Square Kilometre Array (SKA) SA

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SKA AFRICA
SQUARE KILOMETRE ARRAY

science & technology
Department: Science and Technology
REPUBLIC OF SOUTH AFRICA

NRF National Research Foundation

SKA

Mr Manyaapelo Richard Makgotlho
The Independent Communications Authority of South Africa (ICASA)
Private Bag XI0002
Sandton 2146

Attention:
Mr Manyaapelo Richard Makgotlho
E-mail: rmakgotlho@icasa.org.za

Date: 20 October 2017

Dear Mr. Makgotlho,

RE: A NOTICE INVITING COMMENTS ON THE DRAFT NATIONAL RADIO FREQUENCY PLAN 2017

The attached submission is made by the Square Kilometre Array South Africa (SKA SA), a business unit of the National Research Foundation (NRF) established in terms of the National Research Foundation Act, Act 23 of 1998.

The submission is made in response to the invitation by the Authority to submit written representations on the Second Draft Radio Frequency Spectrum Assignment Plan for the Frequency Band 825 MHz to 830 MHz and 870 MHz to 875 MHz as published in the Government Gazette number 41082.

We hope that you will find our submission technically sound and contributing to the development of a high quality document.

Kind Regards,

Mr Selaelo Matlhane
Spectrum & Telecoms Manager
smatlhane@ska.ac.za

SKA SA's written submission in response to ICASA's Second Draft Radio Frequency Spectrum Assignment Plan for the Frequency Band 825 to 830 MHz and 870 to 875 MHz

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3rd Floor, The Park, Park Road,
Pinelands 7405, South Africa
+27 (0)21 506 7300
+27 (0)21 506 7375

17 Baker Street, Rosebank
Johannesburg, South Africa
+27 (0)11 442 2434
+27 (0)11 442 2454

Karoo Support Base
P.O. Box 69
Carnarvon, 8925
+27 (0) 21 506 7300

INTRODUCTION

The Square Kilometre Array (SKA) Project is an international effort to build the World's largest radio telescope. It is one of the largest scientific endeavours in history and it represents a huge leap forward in both engineering and research towards building and delivering a unique instrument.

The Republic of South Africa is really privileged to be one of the countries at the centre of this technological advancement and with the responsibility to host the core of the high and mid frequency dishes and ultimately extending over the African continent.

The Square Kilometre South Africa (SKA SA) is a business unit of the National Research Foundation and it is responsible for coordinating Africa's involvement in the design and construction of the Karoo Array radio telescope and the African VLBI Network (AVN).

SKA SA welcomes the opportunity to submit written representation on the second draft Radio Frequency Spectrum Assignment Plan (RFSAP) for the frequency band **825 to 830 MHz** paired with **870 to 875 MHz** as published in the Government Gazette No. **41082**. Furthermore, SKA SA confirms its willingness to participate in the public hearings or any other consultative process, which the Authority may undertake with respect to the second draft RFSAP.

Our submission is composed of two parts

1) Protection of the SKA radio telescope
2) General comments on the second draft RFSAP

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Protection of the SKA Radio Telescope

While SKA SA applaud the Authority's continued effort to advance the objectives of SA Connect broadband policy, SKA SA is deeply concerned that there has been no reference to the required restrictions in the declared KCAAA areas for protecting the SKA radio telescope.

The band 350 – 1050 MHz has been assessed by the Square Kilometre Organisation (SKAO) as one of the scientific priorities for Phase 1 of the SKA telescope. The figure below indicates the frequency ranges and priorities of SKA1 observations.

