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**

Computer aided spectrum management

- The use of computers in the spectrum management process has become crucial for most administrations that are faced with the ever-increasing use of the radio frequencies.

- Several aspects of this process, such as frequency coordination, administrative procedures (registration and issuing of licenses) and notifications of assignments to the ITU according to the Radio Regulations, are crucial in the establishment of a computer-automated process.

- ITU-R Handbook: Computer-aided Techniques for Spectrum Management (CAT) (2015) http://www.itu.int/pub/R-HDB-01

National Spectrum Management

Spectrum management is a combination of administrative and technical activities for efficient utilization of spectrum by users without causing harmful interference in their service area
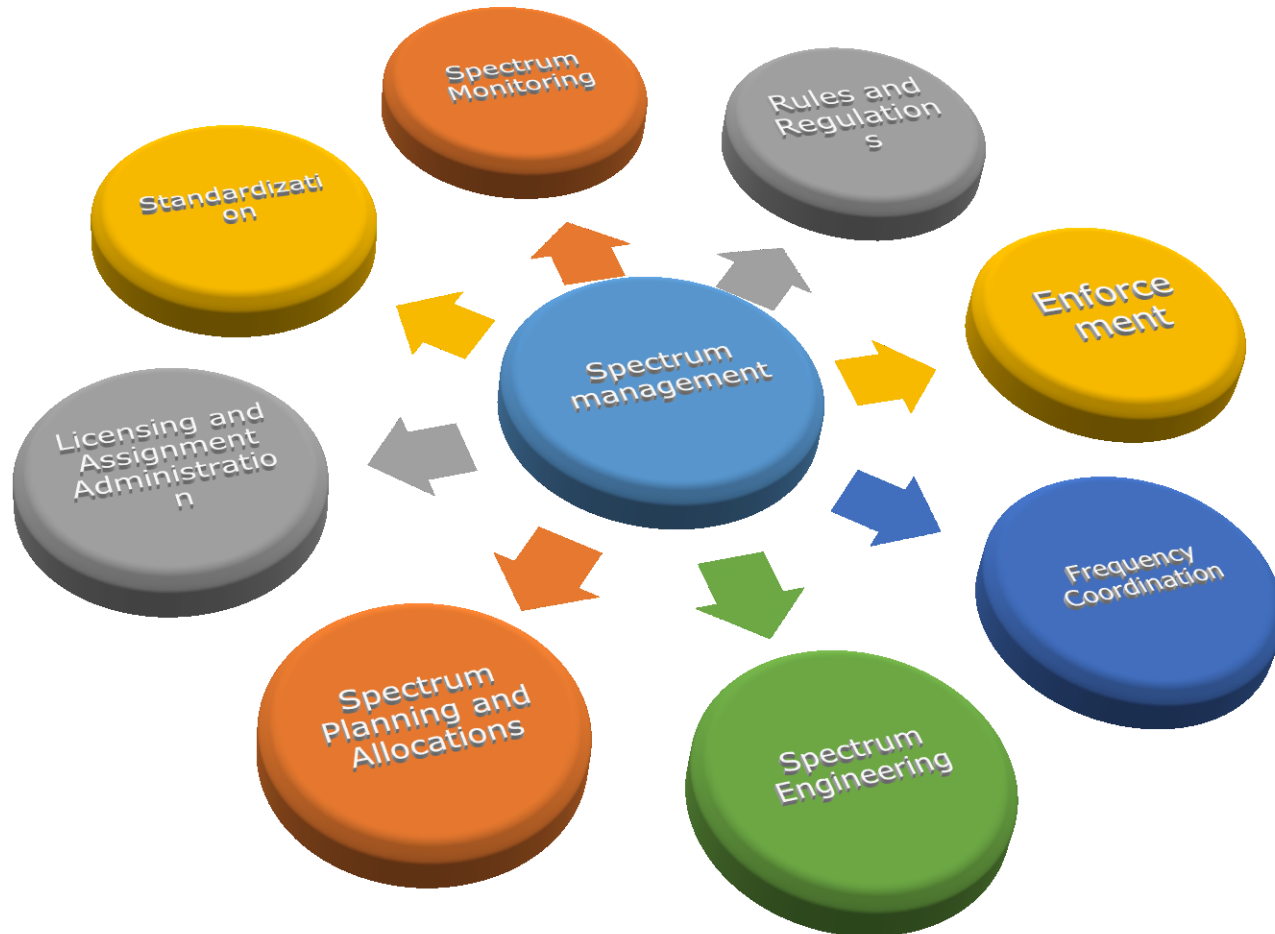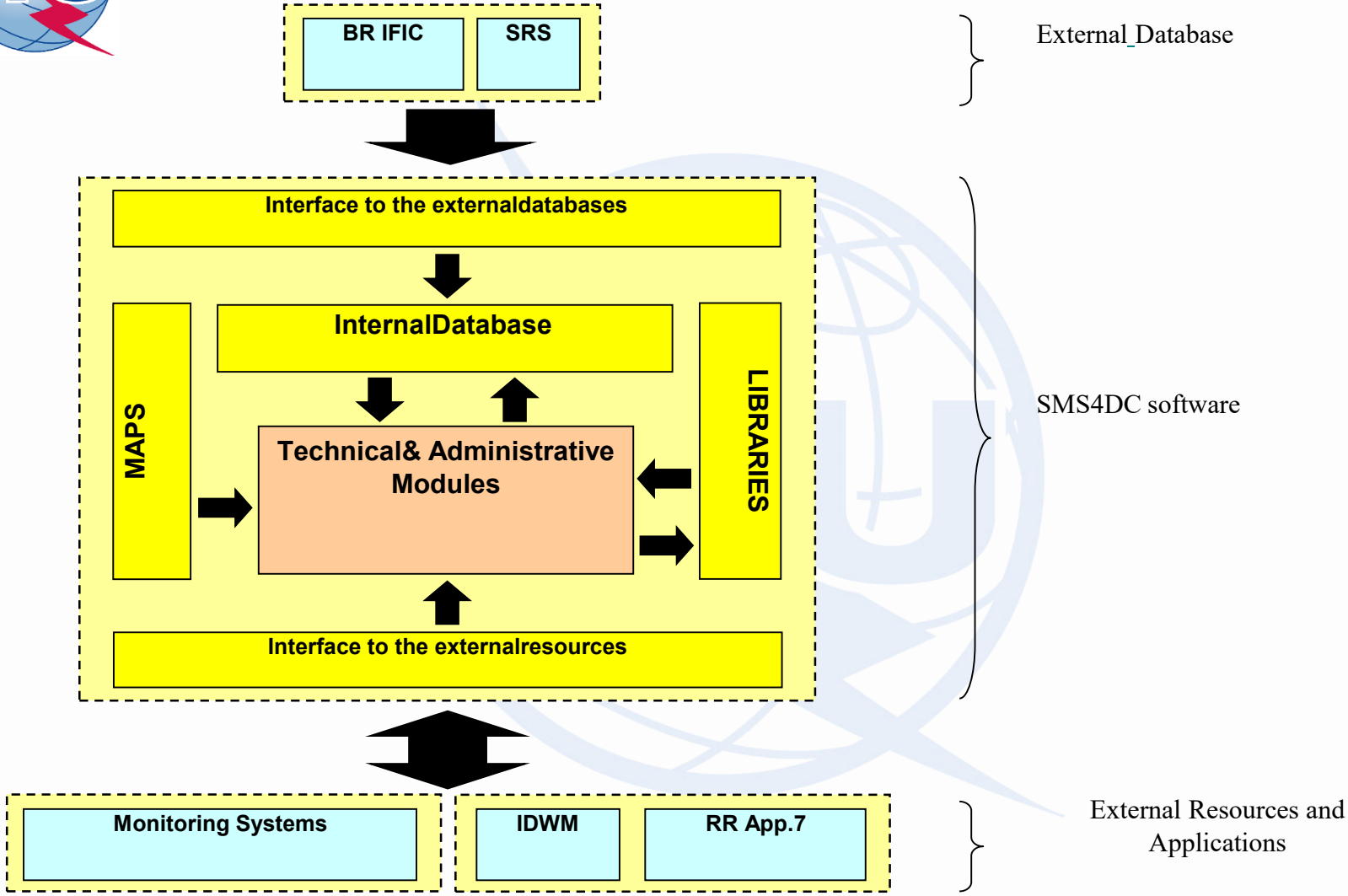
System architecture
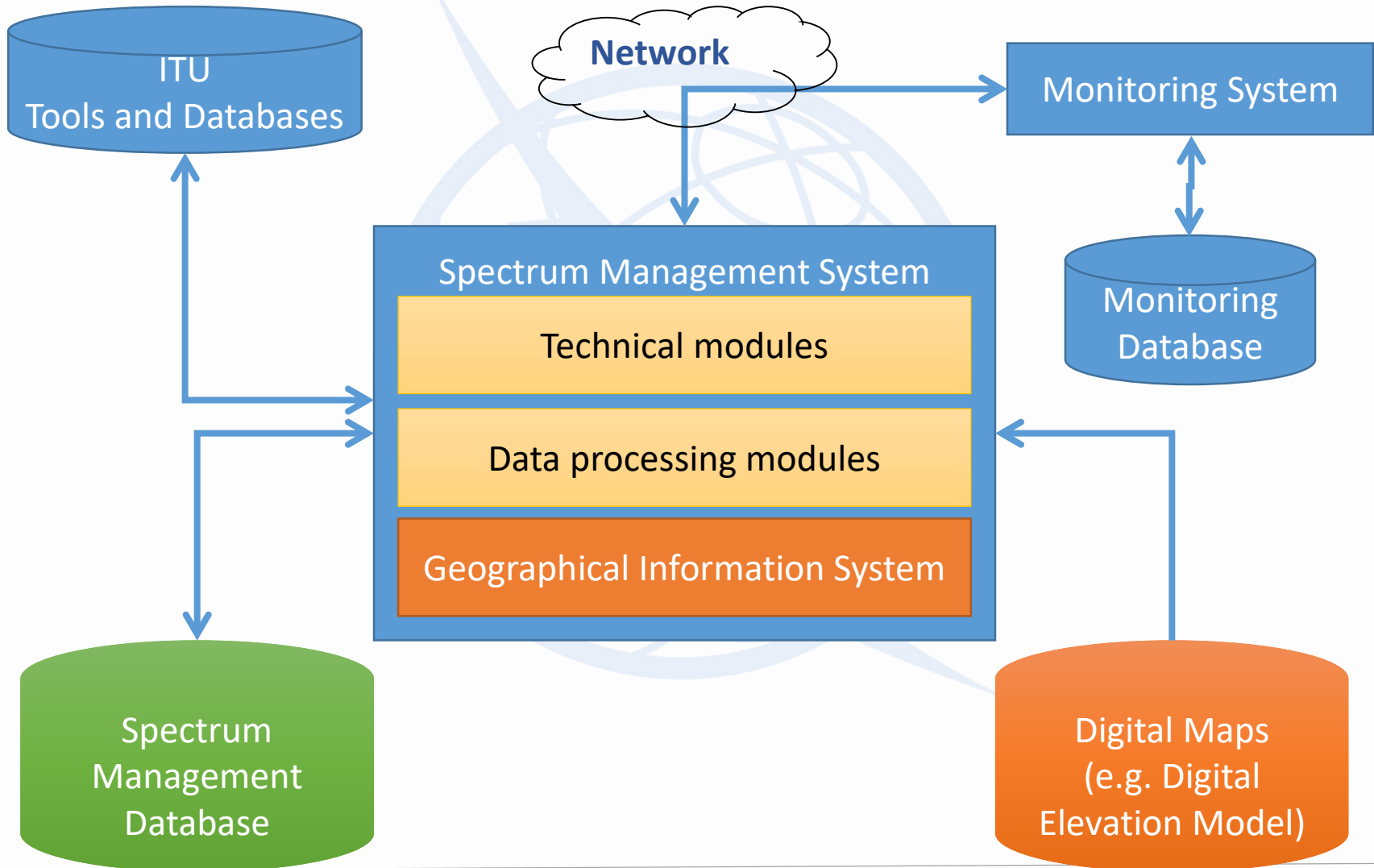
SMS4DC Development Cycle

