studies for the frequency band 5 725-5 850 MHz (see Section 1/1.1/3.2.12 of the Report of the CPM to WRC-15). As such, WRC-15 concluded no change (NOC) for these frequency bands and established a WRC-19 agenda item to continue the work.
Resolution 239 (WRC-15), calls for ITU-R to:
– study WAS/RLAN technical characteristics and operational requirements in the 5 GHz frequency range;
– perform sharing and compatibility studies between WAS/RLAN applications and incumbent services in the frequency bands 5 150-5 350 MHz, 5 350-5 470 MHz, 5 725-5 850 MHz and 5 850-5 925 MHz while ensuring the protection of incumbent services including their current and planned use;

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[1] *Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update*, 2015-2020, pp. 24-25 (3 Feb. 2016), available at http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/mobile-white-paper-c11-520862.pdf.

[2] *Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2015-2020*, p. 25 (3 Feb. 2016).

– consider enabling outdoor WAS/RLAN operations in the frequency band 5 150-5 350 MHz;
– consider potential MS allocations to accommodate WAS/RLAN operations in the 5 350-5 470 MHz and 5 725-5 850 MHz frequency bands; and
– identify potential WAS/RLAN use in the 5 850-5 925 MHz frequency band.

The frequency bands considered under this agenda item, i.e. 5 150-5 250 MHz, 5 250-5 350 MHz, 5 350-5 470 MHz, 5 725-5 850 MHz and 5 850-5 925 MHz, are denoted by the letters A, B, C, D, and E, respectively. When multiple methods are proposed for a particular frequency band, the methods are expressed by the associated letter and a numerical suffix (Method A1, Method A2, etc.); when only one method is proposed for a particular frequency band, the method is expressed by the associated letter (B, C, etc.).

For the 5 150-5 250 MHz frequency band, six methods (including NOC) are proposed (A1, A2, A3, A4, A5 and A6); for the 5 250-5 350 MHz and for the 5 350-5 470 MHz frequency bands, only one method (NOC) is proposed (B and C respectively); for the 5 725-5 850 MHz frequency band, three methods (including NOC) are proposed (D1, D2 and D3); and for the 5 850-5 925 MHz frequency band only one method (NOC) is proposed (E).

2.4.2 Relevance to Mauritius

This agenda item is also of high relevance to Mauritius given the increasing demand in Wi-Fi spectrum to deliver further capacity for Wi-Fi services. Wi-Fi is a technology where spectrum sharing is key. As more devices share the spectrum, the later becomes less usable, hence the need for additional spectrum. As shown in the table below, the preliminary position of Mauritius is that the band 5150 – 5250 MHz be designated for outdoor applications under the same conditions under resolves 4 of Resolution 229 (WRC-12) for frequency band 5250 – 5350 MHz. We are also advocating the allocation of the 5725 – 5850 MHz to the Mobile Service. It is to be noted that this frequency band is already in use in Mauritius for Broadband Wireless Access (BWA) under ICTA/DEC/01/2006.

2.4.3 Preliminary Positions

Table2 below summarises the issues for each frequency band under consideration under this agenda item, provides the preliminary positions of Mauritius (in line with SADC positions) as well as the changes if any which have been brought to the methods after CPM-2.

Item	Agenda 1.16 Frequency Bands	Background of issues	Preliminary Position Mauritius
A	5150-5250 MHz	This band is allocated to FSS (E to S), MS and AR. The aim of this agenda item is to decide on whether the band which is already designated for indoor RLAN deployments may also be authorised outdoors. Compatibility studies between WAS/RLAN and FSS for non-GSO MSS feeder uplinks are not in agreement. Out of the five studies carried out, only two concluded that use of the frequency band for outdoor deployment do not affect FSS. Compatibility between ARNS and WAS/RLAN is only possible is additional mitigation techniques are implemented. Compatibility between WAS/RLAN and AMT is possible accoring to one study with a reduced eirp (up to 40mW) with in-vehicle use.	Method A3 (Outdoor use - same condition as in resolves 4 of Resolution 229 (WRC-12) for 5250-5350 MHz)

B	5250-5350 MHz	This frequency band is allocated to EESS (active), MS, Radiolocation, SRS. Operation in this frequency band is allowed outdoors under WRC-03 Res 229 under specified technical and regulatory conditions. WRC-15 Res 239 called for studies to investigate whether the operating conditions of WRC-03 Res 229 could be changed while ensuring protection to the other services. Studies have shown that changing the operating conditions would not ensure protection of the radiodetermination service and EESS (active) sensors. Futhermore the studies confirmed that the current operating conditions are sufficient for the operating needs of WAS/RLAN users.	, Method B (NOC)
C	5350-5470 MHz	This band is allocated to EESS, RLS, ARNS, SRS and RNS. No compatibility and no feasible mitigation techniques available between EESS (active) and WAS/RLAN. As for WAS/RLAN and radar systems, studies show that the regulatory provisions contained in Res. 229 (Rev. WRC-12) are insufficient to ensure protection of certain radar types in this frequency band. There are no feasible mitigation techniques to facilitate sharing.	Method C (NOC)

D	5725-5850 MHz	The frequency band is allocated to FSS (Earth-to-space), Radiolocation on primary basis and Amateur and Amateur-satellite (space-to-Earth) on secondary basis. It is recognised that this band is already used for WAS/RLAN in many countries of Regions 1, 2 and 3. Compatibility withg radar systems operating in the frequency band has been found difficult as per one study. As regards compatibility with FSS in Region 1, one study concluded that sharing would be difficult without implementation of mitigation techniques. A second study demonstrated compatibility for indoor only operations and a maximum eirp of 200 mW. It is to be noted that in Mauritius this frequency band has been used for BFWA since 2005.	Method D2 (- Allocation to MS on primary allocation
E	5850-5925 MHz	In Region 1, this frequency band is allocated to Mobile, Fixed and FSS (Earth-to-Space) on a co-primary basis. Compatibility studies between WAS/RLAN as an interferer to Intelligent Transport System (ITS) has shown that appropriate separation distance is necessary for co-channel operation. Work on mitigation techniques has been initiated but no conclusions have been reached yet.	Method E (NOC)

Question 5: Do you agree that the Preliminary positions for the agenda item summarized in this section? If you do not agree, please provide justification for your views.

2.5 Agenda item 9.1 issue 9.1.1:- *Agenda item 9.1 is to consider and approve the Report of the Director of the Radiocommunication Bureau in accordance with Article 7 of the Convention on the activities of the Radiocommunication Sector since WRC-15 and issue 9.1.1 relates to the Implementation of International Mobile Telecommunications in the frequency bands 1 885-2 025 MHz and 2 110-2 200 MHz*

2.5.1 Summary of issues (Source: CPM Report)

The frequency bands 1 885-2 025 MHz and 2 110-2 200 MHz have been identified in the Radio Regulations (RR) for use by IMT. Within these broader frequency ranges, the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz are allocated to the FS, MS and MSS on a co-primary basis. The MSS allocation is in the Earth-to-space direction in the 1 980-2 010 MHz frequency band, and in the space-to-Earth direction in the 2 170-2 200 MHz frequency band. Both the satellite and terrestrial components of IMT have been deployed or are being considered for further deployment within the 1 980-2 010 MHz and 2 170-2 200 MHz frequency bands.

Resolution **212 (Rev.WRC-15)** invites *"ITU-R to study possible technical and operational measures to ensure coexistence and compatibility between the terrestrial component of IMT (in the mobile service) and the satellite component of IMT (in the mobile service and the mobile-satellite service) in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz where those frequency bands are shared by the mobile service and the mobile-satellite service in different countries, in particular for the deployment of independent satellite and terrestrial components of IMT and to facilitate development of both the satellite and terrestrial components of IMT"*.

In accordance with Resolution **212 (Rev.WRC-15)**, coexistence and compatibility between the terrestrial component of IMT (in the MS) and the satellite component of IMT (in the MS and the MSS) in neighbouring countries/different concerned countries/adjacent geographical areas across different countries were studied to facilitate the development of both the satellite and terrestrial components of IMT.

For the satellite component of IMT, the technical and operational characteristics used in the studies were based on the specifications from Recommendation ITU-R M.1850-2. It should be noted that some parameters used in the studies (e.g. bandwidth and satellite e.i.r.p.) differ from those currently in Recommendation ITU-R M.1850-2, as a consequence of technical development of the satellite component of IMT. The use of these parameters is still being studied in ITU-R. However, those differences do not affect the conclusions of the calculations in Scenarios A1 and A2.

The parameters for the terrestrial component of IMT used in the studies are based on Report ITU-R M.2292, and the methodology for modelling and simulating the terrestrial IMT network is given in Recommendation ITU-R M.2101. It should be noted that in addition to the values specified in Report ITU-R M.2292, one study employed different values for some of the parameters (noise figure, antenna gain and body loss), as a consequence of technical development of the terrestrial component of IMT, such as Machine Type Communication (MTC) as contained in Recommendation ITU-R M.2012. The use of these assumed IMT MTC UE parameters, which are still being studied in ITU-R, resulted in different conclusions from those results for IMT UEs related to the scenario of potential interference from IMT space stations into terrestrial receivers.

The protection criterion for IMT-Advanced is provided in Report ITU-R M.2292-0 as $I/N = -6$ dB. Additional studies were performed by ITU-R with the protection criterion of $I/N = -10$ dB in order to assess the impact of lower I/N values on the compatibility between the satellite and terrestrial components of IMT operating in neighbouring countries.

The recommended frequency arrangements for terrestrial IMT are contained in Recommendation ITU-R M.1036-5.

2.5.2 Relevance to Mauritius

The band 1920 – 1980 MHz paired with 2110 – 2170 MHz have been used in Mauritius for the deployment of terrestrial IMT since 2004. This agenda item is of importance as it provides the results of studies conducted by ITU-R regarding the compatibility of the terrestrial component of IMT with the satellite component of IMT in the bands adjacent to the ones already in use. This implies that Mauritius could decide to extend the usage of terrestrial IMT by an additional 30 MHz x 2 after taking into account usage being made of the frequency band by neighbouring countries. Where neighbouring countries have decided on a different usage, mitigation techniques may have to be agreed on a bilateral or multilateral basis.

2.5.3 Summary of Results from Compatibility Studies

Table 3 below gives a summary of the result of the compatibility studies.

Scenarios	Summary	Interference risks and mitigation techniques
A1	Interferers are Base Station and/or User Equipment (UE) in Country A. Victim is MSS satellite in Country B sharing the 1980 - 2010 MHz and 2170 - 2200 MHz bands	In the frequency band 1 980-2 010 MHz, it was observed that the level of potential interference from IMT BS into IMT space stations is high, while the level of potential interference from IMT UE into IMT space stations is low. Mitigation techniques may be implemented to reduce the potential interference from UE as well as Base Stations.
A2	Interferer is Base Station in Country A and Victim is Mobile Earth Station (MES) in country B	In the frequency band 2 170-2 200 MHz, it was observed that potential interference from IMT BSs into IMT MESs may occur. The potential interference may be mitigated by one or more of: assessment of terrain and clutter effects and system characteristics, deployment environments, and separation distance. Given the varying characteristics of the border area across various countries, administrations can bilaterally determine the appropriate mitigation techniques on a case-by-case basis.

B1	Interferer is MES in country B and victims are UE and/or Base Station in Country A	In the frequency band 1 980-2 010 MHz, the results of studies show that a separation distance is dependent on the type of IMT MES, IMT BS and IMT UE, and conditions of the propagation model including terrain and clutter effects. The studies evaluating the interference between IMT terrestrial stations and IMT MES show that geographical separation at the border of two countries would be required. The geographical separation determined in the studies was observed to be larger for a sea-based border than a land-based border. Potential interference from IMT MESs to IMT BSs and IMT UEs could be managed by bilateral/multilateral negotiation, in which actual technical/operational characteristics and mitigation measures for satellite and terrestrial components of IMT could be taken into account.
B2	Interferer is MSS satellite in country B and victim is UE in country A	In the frequency band 2 170-2 200 MHz, the results of studies show that the downlink interference from IMT space stations to IMT UEs may exceed the protection criterion depending on the characteristics of IMT satellite component and those of IMT UEs. Potential interference from IMT space stations to IMT UEs could be managed by bilateral/multilateral negotiation, in which actual technical/operational characteristics and mitigation measures for satellite and terrestrial components of IMT could be taken into account. Several technical and operational measures related to coexistence and compatibility between terrestrial and satellite IMT deployments for minimizing and mitigating the interference into the IMT UEs from IMT space stations have been identified in the CPM report.

