

|                                                                                                |                 |                   |
|------------------------------------------------------------------------------------------------|-----------------|-------------------|
|  <b>Eskom</b> | <b>Standard</b> | <b>Technology</b> |
|------------------------------------------------------------------------------------------------|-----------------|-------------------|

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SPECIFICATION**

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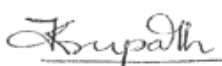
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## 1. Introduction

This document defines Eskom's requirements for a radio planning tool to be used in the design of both point to point radio link networks and point to multi point area coverage systems. All technical information supplied as part of the tender will be taken as binding. This includes technical brochures, leaflets etc. Nothing in this standard shall lessen the obligations of the Tender Company detailed in any other document forming part of the contract. The metric system of weights and measures shall be used in any technical document pertaining to the enquiry and thereafter, in case of contract, in all documents. The ITU-(T/R) terminology applying to all technical parameters shall be adhered to.

### 1.1 Expected Response Indicators

The words "**Shall**", "**Will**", "**Should**" and "**May**" are used to indicate the following:

- Shall** - Whenever it is necessary to express a provision that is mandatory.
- Should & May** - Whenever it is necessary to express non-mandatory provisions.
- Will** - Used to express a declaration on the part of Eskom or the Tender Company.

Respondents shall submit a detailed statement of compliance or non-compliance and reasons (if any), for each and every requirement called for in the specification. The detailed statements shall be written in Schedule B. Further notes may also be appended to the schedule. It shall be clearly stated whether the equipment offered, for each of the specification requirements, is:

- Fully-compliant.
- Non-compliant.

Phrases such as "noted" shall only be used against paragraphs that are for information only and carry no contractual commitment

Phrases such as "Noting", "Will comply" and "Comply: Except", in a paragraph that requires a compliance or non-compliance statement will be read as non-compliance

Furthermore, a letter requesting a particular response as follows marks each paragraph. Requirements which have not been marked with any of the letter indications are general. The suppliers must state compliance, non-compliance or a degree of compliance in response to these requirements.

| Definition                                                                                        | Description                                                                                                                |
|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| [D]: Description                                                                                  | Give a description of the function or the feature as requested                                                             |
| [G] General                                                                                       | General information to be noted by tenderers and accepted or rejected                                                      |
| [I]: Information–suppliers to give actual values, quantities or other specific details called for | Provision of requested information is mandatory and failure to provide it may lead to disqualification from the evaluation |
| [M]: Mandatory                                                                                    | Compliance required                                                                                                        |

## 2. Supporting clauses

### 2.1 Scope

This Standard defines Eskom's requirements for a radio-planning tool to be used in the design of point to point radio links/networks and point to multi-point area coverage systems. [G]

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Equipment covered by this standard includes: [G]

- a) The hardware required to operate and run the software program.
- b) The various modules that make up the complete suite of the tool.
- c) Licensing obligations

This document overrides any other recommendation or standard/specification. In cases of conflicting requirements, schedule A to the supplier or contract documents only, overrides the standard. Nevertheless, nothing in this standard shall lessen the obligations of the supplier detailed in any other document forming part of the contract. The supplier must complete schedule A 'Contractor Compliance Statement' for this standard

### **2.1.1 Purpose**

The purpose of this standard is to describe Eskom's requirements for a radio planning tool to be used in the design of point to point radio links/networks and point to multi-point area coverage systems. The standard will also be used for procurement enquiry purposes.

### **2.1.1 Applicability**

This standard shall apply throughout Eskom Holdings Limited, its divisions, subsidiaries and entities, especially Eskom Telecommunications.

## **2.2 Normative/informative references**

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

### **2.2.1 Normative**

- [1] ISO 9001, Quality Management Systems. [I]
- [2] SABS 0157 of 1987 :Quality management systems of codes of practice

### **2.2.2 Informative**

- [3] Rec P.530 Propagation Data and prediction methods required for the design of terrestrial line of sight systems. [I]
- [4] Rec G.826 end-to-end error performance parameters and objectives for international, constant bit rate digital paths and connections. [I]
- [5] Rec F.557 Availability objectives for radio-relay systems over a hypothetical reference digital path. [I]
- [6] Rec. P.452 Prediction procedure for the evaluation of interference between stations on the surface of the earth at frequencies above about 0.1 GHz [I]
- [7] Rec. P.837 Characteristics of precipitation for propagation modelling. [I]
- [8] Rec. P.1546 Method for point to area predictions for terrestrial services in the frequency range 30MHz to 4000MHz. [I]
- [9] Rec. P.526 Propagation by diffraction [I]
- [10] Rec. P.676 Attenuation by atmospheric gases and related effects [I]
- [11] Rec. P.525 Calculation of free-space attenuation [I]
- [12] ETSI TR 101 854 Derivation of receiver interference parameters useful for planning fixed services point to point systems operating different equipment classes and/or capacities. [I].

