



SMS4DC
SPECTRUM MANAGEMENT SYSTEM FOR DEVELOPING COUNTRIES

**Special Presentation for WRC-12
Delegates**

Wednesday, 8th February
12:00 – 13:00
Room C1 (ITU Tower)



***SPECTRUM MANAGEMENT
ACTIVITIES
OF
ITU / BDT***

István BOZSÓKI
ITU / BDT / TND

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PROGRAMME 1 (Hyderabad 2010): Information and communication infrastructure and technologies development

Priority areas:

- 1 Spectrum management and radio monitoring
- 2 Broadcasting
- 3 Next Generation Networks
- 4 Mobile communications (2G, 3G, 4G, etc.)
- 5 Broadband networks
- 6 Rural communications
- 7 Outside plants

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TASKS WITHIN THE PROGRAMME

- Creation of tools
- Creation of training material
- Assistance to members
- Information sharing

The Programme is carried out by various means, including symposia, workshops, conferences, seminars and expert advice.

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TND Activities

- **Training**
Technology-oriented training material developed and presented in all regions
- **Assistance to members**
Network engineering and dimensioning (Wireline, Wireless, Mobile),
Spectrum management
Transition to digital broadcasting
- **Partnerships**
United Nation agencies and other stakeholders, international and regional organisations

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SPECTRUM MANAGEMENT AND BROADCASTING ACTIVITIES OF TND / 1

- Developing principles and techniques for effective spectrum management
- Advising on practical questions from developing countries on spectrum management and broadcasting
- Providing an opportunity for expert and high-level consultation for senior personnel from developing countries

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SPECTRUM MANAGEMENT AND BROADCASTING ACTIVITIES OF TND / 2

- Providing information on various aspects of sound and television broadcasting systems/networks and of spectrum management systems
- Evaluating existing systems and participate in the evaluation of tenders
- Participating in seminars and courses organized at ITU Headquarters or elsewhere on specialized aspects of broadcasting and spectrum management subjects

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SPECTRUM MANAGEMENT ACTIVITY EXAMPLES

- **SMS4DC (Spectrum Management Software for Developing Countries)**
 - Developed by BDT close cooperation with the ITU-R sector
 - Trainings
 - Presentations
- **ITU-D SG2, Resolution 9**
- **Assistance to developing countries**
 - spectrum management assessments
 - revising legislation
 - spectrum pricing
 - coordination procedures,
 - assisting in spectrum management projects

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BROADCASTING ACTIVITY EXAMPLES

- **Transition from analogue to digital broadcasting**
 - Roadmap project for Africa, Asia-Pacific
 - ITU-D SG2 Question 11-3/2
- **Cooperation with regional broadcasting unions**
 - e.g. WBU, EBU, ABU, AIBD, CBU, ASBU, AUB
- **Delivering seminars for capacity building**
- **Assistance to developing countries**
- **Conversion of audiovisual archives from analogue to digital**

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Content of the presentation

- History of SMS4DC
- Main Functions of SMS4DC
 - Administrative Functions
 - Engineering Functions
 - Geographic Map Display functions
- Samples for the different functions
- How to obtain SMS4DC
- Future developments

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History

- ITU-R and ITU-D cooperation
- 1995 BASMS (FoxPro)
- 1997 WinBASMS
- WTDC March 2002: further developments
- 2002 ITU-R SG1: Rec. ITU-R SM.1604
- Consolidated technical specification: 2004
- 2007 first quarter: Version 1
- 2008 first quarter: Version 2
- 2009 third quarter: Version 3
- 2012 first quarter: Version 4

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Main Functions of SMS4DC/1

Administrative Functions

- Relational database management
- Recording frequency application, frequency assignment, licensing, coordination data, import data from BRIFIC & SRS
- Producing electronic notices, print license, invoice & spectrum fee
- Security features: Multi level access enables system administrator to define users and groups with different access levels

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Main Functions of SMS4DC/2

Engineering Analysis Functions

- Enhanced analysis tools for frequency arrangement, assignment, coordination and interference calculation
- Propagation models based on ITU-R latest recommendations available at the time of development
- Coverage area, field strength, field strength contour, microwave link calculations, network coverage and best server calculation
- Azimuth, elevation and horizon elevation for earth stations
- Link to monitoring software

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Main Functions of SMS4DC/3

Geographic Map Display Function

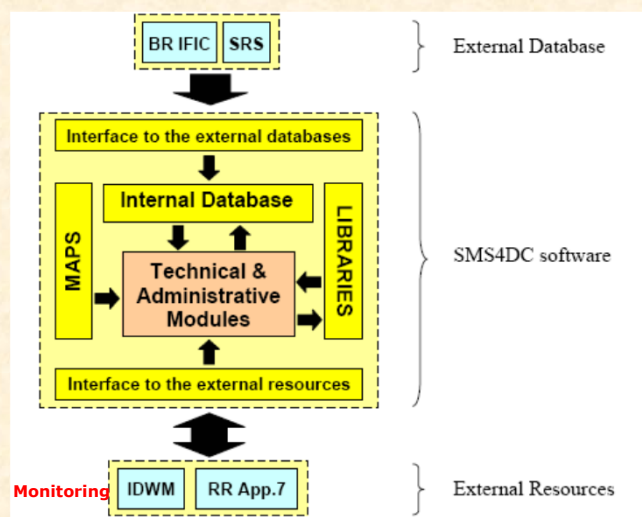
- User friendly interface, displaying of DTM, capability of importing standard mapping formats including Globe map, displaying of other higher resolution maps and export to Google Earth
- Online latitude, longitude and altitude presentation, overlaying, Scrolling and Zooming functionality capability of handling vectors,
- Providing multiple entry functions, menu items, assigning new stations on map and searching and displaying a station or group of stations on map.

