# Spectrum Management System for Developing Countries (SMS4DC)

**Workshop on Spectrum Management and Harmonized use of Spectrum Resource**
**Nadi, Fiji**
**28 – 30 November 2017**

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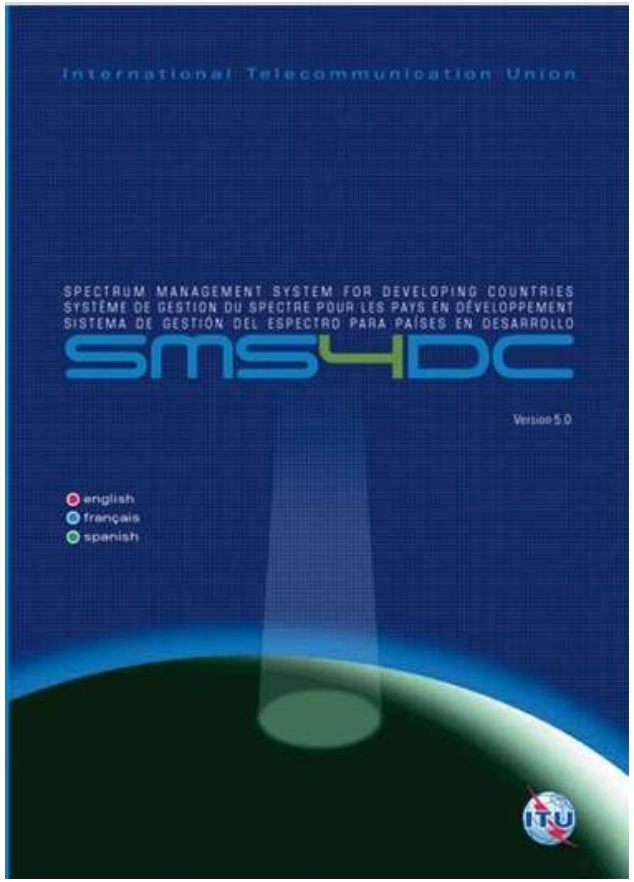
# ITU Spectrum Management System for Developing Countries (SMS4DC)

- SMS4DC is software designed by ITU based on ITU recommendations
- Developed to assist the administrations of developing countries to undertake their spectrum management responsibilities more effectively;
- SMS4DC covers terrestrial fixed, mobile, sound and television broadcasting services in the bands above 30 MHz, including GE-06 as well as frequency coordination of Earth stations

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# SMS4DC subscribers


V.5.0 V.4.1 V.4.0

**Until Dec 2016**

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# SMS4DC Development Cycle

- **2007:** *SMS4DC Version 1.0*
- **2008:** *SMS4DC Version 2.0 (Addition of Digital TV planning tools (GE06))*
- **2009:** *SMS4DC Version 3.0 (Addition of Google Earth and monitoring interface)*
- **2012:** *SMS4DC Version 4.0 (link to ESMERALDA monitoring software of Thales and additional enhancements*
- **2014:** *SMS4DC Version 4.1 (Update of Article 5 according to WRC12, import from new BRIFIC & interface with appendix 7)*
- **2015:** *SMS4DC Version 5.0 (Revised propagation models based on the latest version of P.452, P.530 and P. 1812, P.1546 + 11343).*
- **2017: SMS4DC Version 5.1**
  - *Results of WRC-15*
  - *Revision of the Radio Regulations Article 5 module and update of the international frequency allocation*
  - *HCM*
  - *Spectrum Fee Calculation Example*

# Key Functions of SMS4DC

- **Comprehensive database (MS Access) of user/license details, with data fields in accordance with ITU recommendations;**
- **Provides complete process from: frequency application, frequency assignment, licensing, ITU plans and Bilateral frequency coordination procedures;**
- **Imports coordination data from ITU BRIFIC & SRS CD-ROM database;**
- **Producing electronic notices, print license, invoice & spectrum fee**
- **Security features:** *The designated system administrator can define an individual account for each SMS4DC user up to 6 levels of access to the different processes (e.g. licensing, assignment etc). Each user account is named and password protected.*

# SMS4DC Configuration

Single user

Workstation

-Main application
-Database
-Reports
-Maps

Multi user

-Database
-Reports
-Maps

Server

Workstation B

-Main application

Workstation A

-Main application

# Functions of SMS4DC

- **Administrative Functions**
- **Graphical User Interface (GIS) Functions** *(including Map Displays)*
- **Engineering Analysis Functions**

