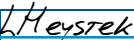




## SKA1\_MID PHYSICAL CONFIGURATION COORDINATES

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|                |                      |             | Date:                                                                                                                      | May 27, 2015            |
| SKAO Approval: |                      |             |                                                                                                                            |                         |
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|                |                      |             | Date:                                                                                                                      | May 27, 2015            |
| SKAO Approval: |                      |             |                                                                                                                            |                         |
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|                |                      |             | Date:                                                                                                                      | May 27, 2015            |
| SKAO Release:  |                      |             |                                                                                                                            |                         |
| A. McPherson   | HoP                  | SKAO        | <br>A. McPherson                        |                         |
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| A        | 2014-08-26    | -                         | First draft release for internal review     |
| 1        | 2014-11-28    | -                         | Released for PDR                            |
| 1A       | 2015-03-01    | -                         | Draft Revision based on PDR Observations    |
| 2        | 2015-05-04    | -                         | Updated to Rev 2 after observations cleared |

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|----------------|---------|-----------|---------------------------------------------------------|
| Word processor | MS Word | Word 2013 | SKA1_Mid Physical Configuration Coordinates Rev 2..docx |
| Block diagrams |         |           |                                                         |
| Other          |         |           |                                                         |

## ORGANISATION DETAILS

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# LIST OF ABBREVIATIONS

ECP .....Engineering Change Proposal  
SKA .....Square Kilometre Array  
SKA1 .....SKA Phase 1  
SKAO .....SKA Project Office  
WGS84.....World Geodetic System 1984

# 1 Introduction

## 1.1 Purpose of the document

This document defines the geodetic coordinates of the MeerKAT and SKA1\_MID antennas. The Geodetic datum used is WGS84 [RD1]. The coordinates listed in this document have been defined according to an ECP issued by the SKAO [AD1].

## 1.2 Scope of the document

This document is primarily intended to define the configuration of the SKA1\_MID antennas. Since the 64 MeerKAT antennas are to be incorporated into the SKA1\_MID configuration their positions are also tabled and illustrated.

## 1.3 Contents of the document

Table 1 specifies the latitude and longitude coordinates of each MeerKAT antenna. There are 64 MeerKAT antennas in the core area (densely populated central area).

Table 2 specifies the latitude and longitude coordinates of each SKA1\_MID antenna. There are 133 SKA1\_MID antennas distributed in the core area and in three spiral arms emanating from the core area.

Figure 1 illustrates the estimated flat earth X and Y positions for each of the MeerKAT and SKA1\_MID antennas. The antennas are positioned in X and Y coordinates *relative* to the first antenna listed in Table 1 and Table 2 i.e. antenna 1 in each table is located at coordinates (0,0) for both MeerKAT and SKA1\_MID.

Figure 2 is an expanded view of the core area.

Figure 1 and Figure 2 are included for illustrative purposes only.

## **2 References**

### **2.1 Applicable documents**

[AD1] ECP 150001: RBS Board Decision Implementation, Wallace Turner (SKAO).

[AD2] SKA-TEL-SKO-0000242 Rev. A, SKA1\_Mid Configuration Coordinates Definition Process.

### **2.2 Reference documents**

[RD1] Office of Geomatics: World Geodetic System 1984 (WGS 84), National Geospatial Intelligence Agency.

