



## Electromagnetic Field Measurement Survey



**BS Number: 6**

**Site Name: Phase4**

**Site Address:**

BTC RLU 6

Cnr A1 & Mokukumelo

Gaborone

**Site visit date: 26 October 2010**

**Site report date: 01 December 2010**

## Introduction

As part of an electromagnetic measurement survey program of base station installations performed by the Botswana Telecommunications Authority (BTA), measurements were performed at Phase4. The aim of the survey was to measure the electromagnetic exposure levels at various positions around the base station.

Measured results are compared to the guidelines of limiting exposure proposed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP).

## Measured Results

Table 1 and Figure 1 presents the measured positions and exposure levels in terms of a percentage of the ICNIRP guidelines, where a 100% value would indicate that the safe exposure limit for the General Public has been reached. The total exposure is given in the first column of the table. Since the aim of the survey was to measure the typical exposure values, the reported results are un-extrapolated peak field instantaneous exposure results, at the specific date and time of the measurement survey.

## Summary of Results & Conclusion

For the measured results presented in this report a 100% value would indicate that the ICNIRP exposure limit for the General Public has been reached. The highest value measured is 0.0517% of the ICNIRP General Public guidelines and was obtained at position 1. This is more than 1930 times below the General Public limit.

**Table 1: RF Exposure Levels at Measurement Positions**

| Measured On         | No. | Position   | Total Exposure | GSM900 DL | GSM1800 DL | UMTS DL | Others  |
|---------------------|-----|--|----------------|-----------|------------|---------|---------|
| 2010/10/26<br>14:34 | 1   | At the base of the Phase 4 mast.                                   | 0.0517%        | 0.0469%   | 0.0023%    | 0.0009% | 0.0016% |
| 2010/10/26<br>14:41 | 2   | Along Mokulumela Road, south of the Phase 4 mast.                  | 0.0323%        | 0.0273%   | 0.0005%    | 0.0024% | 0.0021% |
| 2010/10/26<br>14:45 | 3   | On the corner of Mokukumelo Road and Western Bypass.               | 0.0500%        | 0.0447%   | 0.0017%    | 0.0019% | 0.0018% |
| 2010/10/26<br>14:51 | 4   | Along Mokukumelo Road, opposite the gate of BTC RLU 6.             | 0.0227%        | 0.0184%   | 0.0011%    | 0.0017% | 0.0016% |
| 2010/10/26<br>14:58 | 5   | Along the road to the east of the Phase 4 site.                    | 0.0064%        | 0.0047%   | 0.0004%    | 0.0002% | 0.0011% |
| 2010/10/26<br>15:05 | 6   | In front of plot 22442.  | 0.0120%        | 0.0102%   | 0.0003%    | 0.0002% | 0.0013% |
| 2010/10/26<br>15:12 | 7   | Next to plot 22636.  | 0.0241%        | 0.0212%   | 0.0007%    | 0.0008% | 0.0013% |
| 2010/10/26<br>15:17 | 8   | Along the Western Bypass, close a pedestrian bridge.               | 0.0366%        | 0.0300%   | 0.0035%    | 0.0010% | 0.0021% |
| 2010/10/26<br>15:21 | 9   | Across Western Bypass, about 30 meters west from the Phase 4 mast. | 0.0268%        | 0.0204%   | 0.0030%    | 0.0019% | 0.0015% |
| 2010/10/26<br>15:26 | 10  | Across Western Bypass from the Phase 4 mast, along a sidewalk.     | 0.0299%        | 0.0266%   | 0.0004%    | 0.0011% | 0.0018% |



**Figure 1: Map of Area around Base Station Site and Measurement Positions**

## Measurement Equipment and Methodology

Both survey meter and probe must be calibrated on a regular basis. The calibration status is presented in the following table.

|                      |   |                            |                                 |
|----------------------|---|----------------------------|---------------------------------|
| <b>Survey Meter:</b> | Narda SRM 3006 Selective Radiation Meter, S/N: D-0016 | <b>Calibration Status:</b> | Valid calibration: 12 July 2010 |
| <b>Probe:</b>        | Narda BN 3501 Three-Axis E-Field Probe, S/N: K-0195   | <b>Calibration Status:</b> | Valid calibration: 24 June 2010 |

## Assessment Process and Software

The assessment process, software and training were developed by EMSS Consulting (EMSS). EMSS has expertise in the field of human exposure assessment to radio-frequency fields.

BTA engineers were trained by EMSS to perform measurements in accordance with the measurement protocol of the CENELEC 50492 (November 2008) standard for the in-situ measurement of electromagnetic field strength related to human exposure in the vicinity of base stations. The CENELEC 50492 standard requires an uncertainty assessment to be performed when extrapolation is not used to address maximum traffic. A full uncertainty analysis for the measurement methodology developed by EMSS has been performed and resulted in an expanded uncertainty of 3.8 decibel (dB).

Additional survey information, typically shown in a CENELEC 50492 report, is available from BTA on request.

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