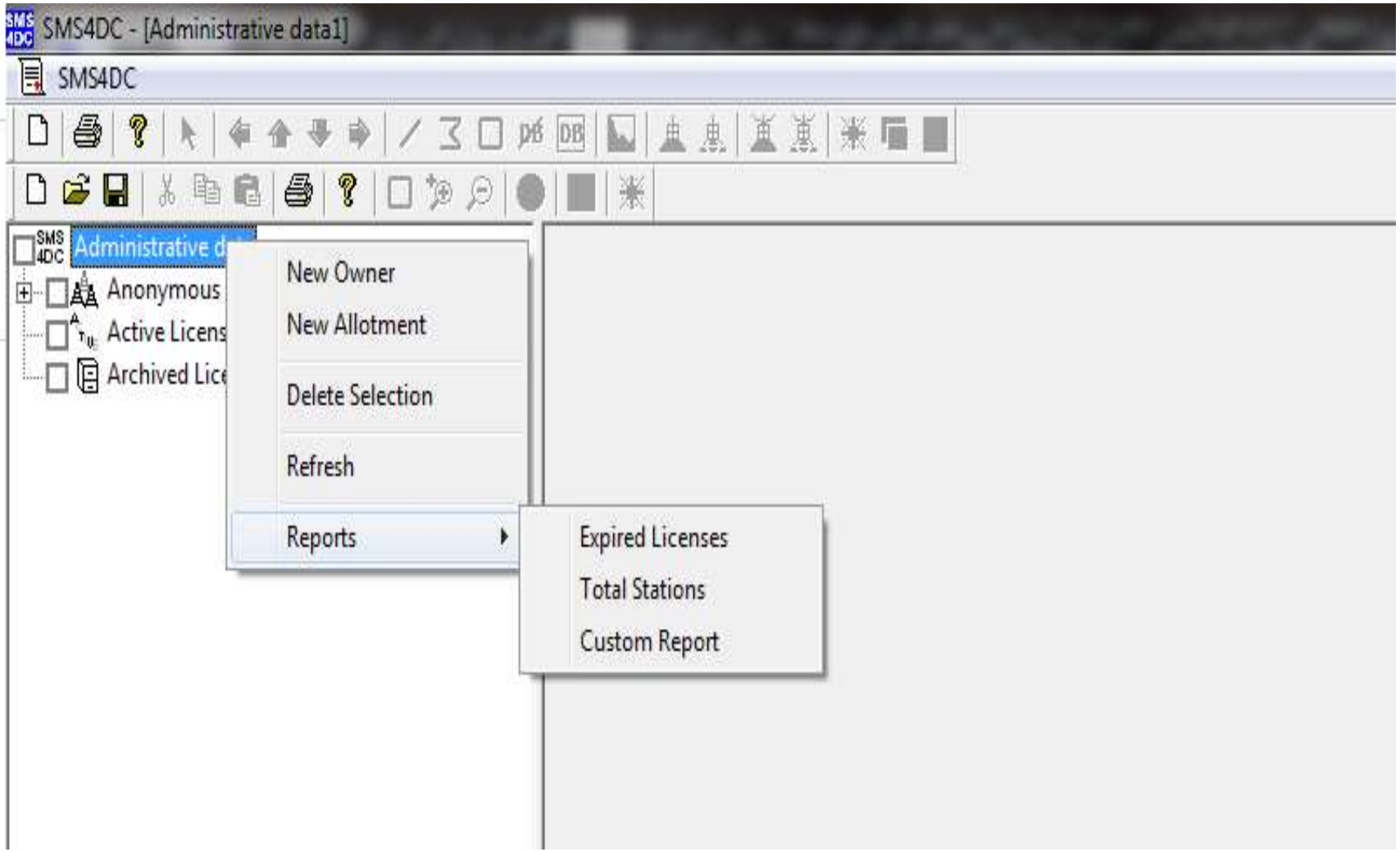
# Administrative Functions of SMS4DC

- **Administrative Functions**
  - *Comprehensive database (MS Access) of user/license details, with data fields in accordance with ITU recommendations;*
  - *Provides complete process from: frequency application, frequency assignment, licensing, ITU plans and Bilateral frequency coordination procedures;*
  - *Imports coordination data from ITU BRIFIC & SRS CD-ROM database;*
  - *Producing electronic notices, print license, invoice & spectrum fee*
  - *Security features: The designated system administrator can define an individual account for each SMS4DC user up to 6 levels of access to the different processes (e.g. licensing, assignment etc). Each user account is named and password protected.*