2.5.4 Addressing issue 9.1.1 of Agenda Item 9.1

Two views have been expressed in the CPM Report on this issue of agenda item 9.1.

View 1 states that Scenario A1 may be addressed through the inclusion of eirp limits on IMT Base stations in a footnote to the Table of Frequency Allocations in Article 5 of the Radio Regulations or through a modification to the resolves part of Resolution 212 (Rev. WRC-15). As for Scenarios A2 and B1, view 1 argues that the provisions contained in Article 9 of the Radio Regulations may be used for cross-border coordination. As regards Scenario B2, it is suggested under view 1 to establish new coordination threshold pfd level to protect terrestrial IMT stations.

View 2 on the other hand reminds that regulatory measures and changes to the Radio Regulations are outside the scope of agenda item 9.1 issue but that the ITU-R studies have concluded that technical and operational measures studied and developed pursuant to Resolution 212 (Rec. WRC-15) are sufficient to ensure coexistence and compatibility between the terrestrial and satellite components of IMT in adjacent geographical areas in different countries for all scenarios. Hence view 2 argues that there is no need for any changes to the Radio Regulations.

2.5.5 Preliminary Position

Mauritius aligns itself to other SADC countries and supports the implementation of regulatory measures aimed at preventing IMT base stations transmitting in the 1980-2010MHz from causing harmful interference to IMT Space Station operating in the same band. Accordingly, SADC supports the introduction of an e.i.r.p limit, in the Radio Regulations, applicable to IMT base stations transmitting in the frequency band 1980-2010MHz.

The value of such an e.i.r.p limit needs to be determined through further analysis of relevant ITU-R studies, with a view to ensure balanced prospects for the growth of both the terrestrial and satellite IMT ecosystems.

In the case of the other scenarios A2, B1 and B2; while cases of potential interference could exist, these are considered to be of a lesser concern as they are manageable on a national basis using existing provisions in the radio regulations.

In the case of scenarios A2, B1, B2, Mauritius supports no change to the radio regulations apart from noting that some updates to the existing provisions will be required in respect of Appendix 7 (Table 7a) and Appendix 5 (Table 5-2) of the radio regulations. In particular, the deletion of note 3 under Table 5-2 to extend the application of the existing pdf limits applicable to the Satellite services to include the protection of terrestrial IMT

Question 6: Do you agree that the Preliminary positions for the agenda item summarized in this section? If you do not agree, please provide justification for your views.

2.6 Agenda item 9.1 issue 9.1.8:- *Agenda item 9.1 is to consider and approve the Report of the Director of the Radiocommunication Bureau in accordance with Article 7 of the Convention on the activities of the Radiocommunication Sector since WRC-15 and issue 9.1.8 relates to Urgent studies required in preparation for the 2019 World Radiocommunication Conference*

3) Studies on the technical and operational aspects of radio networks and systems, as well as spectrum needed, including possible harmonized use of spectrum to support the implementation of narrowband and broadband machine-type communication infrastructures, in order to develop Recommendations, Reports and/or Handbooks, as appropriate, and to take appropriate actions within the ITU Radiocommunication Sector (ITU-R) scope of work.

2.6.1 Summary of issues (Source: CPM Report)

Machine Type Communications (MTC), which are also known as Machine-to-Machine (M2M) communications or Internet of Things (IoT), describe communication between devices that do not require human intervention. An increasingly large number of MTC devices, with a range of performance and operational requirements, are expected to communicate due to further improvements of low-cost and low complexity device types requiring high reliability techniques, for instance in the field of traffic safety, traffic efficiency, smart grid, e-health, wireless industry automation, augmented reality, remote tactile control and tele-protection.

The results of ITU-R studies of the current and future spectrum use for narrowband and broadband MTC performed, as expressed in Resolution 958 (WRC-15), concluded that there is no need for any regulatory action in the Radio Regulations with regard to specific spectrum intended for use by those applications. Nonetheless, there are other mechanisms, which could facilitate the harmonized use of spectrum to support the implementation of narrowband and broadband MTC infrastructures, including ITU-R Recommendations or Reports.

2.6.2 Relevance to Mauritius

M2M applications are on the rise in Mauritius hence the relevance of this issue for the country. As mentioned above, however, we share the view that there is no need to take any regulatory action in the Radio Regulations with respect to specific spectrum for use by these applications.

Question 7: Do you agree that the Preliminary positions for the agenda item summarized in this section? If you do not agree, please provide justification for your views.

2.7 ***Agenda item 1.4:*** *- to consider the results of studies in accordance with Resolution 557 (WRC-15), and review, and revise if necessary, the limitations mentioned in Annex 7 to Appendix 30 (Rev.WRC-15), while ensuring the protection of, and without imposing additional constraints on, assignments in the Plan and the List and the future development of the broadcasting-satellite service within the Plan, and existing and planned fixed-satellite service networks;*

Resolution 557 (WRC-15) – Consideration of possible revision of Annex 7 to Appendix 30 of the Radio Regulations.

2.7.1 Summary of issues (Source: CPM Report)

WRC-15 adopted Resolution 557 (WRC-15) to study possible revisions of the limitations mentioned in Annex 7 to Appendix 30 (Rev.WRC-15) of the Radio Regulations (RR).

It should be noted that the broadcasting-satellite service (BSS) not subject to RR Appendix 30 (12.5-12.7 GHz, in Region 3) is not the subject of consideration in accordance with Resolution 557 (WRC-15).

It should be emphasized that studies calling for revision of Annex 7 to RR Appendix 30 (Rev.WRC-15) under Resolution 557 (WRC-15) in no way was intended to have any impact whatsoever to the integrity of RR Appendix 30 for Regions 1 and 3.

The Annex 7 to RR Appendix 30 (Rev.WRC-15) contains several orbital position limitations for proposed modifications to the Region 2 Plan and for proposed new or modified assignments in the Regions 1 and 3 List applicable to specific parts of the frequency band 11.7-12.7 GHz.

There are no orbital position limitations in RR Appendix 30A. One can already apply for and use the entire feeder-link frequency band within the restricted portions of the Annex 7 to RR Appendix 30 (Rev.WRC-15) arc. As a result, it is not necessary to analyse the impact of removing limitations that do not exist.

Should WRC-19 decide to remove some or all the current limitations on the use of the orbital arc for Regions 1 and 3 BSS networks as contained in Annex 7 to RR Appendix 30 (Rev.WRC-15), priority on the use of these new orbital positions should be given to those countries in Regions 1 and 3 with Plan assignments with equivalent downlink protection margin values in the RR Appendix 30 equal or below −10 dB, and with neither frequency assignments included in the List nor for which complete RR Appendix 4 information has been received by the Bureau in accordance with the provisions of § 4.1.3 of RR Appendix 30 (Rev.WRC-15). See draft new Resolution [B14-PRIORITY] (WRC-19) and draft new Resolution [D14-ENTRY-INTO-FORCE] (WRC-19) in the CPM Report.

2.7.2 Relevance to Mauritius

Mauritius has planned allotments under Appendices 30 and 30 A for Broadcasts Satellite Service (BSS) and under Appendix 30 B for Fixed Satellite Service (FSS). The orbital position allotted to Mauritius under Appendix 30 is 29 degrees East and under Appendix 30 B is 92.20 degrees East. Given that these orbital positions have remained unused since their allotment, the equivalent protection margins have degraded due to the entry of operation of satellites in adjacent orbital slots.

The SADC has initiated a Shared Satellite Programme under which the orbital positions allotted to SADC countries may now be brought into use.

Given that with the removal of some or all current limitations on the use of the orbital arc for Regions 1 and 3 BSS networks as contained in Annex 7 to RR Appendix 30 (Rev. WRC-15) new orbital positions would be given to those countries with degraded equivalent protection margin. These new orbital positions would enable the SADC to implement the Shared Satellite Programme

2.7.3 Preliminary Position

Method B: Deletion of some limitations of Annex 7, addition of draft new Resolutions [A14-LIMITA3] (WRC-19), [B14-PRIORITY] (WRC-19), [D14-ENTRY-INTO-FORCE] (WRC-19) and application of draft new Resolution [C14-LIMITA1A2] (WRC-19) with revised criteria for protection of new BSS networks with respect to limitations "A1a" and "A2a"

This method proposes to delete the following limitations of Annex 7 to RR Appendix 30:
– limitations "A1a" and "A2a" and the application for cases of certain orbital separations between new FSS and new BSS networks of draft new Resolution [C14-LIMIT-A1A2] (WRC-19) with revised criteria for protection of new BSS networks;
– limitations "A2b", "A3b", "A3c";
– limitations "A3a" accompanied by draft new Resolution [A14-LIMITA3] (WRC-19) WRC-19) to guarantee the protection of frequency assignments with earth station receiving antenna size smaller than 60 cm (40 cm and 45 cm), in accordance with the criteria of RR Appendix 30 (Rev.WRC-15).

This method proposes to retain limitations "A1b", "A2c" and "B".

This method also proposes the application of draft new Resolution [B14-PRIORITY] (WRC-19) after the removal of the relevant limitations in Annex 7 to RR Appendix 30 (Rev.WRC-15), giving priority to national assignments in the Regions 1 and 3 Plan with equivalent downlink protection margin values equal or below −10 dB. Considering the importance of this draft new Resolution [B14-PRIORITY] (WRC-19) to help administrations to improve equitable access to satellite orbit resources by providing priority to administrations with a degraded reference situation, this method proposes to apply as of 23 November 2019 the revised Annex 7 of RR Appendix 30. To this effect, a revision of RR Article 59 and a draft new Resolution [D14-ENTRY-INTO-FORCE] (WRC-19) are proposed.

In addition, this method proposes suppression of Resolution 557 (WRC-15).

Question 8: Do you agree that the Preliminary positions for the agenda item summarized in this section? If you do not agree, please provide justification for your views.

Agenda item 1.1:- *to consider an allocation of the frequency band 50-54 MHz to the amateur service in Region 1, in accordance with Resolution 658 (WRC-15);*

Resolution 658 (WRC-15) – Allocation of the frequency band 50-54 MHz to the amateur service in Region 1

2.7.4 Summary of issues (Source: CPM Report)

This agenda item addresses a possible new Region 1 allocation to the amateur service in the frequency band 50-54 MHz by full or partial worldwide harmonization with the existing 4 MHz primary allocations in Regions 2 and 3.

The spectrum needs for the amateur service has been quantified in two studies using an application- based approach. One of them indicates that 4 MHz of spectrum is required while the other indicates that 1.75 MHz is required.

Administrations in parts of Region 1 are party to the ST61 and GE89 Regional Agreements which remain in force in the band 50-54 MHz.
Studies have been undertaken to assess the possibility of sharing with the incumbent broadcasting, land mobile and radiolocation services. The studies have demonstrated that large separation distances are required for sharing with incumbent services. Furthermore, regulatory provisions will need to be implemented. Depending upon the incumbent service to be protected, the different protection distances and some measures can be found in Report ITU-R M.[AMATEUR_50_MHz].

Four methods are provided to satisfy the agenda item including the No Change method:
– Method A: An allocation to the amateur service on a primary basis in Region 1 in the band 50-54 MHz, or part thereof;
– Method B: An allocation to the amateur service on a secondary basis in Region 1 in the band 50.080-50.280 MHz, (Method B1), or in the band 50-52 MHz (Method B2);
– Method C: An allocation to the amateur service in Region 1 on a partly primary and partly secondary basis in all or part of the frequency band 50-54 MHz;
– Method D: No changes in the frequency band 50-54 MHz.

2.7.5 Relevance to Mauritius

The 50 – 54 MHz band in Mauritius is already allocated on secondary basis to Amateur service. A region 1 primary allocation would benefit the Amateur Radio community as they would receive protection from interference.

2.7.6 Preliminary Position

Method A

Question 9: Do you agree that the Preliminary positions for the agenda item summarized in this section? If you do not agree, please provide justification for your views.

2.8 Agenda item 1.8:- *to consider possible regulatory actions to support Global Maritime Distress Safety System (GMDSS) modernization and to support the introduction of additional satellite systems into the GMDSS, in accordance with Resolution 359 (Rev.WRC-15);*

Resolution 359 (Rev.WRC-15) – Consideration of regulatory provisions for updating and modernization of the Global Maritime Distress and Safety System

2.8.1 Summary of issues (Source: CPM Report)

Agenda item 1.8 (Resolution 359 (Rev.WRC-15)), concerns GMDSS. Resolves 1 addresses the modernization of the GMDSS while resolves 2 addresses the introduction of additional satellite providers into the GMDSS.