## 2.3 Definitions

### 2.3.1 General

| Definition | Description                                                                                                                                                                                                       |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Eskom      | Eskom Holdings Limited (Reg. No. 2002/015527/06) a juristic person incorporated in terms of the company laws of the Republic of South Africa, with its registered office at Megawatt Park, Maxwell Drive, Sandton |

### 2.3.2 Disclosure classification

**Controlled disclosure:** controlled disclosure to external parties (either enforced by law, or discretionary).

## 2.4 Abbreviations

| Abbreviation | Description                                     |
|--------------|-------------------------------------------------|
| ETSI         | European Telecommunications Standards Institute |
| GoS          | Grade of Service                                |
| ITU          | International Telecommunications Union          |
| QoS          | Quality of Service                              |
| Rx           | Receive                                         |
| Tx           | Transmit                                        |
| UHF          | Ultra High Frequency                            |
| VHF          | Very High Frequency                             |

## 2.5 Roles and responsibilities

All equipment supplied under tender to Eskom Telecommunications shall comply with the technical requirements of this standard. No equipment will be deployed by any area, which does not comply. Project Design Engineers are responsible for the ensuring this requirement is adhered to.

## 2.6 Process for monitoring

Not applicable.

## 2.7 Related/supporting documents

- 1) 240-135089195 Generic Technical Requirements For Eskom Telecoms Contracts

## 3. Planning Tool Engineering and Requirements

### 3.1 Computer Equipment Specification

- 2) The operating platform should be Windows based from Windows 7, 64 bit and above. The supply shall state what versions the system is compatible with. [M]
- 3) The system should be capable of working over both LANs and WANs. [M]
- 4) The supplier shall state the specifications for the server. [M]

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- 5) The supplier shall state any special printers and plotters required for use with the proposed solution. [M]
- 6) The application shall have an intuitive graphic user interface, providing ease of use, and logical menu structures. [M]

### **3.2 Licensing requirements**

- 1) The supplier shall give full details of its licensing policies and requirements. [M]

### **3.3 Point to point system**

- 1) The tool shall support the latest revision of ITU-R P.530's Propagation data and prediction methods required for the design of terrestrial line-of-sight systems (30MHz to 100GHz) [I]
- 2) The supplier shall state which other prediction models the tool supports. [M]
- 3) Availability and error performance calculations shall be based on those mentioned in Section 2.2.2 above. [M]
- 4) The tool shall support rain models from ITU-R P.837, Crane and Vigants. [M]
- 5) The supplier shall name other rain models supported by the tool. [I]
- 6) The tool shall be capable of conducting interference analysis for any selected network of radios in accordance with ITU-R P.452 recommendation. [M]
- 7) The tool shall be capable of recommending / finding the best/least number of hops of a route [M]
- 8) The tool shall report on a High/Low frequency conflict. [M]
- 9) The tool shall be capable of passive repeater calculation. [M]
- 10) The tool shall be capable of performance and availability calculations on multiple-hop radio links in terms of the Recommendations stated in 4.1 above and in addition also should be able to interpolate the result of a single hop. [M]
- 11) The tool shall be capable of performance and availability calculations for space, angle and frequency diversity. [M]
- 12) The tool shall provide warnings when different equipment bands are coupled together in error. Example: When picking equipment from a list an error could be made by picking two different types of equipment for each end of the same hop. [M]
- 13) The tool shall be capable of performing inter-modulation calculations at any one site. The Tender Company shall state the number of Tx/Rx combinations that can be accommodated in the calculation as well as what order of inter-modulation the tool is capable of. [M]
- 14) The tool shall be capable of performing co-channel and adjacent channel interference degradation calculations, in accordance with ETSI TR 101 854. [I]
- 15) The tool shall be capable of recommending best polarization orientation on long routes. [M]
- 16) The tool shall be capable of identifying the co-ordinates of an obstacle along a link. [M]
- 17) The tool shall be capable of generating own clutter given hypothetical ground clutter. For example, vegetation, buildings of "x" height covering "y" area in the path and recommend signal absorption characteristics of the clutter. [M]
- 18) The tool shall be able to up-load real clutter and use in its calculations. [M]
- 19) It shall be possible to import data from antenna suppliers depicting radiation patterns, antenna gains, etc. [M]

- 
- 20) The supplier shall state which radio OEM's equipment specification data can be imported directly from suppliers libraries into the tool. [M]
  - 21) The supplier shall state which other radio planning tool's data and other formatted data file types (e.g. CSV, MS Word Excel, Google maps etc) can be imported into the tool. [I]
  - 22) The tool shall be capable of exporting profiles and other data to Word or PDF. The supplier shall state what data can be exported in what format. [I]
  - 23) The tool shall have the ability to export the raw data (the respondent shall state which data e.g. diffraction losses along a radial etc) to a spreadsheet format for manipulation of the data. [I]
  - 24) The tool shall have the ability to link the planning tools via a network with each planner having privilege to change their own zone yet compute the effects of those adjacent. [M]
  - 25) The ability to search for likely sites by examining the surrounding terrain and suggesting a path with best free space loss conditions. [M]
  - 26) The tool shall have the ability to automatically assign frequencies taking cognizance of international frequency plans. [M]
  - 27) The tool shall have the ability to design and view the complete nation-wide link plan on screen with zoom in and zoom out facilities. [M]
  - 28) The tool shall have the ability to suggest network optimisation that could be possible taking cognizance of network changes. [M]
  - 29) The tool shall be capable of performing desensitisation analysis in the presence of strong radiated power. [M]