**Table 1 MeerKAT Antenna Coordinates**

| <b>MeerKAT Antenna No.</b> | <b>Degrees Longitude</b> | <b>Degrees Latitude</b> |
|----------------------------|--------------------------|-------------------------|
|                            |                          |                         |
| M001                       | 21.4469635               | -30.681655              |
| M002                       | 21.4146123               | -30.68682               |
| M003                       | 21.4731677               | -30.68682               |
| M004                       | 21.4285756               | -30.695255              |
| M005                       | 21.4499502               | -30.703263              |
| M006                       | 21.4823636               | -30.704205              |
| M007                       | 21.434536                | -30.70564               |
| M008                       | 21.4605717               | -30.706845              |
| M009                       | 21.4062526               | -30.707114              |
| M010                       | 21.4247587               | -30.708649              |
| M011                       | 21.4419898               | -30.70902               |
| M012                       | 21.4487038               | -30.709472              |
| M013                       | 21.4402247               | -30.709702              |
| M014                       | 21.4456766               | -30.710027              |
| M015                       | 21.4564328               | -30.710184              |
| M016                       | 21.4464625               | -30.71021               |
| M017                       | 21.4428561               | -30.710901              |
| M018                       | 21.4399959               | -30.71105               |
| M019                       | 21.4443122               | -30.711264              |
| M020                       | 21.4476236               | -30.71131               |
| M021                       | 21.4433554               | -30.711841              |
| M022                       | 21.445973                | -30.712068              |
| M023                       | 21.4429627               | -30.712174              |
| M024                       | 21.4373145               | -30.712212              |
| M025                       | 21.4405252               | -30.712338              |
| M026                       | 21.4439008               | -30.712605              |
| M027                       | 21.4479204               | -30.712687              |
| M028                       | 21.4468974               | -30.712732              |
| M029                       | 21.4431947               | -30.71288               |
| M030                       | 21.443803                | -30.712925              |
| M031                       | 21.4460884               | -30.713031              |
| M032                       | 21.4435544               | -30.713078              |
| M033                       | 21.4449926               | -30.713273              |
| M034                       | 21.4425991               | -30.713336              |
| M035                       | 21.4428239               | -30.713608              |
| M036                       | 21.4456721               | -30.713627              |
| M037                       | 21.4468189               | -30.713632              |
| M038                       | 21.4479423               | -30.713677              |
| M039                       | 21.4436985               | -30.71372               |
| M040                       | 21.4449023               | -30.713758              |



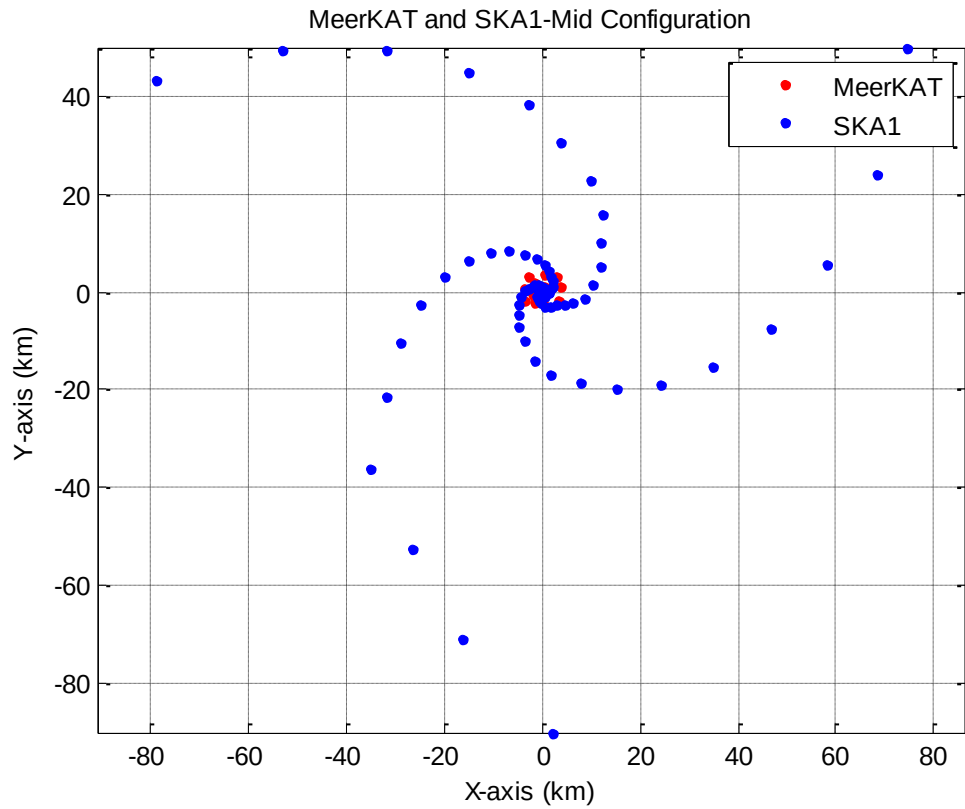
| MeerKAT Antenna No. | Degrees Longitude | Degrees Latitude |
|---------------------|-------------------|------------------|
| M041                | 21.4407999        | -30.714007       |
| M042                | 21.4447659        | -30.714231       |
| M043                | 21.4453505        | -30.714376       |
| M044                | 21.4442268        | -30.714402       |
| M045                | 21.4463607        | -30.714604       |
| M046                | 21.4429543        | -30.714687       |
| M047                | 21.447859         | -30.715197       |
| M048                | 21.4401136        | -30.715206       |
| M049                | 21.4529914        | -30.715563       |
| M050                | 21.444809         | -30.715672       |
| M051                | 21.4378529        | -30.71572        |
| M052                | 21.4429127        | -30.71588        |
| M053                | 21.446116         | -30.716188       |
| M054                | 21.4465384        | -30.716396       |
| M055                | 21.440888         | -30.717023       |
| M056                | 21.4436093        | -30.717478       |
| M057                | 21.4350137        | -30.717994       |
| M058                | 21.4224655        | -30.718662       |
| M059                | 21.4376965        | -30.721414       |
| M060                | 21.4439872        | -30.722819       |
| M061                | 21.4795886        | -30.727648       |
| M062                | 21.4081913        | -30.727648       |
| M063                | 21.4437176        | -30.732012       |
| M064                | 21.4288489        | -30.733634       |

