

## **Spectrum Management System for Developing Countries (SMS4DC)**

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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







### **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





### **SMS4DC subscribers**









### **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

#### Vorkstation



-Main application -Database -Reports

-Maps









### **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**

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🔁 Archived Lice	Delete Selection			
	Refresh			
	Reports •	Expired Licenses Total Stations Custom Report		

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- 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







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







Display Converted Assignment(s)

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tabase Propagation Models Vectors Fre		
Display Selected Station(s) Station(s) in Desktop Move Station Add Station Search Station		
Display Links	Propagation Models Vectors	
Import from IFIC Import from SRS	Free Space  Line of Sight	Draw Circle
Licensing	Former P.370	Draw from File
Audit Trail Users	Okumura-Hata	Draw Country Border
Display Selected Earth Station(s) Earth Station(s) in Desktop Move Earth Station Add Earth Station	P.526 (Diffraction) P.526 (Smooth Earth) P.452 P.530	Vector Handling
Search Earth Station	P.618	
Display Receiving Area Display Service Area(FXM) Display Service Area(GE06 BC,BT) Display Allotment Area Define Allotment Area	Overlay	



#### **Digital Elevation Model (DEM) Menu**





Digital Elevation Model (DEM) 2D and 3D views Map Display in 3D

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





**Raster Map 1m resolution** 





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





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;

		Class of Stati	on
F - Fixed	FX - Fixe	ed station, i.e. station in t	ne fixed service
Station			
Name Fiji Fixe	ed 001		
Latitude 18 S	- 58 30.0	Latitude(deg.)	.975
Longitude 178 E	23 0.0	Longitude(deg.) 17	3.383333
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Antenna Name Azimuth(deg.) Elevation(deg.) Gain(dB)	FX1500_Yagi 0 Bea 0 Bea 30	amWicth_E(deg.) 60 mWidth_H(deg.) 40 Polarization V	Assign Antenna Show Pattern

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





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





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





#### 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).





#### **3D radiation Patterns**







### **Higher Resolution DEMs**







5MS4DC - (Main Desktop 1)

File View Window Help Tools Calculation Profile Database Propagation Models Vectors Frequency Allocations Coordination Interference Monitoring





#### **Default DEMs**

**High Res. DEMs** 









#### SMS4DC - [Main Desktop1]

💑 File View Window Help Tools Calculation Profile Database Propagation Models Vectors Frequency Allocations Coordination Interference Monitoring

#### 



#### 5M54DC - [Main Desktap]

#### Samoa





1. Copy the text file (USERMAP1.txt) in the Texts folder of your SMS4DC installation (usually in drive c:).

2. Create a sub-folder under SMS4DC named "MAP-PACIFIC".

3. Unzip the PacificTiles.zip into MAP-PACIFIC folder.







1. Run SMS4DC you can access this new map through the menu of Tools->Map Layers->User Map1

In order to navigate to an area you should first in IDWM map select a small area on an island in the region (e.g. Solomon Islands) and then click on the DEM view button. Then again a small area should be selected in the DEM view and the menu of Tools->Map Layers->User Map1 should be selected.





# Thank U

#### "Committed to connecting the WORLD"