➤ **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, French language)*

➤ **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, Spanish language).*

➤ **2017:** *SMS4DC Version 5.1 (HCM, results of WRC-15: revision of the Radio Regulations Article 5 module, the international frequency allocation).*

Structure of the SMS4DC

External_Database

BR IFIC **SRS**

Interface to the externaldatabases

InternalDatabase

MAPS

Technical& Administrative Modules

LIBRARIES

Interface to the externalresources

SMS4DC software

Monitoring Systems

IDWM **RR App.7**

External Resources and Applications

Functions of SMS4DC

➢ **Administrative Functions**

➢ **Graphical User Interface (GIS) Functions** *(including Map Displays)*

➢ **Engineering Analysis Functions**

Administrative 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

Server
-Database
-Reports
-Maps

Workstation B
-Main application

Workstation A
-Main application

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**
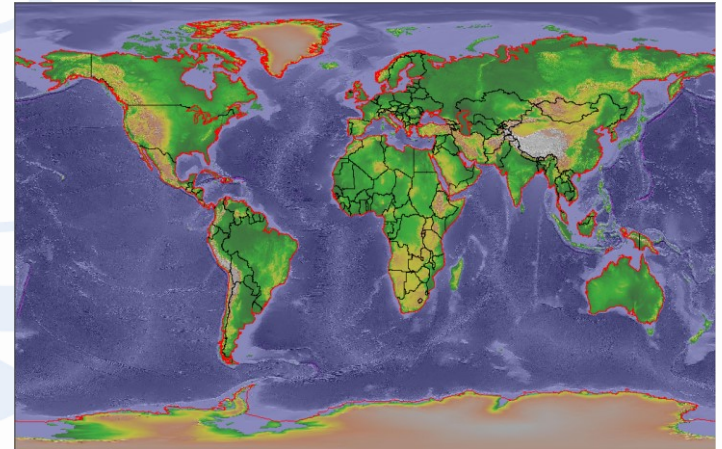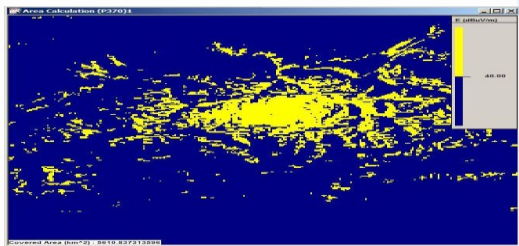
SMS4DC's Engineering Functions