**Table 2 SKA1\_MID Antenna Coordinates**

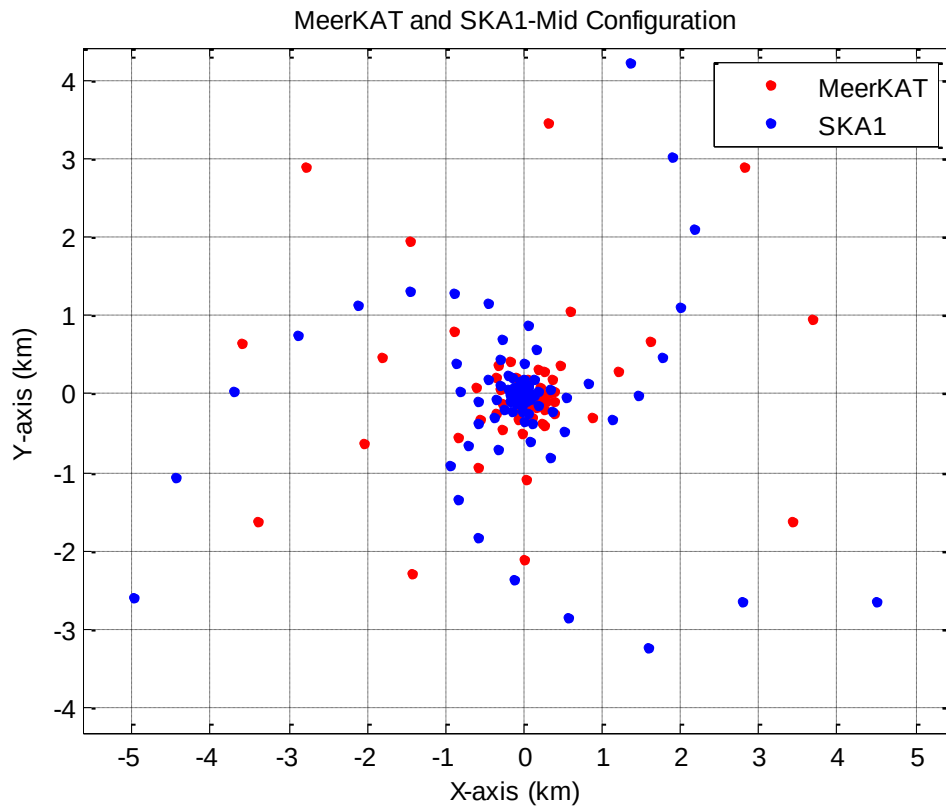
| <b>SKA1 Antenna No.</b> | <b>Degrees Longitude</b> | <b>Degrees Latitude</b> |
|-------------------------|--------------------------|-------------------------|
| SKA001                  | 21.449412                | -30.71329               |
| SKA002                  | 21.443214                | -30.711544              |
| SKA003                  | 21.442342                | -30.710966              |
| SKA004                  | 22.2217939               | -30.262608              |
| SKA005                  | 20.8890257               | -30.266774              |
| SKA006                  | 21.1118102               | -30.268699              |
| SKA007                  | 21.2857055               | -30.308442              |
| SKA008                  | 20.6206745               | -30.32309               |
| SKA009                  | 21.4128112               | -30.369509              |
| SKA010                  | 21.4812139               | -30.439265              |
| SKA011                  | 22.1574255               | -30.495371              |
| SKA012                  | 21.5473569               | -30.508317              |
| SKA013                  | 21.5733041               | -30.571138              |
| SKA014                  | 21.56761                 | -30.622713              |
| SKA015                  | 21.374214                | -30.638584              |
| SKA016                  | 21.3340906               | -30.641813              |
| SKA017                  | 21.4063313               | -30.642963              |
| SKA018                  | 21.430449                | -30.651906              |
| SKA019                  | 21.2871238               | -30.656278              |
| SKA020                  | 21.4472571               | -30.663055              |
| SKA021                  | 22.0491848               | -30.663947              |
| SKA022                  | 21.5687373               | -30.666963              |
| SKA023                  | 21.4578392               | -30.674663              |
| SKA024                  | 21.4634453               | -30.685568              |
| SKA025                  | 21.2352359               | -30.685611              |
| SKA026                  | 21.466419                | -30.693932              |
| SKA027                  | 21.5519732               | -30.698639              |
| SKA028                  | 21.4286368               | -30.701155              |
| SKA029                  | 21.4344917               | -30.701264              |
| SKA030                  | 21.439049                | -30.702356              |
| SKA031                  | 21.4215593               | -30.70258               |
| SKA032                  | 21.4645868               | -30.702805              |
| SKA033                  | 21.4444697               | -30.704982              |
| SKA034                  | 21.4135728               | -30.706149              |
| SKA035                  | 21.4409894               | -30.706517              |
| SKA036                  | 21.4453007               | -30.70782               |
| SKA037                  | 21.4622289               | -30.708744              |
| SKA038                  | 21.4405906               | -30.708913              |
| SKA039                  | 21.4436864               | -30.709254              |
| SKA040                  | 21.4346288               | -30.709314              |
| SKA041                  | 21.4416387               | -30.71069               |
| SKA042                  | 21.4451202               | -30.711168              |
| SKA043                  | 21.4390904               | -30.711278              |
| SKA044                  | 21.4437639               | -30.71128               |
| SKA045                  | 21.4522796               | -30.711729              |
| SKA046                  | 21.4443592               | -30.711825              |