- **Graphical User Interface Functions (including Map Displays)**

- **Engineering Analysis Functions**

# SMS4DC License Database GUI




**Easy generation of customizable reports for Licenses and their status**

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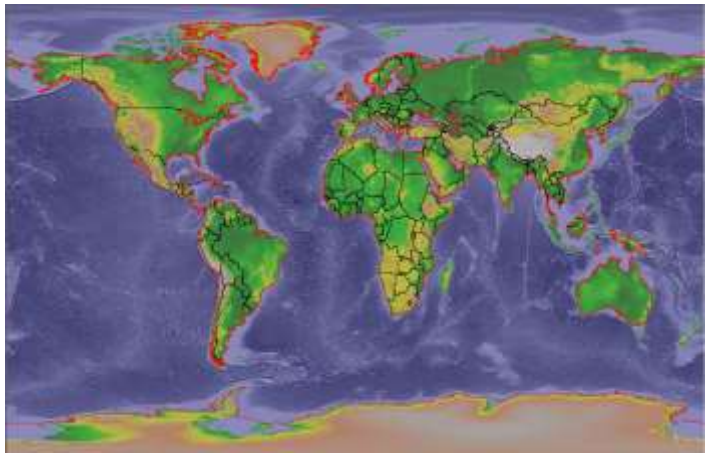
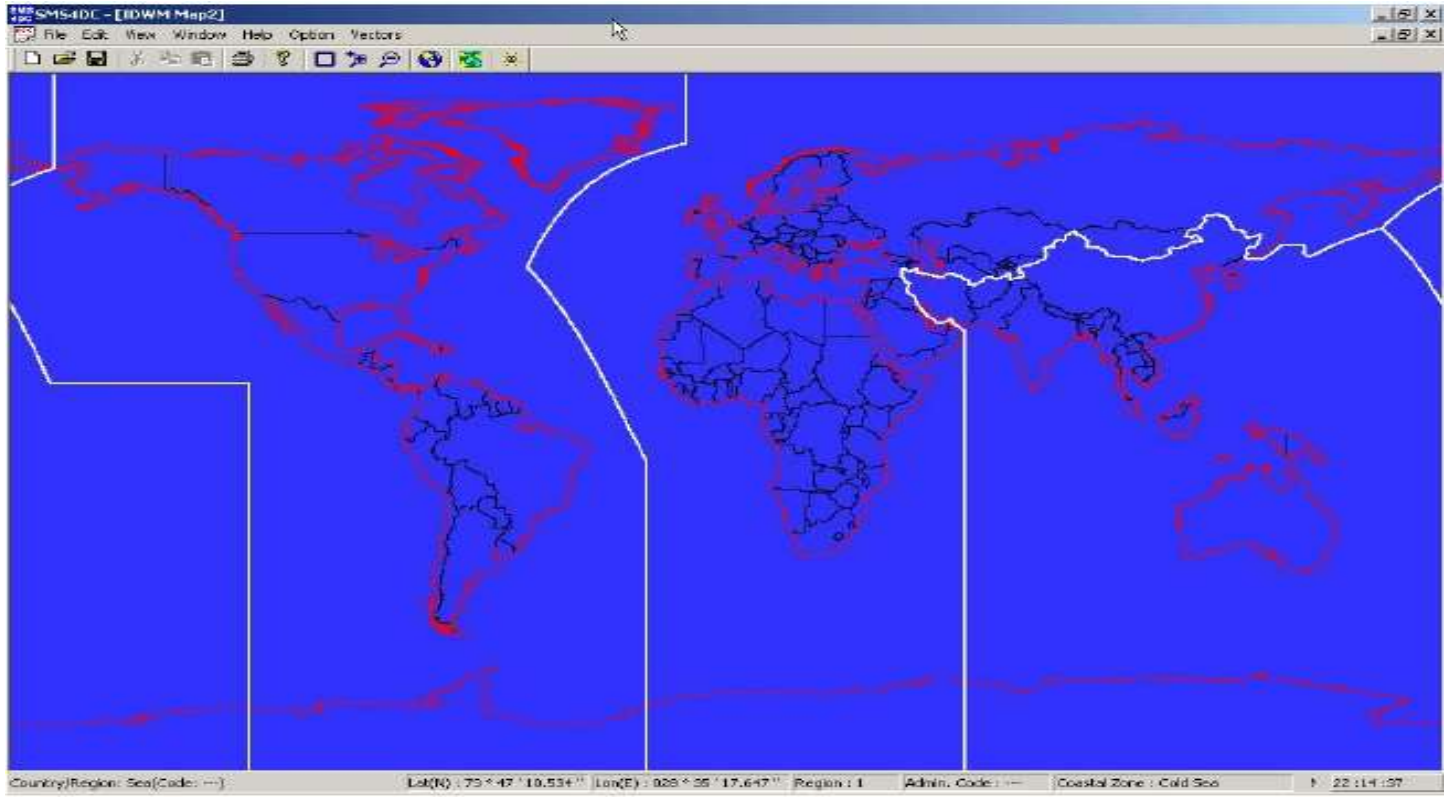
# GIS Functions of SMS4DC

- **User friendly interface with text menus and icon-tool bars;**
- **Display views**
  - *International Digital World Map (IDWM)*
  - *Digital Elevation Map (DEM) (2-D and 3-D)*
- **Data entry/Assigning of new stations on DEM by mouse point-and-click**
- **Export of maps, overlays and vectors to Google Earth Searching and displaying stations on DEM**