Issue A: Global maritime distress and safety system modernization

The GMDSS was adopted as part of the 1988 amendments to the International Convention for the Safety of Life at Sea, 1974 (SOLAS). It was fully implemented in 1999. It has served the mariner and the maritime industry well since its inception, but some of the GMDSS technologies used have not reached their full potential, and some GMDSS functions could be performed by more modern technologies.

IMO has adopted a modernization plan for the GMDSS containing a high-level review and a detailed review. The detailed review and the plan show that the use of some existing services is declining. Meanwhile, some new technologies are considered to be possibly introduced in the modernized GMDSS, such as VHF data exchange system (VDES) and the NAVDAT system. The VDES has been already covered by WRC-15 for the terrestrial component and agenda item 1.9.2 covers the satellite component, therefore no action is requested for the VDES under agenda item 1.8.

Navigational text (NAVTEX) was incorporated into the regulations for the GMDSS for disseminating maritime safety information, which was introduced in a transitional phase from 1992 to 1999, after which it became mandatory under Chapter V of the SOLAS regulations.

In March 2012, ITU-R approved Recommendation ITU-R M.2010 “Characteristics of a digital system, named Navigational Data for broadcasting maritime safety and security related information from shore-to-ship in the 500 kHz band”. In April 2014, the other Recommendation ITU-R M.2058 “Characteristics of a digital system, named navigational data for broadcasting maritime safety and security related information from shore-to-ship in the maritime HF frequency band” was also approved. NAVDAT is counted as an enhancement of existing NAVTEX and could be considered as a potential entity in the next generation of GMDSS.

WRC-12 addressed the allocation of the 495-505 kHz frequency band for the maritime mobile service. This band is regarded as the most suitable for MF NAVDAT application. However, regulatory provisions are still needed for both MF and HF NAVDAT applications.

To satisfy Issue A under WRC-19 agenda item 1.8, three methods are presented below to be reflected in the Radio Regulations.
– The first method is no change.
– The second method includes frequencies to be used for medium frequency (MF) and high frequency (HF) navigational data (NAVDAT) systems, in support of GMDSS modernization.
– The third method is similar to the second one with the following conditions:
• NAVDAT transmits only from coastal stations
• Their usage is subject to agreement to be obtained with affected administrations.

Issue B: Introduction of additional satellite systems into the Global Maritime Distress and Safety System (resolves to invite ITU-R 2)

To date, only one satellite system has been incorporated by the IMO in the GMDSS "system of systems".

IMO recognized a non-GSO MSS system[3], operating in the frequency band 1 616-1 626.5 MHz which is expected to come into GMDSS operation in early 2020.

To satisfy Issue B under WRC-19 agenda item 1.8, several methods are presented in the CPM report to reflect in the Radio Regulations the frequencies used by a non-GSO MSS GMDSS satellite system, noting that WRC-19 is invited to take into consideration the activities of International Maritime Organization (IMO) which has recognized a non-GSO MSS satellite system as an additional provider of GMDSS communications.

2.8.2 Relevance to Mauritius

Mauritius has a developing ocean economy of which safety at sea is an essential component. In this respect the modernisation of GMDSS under Issue A is of relevance. Whereas modernisation of GMDSS is welcomed with the introduction of NAVDAT, its implications on existing systems used on vessels registered under the Mauritian flag as well as HF coast stations have to be well understood prior to finalising our position.

As regards Issue B, it is to be noted that frequency band 1616-1626.5 MHz which is used by the system recognized by IMO is assigned to MSS (Earth-to-space) on primary basis and MSS (space-to-Earth) on secondary basis. This system intends to operate using Time Division Duplex (i.e. using the same frequency for uplink and downlink synchronously). The introduction of a second GMDSS service provider is expected to have a number of benefits for Mauritius.

2.8.3 Preliminary Position

Issue A: Method A2. The frequency band 495-505 kHz should be assigned for the use of international MF NAVDAT

Issue B: Method B1. This method is in support of the introduction of an additional satellite system into GMDSS.

Question 10: Do you agree that the Preliminary positions for the agenda item summarized in this section? If you do not agree, please provide justification for your views.

2.9 Agenda item 1.9.1:-

1.9 to consider, based on the results of ITU-R studies:

[3] See IMO Resolution MSC.451(99), "Statement Of Recognition Of Maritime Mobile Satellite Services Provided By Iridium Satellite LLC" (May 2018).

1.9.1 regulatory actions within the frequency band 156-162.05 MHz for autonomous maritime radio devices to protect the GMDSS and automatic identifications system (AIS), in accordance with Resolution 362 (WRC-15);
Resolution 362 (WRC-15) – Autonomous maritime radio devices operating in the frequency band 156-162.05 MHz

2.9.1 Summary of issues (Source: CPM Report)

The aim of this agenda item is to prevent unregulated operation of autonomous maritime radio devices (AMRD) in order to enhance safety of navigation and to ensure the integrity of the global maritime distress and safety system (GMDSS) which is the only system for distress, urgency, safety and routine communication for general shipping. Furthermore, the integrity of the collision avoidance system, automatic identification system (AIS), including the AIS VHF data link needs to be ensured.

The AMRD are grouped and identified as AMRD Group A that enhance the safety of navigation and AMRD Group B that do not enhance the safety of navigation. Four methods to satisfy this agenda item were developed. It is noted that according to Resolution ITU-R 2-7 Annex 2 Section 4 “methods of no change is always a possible method and normally should not be included amongst the methods”.

Method A considers amendments to the footnote f) in RR Appendix 18 to allow AMRD Group A to operate on certain channels.

Under Method B, there are three approaches to consider the harmonization of the spectrum use for AMRD Group B.

Method B1 proposes the use of channel 2006 as listed in RR Appendix 18 for AIS technology.

Method B2 proposes the use of channel 2006 in RR Appendix 18 for AIS technology and channels 2078, 2019 and 2079 in RR Appendix 18 for non-AIS technology.

Method B3 proposes the use of channel 2006 in RR Appendix 18 for AIS technology and channels 2078, 2019 and 2079 in RR Appendix 18, for non-AIS technology, with an e.i.r.p. limitation inserted in the RR.

2.9.2 Relevance to Mauritius

As for Agenda item 1.8, this agenda item is of high relevance to Mauritius. AIS in both Groups A and B are in use on board of vessels registered under the Mauritius flag. The proposal to segregate the two different groups in separate frequency bands is welcomed and is expected to benefit the safety of navigation.

2.9.3 Preliminary Position

Group A - Method A: For the operation of AMRD Group A, it is proposed to amend footnote f) of RR Appendix 18 to allow AMRD Group A to operate on frequency channels 156.525 MHz (channel 70), 161.975 MHz (AIS 1) and 162.025 MHz (AIS 2).

Group B – Method B2

Question 11: Do you agree that the Preliminary positions for the agenda item summarized in this section? If you do not agree, please provide justification for your views.

Agenda item 1.9.2:-

1.9 to consider, based on the results of ITU-R studies:
1.9.2 modifications of the Radio Regulations, including new spectrum allocations to the maritime mobile-satellite service (Earth-to-space and space-to-Earth), preferably within the frequency bands 156.0125-157.4375 MHz and 160.6125-162.0375 MHz of Appendix 18, to enable a new VHF data exchange system (VDES) satellite component, while ensuring that this component will not degrade the current terrestrial VDES components, applications specific messages (ASM) and AIS operations and not impose any additional constraints on existing services in these and adjacent frequency bands as stated in recognizing d) and e) of Resolution 360 (Rev.WRC-15);
Resolution 360 (Rev.WRC-15) – Consideration of regulatory provisions and spectrum allocations to the maritime mobile-satellite service to enable the satellite component of the VHF Data Exchange System and enhanced maritime radiocommunication

2.9.4 Summary of issues (Source: CPM Report)

In accordance with Resolution 360 (Rev.WRC-15), the ITU-R has undertaken studies for possible new allocations to the maritime mobile-satellite service (MMSS) (Earth-to-space) and (space-to- Earth), preferably within the frequency bands 156.0125-157.4375 MHz and 160.6125-162.0375 MHz of RR Appendix 18, to support the digital evolution of maritime radio communications.

The results of the sharing and compatibility studies are contained in Recommendation ITU-R M.2092-0 which was developed in the WRC-15 study cycle, and Report ITU-R M.2435-0, which has been developed in this study cycle.

Based on the results of these studies, six methods have been developed to satisfy WRC-19 agenda item 1.9.2. The main differences between the methods are the frequency plan and pfd-mask to be imposed on the MMSS (space-to-Earth) emissions, which are further described in Report ITU-R M.2435-0.

Method A
NOC to the Radio Regulations except suppression of Resolution 360 (Rev.WRC-15). As a result there will be no frequency allocations to the satellite component of VDES (VDE-SAT).

Method B
This method proposes new primary allocations to the maritime mobile-satellite service (MMSS) (Earth-to-space) and (space-to-Earth) using frequency plan alternative 2 as described in section 5/1.9.2/3.2.2 of the CPM Report. The coordination mechanism with respect to

terrestrial services under RR No. 9.14 is introduced with two options for the pfd-mask, as detailed in section 5/1.9.2/5.2 of the CPM Report.

Method C
This method uses the same frequency plan as Method B but with new secondary allocations for the MMSS (Earth-to-space) and (space-to-Earth).

Due to the proposed secondary status of the allocation to the MMSS, there is no coordination required between the MMSS and terrestrial services and therefore there is no need to make any modifications to Appendix 5 of the RR.

Method D
This method is the same as Method C except with the addition of a pfd limit in RR Article 5 in order to protect the terrestrial services. This method includes two options, and the description of the pfd masks, as detailed in section 5/1.9.2/5.3 of the CPM report.

Method E
This method proposes new secondary allocations for the MMSS (Earth-to-space) and (space-to- Earth) subject to agreement in accordance with No. 9.21 of the RR to be limited to the use of the VDES satellite component to ensure compatibility with existing services.

Method F
This method proposes new primary allocations to the MMSS (Earth-to-space) and (space-to-Earth) using frequency plan based on alternative 3 as described in section 5/1.9.2/3.2.3. Details on the pfd mask for coordination of MMSS (space-to-Earth) with respect to terrestrial services are provided in the section 5/1.9.2/5.5 of the CPM report.

2.9.5 Relevance to Mauritius

As for previous agenda items, this is also relevant to Mauritius as same relates to enhanced safety at sea through the digital evolution of maritime communications.

2.9.6 Preliminary Position

Method B, Option 1 - This method proposes changes to the RR in order to introduce VDE-SAT to support the digital evolution of maritime communications.

This method is based on frequency plan alternative 2 and proposes new primary allocations to the MMSS (Earth-to-space) in the frequency bands 157.1875-157.3375 MHz and 161.7875-161.9375 MHz. These two frequency bands correspond to channels 24, 84, 25, 85, 26 and 86 of RR Appendix 18. The channels 26 and 86 are identified for ship-to-satellite (VDE-SAT uplink) communications. The channels 24, 84, 25 and 85 are identified for VDE-TER, but ship-to-satellite (VDE-SAT uplink) communications may be possible without imposing constraints on ship-to-shore communications.

The method also proposes a new primary allocation for the MMSS (space-to-Earth) in the frequency band 160.9625-161.4875 MHz, which is identified for satellite-to-ship (VDE-SAT downlink).

Coordination of MMSS (space-to-Earth) assignments in the frequency band 160.9625-161.4875 MHz with respect to terrestrial services is captured under RR No. 9.14 which is introduced by the new footnote RR No. 5.A192.

Option 1: proposes to include pfd mask provided in Recommendation ITU-R M.2092-0 in Appendix 5 of the RR.

The method proposes to modify RR Nos. 5.208A and 5.208B and Annex 1 to Resolution 739 (Rev.WRC-15) in order to ensure the protection of the RAS in the frequency bands 150.05-153 MHz and 322-328.6 MHz.

Question 12: Do you agree that the Preliminary positions for the agenda item summarized in this section? If you do not agree, please provide justification for your views.