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Carnarvon, 8925
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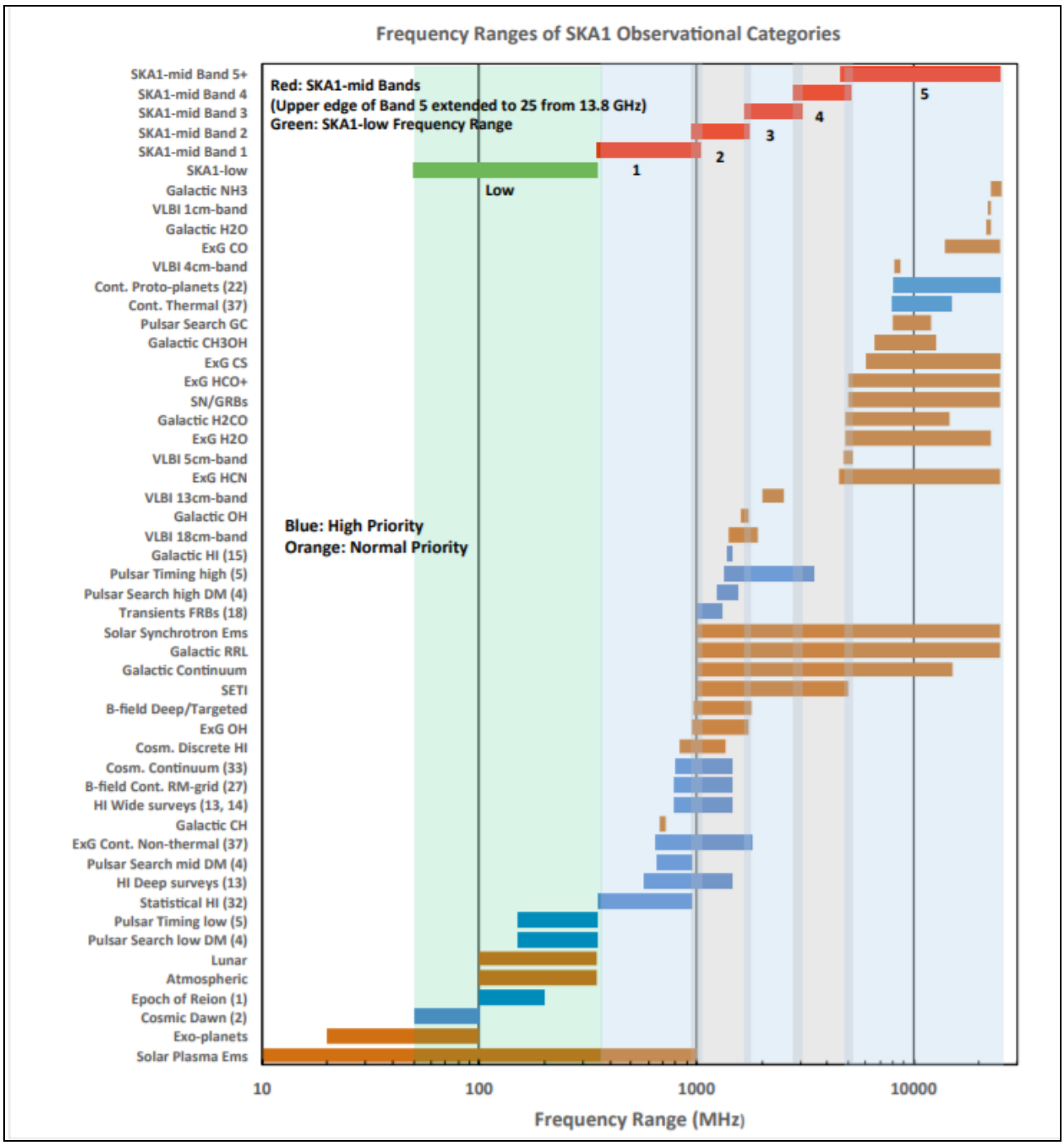

Figure 2: Scientific Priorities for SKA1 Observations

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As indicated in Figure 2, the band 825 – 830 MHz and 870 – 875 MHz falls within observational bands for discrete galaxy detection, radio continuum, statistical galaxy detection and other observations that form part of the high scientific priorities for SKAO.

On the basis of the above priorities, the use of IMT850 frequency bands in the Northern Cape would provide a new sources of Radio Frequency Interference (RFI) in critical SKA observation bands.

SKA SA has conducted a preliminary desktop analysis of the possible risks presented by the IMT850 system to the SKA radio telescope. Figure 3 below, indicated the coverage predictions for a theoretical IMT850 site located in Van Wyksvlei, within the declared KCAAA. The coverage predictions were conducted using the worst case scenario for the downlink BTS power spectral density value given in paragraph 5.6 of the second draft RFSAP. The height and coordinates were obtained from field information. The propagation model used is ITU-R Rec P.1546 as also prescribed under the Site General model in Appendix B of the second draft RFSAP.