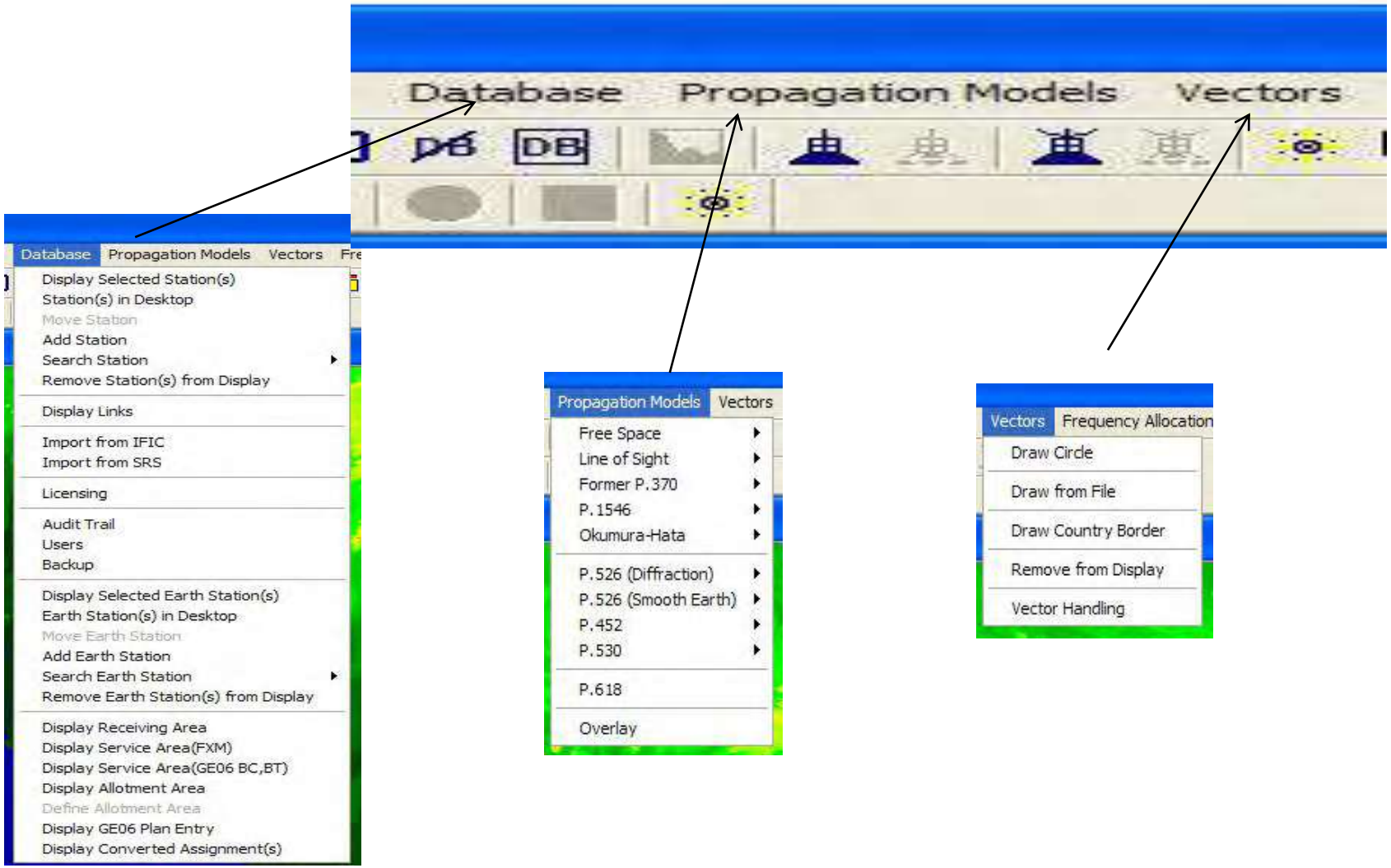


# GIS Functions of SMS4DC

**IDWM Menu:** *The IDWM is used to draw political boundaries of countries on the desktop of SMS4DC*

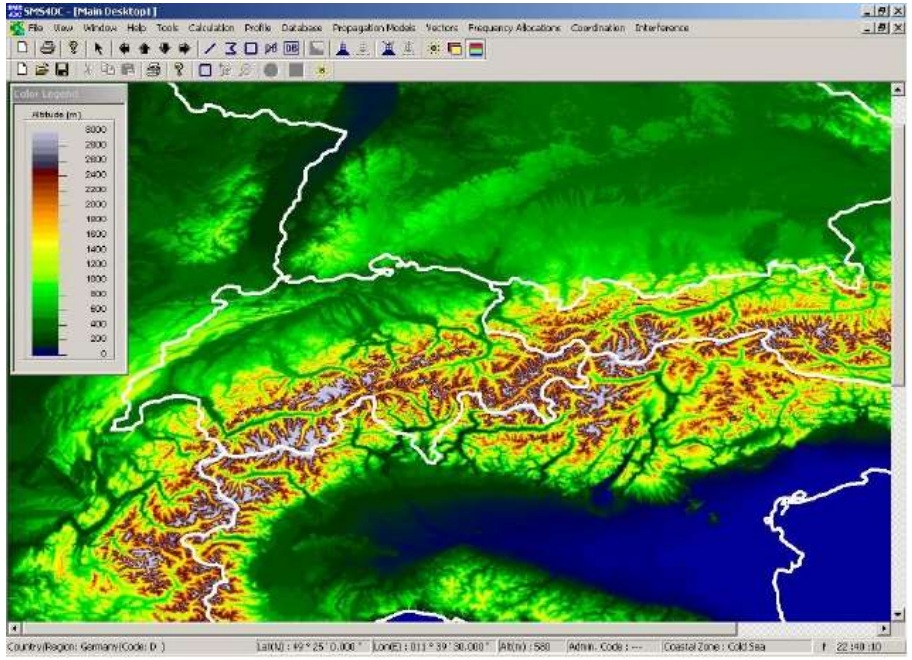


# GIS Functions of SMS4DC

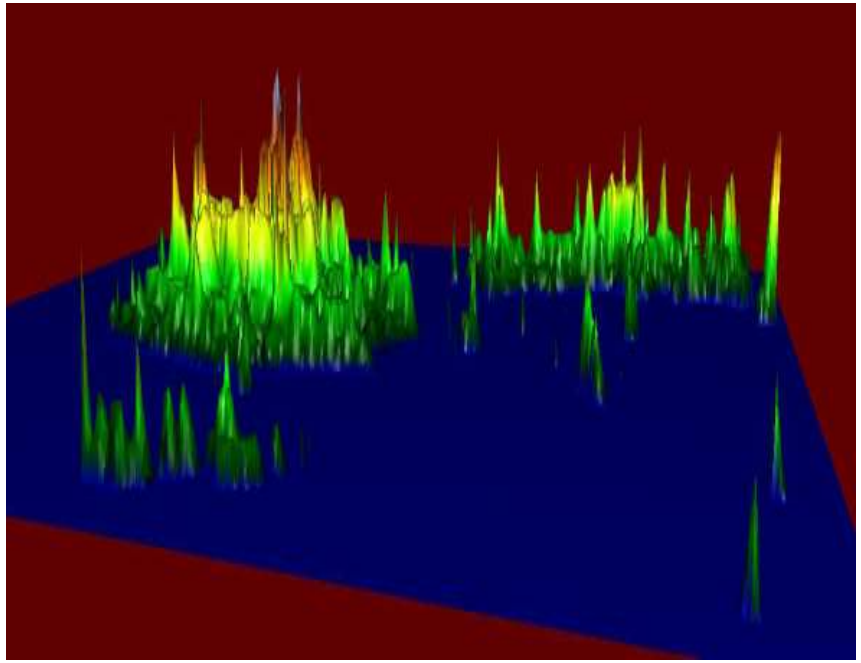



Digital Elevation Model (DEM) Menu