| <b>SKA1 Antenna No.</b> | <b>Degrees Longitude</b> | <b>Degrees Latitude</b> |
|-------------------------|--------------------------|-------------------------|
| SKA047                  | 21.4405425               | -30.711918              |
| SKA048                  | 21.4423558               | -30.712025              |
| SKA049                  | 21.4435744               | -30.712107              |
| SKA050                  | 21.4444375               | -30.712193              |
| SKA051                  | 21.4439168               | -30.712207              |
| SKA052                  | 21.4426256               | -30.712221              |
| SKA053                  | 21.4433231               | -30.712317              |
| SKA054                  | 21.4473345               | -30.712406              |
| SKA055                  | 21.4416585               | -30.712409              |
| SKA056                  | 21.4436675               | -30.712428              |
| SKA057                  | 21.4429691               | -30.71245               |
| SKA058                  | 21.4422514               | -30.712485              |
| SKA059                  | 21.4442278               | -30.712544              |
| SKA060                  | 21.4052401               | -30.712547              |
| SKA061                  | 21.445672                | -30.712552              |
| SKA062                  | 21.4432796               | -30.712597              |
| SKA063                  | 21.4352434               | -30.712648              |
| SKA064                  | 21.4426044               | -30.712715              |
| SKA065                  | 21.4429391               | -30.712722              |
| SKA066                  | 21.4445107               | -30.71285               |
| SKA067                  | 21.4451171               | -30.712941              |
| SKA068                  | 21.4419132               | -30.71295               |
| SKA069                  | 21.4426862               | -30.712981              |
| SKA070                  | 21.4590247               | -30.712981              |
| SKA071                  | 21.4441059               | -30.712991              |
| SKA072                  | 21.4423381               | -30.71309               |
| SKA073                  | 21.4432221               | -30.713174              |
| SKA074                  | 21.442917                | -30.71328               |
| SKA075                  | 21.4439358               | -30.713328              |
| SKA076                  | 21.4442883               | -30.713364              |
| SKA077                  | 21.4400382               | -30.713405              |
| SKA078                  | 21.4422628               | -30.713413              |
| SKA079                  | 21.4435953               | -30.713434              |
| SKA080                  | 21.4432548               | -30.71348               |
| SKA081                  | 21.4446124               | -30.713603              |
| SKA082                  | 21.4440499               | -30.713665              |
| SKA083                  | 21.4377571               | -30.713717              |
| SKA084                  | 21.4418779               | -30.713786              |
| SKA085                  | 21.4424806               | -30.713809              |
| SKA086                  | 21.4434036               | -30.713858              |
| SKA087                  | 21.4427442               | -30.714023              |
| SKA088                  | 21.4436833               | -30.714159              |
| SKA089                  | 21.4457952               | -30.71416               |
| SKA090                  | 21.4410498               | -30.714684              |
| SKA091                  | 21.4435517               | -30.714778              |
| SKA092                  | 21.4474835               | -30.714879              |
| SKA093                  | 21.4421612               | -30.714887              |
| SKA094                  | 21.4442517               | -30.715123              |