International & National frequency allocations table (chart)
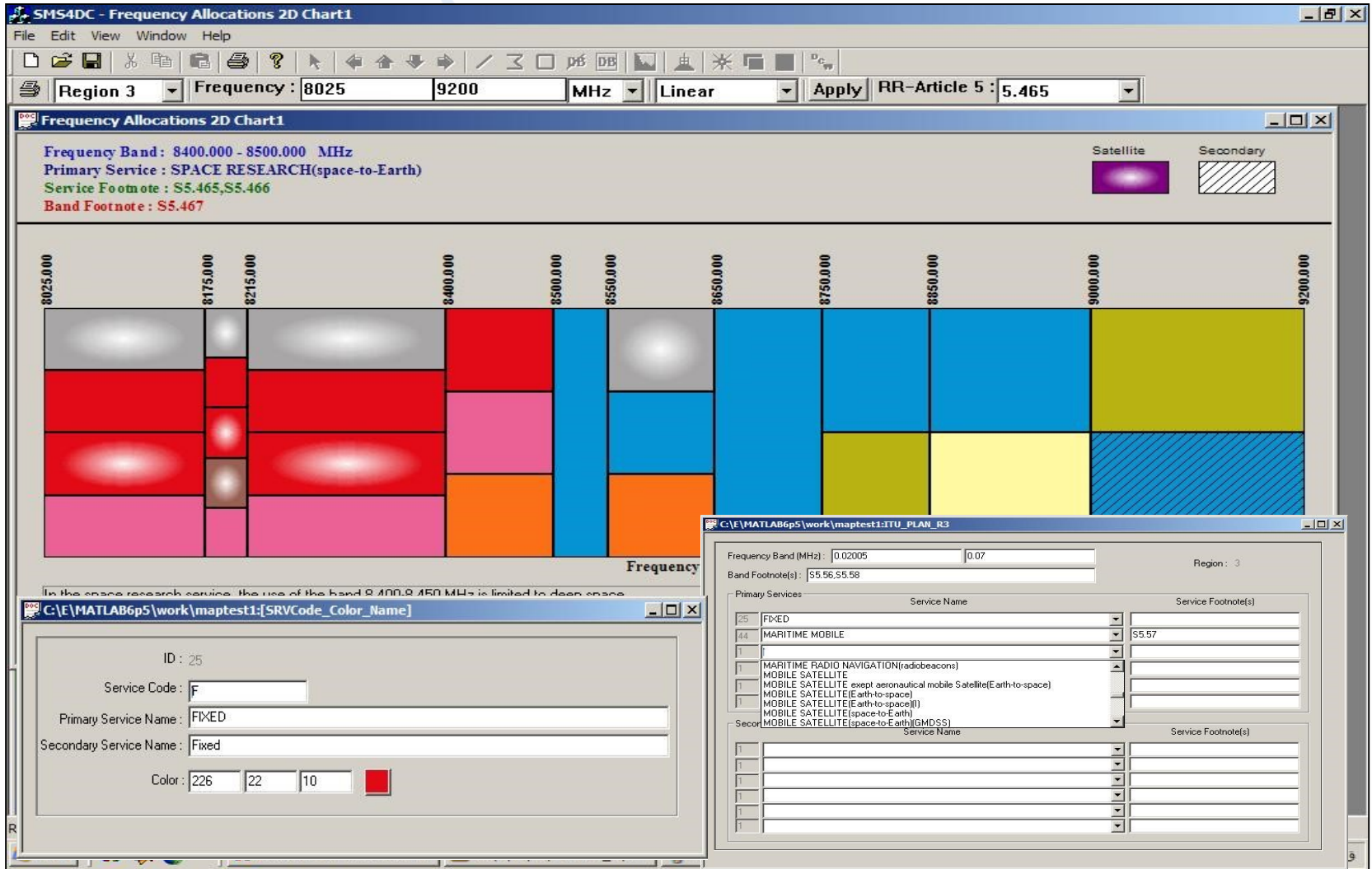
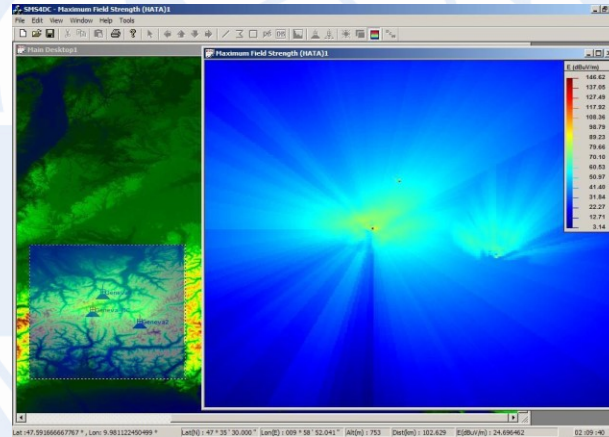# Engineering Analysis Functions of SMS4DC