# GIS Functions of SMS4DC



Digital Elevation Model (DEM) 2D and 3D views



Map Display in 3D

**Based on the Global Land One- kilometer Base Elevation model (GLOBE)**

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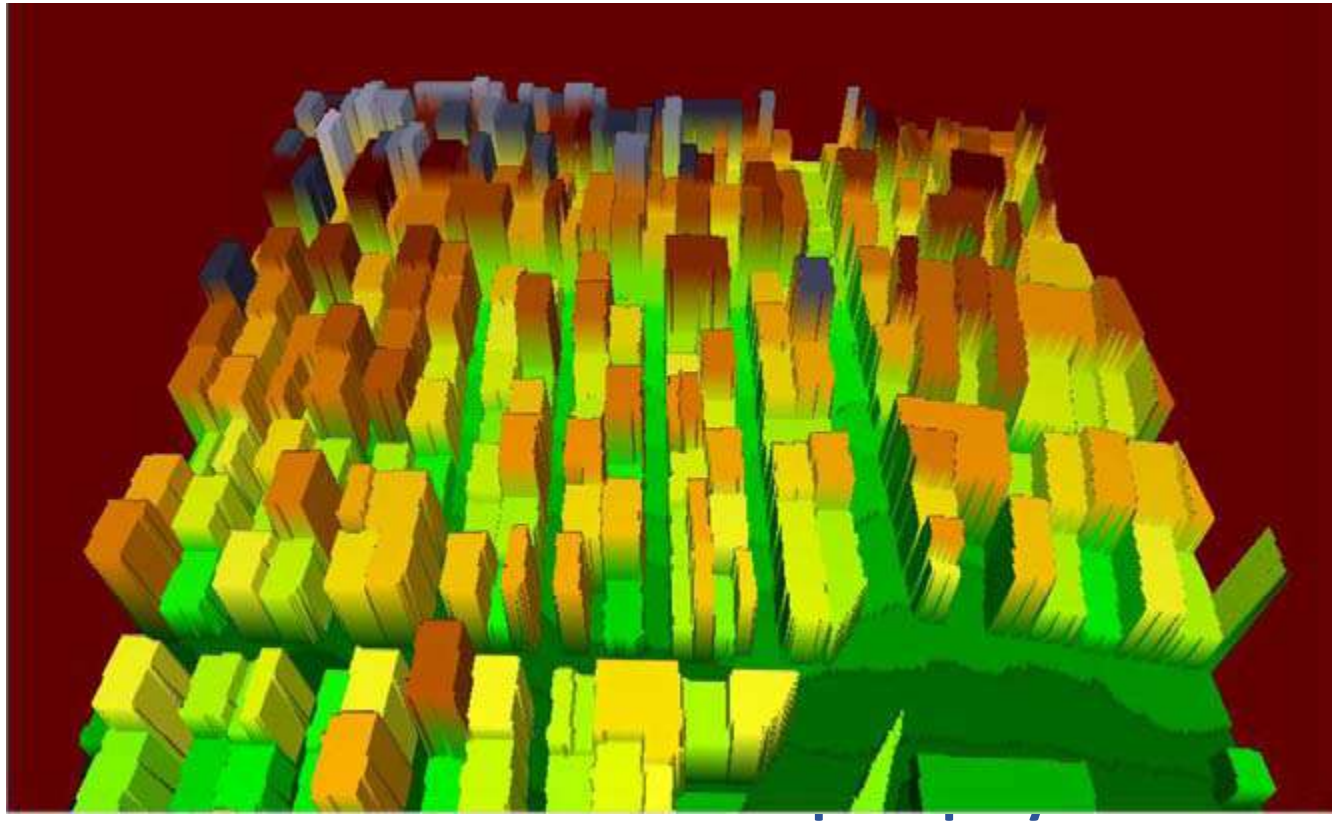
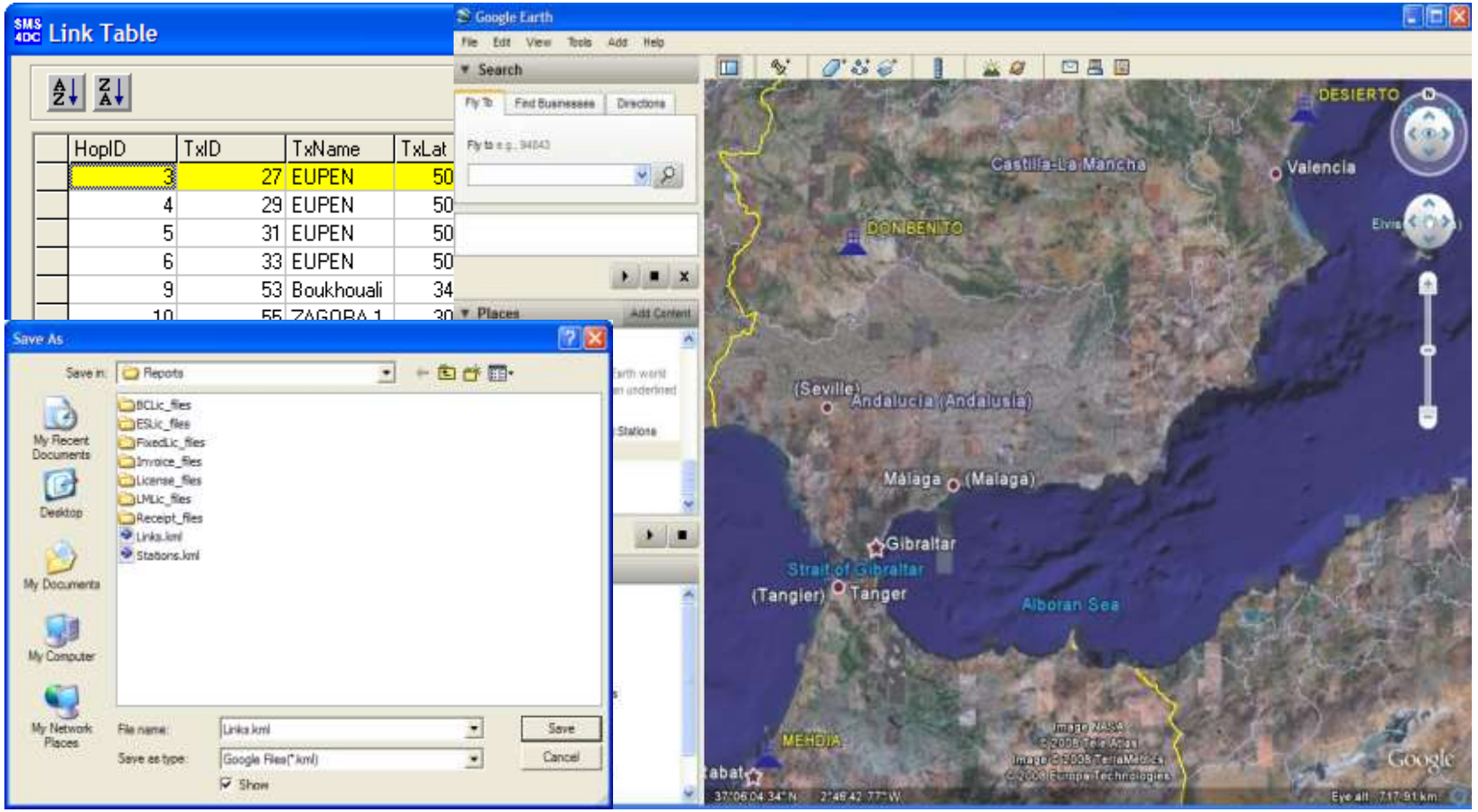
# GIS Functions of SMS4DC