### **3.4 Point to multi-point coverage Calculations**

- 1) The tool shall support the ITU-R P.370 (VHF and UHF propagation curves for the frequency range from 30 MHz to 1 000 MHz) [M]
- 2) The tool shall support the ITU-R P.1546 propagation model (Method for point to area predictions for terrestrial services in the frequency range 30MHz to 3000MHz.). [M]
- 3) The supplier shall state which other models the tool supports. [I]
- 4) The tool shall support rain models from ITU-R P.837, Crane and Vigants. [I]
- 5) The supplier shall name other rain models supported by the tool. [M]
- 6) The tool shall make use of ITU-R's P.1812 or similar (A path specific propagation prediction method for point-to-area terrestrial services in the VHF and UHF bands)) [I]
- 7) The tool shall be capable of Interference analysis for any network of point to multi-point radios. [M]
- 8) The tool shall be capable of performing inter-modulation calculations at any one site [M]
- 9) The supplier shall state the number of Tx/Rx combinations that can be accommodated in the intermodulation calculation as well as what order of inter-modulation the tool is capable of. [M]
- 10) The tool shall be capable of channel and adjacent channel interference degradation calculations based on either an international standard or actual specification parameters of specific equipment [M]
- 11) The tool shall be capable of overlaying a static hexagonal cell structure over the selected terrain [M]
- 12) The tool shall be capable of performing reverse coverage plots as seen from the outstation (i.e. how many base stations an outstation can see). [M]
- 13) The tool shall be capable of overlaying a number of base station footprints to gauge the composite coverage of the selected base station. [M]

- 
- 14) The tool shall be capable of performing reverse coverage plots from a number of selected outstations to determine the position of one suitable base station. [M]
  - 15) The tool shall be capable of generating its own clutter based on hypothetical ground cover (e.g. a town / city environment with "x" m high buildings / vegetation in "y" square m of the coverage area and recommend signal absorption characteristics of the clutter. [M]
  - 16) The tool shall allow for the comparison and analysis of theoretical and measured data. [M]
  - 17) It shall be possible to produce multiple levels of a coverage plot (e.g. simultaneous depiction of coverage at -XdBm, -YdBm etc ...) [M]
  - 18) It shall be possible to import data from antenna suppliers depicting radiation patterns , antenna gains, etc [M]
  - 19) The supplier shall state which manufactures equipment specification data and other formatted data file types (e.g. CSV, MS Word Excel, etc) can be imported into the tool. [M]
  - 20) The supplier shall state which other radio planning tool's data can be imported into the tool. [I]
  - 21) The tool shall have the ability to export the raw data to a spreadsheet format for manipulation of the data. The supplier shall state which raw data can be exported. [M]
  - 22) The tool shall be capable of counting outstations / mobiles covered under a base station footprint with the addition of a polygon cell. [M]
  - 23) The tool shall be capable of calculating power budget for each fixed outstation. [M]
  - 24) The tool shall be capable of traffic analysis and forecasting per base station in terms of GoS and QoS. [M]
  - 25) The tool shall have an ability to highlight points of interests against attribute data encompassed within the addition of a polygon cell.
  - 26) The tool shall have an ability to link the planning tools via a network with each planner having the privilege to change their own zone yet compute the effects of those adjacent. [M]
  - 27) The tool shall be capable of performing desensitisation analysis in the presence of strong radiated power. [M]
  - 28) The tool shall have the ability to automatically assign frequencies taking cognizance of Eskom and international frequency plans. [M]
  - 29) The tool shall have the ability to design and view the complete nation-wide network plan on screen with zoom in and zoom out facilities. [M]
  - 30) The tool shall have the ability to suggest network optimisation that could be possible taking cognizance of network changes [M]

### 3.5 Frequency Management

- 1) The supplier shall state the degree to which the frequency management functionality complies with ITU-R SM.1370. [I]
- 2) The tool shall have the capability of making use of the standard frequency plans as published by ETSI and ITU-R. [M]
- 3) The tool shall also have the capability of supporting manually added frequency plans. [M]
- 4) The tool shall be capable of suggesting a frequency selected from a limited frequency range based on interference analysis of selected area. [M]

### 3.6 Plots and reports

- 1) The tool shall be capable of easily selecting colours, fonts and formats of the displayed data.[M]
- 2) It shall be possible to add notes both in the legend and on the plot. [M]

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- 
- 3) The supplier shall state if link and coverage plots can be exported in formats suitable for CAD, GeoTiff, Paint shop etc. [M]
  - 4) It shall be possible to print, plot and export coverage plots and link plots and notes onto TIF or JPG files showing scaled maps e.g.1:250,000/1:500,000etc. [M]

### **3.7 Data Terrain Model**

- 1) The supplier shall state which formats of DTM data the tool can accommodate. [I]

### **3.8 Handbooks**

- 1) Four (4) complete sets of handbooks must be provided free of charge to Eskom Telecommunications once the contract is established. [M]
- 2) Additional handbooks may be ordered on an as and when required basis. [M]
- 3) The Supplier must correct any errors discovered in the handbooks and amendments sent to Eskom Telecommunications to ensure that all copies issued are updated. These changes will be for the Supplier's account. [M]

### **3.9 General Requirements**

- 1) The tool shall have a password enabled database management. [M]
- 2) The tool shall be adaptable to various technologies e.g. TDMA, CDMA, FDMA, etc. [M]

The Respondent shall:

- 3) Provide a description of the various deployment configurations and pricing for each configuration of the product [M]

Eskom foresees two possible configurations that will be considered for its use. [I]

The planning tool may be installed at a single office and personnel from all over the country will access the program from the single location. [I]

A copy of the planning tool may be installed on a server in each Eskom Region with limited access per region [I]

- 4) The respondent shall state whether their solution would be able to update, from a central database, the various databases sitting in the various locations and how this is done. [M]
- 5) The Tender Company shall state the WAN bandwidth required for their solution to operate (1) optimally and (2) best. [M]

### **3.10 Training**

- 1) The supplier shall give full details of the training provided (e.g. cost, place of training and number of candidates, etc.). [M]

### **3.11 Warranty**

- 1) Eskom's standard Conditions of Contract require a warranty period, the supplier shall state the warranty period. [M]
- 2) The supplier shall state their policy on future upgrades. [M]

### **3.12 History of the supplier**

All respondents shall give full details called for in section 3.12.2. (Parent Equipment Supplier/Manufacturer) below. However, in the event that any equipment proposed in response to this Enquiry is imported, respondent shall complete both section 3.12.1. and 3.12.2.

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### 3.12.1 South African Agent

- 1) Respondents shall provide the following information: [M]
  - a) Name of the company.
  - b) Company address.
  - c) Date of establishment of company.
  - d) Length of association with the Parent.
  - e) A copy of the agreement to sell the Parent's product and back-up support.
- 2) Outline the company's management structure. [M]
- 3) State the company's staff complement: [M]
  - a) Total.
  - b) Administrative.
  - c) Dealing with the Parent's product range.
  - d) System implementation including installation and commissioning.
  - e) Inspection and quality assurance.
  - f) Other.
- 4) State the level of qualification of the technical staff who will be involved with this product.
- 5) State what level (1st, 2nd or 3rd) of maintenance can be attained of the proposed solution in South Africa. [M]

Where;

1 = Gather information and consult with overseas parent before proposing a solution to a problem.

2 = Answer most questions that may arise with limited referrals to parent company

3 = Answer any question that may arise i.e. totally conversant with the total package offered.

- 6) State the level of experience with the Parent's product range. [M]
- 7) List the courses offered by the Parent attended by the agent's staff that will be involved in this project. [M]
- 8) Briefly describe the nature of your resources in South Africa, specifically: [M]
  - a) Expertise in operating the offered equipment.
  - b) Other relevant information.

### 3.12.2 Parent Equipment Supplier

- 1) Provide the following information: [M]
  - a) Name of the company.
  - b) Company address.
  - c) Date of establishment of the company.
- 2) State the company's staff complement: [M]
- 3) State the proportion of the annual turnover invested in development in the proposed product range for each of the last two years. [M]

## **4. Authorization**

This document has been seen and accepted by:

| <b>Name and surname</b> | <b>Designation</b>                                                                    |
|-------------------------|---------------------------------------------------------------------------------------|
| Mfundiso Hina           | Senior Manager - Eskom Telecommunications (Acting)                                    |
| Lenah Mothata           | Senior Manager - Grids                                                                |
| Barry Clayton           | Chief Engineer – Transmission Secondary Plant, Work Planning and Centralised Services |
| Sikelela Mkhabela       | Senior Manager - Distribution                                                         |
| Prudence Madiba         | Senior Manager - Generation                                                           |
| Maureen Mokone          | Senior Manager – Group Information Technology (Acting)                                |
| Botse Sikhwitshi        | Senior Manager – Group Security (Acting)                                              |

## **5. Revisions**

| <b>Date</b> | <b>Rev</b> | <b>Compiler</b> | <b>Remarks</b>                                   |
|-------------|------------|-----------------|--------------------------------------------------|
| Oct 2020    | 2          | K Jose          | Revised to incorporate the current requirements. |
| March 2016  | 1          | K Jose          | Adapted from ETSP 0490.                          |

## **6. Development team**

The following people were involved in the development of this document:

- Kgomoitso Setlhapelo

## **7. Acknowledgements**

Not applicable.

**Annex A – Technical Schedules**

| <b>Clause No</b> | <b>Description</b>                                                                                                                                                                        | <b>Schedule A:<br/>Eskom<br/>Telecommunica<br/>tions minimum<br/>technical<br/>requirements</b> | <b>Schedule B:<br/>Tenderer's<br/>guaranteed<br/>statements of<br/>compliance or non-<br/>compliance and<br/>supporting evidence</b> |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| <b>3.1</b>       | <b>COMPUTER EQUIPMENT</b>                                                                                                                                                                 |                                                                                                 |                                                                                                                                      |
| 1)               | The operating platform should be Windows based from Windows 7, 64 bit and above. The supply shall state what versions the system is compatible with.<br>[M]                               | Compliance required                                                                             |                                                                                                                                      |
| 2)               | The system should be capable of working over both LANs and WANs.<br>[M]                                                                                                                   | Compliance required                                                                             |                                                                                                                                      |
| 3)               | The supplier shall state the specifications for the server.<br>[M]                                                                                                                        | Compliance required                                                                             |                                                                                                                                      |
| 4)               | The supplier shall state any special printers and plotters required for use with the proposed solution.<br>[M]                                                                            | Compliance required                                                                             |                                                                                                                                      |
| 5)               | The application shall have an intuitive graphic user interface, providing ease of use, and logical menu structures.<br>[M]                                                                | Compliance required                                                                             |                                                                                                                                      |
| <b>3.2</b>       | <b>LICENSING REQUIREMENTS</b>                                                                                                                                                             |                                                                                                 |                                                                                                                                      |
| 1)               | The supplier shall give full details of its licensing policies and requirements.<br>[M]                                                                                                   | Compliance required                                                                             |                                                                                                                                      |
| <b>3.3</b>       | <b>POINT -TO -POINT SYSTEM</b>                                                                                                                                                            |                                                                                                 |                                                                                                                                      |
| 1)               | The tool shall support the latest revision of ITU-R P.530's Propagation data and prediction methods required for the design of terrestrial line-of-sight systems (30MHz to 100GHz)<br>[I] | To be stated                                                                                    |                                                                                                                                      |
| 2)               | The supplier shall state which other prediction models the tool supports.<br>[M]                                                                                                          | Compliance required                                                                             |                                                                                                                                      |