2.10 Agenda item 1.10:-

1.10 to consider spectrum needs and regulatory provisions for the introduction and use of the Global Aeronautical Distress and Safety System (GADSS), in accordance with Resolution 426 (WRC-15);
Resolution 426 (WRC-15): Studies on spectrum needs and regulatory provisions for the introduction and use of the Global Aeronautical Distress and Safety System

2.10.1 Summary of issues (Source: CPM Report)

The International Civil Aviation Organization (ICAO) has developed a concept of operations (ConOps) to support the future development of GADSS.
The ConOps[4] describes in particular the following functions:
– Aircraft tracking
• Typically uses existing technologies to assist in the timely identification and location of aircraft.
• Provides an automated reporting function every 15 mins or less.
• Aircraft tracking may be accomplished by multiple different systems over the duration of a flight.
– Autonomous distress tracking

[4] Version 6.0. In 2017 the ICAO Air Navigation Commission agreed to use Version 6.0 to guide the further development of ICAO performance-based standards in order to support the implementation of the ConOps.

- An automated method of position reporting at intervals of one minute or less to support search and rescue (SAR), triggered by indications that an aircraft is in distress which may result in an accident.
- Distress tracking aims to establish the location of a potential accident site within a six nautical mile (11.11 km) radius.

– Post-flight localization and recovery

- A combination of both the immediate need to locate and rescue possible survivors after an air accident using emergency location beacons and other methods to an accuracy of < 1 nautical mile (< 1.85 km), and the timely collection of aircraft components and data that will assist in the accident investigation.

– Procedures and information management

- The method of data collection and notification of flight tracking data to the relevant SAR, and rescue coordination centres.

The ConOps provides the guidelines for the development of ICAO performance-based standards, outlining specific technical and operational requirements that an aircraft shall meet. It does not identify specific systems proposed to contribute to GADSS. ICAO intends to use systems operating under existing allocations in accordance with the provisions of the RR, including the use of emergency position-indicating radio beacons (termed as emergency locator transmitters in ICAO) operating in the 406-406.1 MHz frequency band5.

In addition, ICAO is of the view that:

1) systems being utilized to meet GADSS requirements should not receive any additional priority beyond that accorded by the RR to the radiocommunication service(s) under which those systems operate, and

2) ICAO does not support regulatory modifications that would require future WRC action in order to update or modify GADSS requirements and/or systems available for satisfying GADSS requirements.

In accordance with Resolution 426 (WRC-15), ITU-R considered spectrum needs and regulatory provisions for the introduction and the use of the global aeronautical distress and safety system (GADSS).

Three methods were developed. Each method states that no changes to Article 5 of the Radio Regulations (RR) are required in addition to suppression of Resolution 426 (WRC-15).

In Method A, modification to RR Article 30 and a new RR Article 34A to recognize GADSS in the RR are suggested.

In Method B, by comparison to Method A, different modifications to RR Article 30, and RR Article 34A are proposed, as is a Resolution requiring the development of ITU-R Recommendations to list the frequency bands of the systems contributing to GADSS, their technical characteristics and protection criteria are suggested. Method B also states that systems composing the GADSS shall only operate in primary allocations when used for safety purposes.

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5 The 406-406.1 MHz frequency band is already identified for the use of emergency position-indicating radiobeacons in the provisions of RR No. **5.266**.

Method C proposes no changes to the RR.

2.10.2 Relevance to Mauritius

Agenda item 1.10 is another important agenda item for Mauritius as it concerns the safety of aircrafts. The proposed GADSS will be the equivalent of GMDSS for the aeronautical service and as explained above same will be a number of benefits to the safety of aircrafts passengers as well as in search and rescue.

2.10.3 Preliminary Position

Method B (Source CPM Report) - Regarding invites ITU-R 2 of Resolution 426 (WRC-15), in order to facilitate its introduction, modification of the RR are proposed to include GADSS as a distress and safety communications system in RR Chapter VII – Distress and safety communications. In addition, the frequency bands used for GADSS, its systems, their technical characteristics and protection criteria shall be reflected in the relevant ITU-R Recommendations. Therefore, a new Resolution [A110-GADSS] (WRC-19) calling ICAO to provide to ITU-R the information in relation to the frequency bands and systems included in GADSS and also the information about the technical characteristics of such systems and inviting ITU-R to develop appropriate Recommendations shall be developed.
The modifications of the RR proposed under Method B specify:
– that the details of the GADSS elements are contained in Annexes to the ICAO Convention;
– that radiocommunication systems contributing to the GADSS are operated in conformity with the RR;
– that the use of frequency bands for GADSS shall be limited to systems that operate in accordance with recognized international aviation standards;
– that the use of GADSS shall also not prevent the use of these frequency bands by any applications of services to which these bands are allocated on a primary basis, and shall not establish a priority for GADSS in the RR;
– that the GADSS must operate in accordance with the terms of new Resolution [A110-GADSS] (WRC-19), resolving:
• that systems composing the GADSS shall only operate in primary allocations when used for safety purposes;
• that ITU-R shall develop ITU-R Recommendations detailing the system elements of the GADSS including their operating frequency bands and technical characteristics;
• that if constituent elements of GADSS are changed, those changes should be reflected in the relevant ITU-R Recommendation.

Question 13: Do you agree that the Preliminary positions for the agenda item summarized in this section? If you do not agree, please provide justification for your views.

2.11 Agenda item 9.1.7:- *Urgent studies required in preparation for the 2019 World Radiocommunication Conference*

2) Studies to examine:

a) whether there is a need for possible additional measures in order to limit uplink transmissions of terminals to those authorized terminals in accordance with No. 18.1;
b) the possible methods that will assist administrations in managing the unauthorized operation of earth station terminals deployed within its territory, as a tool to guide their national spectrum management programme, in accordance with Resolution ITU-R 64 (RA-15).

2.11.1 Summary of issues (Source: CPM Report)

Fixed-satellite services designed to meet the demand for global communication services are characterized by flexible, rapid and ubiquitous deployment of large numbers of cost-optimized earth stations employing small antennas and having common technical characteristics.

The issue under study is uplink transmissions from such earth stations not adhering to certain international regulations or national service rules: i.e. an earth station operating in the territory of a country without any authorization obtained from that country.

Unauthorized uplink earth station transmissions may also cause interference to legitimate users as well as raise other difficulties for administration spectrum managers.

For these reasons, the Radiocommunication Assembly 2015 (RA-15) approved Resolution ITU-R 64, titled “Guidelines for the management of unauthorized operation of earth station terminals”. The resolves of this Resolution invited ITU-R study groups concerned:

1) to conduct studies to examine whether there is a need for possible additional measures in order to limit uplink transmissions of terminals to those terminals authorized in accordance with No. 18.1;
2) to study the possible methods that will assist administrations in managing the unauthorized operation of earth station terminals deployed within their territory, as a tool to guide their national spectrum management programme.
In addition, WRC-15 also considered this subject and approved Issue 2) in the Annex to Resolution 958 (WRC-15) recognizing the urgency of these studies in preparation for, and to be reported to, WRC-19.

The difficulties facing administrations from the use of unauthorized earth station uplinks are listed below:
a) Administrations may not have the capability to monitor if there is an unauthorized uplink transmission from an earth station in their territory.
b) If an unauthorized uplink transmission is discovered in their territory, administrations may not have the capability to geolocate the earth station.
c) If the location of the unauthorized earth station is identified, administrations may need assistance to resolve the issue with satellite networks notified by other administrations.
d) Administrations may discover earth stations operating without proper licence, violating RR No. 18.1.

Studies under WRC-19 agenda item 9.1, issue 9.1.7 examined the need for additional measures to limit uplink transmissions of earth stations to authorized ones and possible methods to assist administrations in managing unauthorized operation of earth stations.
With respect to Issue 2a) in the Annex of Resolution 958 (WRC-15), two options have been identified:
– Option 1: no change to the Radio Regulations as current measures are sufficient. The Radio Regulations, specifically the provisions of Article 18, contain a clear and unambiguous requirement to operate an earth station only if duly authorized. New provisions in the Radio Regulations will not help address unlawfully operated earth stations.
– Option 2: to develop a new WRC Resolution to assist administrations with the application of RR No. 18.1.
With respect to Issue 2b) in the Annex of Resolution 958 (WRC-15), one option has been identified:
– to provide necessary guidelines on satellite monitoring capabilities, along with possible revision and/or further development of ITU-R Reports or Handbooks to assist administrations with managing unauthorized operation of earth stations deployed within their territory, as a tool to guide their national spectrum management.

2.11.2 Relevance to Mauritius

Mauritius is in the category of those administrations which faces difficulties in identifying unauthorized earth station uplinks. Hence the relevance of this agenda item for Mauritius.

2.11.3 Preliminary Position

Issue 2a – Option 2
Issue 2b – Single available option

Question 14: Do you agree that the Preliminary positions for the agenda item summarized in this section? If you do not agree, please provide justification for your views.

Agenda Item	SADC Common Position Brief
Chapter 1: Land Mobile and Fixed Services (Zambia)	
Agenda Item 1.11 is considering to take necessary actions to facilitate global or regional harmonized frequency bands to support Railway Radiocommunication Systems between Train and Trackside (RSTT) within existing Mobile Service allocations, in accordance with Resolution 236.	**Methods to satisfy the Agenda Item:** **Method A:** No change to the RR except suppression of Resolution 236 (WRC-15) **Reasons:** Harmonization of frequencies for RSTT can be achieved through the course of ITU-R study group work by applicable ITU-R Recommendations and/or Reports (e.g. Recommendation ITU-R [RSTT_FRQ]). **Method B:** Add a new Resolution [A111-METHOD B] (WRC-19) specifying frequency ranges for RSTT and referencing the most recent version of Recommendation ITU-R M.[RSTT_FRQ] and consequently suppress Resolution 236 (WRC-15) A new WRC Resolution specifying frequency ranges for RSTT can provide a regulatory framework to guide the harmonization process. At the same time, an ITU-R Recommendation can recommend possible global and/or regional harmonization of frequency ranges for RSTT and can provide flexibility. **Method C:** Add a new Resolution [B111-METHOD C] (WRC-19) without specifying frequency ranges for RSTT, while referencing the most recent version of Recommendation ITU-R M.[RSTT_FRQ] and consequently suppress the Resolution 236 (WRC-15).

	A new WRC Resolution specifying frequency ranges for RSTT can provide a regulatory framework to guide the harmonization process. At the same time, an ITU-R recommendation can recommend possible global and/or regional harmonization of frequency arrangements for RSTT and can provide flexibility. **SADC Support Method C** NB: Recommendation of ITU-R M.[**RSTT_FRQ]** is yet to be finalised
Agenda Item 1.12 is considering possible global or regional harmonized frequency bands for the implementation of evolving Intelligent Transport Systems (ITS) under existing Mobile Service allocations, in accordance with Resolution 237.	**Methods to satisfy the Agenda Item:** **Method A:** No change to the Radio Regulations and suppress Resolution 237 (WRC-15) **Method B:** Add a new WRC Resolution No change to the RR Table of Frequency Allocations and to add a new WRC Resolution. Suppress Resolution **237 (WRC-15)**. **Method C:** Add a new WRC Resolution and non- mandatory reference to ITU-R Recommendation No change to the Table of Frequency Allocations in the Radio Regulations, and add a new WRC Resolution. **SADC support Method A** (**NOC**) and **Method C** as second option.
Agenda Item 1.14 is considering appropriate regulatory actions for High-Altitude Platform Stations (HAPS), within existing Fixed Service allocations.	**SADC Support the following Methods** ➢ Band 6440 – 6520MHz : **Method B1 option 1** Designate the band 6 440-6 520 MHz worldwide for use by HAPS and limited to HAPS-to-ground direction via a new footnote RR No. 5.A114[-6400B1-O1]

	together with a new Resolution [A114-6400B1-O1] (WRC-19) that will incorporate all necessary provisions to protect the existing services and taking into account RR No. 5.458. To this effect the existing footnote RR No. 5.457 and existing Resolution 150 (WRC-12) need to be amended accordingly. ➢ The band 6 560-6 640 MHz: **Method A** This band is not under consideration for HAPS; therefore, no modifications are required. The existing HAPS designation will remain unchanged, limited to the ground-to-HAPs direction, in accordance with Resolution 150 (WRC-12). ➢ The band 27.9-28.2 GHz **Method B1 option 1** Designate the band 27.9-28.2 GHz worldwide for use by HAPS and limited to HAPS-to-ground direction through a new footnote RR No. 5.E114[-28B1-O1]. A new Resolution [E114 28+31B1-O1] (WRC-19) will incorporate all necessary provisions to protect the existing services. Suppress RR No. 5.537A and modify Resolution 145 (Rev.WRC-12) accordingly. ➢ The band 31–31.3 GHz **Method B1 option 1A+1B** **Option 1a**: Identify worldwide the band 31-31.3 GHz for use by HAPS in the HAPS-to ground direction through an new footnote RR No. **5.F114[-31B1-O1A].** Such use is proposed to be subject to the provisions of a new Resolution [E114-28+31B1-O1] (WRC-19) and/or Resolution 145 (Rev.WRC-12) that will be amended to incorporate all necessary provisions to protect the existing services.