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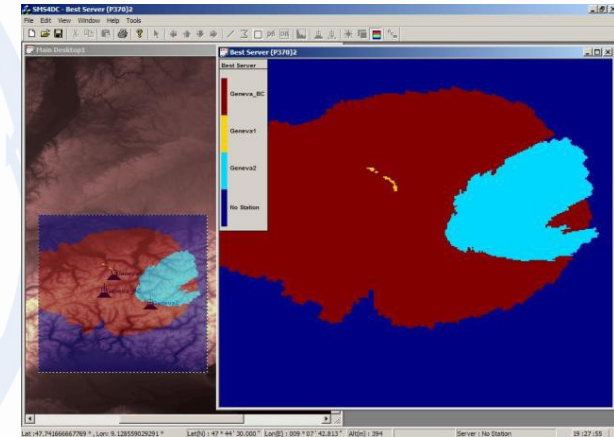

Coverage area

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.
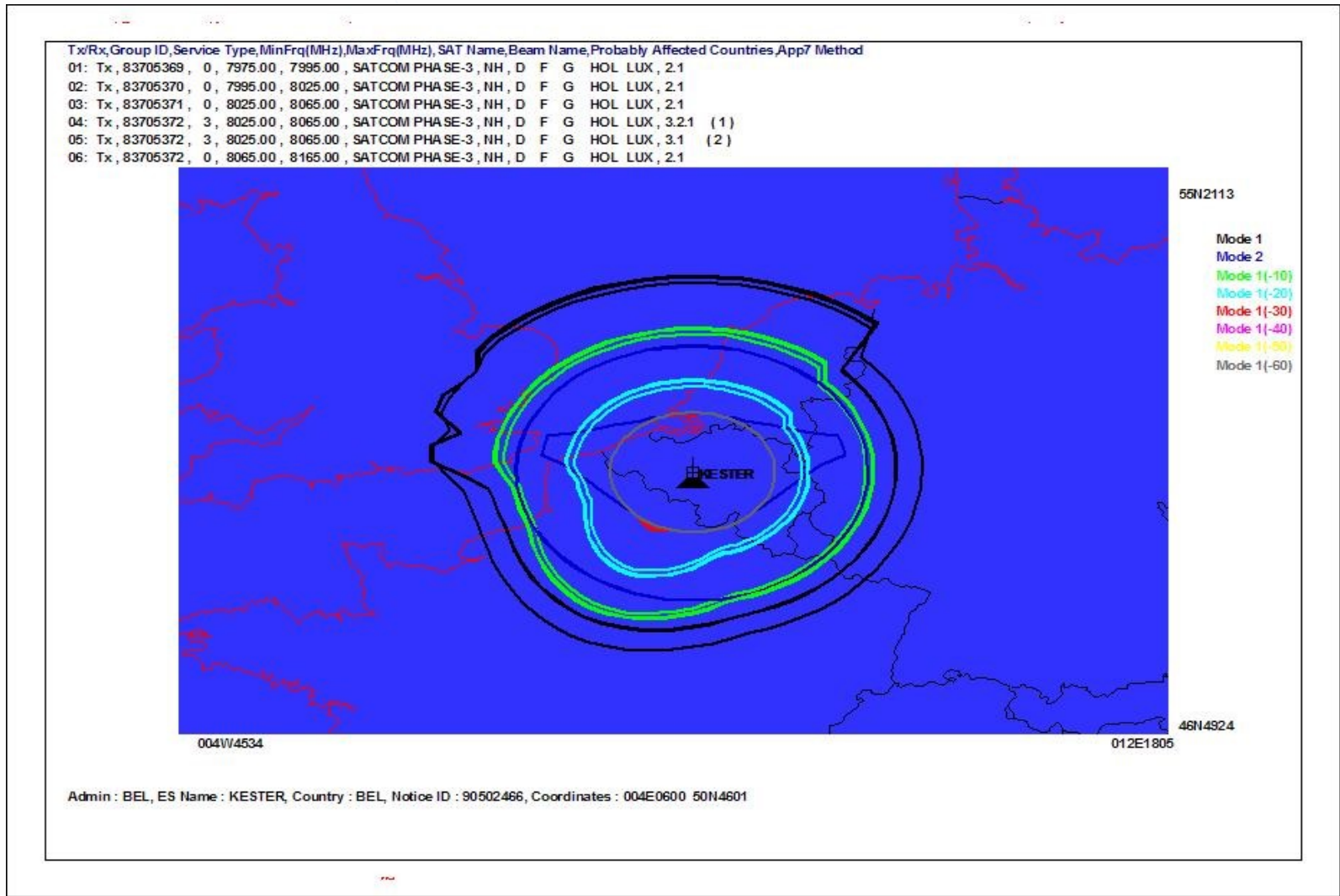