Raster Map 1m resolution

# GIS Functions of SMS4DC




**Export of maps, overlays and vectors to Google Earth Searching and displaying stations on DEM)**

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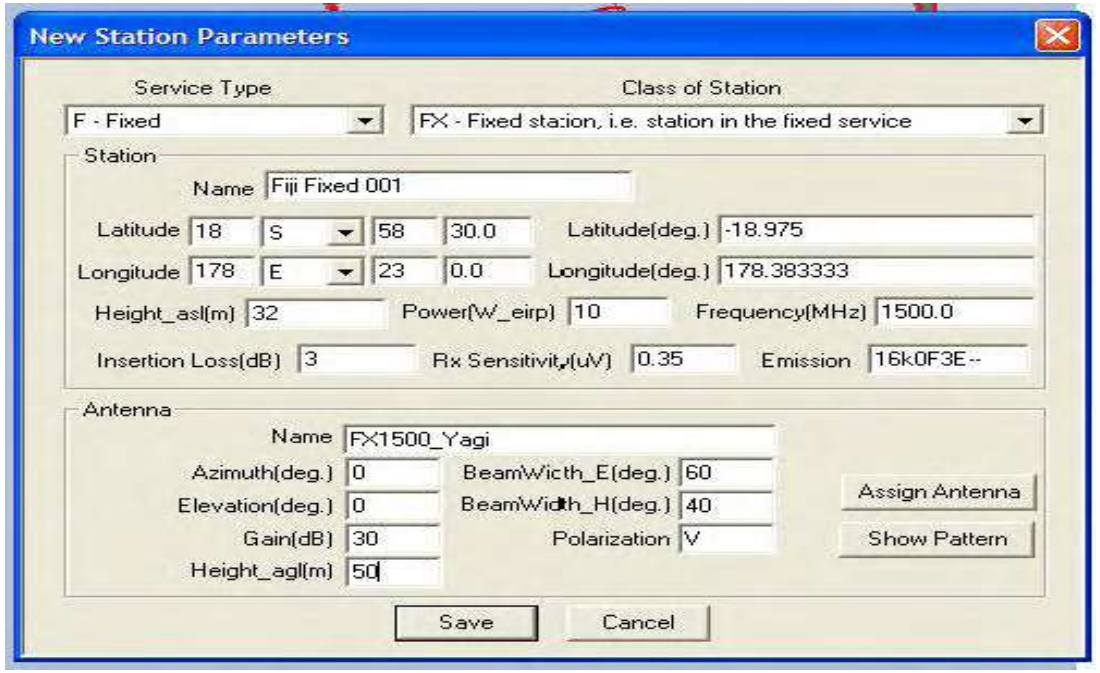
# Engineering Analysis Functions of SMS4DC

**Enhanced analysis tools to assist a spectrum engineer in frequency assignment, national and international frequency coordination and interference calculation for the Land Mobile, Fixed and Broadcast services and satellite Earth Station coordination;**