Option 1b: Identify worldwide the band 31–31.3 GHz for use by HAPS in the ground-to-HAPS direction through an new footnote RR No. **5.F114[-31B1-O1B].** Such use is proposed to be subject to the provisions of a new Resolution [E114-28+31B1-O1] (WRC-19) and/or Resolution 145 (Rev.WRC-12) that will be amended to incorporate all necessary provisions to protect the existing services.

- The band 38-39.5 GHz: **Method B2 option 1C**

Option 1c: Identify the band 38-39.5 GHz through a new footnote RR No. 5.G114[-38B2-O1C] for use by HAPS in the ground-to-HAPS direction on a worldwide basis with all relevant provisions included in a new footnote RR No. 5.G114-38B2-O1C].

- The band 47.2–47.5 & 47.9 48.2MHz: **Method B1**

Method B1: The use of the bands by HAPS is proposed to be subject to the provisions of Resolution 122 (WRC-07) slightly amended to review the protection of existing services.

Bands	**Methods and options**	
	Method	**Option**
6 440-6 520 MHz	B1	1
6 560-6 640 MHz	A	N/A
27.9-28.2 GHz	B1	1
31-31.3 GHz	B1	1A+1B
38-39.5 GHz	B2	1C
47.2-47.5 GHz / 47.9-48.2 GHz	B1	Example 2

Agenda Item 1.15 is considering identification of frequency bands for use by administrations for the land-mobile and fixed services applications operating in the frequency range 275-450 GHz, in accordance with Resolution 767.	**Methods to satisfy the Agenda Item:** **Method A:** No change to the Radio Regulations. **Method B:** Modifying the existing footnote RR No. 5.565 proposing a **portions** of frequency bands in the range 275-450 GHz for FS/LMS applications. **Method C:** This method suggests adding a new footnote to identify the 275-450 GHz frequency range for use by FS/LMS applications, while protecting EESS (passive) and RAS using the evolving guidance of ITU-R Recommendations and Reports, taking into account that there are no service allocations above 275 GHz. **Method D:** Adding a new footnote RR No. **5.D115** is proposed for land mobile and fixed service applications: 275-296 GHz, 306-313 GHz, 320-330 GHz and 356-450 GHz. **Method E:** Adding a new footnote RR No. **5.E115** and modifying the existing footnote RR No. 5.565 are proposed for FS/LMS applications in portions of the 275-450 GHz band. **Method F:** Adding a new footnote RR No. **5.F115** is proposed for FS applications in **portions** of the 275-450 GHz band and for LMS applications in the **entire** 275-450 GHz frequency band. **Method G:** Adding a new footnote RR No. **5.G115** is proposed for FS/LMS applications in portions of the 275-450 GHz band.

	SADC Support Method B
Chapter 2: Broadband Applications in the Mobile Service (Zimbabwe)	
Agenda Item 1.13 is to consider identification of frequency bands for the future development of International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution 238.	➢ SADC supports the identification of the 26 GHz (24.25-27.5 GHz), 40 GHz (37-43.5 GHz) and 70 GHz (66-71 GHz) frequency bands for IMT, based on the potential for global harmonization in these bands and considering the outcome of sharing and compatibility studies. ➢ SADC does <u>not support</u> the identification of the 32 GHz and Band K (71-76 and Band L (81-86 GHz) under this resolution. ➢ SADC also supports identification of IMT in the bands in the 50 GHz range (45.5 – 52.6 GHz). **Band A (24.25-27.5 GHz),** ➢ SADC supports the allocation of the band 24.25 – 25.25 GHz to the MS (except aeronautical mobile) on a primary basis in Regions 1 and 2 and identification of the band 24.25 – 27.5 GHz for IMT in all three Regions. • Method A2 – identify the band for IMT has two alternatives: o **Alternative 1:** allocate the 24.25-25.25 GHz frequency band, to the MS (except aeronautical mobile); limit the band for the terrestrial component of IMT within the land mobile service o **Alternative 2:** allocate the 24.25-25.25 GHz frequency band, to the MS (except aeronautical mobile); limit the band for the terrestrial component of IMT

	➢ SADC supports **Method A2, Alternative 2** as there is no need to restrict IMT to the LMS in line with other IMT identifications; use of IMT on ships in the MMS will be very limited and not impact the sharing environment compared to LMS use. • **Condition A2a: Protection of EESS (passive) in the 23.6-24 GHz frequency band:** o **Option 1:** Introduce unwanted emission levels in Table 1-1 of Res. 750 o **Option 2:** Introduce unwanted emission levels in Table 1-2 of Res. 750 o **Option 3:** Develop a WRC Recommendation stipulating unwanted emission levels o **Option 4:** Develop a WRC Recommendation and move Table 1-2 of Res. 750 to the new WRC Recommendation o **Option 5:** No condition is necessary ➢ SADC supports **Condition A2a: Option 1** to ensure that the EESS (pas) is protected (Table 1-2 is only recommended values); WRC Rec also has no mandatory effect. Further, moving Table 1-2 of Res. 750 to WRC Rec is outside the scope of the agenda item. ➢ SADC adopted OOBE values of -32 dB (W/200 MHz) for IMT BS and -28 dB (W/200 MHz) for IMT UEs. ➢ For the other services, SADC supports no additional conditions • Condition A2b: EESS (pas) in the 50.2-50.4 GHz and 52.6-54.25 GHz frequency bands (2nd harmonic): **Option 3** • Condition A2c: earth stations in the SRS/EESS (↓) in 25.5-27 GHz band: **Option 5**

	• Condition A2d: transmitting earth stations in the FSS (↑) at known locations: **Option 4** • Condition A2e: ISS and FSS (↑) receiving space stations: **Option 9** • Condition A2f: Radio Astronomy protection in band 23.6-24 GHz): **Option 3** • Condition A2g: Protection of multiple services: **Option 5** **Band B (31.8-33.4 GHz),** ➢ SADC supports **Method B1 (NOC)** for the 31.8-33.4 GHz frequency band (only option in draft CPM Report) since sharing with RNS is not feasible and EESS (pas) protection requirements in adjacent band requires very stringent unwanted emission levels **Band C (37-40.5 GHz),** ➢ SADC supports the identification of the band 37 – 40.5 GHz for IMT in all three Regions. • **Method C2** – identify the band for IMT has two alternatives: o **Alternative 1:** identify the 37-40.5 GHz frequency band for the terrestrial component of IMT within the land mobile service in all Regions o **Alternative 2:** identify the 37-40.5 GHz frequency band for the terrestrial component of IMT in all Regions

	➢ SADC supports **Method C2, Alternative 2** as there is no need to restrict IMT to the LMS in line with other IMT identifications; use of IMT on ships in the MMS will be very limited and not impact the sharing environment compared to LMS use. ➢ For the other services, SADC supports <u>no additional conditions.</u> • <u>Condition C2a:</u> EESS (pas) in the 36-37 GHz band: Option 2 • <u>Condition C2b:</u> FSS (space-to-Earth): Option 6 • <u>Condition C2c:</u> SRS (space-to-Earth): Option 3 • <u>Condition C2d:</u> SRS (Earth-to-space) and EESS (Earth-to-space): Option 2 • <u>Condition C2e:</u> Protection measures for multiple services: Option 3 **Band D (40.5-42.5 GHz),** ➢ SADC supports the identification of the band 40.5-42.5 GHz for IMT in all regions. • **Method D2: Identification of the frequency band 40.5-42.5 GHz for IMT in accordance with the following 2 alternatives** o **Alternative 1:** upgrade the existing secondary allocation to the MS in the frequency band 40.5-42.5 GHz to a primary allocation in the Table of Frequency allocations and identify the frequency

	band for the terrestrial component of IMT within the land mobile service. o **Alternative 2:** upgrade the existing secondary allocation to the MS in the frequency band 40.5-42.5 GHz to a primary allocation in the Table of Frequency allocations and identify the frequency band for the terrestrial component of IMT. ➢ SADC supports **Method D2, Alternative 2** as there is no need to restrict IMT to the LMS in line with other IMT identifications; use of IMT on ships in the MMS will be very limited and not impact the sharing environment compared to LMS use. ➢ For the other services, SADC supports <u>no additional conditions.</u> • <u>Condition D2a:</u> Protection measures for the FSS (space-to-Earth) **Option 6** • <u>Condition D2b:</u> Protection measures for the RAS in band 42.5-43.5 GHz **Option 3** • <u>Condition D2c:</u> Protection measures for multiple services **Option 3** **Band E (42.5-43.5 GHz),** ➢ SADC supports the identification of the band 42.5-43.5 GHz for IMT in all regions.

	• **Method E2**: Identification of the frequency band 42.5-43.5 GHz for IMT in accordance with the following 2 alternatives
	  o **Alternative 1:** identify the frequency band for the terrestrial component of IMT within the land mobile service.
	  o **Alternative 2:** identify the frequency band for the terrestrial component of IMT.
	
	➢ SADC supports **Method E2, Alternative 2** as there is no need to restrict IMT to the LMS in line with other IMT identifications; use of IMT on ships in the MMS will be very limited and not impact the sharing environment compared to LMS use.
	
	➢ For the other services, SADC supports <u>no additional conditions.</u>
	
	• <u>Condition E2a:</u> Protection measures for FSS (Earth-to-space) **Option 7**
	
	• <u>Condition E2b:</u> Protection measures for RAS in the band 42.5-43.5 GHz **Option 3**
	
	• <u>Condition E2c:</u> Protection of multiple services **Option 5**
	
	• <u>Condition E2d:</u> Measures relation to transmitting earth stations in the FSS (Earth-to-space) at known locations **Option 3**
	
	Band F (45.5-47 GHz),
	
	• **Method F1:** NOC

	• **Method F2:** NOC, proposal for further ITU-R studies • **Method F3:** Identification of the band 45.5-47 GHz for IMT o **Alternative 1:** identification of the frequency band for the terrestrial component of IMT within the LMS taking into account 5.553 o **Alternative 2:** identification of the frequency band for the terrestrial component of IMT taking into account 5.553 • **Method F4:** Identification of the band 45.5-47 GHz for IMT <u>and removal of the frequency band from RR No. 5.533</u>: o **Alternative 1:** identification of the frequency band for the terrestrial component of IMT within the LMS and removing the band from 5.553 o **Alternative 2:** identification of the frequency band for the terrestrial component of IMT and removing the band from 5.553 ▪ **5.553:** In the bands 43.5-47 GHz and 66-71 GHz, stations in the land mobile service may be operated subject to not causing harmful interference to the space radiocommunication services to which these bands are allocated (see No. 5.43).