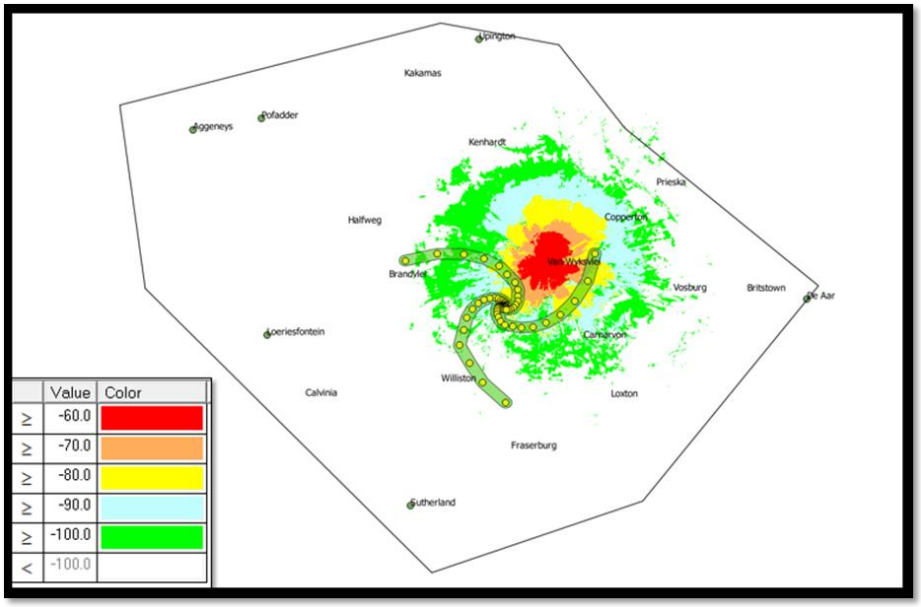

Figure 3: Coverage Predictions from Van Wyksvlei IMT850 theoretical site

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It is our view that all sub-gig frequency bands are very popular and may be in high demand, including in the Northern Cape Province. As indicated in Figure 3, their use will present a new source of RFI to the SKA in critical radio astronomy observation bands. The protection levels for radio astronomy as defined in Schedule A of the draft KCAAA Regulations, for which ICASA has provided concurrence has been given as -100 dBm. This is the worst kind of interference as it will prevent any form of observations within the RA bands, including the possibilities of damaging the receiving equipment.

In addition to the above analysis, radio astronomy observations will also be adversely affected at lower levels down as defined in the Protection Levels Regulations 2012, published on 10 February 2012 in GG 35007. Therefore, the impact of these transmission on radio astronomy can be experienced at received power levels even far lower than -100 dBm.

The second draft RFSAP does not include any measures to protect radio astronomy within the Karoo Core and Central AAAs. We would like to propose that the Authority make specific reference to the protection of the SKA radio telescope in the final RFSAP in the IMT850 band to ensure that the assignment of this band, post the ITA is compliant with section 22(6) of the AGA Act and applicable Regulations for which the Authority has already provided concurrence.

General Comments of the second draft RFSAP for IMT850

The comments under this section does not have any immediate impact on the SKA, they are however, given to contribute to the development of a high quality RFSAP regulatory document.

Section	Text on draft Regulation	SKA Proposed Text	Comment
Reg 1	"3GPP" means the 3rd Generation partnership Project (3GPP) which consist of six telecommunications standard development organisations.	"3GPP" means 3rd Generation Partnership Project	3GPP consist of seven telecommunications standard development organisations not six. The number may change in the future as well.
Reg 1	"LTE" means long Term Evolution is a standard for wireless communication of high-speed data for mobile phones and data terminals. It is based on the GSM/EDGE and UMTS/HSPA network	"LTE Advanced" means Long Term Evolution as first specified in 3GPP Release 8	The current text has been taken word for word from Wikipedia website. It is better to use definition that is more in line with 3GPP standards.
Reg 1	None	"LTE Advanced" means Long Term Evolution as first specified in 3GPP Release 10.	The Authority has not defined LTE Advance. The text was used in Reg 3.7
Reg 1	None	"HSPA+" means Evolved High Speed Packet Access	The Authority has not defined HSPA+. The text was used in Reg 3.7
Reg 1	None	"WiMAX" means Worldwide Interoperability for Microwave Access	The Authority has not defined WiMAX. The text was used in Reg 3.7

Reg 1	"NRFP" means National Radio Frequency Plan 2013	"NRFP" means National Radio Frequency Plan 2013 or later versions.	To take into account future developments of the NRFP
Reg 2.3	• Enhanced peak data rates to support advanced services and applications.	Enhanced peak data rates to support advanced services and applications (100 Mbits/s for high and 1 Gbits/s for low mobility)	These data rates are established IMT peak rates. This key feature should be stated in its entirety as in ITU-R M.2012-2 and ITU-R M.1645
Reg 3.8	Typical technical and operational characteristics of IMT systems as identified by the ITU are described in the following documents	Typical technical and operational characteristics of IMT systems as identified by the ITU are described in the following documents or later Revisions	The ITU-R has already revised a number of documents mentioned under this section.
Reg 3.8	• Recommendation ITU-R M.2012-1 (02/2014)	Recommendation ITU-Rm.2012-2 (09/2015)	ITU-R M.2012-1(02/2015) has been superseded by ITU-R M.2012-2 (09/2015)
Reg 3.8	• Recommendation ITU-R M.1036-4 (03/2012)	Recommendation ITU-R M.1036-5 (10/2015)	ITU-R M.1036-4(03/2012) has been superseded by ITU-R M.1036-5 (10/2015)

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