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| Clause No | Description                                                                                                                                                                                                                                  | Schedule A: Eskom Telecommunications minimum technical requirements | Schedule B: Tenderer's guaranteed statements of compliance or non-compliance and supporting evidence |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| 3)        | Availability and error performance calculations shall be based on those mentioned in Section 2.2.2 above.<br>[M]                                                                                                                             | Compliance required                                                 |                                                                                                      |
| 4)        | The tool shall support rain models from ITU-R P.837, Crane and Vigants.<br>[M]                                                                                                                                                               | To be stated.                                                       |                                                                                                      |
| 5)        | The supplier shall name other rain models supported by the tool.<br>[I]                                                                                                                                                                      | Compliance required                                                 |                                                                                                      |
| 6)        | The tool shall be capable of conducting interference analysis for any selected network of radios in accordance with ITU-R P.452 recommendation.<br>[M]                                                                                       | Compliance required                                                 |                                                                                                      |
|           | The tool shall be capable of recommending / finding the best/least number of hops of a route<br>[M]                                                                                                                                          | Compliance Required                                                 |                                                                                                      |
| 7)        | The tool shall report on a High/Low frequency conflict.<br>[M]                                                                                                                                                                               | Compliance Required                                                 |                                                                                                      |
| 8)        | The tool shall be capable of passive repeater calculation.<br>[M]                                                                                                                                                                            | Compliance Required                                                 |                                                                                                      |
| 9)        | The tool shall be capable of performance and availability calculations on multiple-hop radio links in terms of the Recommendations stated in 4.1 above and in addition also should be able to interpolate the result of a single hop.<br>[M] | Compliance required                                                 |                                                                                                      |
| 10)       | The tool shall be capable of performance and availability calculations for space, angle and frequency diversity.<br>[M]                                                                                                                      | Compliance required                                                 |                                                                                                      |

| Clause No | Description                                                                                                                                                                                                                                                                 | Schedule A:<br>Eskom<br>Telecommunica<br>tions minimum<br>technical<br>requirements | Schedule B:<br>Tenderer's<br>guaranteed<br>statements of<br>compliance or non-<br>compliance and<br>supporting evidence |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| 11)       | The tool shall provide warnings when different equipment bands are coupled together in error. Example: When picking equipment from a list an error could be made by picking two different types of equipment for each end of the same hop.<br><br>[M]                       | Compliance Required                                                                 |                                                                                                                         |
| 12)       | The tool shall be capable of performing inter-modulation calculations at any one site. The Tender Company shall state the number of Tx/Rx combinations that can be accommodated in the calculation as well as what order of inter-modulation the tool is capable of.<br>[M] | Compliance Required                                                                 |                                                                                                                         |
| 13)       | 14)The tool shall be capable of performing co-channel and adjacent channel interference degradation calculations, in accordance with ETSI TR 101 854.<br>[I]                                                                                                                | To be stated                                                                        |                                                                                                                         |
| 14)       | The tool shall be capable of recommending best polarization orientation on long routes.<br>[M]                                                                                                                                                                              | Compliance Required                                                                 |                                                                                                                         |
| 15)       | The tool shall be capable of identifying the co-ordinates of an obstacle along a link.<br>[M]                                                                                                                                                                               | Compliance Required                                                                 |                                                                                                                         |
| 16)       | The tool shall be capable of generating own clutter given hypothetical ground clutter. For example, vegetation, buildings of "x" height covering "y" area in the path and recommend signal absorption characteristics of the clutter.<br>[M]                                | Compliance Required                                                                 |                                                                                                                         |
|           | The tool shall be able to up-load real clutter and use in its calculations.<br>[M]                                                                                                                                                                                          | Compliance Required                                                                 |                                                                                                                         |
| 17)       | It shall be possible to import data from antenna suppliers depicting radiation patterns, antenna gains, etc.<br><br>[M]                                                                                                                                                     | Compliance Required                                                                 |                                                                                                                         |