	➢ SADC supports **Method F4**, **Alternative 2** *(identification of the frequency band for the terrestrial component of IMT and removing the band from 5.553)* ➢ For the other services SADC supports <u>no additional measures.</u> • <u>Condition F3a:</u> Protection measures for the MSS Studies submitted to CPM19-2 clearly indicating that no conditions are necessary to protect the MSS • <u>Condition F3b:</u> Protection measures for the RNS and RNSS No studies conducted as no characteristics were submitted • <u>Condition F3c:</u> Protection measures for multiple services Method 3 **Band G (47-47.2 GHz),** Note: No studies were conducted within ITU for this band. • **Method G1:** NOC • **Method G2:** NOC, proposal for further ITU-R study • **Method G3:** Identification of the band 47-47.2 GHz for IMT o **Alternative 1:** allocate the band to the LMS and identify the band for the terrestrial component for IMT. o **Alternative 2:** allocate the band to the MS (except aeronautical mobile) and identify the band for the terrestrial component of IMT. ➢ SADC supports **Method G3, Alternative 2** *(allocate the band to the MS (except aeronautical mobile) and identify the band for the terrestrial component of IMT)*

	➢ For the other services: SADC supports no additional measures. • Condition G3a: Protection measures for the ARS and ARSS **no studies have been done for this band** • Condition G3b: Protection measures for multiple services **Method 3 (no condition is necessary)** **Band H (47.2-50.2 GHz),** • **Method H2:** Possible identification of the frequency band 47.2-50.2 GHz for IMT o **Alternative 1:** identify the 47.2-50.2 GHz frequency band for the terrestrial component of IMT within the land mobile service o **Alternative 2:** identify the 47.2-50.2 GHz frequency band for the terrestrial component of IMT ➢ SADC supports **Method H2, Alternative 2** as there is no need to restrict IMT to the LMS in line with other IMT identifications; use of IMT on ships in the MMS will be very limited and not impact the sharing environment compared to LMS use. • **Condition H2a:** Protection of EESS (passive) in the 50.2-50.4 GHz frequency band: o **Option 1:** Introduce unwanted emission levels in Table 1-1 of Res. **750** o **Option 2:** Introduce mandatory limits on unwanted emissions (Table 1-1 of Res.750) taking into account 5.340.1

	○ **Option 3:** No condition is necessary ➢ SADC supports **Condition H2a: Option 2;** with the following protection values from Study D: -31 to -35 dB (W/200 MHz) for BS {consider -32 dB (W/200 MHz)} -25 to -31 dB (W/200 MHz) for UE {consider -28 dB (W/200 MHz)} ➢ For the other services, SADC supports <u>no additional conditions.</u> • <u>Condition H2b:</u> FSS space stations (Earth-to-space) **Option 7** • <u>Condition H2c:</u> Transmitting earth stations in FSS (space-to-Earth) **Option 5** • <u>Condition H2d:</u> Protection measures for multiple services **Option 5** **Band I (50.4-52.6 GHz),** ❑ **Method I2:** Identification of the frequency band 50.4-52.6 GHz for IMT in accordance with the following 2 alternatives: • **Alternative 1:** Under this alternative, identify the 50.4-52.6 GHz frequency band for the terrestrial component of IMT within the land mobile service. • **Alternative 2:** Under this alternative, identify the 50.4-52.6 GHz frequency band for the terrestrial component of IMT. ➢ SADC supports **Method I2, Alternative 2** as there is no need to restrict IMT to the LMS in line with other IMT identifications; use of IMT on ships in the MMS

	will be very limited and not impact the sharing environment compared to LMS use. ❑ **Condition I2a: Protection measures for the EESS (passive) (50.2-50.4 GHz and 52.6-54.25 GHz)** • **Option 1:** Introduce unwanted emission levels in Table 1-1 of Res. **750** • **Option 2:** Introduce unwanted emission levels in Table 1-1 of Res. **750** taking into account **5.340.1** • **Option 3:** ✓ No conditions necessary. ➢ SADC supports **Condition I2a: Option 2**; unwanted emissions to protect EESS (pas) to be confirmed for the band 52.6-54.25 GHz noting 5.340.1 and the unwanted emission values stipulated for Band H (47.2-50.2 GHz). ➢ For the other services, SADC supports <u>no additional conditions.</u> • <u>Condition I2b:</u> Protection measures for the FSS (Earth-to-space) **Option 7** • <u>Condition I2c:</u> Protection measures for multiple services **Option 5** • <u>Condition I2d:</u> Measures relating to transmitting earth stations in the FSS (Earth-to-space) **Option 2**

	Band J (66-71 GHz), ❑ **Method J2:** Identification of the frequency band 66-71 GHz for IMT in accordance with the following 2 alternatives • **Alternative 1:** Under this alternative, identify the 66-71 GHz frequency band for the terrestrial component of IMT within the land mobile service • **Alternative 2:** Under this alternative, identify the 66-71 GHz frequency band for the terrestrial component of IMT. ➢ SADC supports **Method J2, Alternative 2** as there is no need to restrict IMT to the LMS in line with other IMT identifications; use of IMT on ships in the MMS will be very limited and not impact the sharing environment compared to LMS use. Further, because sharing between MSS and ISS is feasible, there is no need to retain the band in **5.553**. ❑ **Condition J2a: Measures for coexistence with MGWS and other WAS** • **Option 1:** Reflect in the WRC Resolution corresponding to the IMT identification the shared use of the band including coexistence techniques between IMT and MGWS/WAS and invite ITU-R to develop necessary reports/recommendations in this regard. • **Option 2:** Band intended for IMT deployment. In some countries the band may also be used by WAS including MGWS; coexistence techniques between these systems may be needed, which can be reflected in WRC Resolution/Recommendation.

	• **Option 3:** Protection of other services (in-band and/or adjacent band) by IMT should be contained in a WRC Resolution cross-referenced in the footnote in RR Article 5 in which the frequency band is identified for IMT. • **Option 4:** No condition is necessary ➢ SADC supports the following: **Condition J2a: Option 1:** Reflect in the WRC Resolution corresponding to the IMT identification the shared use of the band including coexistence techniques between IMT and MGWS/WAS and invite ITU-R to develop necessary reports/recommendations in this regard **Condition J2b:** *Studies were submitted to CPM19-2 indicating that no conditions are necessary to protect MSS in the band 66-71 GHz.* **Condition J2c:** Option 3 – no additional condition necessary, **Band K (71-76 GHz),** ➢ SADC supports **Method K1 (NOC)** for this band; adjacent band compatibility with RLS (automotive radars) is problematic. Characteristics where not received for broadcasting service, ARS and ARSS and therefore no studies were conducted. Further, studies have not been conducted for RAS, BSS and MSS (s-to-E).

	Band L (81-86 GHz). ➢ SADC supports **Method L1 (NOC)** for this band; adjacent band compatibility with RLS (automotive radars) is problematic. Characteristics were not received for the ARS and ARSS and therefore no studies were conducted. Studies for SRS (pas) not needed (sensors around other planets). No studies were conducted for the MSS.
Agenda Item 1.16 is to consider issues related to wireless access systems, including radio local area networks (WAS/RLAN), in the frequency bands between 5 150 MHz and 5 925 MHz, and take the appropriate regulatory actions, including additional spectrum allocations to the mobile service, in accordance with Resolution 239 (WRC-15).	➢ Studies demonstrate and confirm again that RLANs operating in the 5350-5470 MHz frequency range cannot share with EESS (active) confirming that sharing between RLAN deployments in the 5350-5470 MHz frequency range and EESS (active) may only be feasible if additional RLAN mitigation measures are implemented. ➢ Three additional studies have been made with LAA-LTE, compared to ECC Report 244. They show that compatibility of a mix LAA and Wi-Fi market can share with FSS. Results are roughly the same as for the case of Wi-Fi only. Therefore, the impact of adding LAA-LTE use case in 5 GHz bands appears to have minimal effect on the overall results of compatibility and sharing as shown in ECC Report 244. **BAND A 5150 – 5250 MHz** Method A1 – NOC no change to RR Method A2 - Revision to Resolution 229 (Rev.WRC-12) to enable outdoor RLAN operations including possible associated conditions for new e.i.r.p. limits.

	Method A3 - Revision to Resolution 229 (Rev.WRC-12) to enable outdoor RLAN operations by applying the same conditions of use as defined for the 5 250 5 350 MHz band in resolves 4 of Resolution 229 (Rev.WRC-12) Method A4 - Method A4: Revisions to Resolution 229 (Rev.WRC-12) to facilitate limited RLAN outdoor operation and RLAN in-vehicle (cars and trains) usage operation with associated e.i.r.p. levels Method A5 - Revisions to Resolution 229 (Rev.WRC-12) to enable in-car use of RLAN operation with e.i.r.p. up to 40 mW Method A6 - Revision to Resolution 229 (Rev.WRC-12) to enable outdoor RLAN operations including associated conditions for new e.i.r.p. limits and out-of-band emission limits **SADC Position** SADC supports Method A3 – Revision to Resolution 229 (Rev.WRC-12) to enable outdoor RLAN operations by applying the same conditions of use as defined for the 5 250 5 350 MHz band in resolves 4 of Resolution 229 (Rev.WRC-12). Zimbabwe indicated that they prefer method A6 for this band. **BAND B 5250 – 5350 MHz** SADC supports Method B (NOC) **BAND C 5350 – 5470 MHz** SADC supports Method C (NOC) **BAND D 5725 – 5850 MHz** Method D1 – NOC no change to RR Method D2 - A new worldwide or Regional primary MS allocation Allocate the 5 725-5 850 MHz band to the mobile service on primary basis worldwide or in Region 1 to accommodate WAS/RLAN use restricted to indoor

	operation with e.i.r.p. limits up to 200 mW including associated mitigation techniques and together with the revision of Resolution 229 Method D3 - Accommodate WAS/RLAN in an existing or new footnote Accommodate WAS/RLAN in an existing footnote having mobile primary allocation or in a new footnote having mobile primary allocation. SADC supports Method D2 **BAND E 5850 – 5925 MHz** SADC supports Method E (NOC)
Agenda Item 9.1 **Issue 9.1.1** is considering Implementation of International Mobile Telecommunications in the frequency bands 1885-2025 MHz and 2110-2200 MHz.	➢ SADC considered studies conducted under AI 9.1.1 as well as View 1 and View 2, as noted in the CPM text, with an interest on ensuring co-existence of both the Satellite component and the Terrestrial components of IMT in frequency bands 1980-2010 MHz and 2170-2200 MHz in different countries. ➢ As observed in the CPM 19-2 Report, for interference from IMT BSs and IMT UEs to IMT space stations (Scenario A1), in the 1 980-2 010 MHz frequency band, the level of potential interference from IMT BS into IMT space stations is high, while the level of potential interference from IMT UE into IMT space stations is low. Accordingly, SADC notes that IMT Base Stations transmitting in the 1980-2010MHz band pose a significant interference risk (with exceedance up to 56dB) to Space Stations for the Satellite component of IMT, while the interference risk from terrestrial

	IMT Mobile Stations is low and manageable through mitigation techniques. ➢ SADC member states use or are planning to use Channelling Arrangements B1 of ITU-R M. 1036-5 for WCDMA networks and would therefore, where necessary, implement Arrangements B6 for the extension band (1980 -2010 MHz paired with 2170-2200 MHz.). ITU-R studies established that such a deployment scenario (B6) results in a manageable interference situation which can be dealt with bilaterally. ➢ SADC is, however, concerned that elsewhere in other Regions base stations transmit in the 1980 – 2010MHz band thereby raising the potential of interference into MSS Space Stations. ➢ Furthermore, SADC notes that, in their current state and in respect of these bands, the Radio Regulations do not have provisions aimed at preventing interference from IMT base stations to IMT space stations and there is no coordination process between the administration responsible for the MS and the administration responsible for the MSS and no process to identify affected administrations. **SADC Position** SADC therefore supports the implementation of regulatory measures aimed at preventing IMT base stations transmitting in the 1980-2010MHz from causing harmful interference to IMT Space Station operating in the same band. Accordingly, SADC supports the introduction of an e.i.r.p limit, in the Radio

	Regulations, applicable to IMT base stations transmitting in the frequency band 1980-2010MHz. The value of such an e.i.r.p limit needs to be determined through further analysis of relevant ITU-R studies, with a view to ensure balanced prospects for the growth of both the terrestrial and satellite IMT ecosystems. In the case of the other scenarios A2, B1 and B2; while cases of potential interference could exist, these are considered to be of a lesser concern as they are manageable on a national basis using existing provisions in the radio regulations. In the case of scenarios A2, B1, B2, SADC supports no change to the radio regulations apart from noting that some updates to the existing provisions will be required in respect of Appendix 7 (Table 7a) and Appendix 5 (Table 5-2) of the radio regulations. In particular, the deletion of note 3 under Table 5-2 to extend the application of the existing pdf limits applicable to the Satellite services to include the protection of terrestrial IMT
Agenda Item 9.1 **Issue 9.1.5** is consideration of the technical and regulatory impacts of referencing Recommendations ITU-R M.1638-1 and ITU-R M.1849-1 in Nos. 5.447F and 5.450A of the Radio Regulations.	Two approaches were developed to satisfy this agenda item. ➢ Approach A: Delete the second sentence of the footnotes, where the Recommendations are referenced, and clarify that the provisions of Resolution 229 (Rev.WRC-12) apply in this case, such as presented in section 2/9.1.5/4.1 in the CPM.