| <b>SKA1 Antenna No.</b> | <b>Degrees Longitude</b> | <b>Degrees Latitude</b> |
|-------------------------|--------------------------|-------------------------|
| SKA095                  | 21.4398972               | -30.71568               |
| SKA096                  | 21.4555383               | -30.715743              |
| SKA097                  | 21.4439389               | -30.716027              |
| SKA098                  | 21.4376419               | -30.716174              |
| SKA099                  | 21.4449919               | -30.716377              |
| SKA100                  | 21.4490364               | -30.717223              |
| SKA101                  | 21.444662                | -30.718358              |
| SKA102                  | 21.4363558               | -30.71874               |
| SKA103                  | 21.4402166               | -30.719265              |
| SKA104                  | 21.4472659               | -30.720233              |
| SKA105                  | 21.533032                | -30.723924              |
| SKA106                  | 21.4339794               | -30.721009              |
| SKA107                  | 21.3974997               | -30.722426              |
| SKA108                  | 21.4350033               | -30.724996              |
| SKA109                  | 21.4376456               | -30.729515              |
| SKA110                  | 21.5105276               | -30.734134              |
| SKA111                  | 21.4424172               | -30.734251              |
| SKA112                  | 21.1844568               | -30.735364              |
| SKA113                  | 21.3917083               | -30.736333              |
| SKA114                  | 21.4498209               | -30.738661              |
| SKA115                  | 21.4908526               | -30.736857              |
| SKA116                  | 21.4602722               | -30.742016              |
| SKA117                  | 21.4728481               | -30.736715              |
| SKA118                  | 21.3946819               | -30.753799              |
| SKA119                  | 21.3936716               | -30.776987              |
| SKA120                  | 21.9307624               | -30.781482              |
| SKA121                  | 21.4064274               | -30.80286               |
| SKA122                  | 21.1403739               | -30.808077              |
| SKA123                  | 21.4255118               | -30.839095              |
| SKA124                  | 21.8087982               | -30.850668              |
| SKA125                  | 21.4607747               | -30.865551              |
| SKA126                  | 21.5267438               | -30.879119              |
| SKA127                  | 21.6973379               | -30.883676              |
| SKA128                  | 21.6024953               | -30.890232              |
| SKA129                  | 21.1131812               | -30.907047              |
| SKA130                  | 21.078446                | -31.040003              |
| SKA131                  | 21.1654996               | -31.187658              |
| SKA132                  | 21.2740177               | -31.351808              |
| SKA133                  | 21.4678033               | -31.524423              |



**Figure 1 MeerKAT and SKA1\_MID Antenna Configuration**



**Figure 2 Enlarged MeerKAT and SKA1\_MID Configuration**