**STG(14)07**

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| **STG #37**  **WGSE - SEAMCAT Technical Group**  **Biel-Bienne, OFCOM Switzerland**  **11-12 March 2014** | | |  |
| **Date Issued:** 11 February 2014  **Source :** CSIR (Council for Scientific and Industrial Research-South africa) ([www.csir.co.za](http://www.csir.co.za))  **Subject:**  Proposal of incorporating a capability to access digital terrain database(s) in SEAMCAT | | | |
| **Document:** for discussion/for information/for action | | | |
| Password protection required? (Y/N) | N |

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| Summary: CSIR is using SEAMCAT to study compatibility of two systems in difficult geographical terrain environment scenarios: (I) When actual antenna heights above ground level are used. (II) And when terrain data is considered in the antenna heights. The results of the Interference Probability (IP) in the study differ by substantial margins. |
| Proposal: 1 request is presented:   1. Would it be possible to improve SEAMCAT by incorporating a plugin for digital terrain database(s)? |
| Background:  CSIR a research organisation located in South Africa is utilising Monte-Carlo simulations method for assessing the impact of WSDs on DVB-T1&2 receptions; as such SEAMCAT is used intensively. The outcome of this study will assist to determine the best approach for constructing a TVWS geo-location database. (i.e., the Ofcom/EU approach *vs.* the FCC/North America approach). It is important to note that Africa belongs to the ITU region 1 with Europe. However, most of the southern African countries have wide varying geographical terrains ranging from forests, grasslands, deserts, low-lying coastal areas to mountains. This poses serious challenges in the compatibility studies; as such accuracy in the tools is required. |

A snapshot of the 3 compatibility study scenarios is provided herewith. In this study a real-life DVB-T transmitter data were used while the hypothetical WSDs data were used. The tests utilised the inbuilt ITU-R P.1546-4-land propagation model and antenna heights were re-calculated using an online SRTM3 terrain database from the ITU [1]:

1. Scenario 1:

VLT: A real-life DVB-T transmitter with an antenna height at 25 m above ground level (AGL).

VLR: A home digital receiving antenna height at 10 m AGL.

ILT: A hypothetical WSD-BS with antenna height at 30 m AGL.

ILR: A hypothetical WSD-CPE with an antenna height at10 m AGL.

1. Scenario 2:

VLT: A real-life DVB-T transmitter with an antenna height at 165 m; effective height above average terrain (EHAAT)[[1]](#footnote-1).

VLR: A home digital receiving antenna height at 150 m EHAAT.

ILT: A hypothetical WSD transmitter with an antenna height at 170 m EHAAT.

ILR: A hypothetical WSD-CPE antenna height AT 150 m EHAAT.

1. Scenario 3:

VLT: A real-life DVB-T transmitter with an antenna height at 165 m EHAAT.

VLR: A home digital receiving antenna height at 10 m AGL.

ILT: A hypothetical WSD transmitter with an antenna height at 170 m EHAAT.

ILR: A hypothetical WSD-CPE antenna height at 10 m AGL.

After having conducted the aforementioned test scenarios it was observed that the resulting Interference Probability (IP)varied by significant margins when the terrain information was incorporated in the antenna heights of both system links. Table 1 illustrates further.

**Request 1:**

Would it be possible to improve the results generated by SEAMCAT by incorporating a plugin for a digital terrain database(s) such as SRTM3?

Table 1: Comparison between 3 compatibility study scenarios by varying the VL and the IL antenna heights when the terrain database was used and when it was not used. The DVB-T transmitter power = 56.9 dBm; The WSD-BS power = 23 dBm; Noise Limited Networks; ITU-R P.1546-4 propagation model - rural; 70% availability; stdDev of VL and IL = 5.5 dB and 3.5 dB respectively; C/I = -36; C/(N+I) = -45.635; (N+I)/N = 0.5; I/N = -9.136; Number of MC events = 20,000 per scenario.

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| **Interference Criteria:**  **Unwanted Signal** | **Scenario 1:**  **IP%** | **Scenario 2:**  **IP%** | **Scenario 3:**  **IP%** |
| **C/I** | 47.65 | 37.80 | 22.73 |
| **C/(I+N)** | 08.75 | 06.84 | 00.7 |

Reference:

1. Calculation of Effective antenna heights (eff­\_hgt) using the SRTM3 Terrain Database, [Online], available: http://www.itu.int/SRTM3/

1. The EHAAT of an antenna is the average of antenna heights above average terrains (HAATs) for 8 radials spaced every 45 degrees of azimuth starting with true north. HAAT is the height of the radiation centre of the antenna above the average elevation between 3 km to 16 km from the antenna for each radial. [↑](#footnote-ref-1)