	➢ Approach B: Another alternative that would maintain the sharing conditions between WAS/RLANs and radars would be to delete portions of the sentence of the footnotes, where the Recommendations are referenced, and retain the provisions “shall not impose more stringent technical and operational limits upon the mobile service than those in RR No. 5.446A” (see 2/9.1.5/4.2 below). **SADC Position** SADC supports Approach A which SADC considers to be a long-term solution that would avoid reopening the issue of technical and regulatory impacts of referencing new Recommendation versions in RR Nos. 5.447F and 5.450A.
Agenda Item 9.1 **Issue 9.1.8** is considering studies on the technical and operational aspects of radio networks and systems, as well as spectrum needed, including possible harmonized use of spectrum to support the implementation of narrowband and broadband machine-type communication infrastructures, in order to develop Recommendations, Reports and/or Handbooks, as appropriate, and to take appropriate actions within the ITU Radiocommunication Sector (ITU-R) scope of work.	➢ This AI is not satisfied through a Method(s), the Director of the Radiocommunication Bureau will report on these studies under agenda item 9.1 of WRC-19 ➢ SADC supports No Change to the Radio Regulations under Resolution 958 (WRC-15). ➢ There is no need for allocation of additional spectrum for Machine Type Communication (MTC), since spectrum already identified or under study for IMT identification may be utilized for narrowband and broadband MTC.
Chapter 3: Satellite Services (Malawi)	
Agenda Item 1.4	SADC supports:

is to consider the results of studies in accordance with Resolution 557 [COM6/9] (WRC-15), and review, and revise if necessary, the limitations mentioned in Annex 7 to Appendix 30 (Rev. WRC -2), while ensuring the protection of, and without imposing additional constraints on, assignments in the Plan and the List and the future development of the broadcasting-satellite service within the Plan, and existing and planned fixed-satellite service networks.	➢ Deletion of limitations “A1a” and “A2a”, subject to new resolution [C14-LIMIT-A1A2] (WRC-19); ➢ Deletion of limitations “A2b”, “A3b”, and “A3c”; ➢ Deletion of limitation “A3a” subject to draft new Resolution [A14-LIMITA3] (WRC-19); ➢ Retention of limitations “A1b”, “A2c” and “B”; ➢ Application of draft new Resolution [B14-PRIORITY] (WRC-19), giving priority to national assignments in the Regions 1 and 3 Plan with equivalent downlink protection margin values equal or below -10 dB; and ➢ Suppression of Resolution 557 (WRC-15); ➢ Should WRC-19 decide to remove some or all the current restrictions on the use of the orbital arc for Regions 1 & 3 BSS Networks as contained in Annex 7 to RR Appendix 30, priority on the use of these new orbital positions should be given to those countries in Regions 1 & 3 who make such a request, with a view to remedy and improve their current negative reference situation.
Agenda Item 1.5 is to consider the use of the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) by earth stations in motion (ESIM) communicating with geostationary space stations in the fixed-satellite service and take appropriate action, in accordance with Resolution 158.	➢ Support operation of ESIM in 17.7 -19.7 GHz and 27.5 -29.5 GHz whilst ensuring protection of existing and planned primary services allocated in these frequency bands ➢ Support and Participate in the on-going studies in WP4A to ascertain feasibility of sharing with existing services in the band

Agenda Item 1.6 is to consider the development of a regulatory framework for non-GSO FSS satellite systems that may operate in the frequency bands 37.5-39.5 GHz (space-to-Earth), 39.5 42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space), in accordance with Resolution 159 [COM6/18] (WRC 15).	There are two issues to address in this agenda item. ➢ Issue 1: Developing a regulatory framework for non-GSO FSS satellite systems that may operate in the frequency bands 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space). ➢ Issue 2: Modifying Resolution 750 (Rev.WRC-15) for the protection of EESS (passive) in the band 50.2-50.4 GHz. **SADC Position** Issue 1 has two methods and SADC supports method A with Option 3 of footnote 5.A16 and option 1 of footnote 5.B16. On Issue 2 SADC supports option A for the protection of EESS (passive).
Agenda Item 7 is to consider possible changes, and other options, in response to Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference, an advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks, in accordance with Resolution 86 (Rev. WRC-07), in order to facilitate rational, efficient and economical use of radio frequencies and any associated orbits, including the geostationary satellite orbit.	**ISSUE A:** **Bringing into use (BIU)** SADC support that frequency assignment to space station of non-GSO satellite systems shall be considered as having been brought into use, when notifying administration informed the Bureau that at least one space station with the confirmed capability of transmitting or receiving, has been deployed on one of the notified orbital planes of the non-GSO satellite system, irrespective of the notified number of orbital planes and satellites per orbital plane in the system. Furthermore SADC Supports Option A , the 90-day requirement to bring into use the satellite filling . This is in alignment with the current regulatory requirement for GSO satellite networks **Milestones**

	SADC supports option F which represent a good balance between flexibility and avoidance of spectrum warehousing. **Transitional Measures** SADC supports Option 1 for the transition to new regulations and a commencement date of 01 January 2021 as it is consistent with the date of entry into force of the Final Acts. **ISSUE B:** SADC supports the only method in the CPM Report where coordination arc criteria would substitute the ΔT/T>6% criteria that currently applies. This will reduce the number of administrations identified for coordination, reducing the number of coordination processes and resulting in a reduction of required resources in administrations, operators, and the Bureau. This represent a more efficient coordination procedures, while keeping the possibility for Administrations to request ΔT/T criteria under No 9.41. **ISSUE C:** SADC supports the singe method proposed to address the 7 sub –issues are Issue C **ISSUE D:** SADC supports the publication in the CR/D special section the “definitive lists” of those satellite networks with which coordination under Nos 9.12, 9.12A or

	9.13 needs to be effected, similarly to what is currently done under the provisions of No 9.36.2. This is reflected in the CPM Report as Method D1. **ISSUE E:** SADC support establishment of special measures to be applied once with respect to the submission received from an administration having no frequency assignments in the RR Appendix 30B List, the details of which are contained in the attachment to DRAFT NEW RESOLUTION [A7(E)-AP30B] (WRC 19) to facilitate the tasks of those administrations to provide an economically viable satellite service to its national territory as initially considered when the allotment Plan was established in 1988. **ISSUE F:** SADC supports method F1 which calls for updating the coordination triggers to take into account technological advances and avoid some unnecessary coordination while assuring adequate protection of other satellite networks. **ISSUES G:** SADC supports Method G1 which protects administrations from receiving a reduced protection due to a network to which they have not given their agreement, this method prescribes that when a network has entered into the List using § 4.1.18, and when the recording of the associated assignment transitions from provisional to definitive while there is still disagreement, the

	reference situation of the interfered-with network should be updated in consultation with, and only with the agreement of, the affected administration. **ISSUE H:** SADC support the single method proposed in the CPM Report **ISSUE I:** SADC supports Method I2 which proposes a WRC Resolution to satisfy this agenda item. **ISSUE J.** SADC supports method J2 – which proposes no change to the Radio Regulations since the pfd limit referred to in the first paragraph of Section 1 of Annex 1 to RR Appendix 30 is hard limit that shall not be exceeded in order to protect BSS assignments from interference that may be caused by BSS networks located outside an arc of 9 degrees around a wanted BSS network. **ISSUE K.** SADC supports the Only Method, Allowing additional examination allowing networks to receive a favorable finding in respect to senior networks that are no longer considered to be affected and avoiding overprotection of senior networks based on outdated characteristics.
Agenda Item 9.1	

Issue 9.1.2 is the implementation of International Mobile Telecommunications (IMT) in the frequency bands 1885-2025 MHz and 2110-2200 MHz.	❖ SADC should support Possible action 3, Alternative 2 of the draft CPM text which will protect both mobile stations and base stations enabling the support of SDL, TDD and FDD arrangements. The "Possible action 3, Alternative 2" will provision a pfd limit specification for the BSS (sound) in the frequency band 1452-1492 MHz in Table 21-4 under RR No. 21.16 in accordance with the results of sharing and compatibility studies to protect IMT stations as follows: –131.3 dB(W/m2) in 1 MHz for 0 <= δ <= 5, –131.3 + 16/20(δ – 5) dB(W/m2) in 1 MHz for 5 < δ <= 25 –115.3 dB(W/m2) in 1 MHz for 25 < δ <= 90
9.1 **Issue 9.1.3** Study of technical and operational issues and regulatory provisions for new non-geostationary-satellite orbit systems in the 3700 - 4200 MHz, 4 500-4 800 MHz, 5 925-6 425 MHz and 6 725-7 025 MHz frequency bands allocated to the fixed-satellite service	**SADC Preliminary Views:** • **No Change** to Radio Regulations wrt articles 21 & 22 epfd **Why NO CHANGE** • In SADC , there is heavy reliability of geostationary-satellite orbit systems in the 3 700-4 200 MHz and 5 925-6 425 MHz frequency bands spectrum for GSO satellite service due to the characteristics of this band in accommodating the heavy rains in the tropical climate.

	• GSO satellite systems are very important to support the economic growth of the SADC countries through distribution equity of ICT infrastructure, financial service, and government sector. • There is no calculation method on how to measure the amount of maximum aggregate power flux-density produced at the geostationary-satellite orbit and within ±5° of inclination around the geostationary-satellite orbit by a non-geostationary-satellite system in the fixed-satellite service • In fact, adding another category of service to those currently allocated to non-geostationary systems would increase the doubt on how the receiving space station of the FSS in RR Appendix **30B** would be protected. • In addition, at this stage there is no information on the new non-geostationary satellite system as referred to in the WRC-19 agenda item/issue thus there
Agenda Item 9.1 **Issue 9.1.9** is to carry out studies relating to spectrum needs and possible allocation of the frequency band 51.4-52.4 GHz to the fixed-satellite service (Earth-to-space).	➢ Support the additional allocation of 1 GHz spectrum in 51.4 – 52.4 GHz band for the uplink GSO FSS feeder links based on the results of studies on additional spectrum needs for development of the fixed-satellite service,

	➢ On sharing and compatibility studies with existing services for consideration of this new primary allocation SADC supports modification of: ➢ article 5 of RR to make an allocation to the FSS (Earth-to-space) RESOLUTION 750 (Rev.WRC-15) to protect existing services Two issues were raised: ➢ The protection of non-GSO EESS (passive) sensors operating in the frequency band 52.6-54.25 GHz can be achieved by limiting the FSS earth station unwanted emissions falling in the passive band Option 2A: (-64 to -37) dBW in any 100 MHz of the EESS (passive) band for FSS earth stations ➢ The protection of future GSO EESS (passive) sensorsOption 1B: Ensuring a minimum angular separation in the GSO arc between the FSS and the EESS (passive) space stations depending on the FSS ES unwanted emission levels falling in the passive band. (0.5 and 1.8 degrees)
Chapter 4: Science Services (Lesotho)	
Agenda Item 1.2 is to consider in-band power limits for earth stations operation in the mobile-satellite service, meteorological-satellite service and Earth exploration-satellite service in the frequency bands 401-403 MHz and 399.9-400.05 MHz, in accordance with Resolution 765 (WRC-15).	Methods to satisfy the Agenda Item: For the band 399.9-400.05 MHz: **Method A:** No Change