Best Server

Item to calculate and visualize the best serving station at each point among various stations inside a predefined rectangular area.
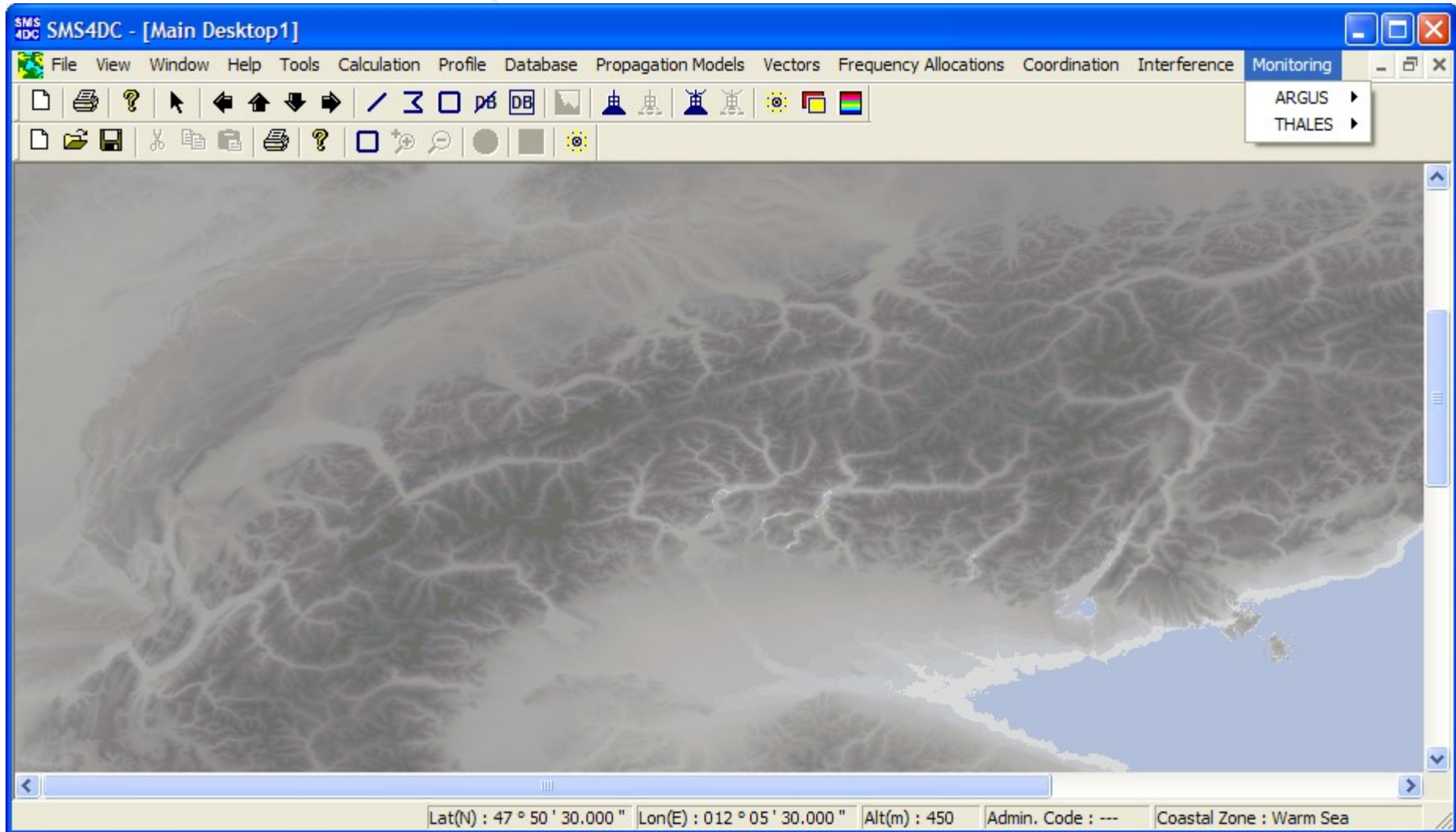
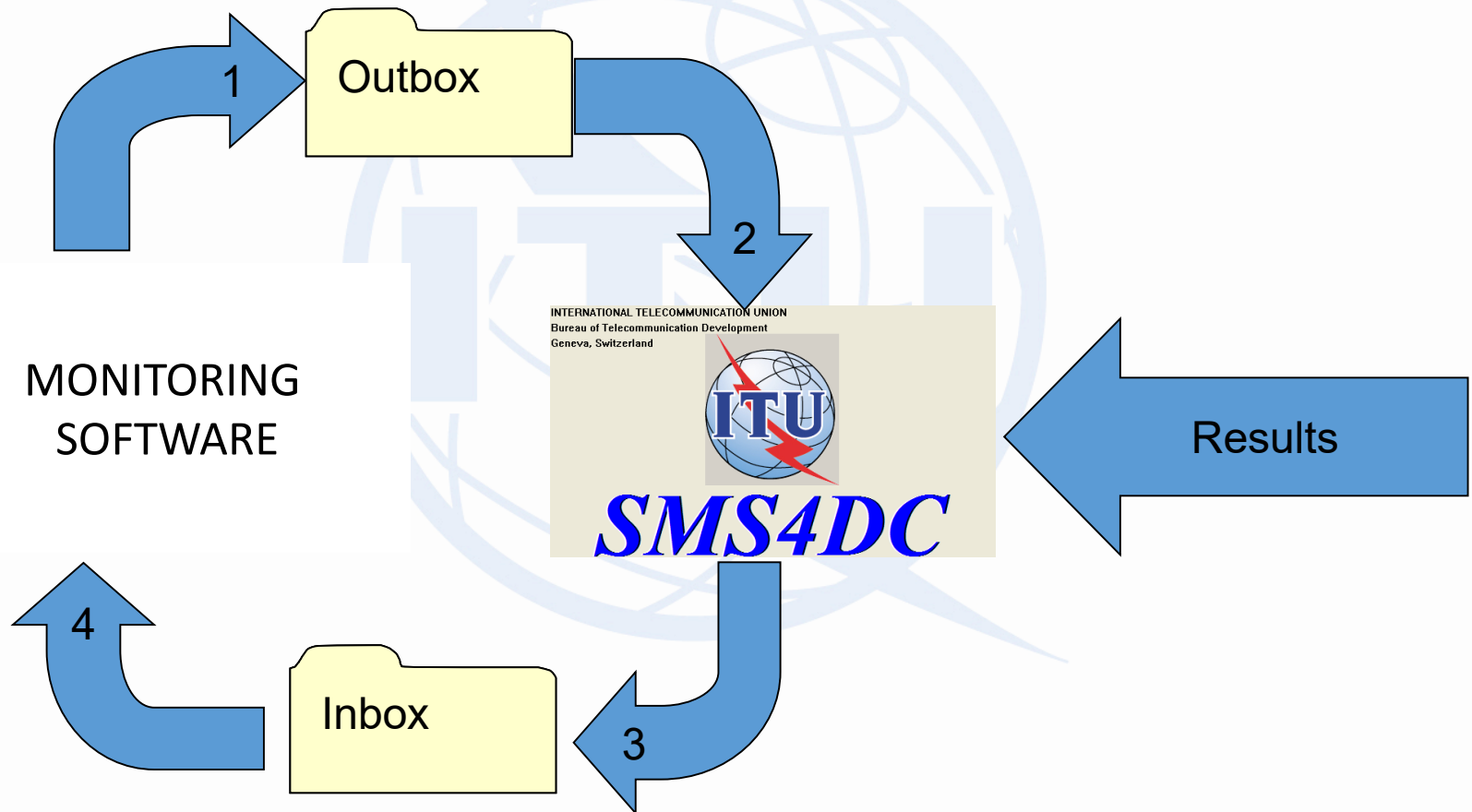# Coordination contours around an Earth station