| Clause No | Description                                                                                                                                                                                            | Schedule A:<br>Eskom<br>Telecommunica<br>tions minimum<br>technical<br>requirements | ScheduleB:<br>Tenderer's<br>guaranteed<br>statements of<br>compliance or non-<br>compliance and<br>supporting evidence |
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| 18)       | The supplier shall state which radio OEM's equipment specification data can be imported directly from suppliers libraries into the tool.<br>[M]                                                        | Compliance Required                                                                 |                                                                                                                        |
| 19)       | The supplier shall state which other radio planning tool's data and other formatted data file types (e.g. CSV, MS Word Excel, Google maps etc) can be imported into the tool.<br>[I]                   | To be stated                                                                        |                                                                                                                        |
| 20)       | The tool shall be capable of exporting profiles and other data to Word or PDF. The supplier shall state what data can be exported in what format.<br>[I]                                               | To be stated                                                                        |                                                                                                                        |
| 21)       | The tool shall have the ability to export the raw data (the respondent shall state which data e.g. diffraction losses along a radial etc) to a spreadsheet format for manipulation of the data.<br>[I] | To be stated                                                                        |                                                                                                                        |
| 22)       | The tool shall have the ability to link the planning tools via a network with each planner having privilege to change their own zone yet compute the effects of those adjacent.<br>[M]                 | Compliance Required                                                                 |                                                                                                                        |
| 23)       | The ability to search for likely sites by examining the surrounding terrain and suggesting a path with best free space loss conditions.<br>[M]                                                         | Compliance Required                                                                 |                                                                                                                        |
| 24)       | The tool shall have the ability to automatically assign frequencies taking cognizance of international frequency plans.<br>[M]                                                                         | Compliance Required                                                                 |                                                                                                                        |
| 25)       | The tool shall have the ability to design and view the complete nation-wide link plan on screen with zoom in and zoom out facilities.<br>[M]                                                           | Compliance required                                                                 |                                                                                                                        |

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| 26)        | The tool shall have the ability to suggest network optimisation that could be possible taking cognizance of network changes.<br><br>[M]                                      | Compliance Required                                                                 |                                                                                                                        |
|            | The tool shall be capable of performing desensitisation analysis in the presence of strong radiated power.<br><br>[M]                                                        | Compliance Required                                                                 |                                                                                                                        |
| <b>3.4</b> | <b>POINT –TO-MULTIPOINT COVERAGE CALCULATIONS</b>                                                                                                                            |                                                                                     |                                                                                                                        |
| 1)         | The tool shall support the ITU-R P.370 (VHF and UHF propagation curves for the frequency range from 30 MHz to 1 000 MHz)<br><br>[M]                                          | Compliance required                                                                 |                                                                                                                        |
| 2)         | The tool shall support the ITU-R P.1546 propagation model (Method for point to area predictions for terrestrial services in the frequency range 30MHz to 3000MHz.).<br>[M]   | Compliance required                                                                 |                                                                                                                        |
| 3)         | The supplier shall state which other models the tool supports.<br>[I]                                                                                                        | To be stated                                                                        |                                                                                                                        |
| 4)         | The tool shall support rain models from ITU-R P.837, Crane and Vigants.<br>[I]                                                                                               | To be stated                                                                        |                                                                                                                        |
| 5)         | The supplier shall name other rain models supported by the tool.<br>[M]                                                                                                      | Compliance required                                                                 |                                                                                                                        |
| 6)         | The tool shall make use of ITU-R's P.1812 or similar (A path specific propagation prediction method for point-to-area terrestrial services in the VHF and UHF bands))<br>[I] | Compliance required                                                                 |                                                                                                                        |
| 7)         | The tool shall be capable of Interference analysis for any network of point to multi-point radios.                                                                           | Compliance required                                                                 |                                                                                                                        |
| 8)         | The tool shall be capable of performing inter-modulation calculations at any one site<br>[M]                                                                                 | Compliance Required                                                                 |                                                                                                                        |

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| Clause No | Description                                                                                                                                                                                                                                                                       | Schedule A:<br>Eskom<br>Telecommunica<br>tions minimum<br>technical<br>requirements | ScheduleB:<br>Tenderer's<br>guaranteed<br>statements of<br>compliance or non-<br>compliance and<br>supporting evidence |
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| 9)        | The supplier shall state the number of Tx/Rx combinations that can be accommodated in the intermodulation calculation as well as what order of inter-modulation the tool is capable of. [M]                                                                                       | Compliance required                                                                 |                                                                                                                        |
| 10)       | The tool shall be capable of performance and availability calculations for space, angle and frequency diversity.<br><br>[M]                                                                                                                                                       | Compliance Required                                                                 |                                                                                                                        |
| 11)       | The tool shall be capable of overlaying a static hexagonal cell structure over the selected terrain<br><br>[M]                                                                                                                                                                    | Compliance Required                                                                 |                                                                                                                        |
| 12)       | The tool shall be capable of performing reverse coverage plots as seen from the outstation (i.e. how many base stations an outstation can see).<br><br>[M]                                                                                                                        | Compliance Required                                                                 |                                                                                                                        |
| 13)       | The tool shall be capable of overlaying a number of base station footprints to gauge the composite coverage of the selected base station.<br><br>[M]                                                                                                                              | Compliance required                                                                 |                                                                                                                        |
| 14)       | The tool shall be capable of performing reverse coverage plots from a number of selected outstations to determine the position of one suitable base station.<br><br>[M]                                                                                                           | Compliance Required                                                                 |                                                                                                                        |
| 15)       | The tool shall be capable of generating its own clutter based on hypothetical ground cover (e.g. a town / city environment with "x" m high buildings / vegetation in "y" square m of the coverage area and recommend signal absorption characteristics of the clutter.<br><br>[M] | Compliance required                                                                 |                                                                                                                        |
| 16)       | The tool shall allow for the comparison and analysis of theoretical and measured data. [M]                                                                                                                                                                                        | Compliance Required                                                                 |                                                                                                                        |