	Method B: To include in RR the relevant e.i.r.p. limits given in section 4/1.2/3.2 by adding a new footnote in the bands 399.9-400.03 MHz in Article 5 of RR, leaving the band 400.03-400.05 MHz without e.i.r.p. limits. This method proposes a transition period up to 22 November 2024 for some systems operating in the MSS **Method C:** To include in RR the relevant e.i.r.p. limits within reference bandwidth of 4 kHz and within 399.9-400.05 MHz, based on figures given in section 4/1.2/3.1 by adding a new footnote in the band 399.9-400.05 MHz in the Table of Frequency Allocations in RR Article **5**. This method introduces limits for the whole 399.9-400.05 MHz band without breaking it into sub-bands and also proposes a transition period until 22 November 2024 for some systems operating in the MSS **Method D:** The proposed method is to include in RR the relevant e.i.r.p. limits given in section 4/1.2/3.2 by adding a new footnote in the bands 399.9-400.02 MHz in the Table of Frequency Allocations in RR Article **5**, leaving the band 400.02-400.05 MHz without e.i.r.p. limits. This method proposes a transition period up to 22 November 2029 for some systems operating in the MSS For the band 401-403 MHz: **Method E:** To include in RR the relevant e.i.r.p. limits within reference bandwidth of 4 kHz and within 401-403 MHz, based on figures given in section 4/1.2/3.2 by adding a new footnote in the band 401-403 MHz in the Table of Frequency Allocations in RR Article **5**. This method introduces e.i.r.p. limits for

	the whole frequency band and the end of transition period, after which new regulations would apply, is proposed to be set on 22 November 2024 or 2029 (date to be decided by WRC-19), depending on WRC-19 decision **Method F:** To include in RR the relevant e.i.r.p. limits and e.i.r.p. densities in different bands by adding a new footnote in the bands 401-403 MHz in Article 5 of RR. This method proposes specific measures for Telecommand to ensure protection of EESS and MetSat **Method G:** The proposed method is to include in the RR the relevant e.i.r.p. limits given in section 4/1.2/3.2 by adding a new footnote in the band 401-403 MHz in the Table of Frequency Allocations in RR Article **5**. This method contains WRC-19 Resolution (still to be developed) which provides provisions for continuation of some telecommand operations while ensuring the protection of the EESS and MetSat in these frequency bands after 1 January 2029. **SADC position** For the band 399.9-400.05 MHz, **SADC supports Method C.** In addition, SADC proposes specific provisions for the frequency band 399.9 400.05 MHz until 22 November 2024. For the band 401 – 403 MHz, **SADC supports Method E.** In order to ensure long term continuity for the operation of satellite data collection systems, SADC supports the establishment of in-band e.i.r.p. limits,

	as appropriate, for earth stations in the EESS and MetSat in the frequency band 401-403 MHz (for GSO and non-GSO) and in the MSS frequency band, specified per emission within reference bandwidth (4 kHz) as well as within whole allocated band, to avoid possible power aggregation of closely spaced narrowband carriers, notified for earth stations, taking into account the result of studies. In addition, SADC should consider proposing specific provisions for the frequency band frequency band 401-403 MHz until 22 November 2027 for existing and planned satellite systems exceeding these e.i.r.p. limits, for which complete notification information has been received by the Radiocommunication Bureau, and that have been brought into use before 22 November 2019.
Agenda Item 1.3 is to consider possible upgrading of the secondary allocation to the meteorological-satellite service (space-to-Earth) to primary status and a primary allocation to the Earth exploration-satellite service (space-to-Earth) in the frequency band 460-470 MHz, in accordance with Resolution 766 (WRC-15).	Methods to satisfy the Agenda Item: **Method A:** Method A proposes no change (NOC) to the RR. **Method B:** An upgrade of the MetSat (space-to-Earth) allocation from secondary to primary status and a primary EESS (space-to-Earth) allocation could be added in the frequency band 460‑470 MHz provided that the **priority of MetSat over EESS**, as currently contained in the Radio Regulations, is retained and that the **protection of primary services in the frequency band** and in adjacent frequency bands is ensured. pfd limits are proposed for both non-GSO and GSO MetSat/EESS satellites to protect terrestrial services.

	Method C: An upgrade of the MetSat (space-to-Earth) allocation from secondary to primary status and a primary EESS (space-to-Earth) allocation could be added in the frequency band 460-470 MHz provided that the **priority of MetSat over EESS**, as currently contained in the Radio Regulations, is retained and that the **protection of primary services in the frequency band** and in adjacent frequency bands is ensured. A new Resolution is proposed to protect existing terrestrial services in the band 460-470 MHz by introducing regulatory provisions, including pfd limits for both non-GSO and GSO MetSat/EESS satellites and also grandfathering the existing MetSat/EESS frequency assignments. In addition, RR No. 5.290 is proposed to be suppressed since MetSat and EESS are primary services in the frequency band **SADC supports Method C**
Agenda Item 1.7 is to study the spectrum needs for telemetry, tracking and command (TT&C) in the space operation service for non-GSO satellites with short duration missions, to assess the suitability of existing allocations to the space operation service and, if necessary, to consider new allocations, in accordance with Resolution 659 (WRC-15).	Methods to satisfy the Agenda Item: **Method A:** No change (NOC) to the RR. **Method B:** Method B1: proposes a new SOS (Earth-space) allocation for NGSO SD systems in the frequency range 403-404 MHz. Method B2**:** proposes a new SOS (Earth-space) allocation for NGSO SD systems in the frequency range 404-405 MHz

	Method C: The method proposes to use the SOS allocation in the frequency band 137-138 MHz for downlink and the band 148-149.9 MHz for uplink and to provide appropriate associated regulatory provisions in the RR for telecommand links of NGSO SD missions. **SADC supports Method C.**
Chapter 5: Maritime, Aeronautical and Amateur Services (Mozambique)	
Agenda Item 1.1 is to consider an allocation of the frequency band 50 54 MHz to the amateur service in Region 1, in accordance with Resolution 658 [COM6/6] (WRC 15).	➢ WRC-19 will consider, based on studies, the allocation of 50 – 54MHz to amateur service in Region 1. The band is already allocated to Amateur service in Regions 2 and 3, as well as some countries of Region 1 (see 5.169). ➢ SADC is advised to support the allocation of the 50 – 54 MHz band to amateur service considering among others that in most SADC countries the range is already allocated to amateur on a primary basis. ➢ Not changing anything would leave almost all the SADC members in the footnote. **SADC Position:** Method A An allocation to the amateur service on a Primary basis in all or part of the band 50-54 MHz, with appropriate footnotes to provide protection to services which already have an allocation in the band. (Footnote 5.169) ➢ This method is in line with ATU proposal.

	The reason being: More than two third of SADC member states have already allocated the band 50-54 MHz to Amateur service stations.
Agenda Item 1.8 is to consider possible regulatory actions to support Global Maritime Distress Safety Systems (GMDSS) modernization and to support the introduction of additional satellite systems into the GMDSS, in accordance with Resolution 359 (Rev WRC Adopt a footnote explicitly excluding protection of GMDSS from the impact of adjacent-band emissions; -15).	➢ Supports the introduction of additional satellite systems; and complements the satellite component of the GMDSS to further support distress, urgency and safety communications on a global basis. ➢ Will take into consideration existing service providers **SADC Position:** ▪ For issue A - The frequency band 495-505 kHz should be assigned for the use of international MF NAVDAT Method A2 , in line with ATU position. • For issue B - Supports introduction of a new GMDSS service provider to enhance global GMDSS service coverage, increase redundancy, introduce competition and enhance value for money and supports Method B1 : Note: Any new additional GMDSS provider now (or in the future) are welcomed, however, they should not cause any constrains to existing operators.
Agenda Item 1.10 is to consider spectrum needs and regulatory provisions for the introduction and use of the Global Aeronautical Distress and Safety System (GADSS), in accordance with Resolution 426 (WRC-15).	In implementing GADSS it should be ensured that GADSS functions: ➢ Are specified using performance based provisions when possible and independent of any one prescriptive technology. ➢ Are sufficiently flexible to accommodate diverse regional needs. ➢ Do not cause degradation of the existing Search and Rescue (SAR) service.

	➢ Ensure there is a minimal or positive impact on Flight Crew workload. ➢ Provide adequate redundancy in the systems utilized. **SADC Position:** Support Method B as prescribed in the CPM report. Support the relevant studies as conducted by ITU-R & ICAO, taking into account information and requirements for both the terrestrial and satellite components including: ➢ Quantification and characterization of radio-communication requirements related to GADDS; ➢ Analysis of the existing allocations to the relevant aeronautical services and determining whether additional spectrum is required; ➢ Studies on sharing and compatibility with existing services.
Agenda Item 1.9.1 is to consider regulatory actions within the frequency band 156-162.05 MHz for autonomous maritime radio devices to protect the GMDSS and	➢ Support the development of regulatory frameworks for autonomous maritime radio devices (AMRD) to ensure protection of Global maritime

Automatic Identifications System (AIS), in accordance with Resolution 362 (WRC-15).	distress and safety services (GMDSS) and the Automatic Identification System (AIS). **SADC Position:** For Autonomous maritime radio devices Group A: ➢ To Support Method A For Autonomous maritime radio devices Group B: ➢ To support Method B1 (AIS Technology) and Method B2 (Non-AIS technologies) In order to accommodate the variety of Group B AMRD technologies:
Agenda Item 1.9.2 is to consider regulatory provisions and spectrum allocations to the maritime mobile-satellite services to enable the satellite component of the VHF Data Exchange System (VDES) and enhanced maritime radiocommunication.	➢ Proposes a new primary allocation for the MMSS (Earth-to-space) in the frequency band 157.1875-157.3375 MHz (channels 1024, 1084, 1025, 1085, 1026 and 1086) and the frequency band 161.7875-161.9375 (channels 2026 and 2086). ➢ Proposes a new primary allocation for the MMSS (space-to-Earth) for frequency band 160.9625-161.4875 MHz, for improved VDE communication capacity and coverage.

	➢ Coordination of VDE space stations of the MMSS (space-to-Earth) with respect to terrestrial services is described in modification of RR Appendix 5, taking into account the pfd mask defined at the last study cycle in Recommendation ITU-R M.2092-0. (option 1). ➢ To protect the RAS, Annex 1 to Resolution 739 (Rev.WRC-07) is revised to include MMSS in the frequency band 160.9625-161.4875 MHz. **SADC Position:** Supports Method B, Option 1.
Agenda Item 9.1 **Issue 9.1.4** is to consider 'Stations on board sub-orbital vehicles' to conduct studies to identify any required technical and operational measures, in relation to stations on board sub-orbital vehicles, that could assist in avoiding harmful interference between radiocommunication services.	**SADC Position:** SADC position is consistent with the only method outlined in the final CPM Report, i.e. ➢ NOC to the Radio Regulations
Chapter 6: General Issues (Botswana)	

<table>
<tr><td colspan="2">Chapter 6 of WRC-19 deals with general issues. The chapter has 5 Agenda Items (9.1.6, 9.1.7, 2, 4, and 10) which deals with studies of wireless power transmission of electric vehicles, unauthorized use of earth station terminal, the revision of ITU-R recommendations incorporated by reference, to review the resolutions and recommendations of previous conferences with a view to their possible revision, replacement or abrogation and the future agenda items of WRC-2023. Three standing agenda items (ie AI 2, 4 and 10) are still at an early stage to formulate preliminary views as they are normally discussed at the conference.</td></tr>
<tr><td>Agenda Item 9.1
Issue 9.1.6
Resolution 950 [COM6/2] (WRC-15): Urgent studies to Urgent studies required in preparation for WRC-19 concerning Wireless Power Transmission (WPT) for electric vehicles.</td><td>SADC Position
▪ The studies show that WPT-EV operating at 55-65 kHz will cause harmful interference to SFTS operating at 60 kHz.
▪ The studies indicate that the operation of WPT-EV in the 19-25 kHz, 55-5X kHz, 6Y 65 kHz, and 79-90 kHz bands is compatible with existing radiocommunication services operating at other frequencies, provided that the WPT-EV unwanted emissions are tightly controlled.
▪ Consequently, there is no need for activity related to WRC-19 to amend the RR.
▪ The ITU-R will need to continue to closely collaborate with SDOs. This is to ensure that appropriate frequency ranges and technical limits are incorporated into standards to protect radiocommunication services</td></tr>
<tr><td>Agenda Item 9.1
Issue 9.1.7 Resolution 958 (WRC-15): Urgent Studies required in preparation of WRC-19 - Unauthorized operation of earth station terminals (Resolution ITU-R64).</td><td>SADC Position:

For Issue 2a:
SADC support Option 2
Develop a new WRC Resolution to introduce additional measures in order to address the issue of unauthorized uplink transmissions of earth station terminals
For Issue 2b:</td></tr>
</table>

	SADC supports the proposed measure to be taken by ITU-R : To assist administrations in managing (identifying and geolocating) the unauthorized operation of earth station terminals deployed within their territory, the ITU-R needs to provide necessary guidelines on satellite monitoring capabilities, along with possible revision and further development of ITU-R Reports or Handbooks in this regard. These may provide guidance and support for administrations in managing the unauthorized operation of earth station terminals deployed within their territory and tools to guide their national spectrum management
AI 10 to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, in accordance with Article 7 of the Convention, Resolution 810 (WRC-15): Preliminary agenda for the 2023 World Radiocommunication Conference	**SADC Position:** SADC member states support the following five proposals for WRC-23 Agenda items subject to further internal consultation; 1. Globally harmonize the use of the 12.75-13.25 GHz band by earth stations on board aircraft communicating with geostationary space stations in the fixed-satellite service for providing in-flight connectivity (IFC) 2. Use of existing IMT identifications in bands below 3 GHz by High Altitude IMT Base Stations (HIBS) 3. Identification of frequency bands for the future development of International Mobile Telecommunications (IMT) in the range 6-24 GHz 4. Review of the 3 300-3 800 MHz frequency range for terrestrial IMT identification. 5. To extend the FM band for the region to below 87.5 MHz.