SMS4DC's Engineering Functions

SMS4DC and monitoring software interface

SMS4DC's Engineering Functions

SMS4DC and monitoring software interface

Monitoring request to SMS4DC

MSIP (Republic of Korea) and ITU project

V5 released at the end of 2015

- Adding propagation models based on the latest version of
  - P.452(-16), Prediction procedure for the evaluation of interference between stations on the surface of the Earth at frequencies above about 0.1 GHz
  - P.530(-16), Propagation data and prediction methods required for the design of terrestrial line-of-sight systems
  - P.1546 (-5) (Method for point to area prediction for terrestrial services in frequency range 30 MHz to 3000 MHz)
  - P. 1812 (-4) (A path specific propagation prediction method for point-to-area terrestrial services in VHF and UHF bands);
- Intermodulation: calculating interference caused by intermodulation products up to 7th order by using ITU-R SM1134-1 and other resources
- General interface between SMS4DC and monitoring software (based on the guidelines prepared for and presented to ITU-R WP1C of the SG1)
- Further development of built-in and user specified administrative reports;
- Preparation of a general method to import data to SMS4DC
- Spanish language added
- Preparation of time limited version as a demo tool which can be used for introduction of SMS4DC;
- Preparation of the training material for assisting self-learning training of the software.
- Train-the-trainer workshop 24 November-2 December 2106, Addis, for around 10 new trainers (English, French and Arabic speaking), in close cooperation with the AFR office

Version 5.1

- V5.1 of SMS4DC released in 2017:
  - Implementation of the WRC-15 results
  - Inclusion of Harmonised Calculation Method (HCM); (European cross-border frequency coordination agreement)
  - HCM4A.dll will be developed by the African experts and when ready, it will be added

International Telecommunication Union

SPECTRUM MANAGEMENT SYSTEM FOR DEVELOPING COUNTRIES
SYSTÈME DE GESTION DU SPECTRE POUR LES PAYS EN DÉVELOPPEMENT
SISTEMA DE GESTIÓN DEL ESPECTRO PARA PAÍSES EN DESARROLLO