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| 17)       | It shall be possible to produce multiple levels of a coverage plot (e.g. simultaneous depiction of coverage at -XdBm, -YdBm etc ...)<br><br>[M]                                           | Compliance Required                                                                 |                                                                                                                         |
| 18)       | It shall be possible to import data from antenna suppliers depicting radiation patterns , antenna gains, etc                                                                              | Compliance required                                                                 |                                                                                                                         |
| 19)       | The supplier shall state which manufactures equipment specification data and other formatted data file types (e.g. CSV, MS Word Excel, etc) can be imported into the tool.                | Compliance Required                                                                 |                                                                                                                         |
| 20)       | The supplier shall state which other radio planning tool's data can be imported into the tool. [I]                                                                                        | Compliance required                                                                 |                                                                                                                         |
| 21)       | The tool shall have the ability to export the raw data to a spreadsheet format for manipulation of the data. The supplier shall state which raw data can be exported.<br>[M]              | Compliance Required                                                                 |                                                                                                                         |
| 22)       | The tool shall be capable of counting outstations / mobiles covered under a base station footprint with the addition of a polygon cell.<br><br>[M]                                        | Compliance required                                                                 |                                                                                                                         |
|           | The tool shall be capable of calculating power budget for each fixed outstation.<br>[M]                                                                                                   | Compliance Required                                                                 |                                                                                                                         |
| 23)       | The tool shall be capable of traffic analysis and forecasting per base station in terms of GoS and QoS.<br><br>[M]                                                                        | Compliance Required                                                                 |                                                                                                                         |
| 24)       | The tool shall have an ability to highlight points of interests against attribute data encompassed within the addition of a polygon cell.                                                 | To be stated                                                                        |                                                                                                                         |
| 25)       | The tool shall have an ability to link the planning tools via a network with each planner having the privilege to change their own zone yet compute the effects of those adjacent.<br>[M] | Compliance Required                                                                 |                                                                                                                         |

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| 26)        | The tool shall be capable of performing desensitisation analysis in the presence of strong radiated power.<br><br>[M]                                   | Compliance Required                                                                 |                                                                                                                        |
| 27)        | The tool shall have the ability to automatically assign frequencies taking cognizance of Eskom and international frequency plans.<br><br>[M]            | Compliance required                                                                 |                                                                                                                        |
| 28)        | The tool shall have the ability to suggest network optimisation that could be possible taking cognizance of network changes<br><br>[M]                  | Compliance Required                                                                 |                                                                                                                        |
| 29)        | The tool shall have the ability to suggest network optimisation that could be possible taking cognizance of network changes<br><br>[M]                  | Compliance Required                                                                 |                                                                                                                        |
| <b>3.5</b> | <b>FREQUENCY MANAGEMENT</b>                                                                                                                             |                                                                                     |                                                                                                                        |
| 1)         | The supplier shall state the degree to which the frequency management functionality complies with ITU-R SM.1370.<br><br>[I]                             | To be stated                                                                        |                                                                                                                        |
| 2)         | The tool shall have the capability of making use of the standard frequency plans as published by ETSI and ITU-R.<br><br>[M]                             | Compliance required                                                                 |                                                                                                                        |
| 3)         | The tool shall also have the capability of supporting manually added frequency plans.<br>[M]                                                            | Compliance Required                                                                 |                                                                                                                        |
|            | The tool shall be capable of suggesting a frequency selected from a limited frequency range based on interference analysis of selected area.<br><br>[M] | Compliance Required                                                                 |                                                                                                                        |

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| <b>3.6</b> | <b>PLOTS AND REPORTS</b>                                                                                                                                                                                                |                                                                                     |                                                                                                                        |
| 1)         | The tool shall be capable of easily selecting colours, fonts and formats of the displayed data.[M]                                                                                                                      | Compliance Required                                                                 |                                                                                                                        |
| 2)         | It shall be possible to add notes both in the legend and on the plot.<br>[M]                                                                                                                                            | Compliance Required                                                                 |                                                                                                                        |
| 3)         | The supplier shall state if link and coverage plots can be exported in formats suitable for CAD, GeoTiff, Paint shop etc.<br>[M]                                                                                        | Compliance required                                                                 |                                                                                                                        |
| 4)         | It shall be possible to print, plot and export coverage plots and link plots and notes onto TIF or JPG files showing scaled maps e.g.1:250,000/1:500,000etc.<br>[M]                                                     | Compliance Required                                                                 |                                                                                                                        |
| <b>3.7</b> | <b>DATA TERRAIN MODEL</b>                                                                                                                                                                                               |                                                                                     |                                                                                                                        |
| 1)         | The supplier shall state which formats of DTM data the tool can accommodate.<br>[I]                                                                                                                                     | To be stated                                                                        |                                                                                                                        |
| <b>3.8</b> | <b>HANDBOOKS</b>                                                                                                                                                                                                        |                                                                                     |                                                                                                                        |
| 1)         | Four (4) complete sets of handbooks must be provided free of charge to Eskom Telecommunications once the contract is established.<br>[M]                                                                                | Compliance Required                                                                 |                                                                                                                        |
| 2)         | Additional handbooks may be ordered on an as and when required basis.<br>[M]                                                                                                                                            | Compliance Required                                                                 |                                                                                                                        |
|            | The Supplier must correct any errors discovered in the handbooks and amendments sent to Eskom Telecommunications to ensure that all copies issued are updated. These changes will be for the Supplier's account.<br>[M] | Compliance Required                                                                 |                                                                                                                        |