**New Radio station parameters in-line with ITU coordination requirements**

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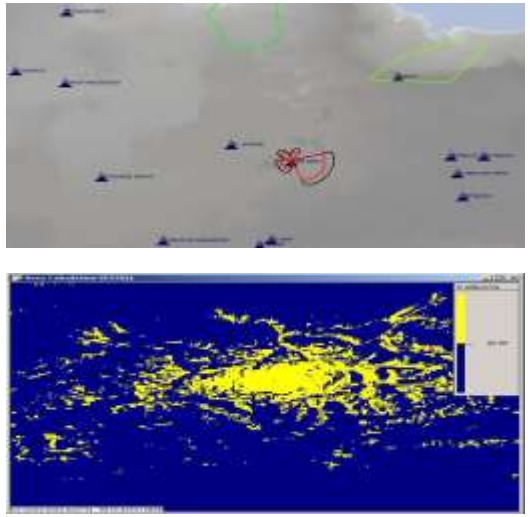
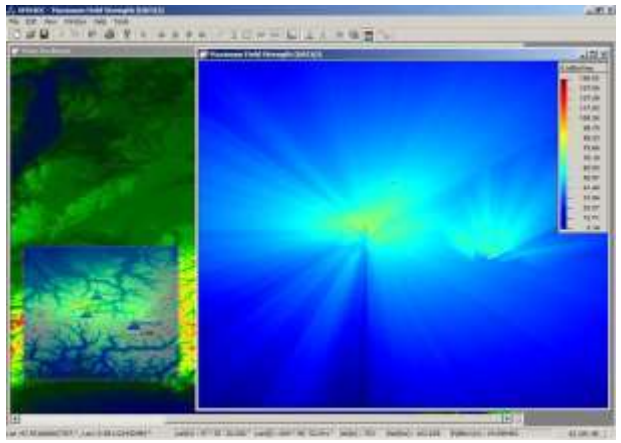
# Engineering Analysis Functions of SMS4DC

## Calculation of coverage area, field strength, field strength contour, network coverage and best server calculations



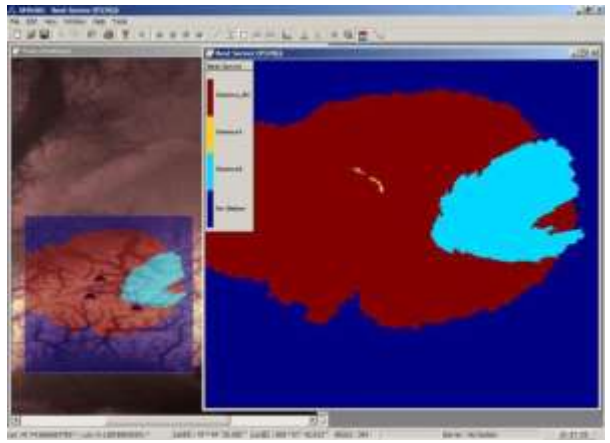
### Coverage area

*Item to calculate area in km2 Where inside the area, the field strength value is higher than a threshold value.*



### Maximum Field Strength

*Item to calculate and visualize the maximum values produced by more than one transmitting stations at any point inside a predefined rectangular area.*