SMS4DC

Version 5.0

- english
- français
- spanish

International Meeting of SMS4DC Users , 8-9 December 2016, ITU, Geneva

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http://www.itu.int/en/ITU-D/Spectrum-Broadcasting/Pages/International-SMS4DC-Users-Meeting_Geneva_December16.aspx

SMS4DC Users's Workshop

Participants

Participating countries/entities of the Workshop: Afghanistan, Albania, Bhutan, Burkina Faso, Burundi, Cameroon, Chad, Cuba, Djibouti, Egypt, Haiti, Hungary, Lao PDR, Libya, Mali, Moldova, Mongolia, Myanmar, Switzerland, Timor-Leste, Togo, Senegal, Germany, Colombia, Sudan

Final conclusions

The participants expressed their view on the usefulness of the software but it can be even better with some improvements. In addition they supported the idea to have this type of meeting once per year and if possible, have also regional meetings of the users.

Proposals for improvements, additions

- Administrative functions

- Engineering

- Graphical

- Training

- Support

- Software

- Promotion

SMS4DC subscriptions after the Workshop

♀ V.5.0   ♀ V.4.1   ♀ V.4.0

PIRRC project (Pacific Islands)

While most of the smaller islands are considering or have procured the SMS4DC systems only few have implemented it as their spectrum management system.
The problems include the lack of the basic like:
1)   Absence of a national frequency allocation table;
2)   Absence of resources for systematic spectrum management;
3)   Lack of training.
4)   All countries who have responded to the survey indicate that while they will adopt SMS4DC they need additional training and more importantly training material that would allow them to work and learn on the system with limited supervision.

The PIRRC Project will be conducting additional training in the first quarter of 2017 and will include the preparation of training aids for the users.

Direct beneficiaries of PIRRC are FSM; Kiribati; Marshall Islands; PNG; Samoa; Solomon Islands; Tonga; Tuvalu and Vanuatu.
Countries that are not are beneficiaries Cook Islands; Fiji; Nauru; Niue; Tokelau and Palau.

Purchased SMS4DC for 10 users

New ITU project supported by Democratic Republic of Korea

Project activities

To improve **administrative function** and user interface for spectrum management, functions below listed should be newly made or improved:
- Improvement of designing license and invoice of fee form
- Adding copy function in data entry to avoid repeating same data
- Improvement of data export and import function to Excel, Word and other commercial software
- Adding search function for stations based on name or ID
- Export and Import data between SMS4DC – SMS4DC
- To make on-line license application possible, set up sample license web pages and link applicant's data to SMS4DC database
- Upload of printed license or invoice(pdf or jpg format) to SMS4DC database or provide a link function to the documents saved in separate place
- Macro function or simplified process for repeated similar stations' licensing

New ITU project (cont'd)

For better radio communication **engineering** and easy work for **licensing**, functions below listed should be newly made or improved:

- Based on the user country's request, provision of non-commercial higher resolution(around 90 m) map based on freely available data
- Adding new database of filter, tower and other available commercial products database of radio communication equipment
- To calculate licensing fee, adding formula configuration and calculation function for licensing fee or importing formula function from other program i.e. Excel, based on the country's law and regulation
- Improving graphical user interface, i.e. add icon of linking and removing linked stations etc.
- For data protection, adding automatic back up menu to separate storage device

New ITU project (cont'd)

To closely **support users** and **exchange useful information** and experiences of users

- closed on-line forum should be operated and this forum may include FAQ, bulletin board and other necessary functions for users. To facilitate this forum, the developers and experts of SMS4DC should participate in it and timely provide answers for users' questions.

  Preparation of additional **training materials**

- Making video with e.g. recording of training classes for SMS4DC software and uploading the videos to You Tube and other sharing site for learners
- Preparation of the training videos as a multimedia DVD and releasing it for assisting self-learning users

Final approval test of the revised version of SMS4DC software package:

- Preparation of a protocol for testing and test the revised version of the SMS4DC software
- Execution of the approval test of the SMS4DC software on the basis of such test protocol, with the participation of the SMS4DC developers, experts and trainers, and ITU staff from BR and BDT

Thank you!

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For further reading:

- **ITU Handbook - Computer-Aided Techniques for Spectrum Management (CAT), 2015**

- **ITU Handbook on National Spectrum Management, 2015**

- **SMS4DC 5.1 User Guide**

- **ITU Handbook on Spectrum Monitoring, 2011**

- **Recommendation ITU-R SM.1370-2 (08/2013)**
  - **Design guidelines for developing automated spectrum management systems**

- **Recommendation ITU-R SM.1537 (08/2013)**
  - **Automation and integration of spectrum monitoring systems with automated spectrum management**

- **Recommendation ITU-R SM.1604 (02/2003)**
  - **Guidelines for an upgraded spectrum management system for developing countries**