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| <b>3.9</b>  | <b>GENERAL REQUIREMENTS</b>                                                                                                                                                      |                                                                                     |                                                                                                                        |
| 1)          | The tool shall have a password enabled database management.<br>[M]                                                                                                               | Compliance required                                                                 |                                                                                                                        |
| 2)          | The tool shall be adaptable to various technologies e.g. TDMA, CDMA, FDMA, etc.<br>[M]                                                                                           | Compliance required                                                                 |                                                                                                                        |
| 3)          | Provide a description of the various deployment configurations and pricing for each configuration of the product                                                                 | Compliance required                                                                 |                                                                                                                        |
| 4)          | The respondent shall state whether their solution would be able to update, from a central database, the various databases sitting in the various locations and how this is done. | Compliance required                                                                 |                                                                                                                        |
| 5)          | The Tender Company shall state the WAN bandwidth required for their solution to operate<br>(1) optimally and<br>(2) best.                                                        | Compliance required                                                                 |                                                                                                                        |
| <b>3.10</b> | <b>TRAINING</b>                                                                                                                                                                  |                                                                                     |                                                                                                                        |
| 1)          | The supplier shall give full details of the training provided (e.g. cost, place of training and number of candidates, etc.).<br>[M]                                              | Compliance required                                                                 |                                                                                                                        |
| <b>3.11</b> | <b>WARRANTY</b>                                                                                                                                                                  |                                                                                     |                                                                                                                        |
| 1)          | Eskom's standard Conditions of Contract require a warranty period, the supplier shall state the warranty period.<br>[M]                                                          | Compliance required                                                                 |                                                                                                                        |
| 2)          | The supplier shall state their policy on future upgrades.<br>[M]                                                                                                                 | Compliance required                                                                 |                                                                                                                        |
| <b>3.12</b> | <b>History of the supplier</b>                                                                                                                                                   |                                                                                     |                                                                                                                        |

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| 3.12.1    | South African agent                                                                                                                                                                                                                                                                                                    |                                                                                 |                                                                                                                         |
| 1)        | Respondents shall provide the following information:<br>[M]<br>a) Name of the company.<br>b) Company address.<br>c) Date of establishment of company.<br>d) Length of association with the Parent.<br>e) A copy of the agreement to sell the Parent's product and back-up support.                                     | Compliance required                                                             |                                                                                                                         |
| 2)        | Outline the company's management structure.<br>[M]                                                                                                                                                                                                                                                                     | Compliance required                                                             |                                                                                                                         |
| 3)        | State the company's staff complement:<br>[M]<br>a) Total.<br>b) Administrative.<br>c) Dealing with the Parent's product range.<br>d) System implementation including installation and commissioning.<br>e) Inspection and quality assurance.<br>f) Other.                                                              | Compliance required                                                             |                                                                                                                         |
| 4)        | State the level of qualification of the technical staff who will be involved with this product.                                                                                                                                                                                                                        | Compliance required                                                             |                                                                                                                         |
| 5)        | State what level (1st, 2nd or 3rd) of maintenance can be attained of the proposed solution in South Africa.<br>[M]<br>Where;<br>1 = Gather information and consult with overseas parent before proposing a solution to a problem.<br>2 = Answer most questions that may arise with limited referrals to parent company | Compliance required                                                             |                                                                                                                         |

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|           | 3 = Answer any question that may arise i.e. totally conversant with the total package offered.                                                                            |                                                                                     |                                                                                                                        |
| 6)        | State the level of experience with the Parent's product range.                                                                                                            | Compliance required                                                                 |                                                                                                                        |
| 7)        | List the courses offered by the Parent attended by the agent's staff that will be involved in this project.                                                               | Compliance required                                                                 |                                                                                                                        |
| 8)        | Briefly describe the nature of your resources in South Africa, specifically:<br>[M]<br>a) Expertise in operating the offered equipment.<br>b) Other relevant information. | Compliance required                                                                 |                                                                                                                        |
| 3.12.2    | <b>Parent Equipment supplier</b>                                                                                                                                          |                                                                                     |                                                                                                                        |
| 1)        | Provide the following information:<br>[M]<br>a) Name of the company.<br>b) Company address.<br>c) Date of establishment of the company.<br><br>[M]                        | Compliance required                                                                 |                                                                                                                        |
| 2)        | State the company's staff complement:                                                                                                                                     | Compliance required                                                                 |                                                                                                                        |
| 3)        | State the proportion of the annual turnover invested in development in the proposed product range for each of the last two years.                                         | Compliance required                                                                 |                                                                                                                        |