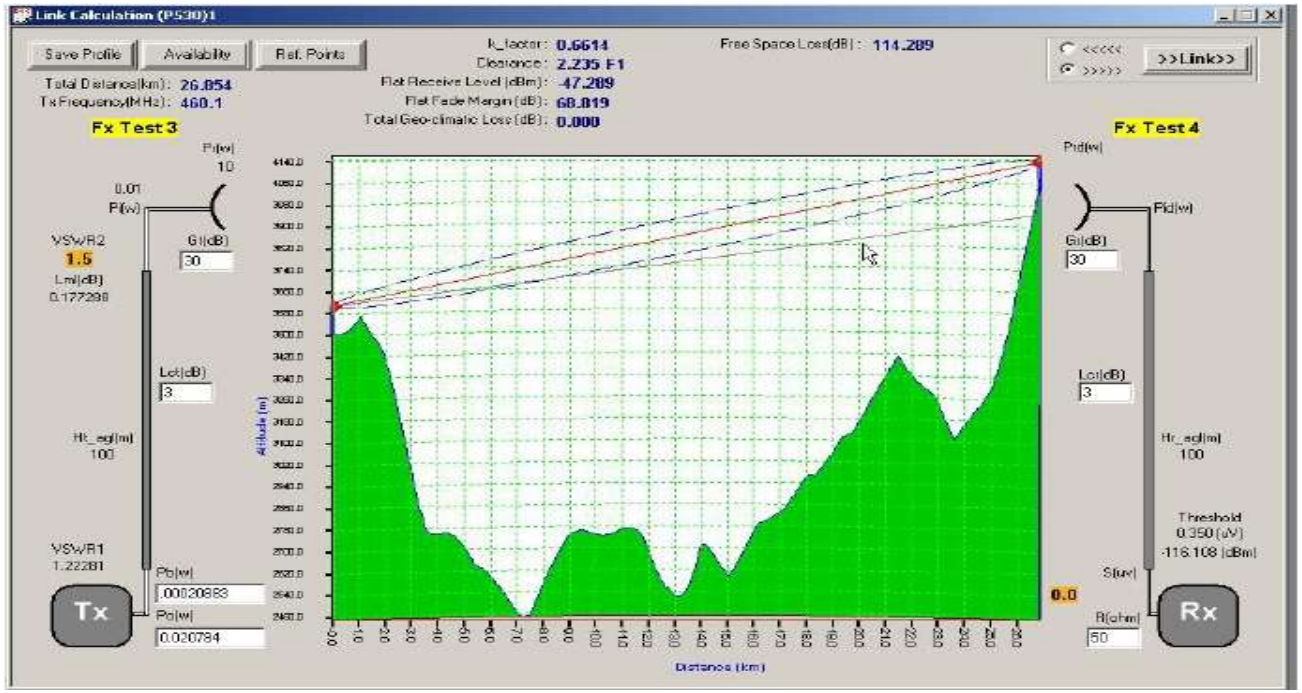
### Best Server

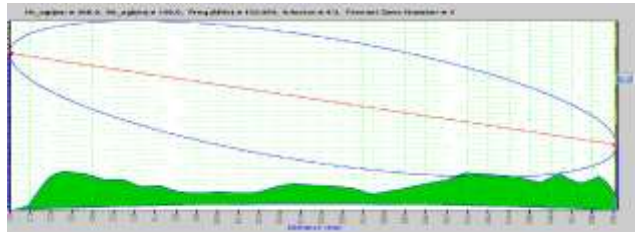
*Item to calculate and visualize the best serving station at each point among various stations inside a predefined rectangular area.*

# Engineering Analysis Functions of SMS4DC

## For fixed service (point-to-point radio links):

- *Link budget calculations*
- *Link availability*
- *Path profiles*
- *Fresnel zone clearance*



### Fresnel Zone:

- *Measure for multipath effect*
- *Mostly used for Aperture antenna*
- *Number of zone each one represents*
- *degree of out phase reflect signal from the LOS signal*
- *First Fresnel Zone includes 90% of radiation pattern (LOS component).*

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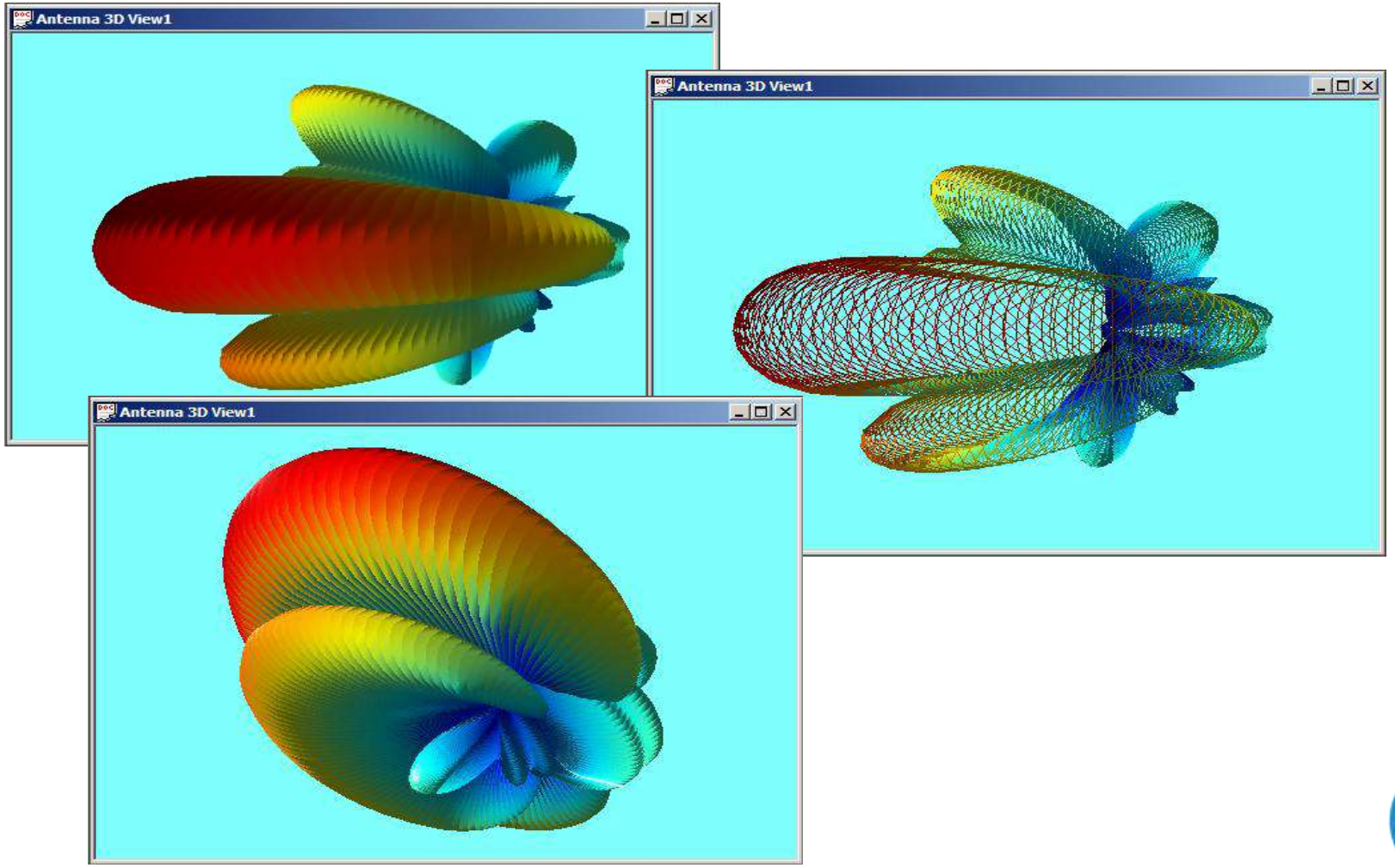
ITU-D 1992 2017

# Engineering Analysis Functions of SMS4DC

## 3D radiation Patterns



I Thank U

"Committed to
connecting the WORLD"

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