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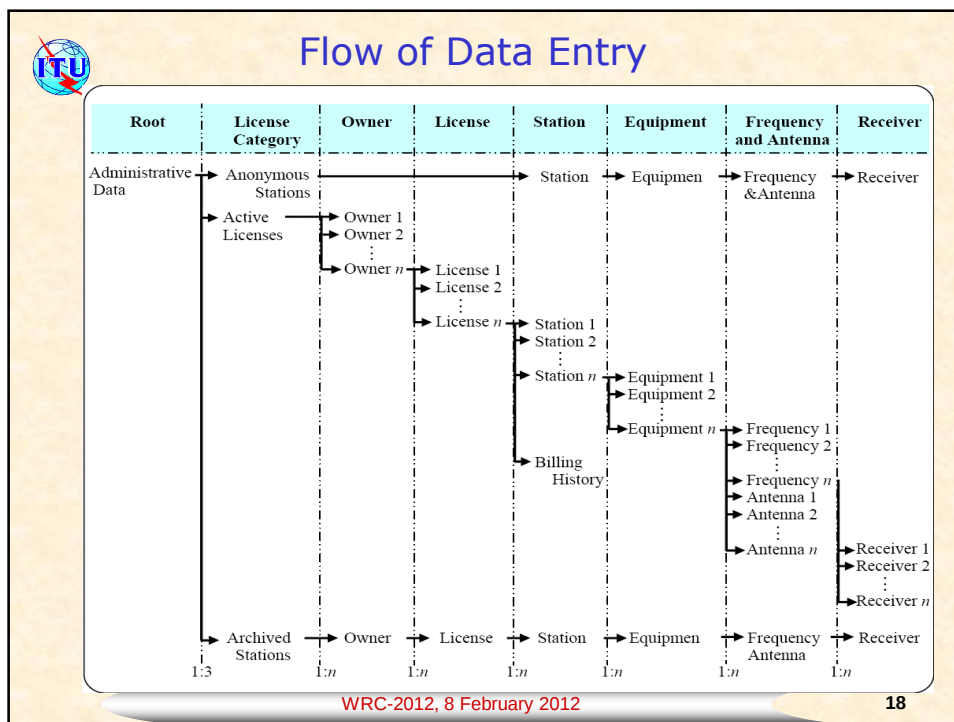
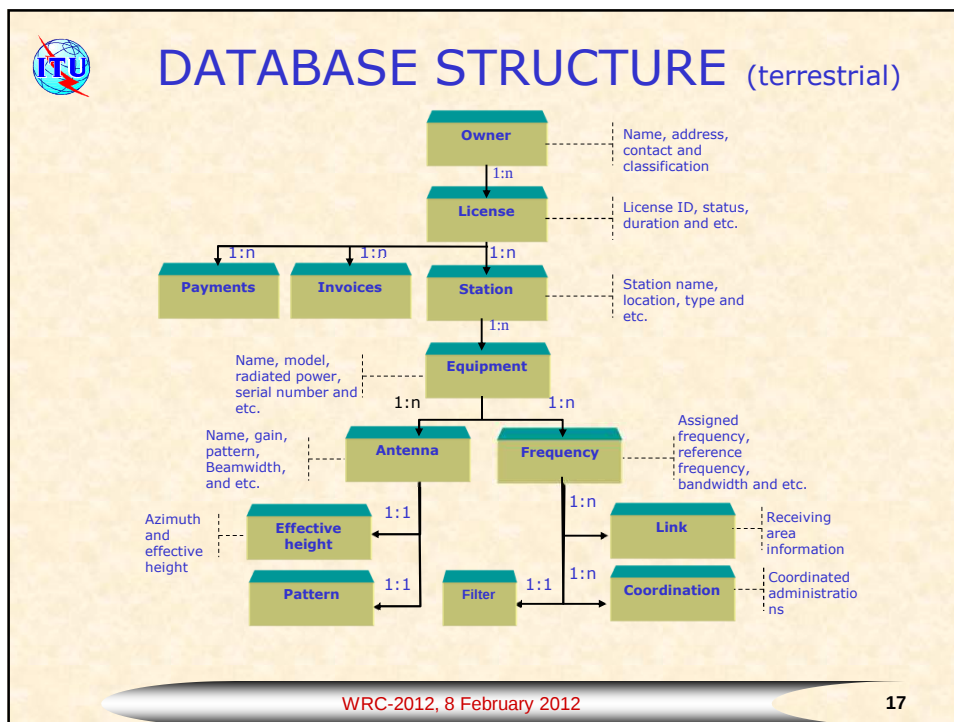


STRUCTURE OF SMS4DC



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SMS4DC's Administrative Functions

Supervisory tasks

- User access
- Backup/Restore
- Audit control



Audit trail

User Name: All Actions: All Table: All

User	Date/Time	Action	Record no.	Table
Samam	2005-10-11 05:24:18	Update equipment	1	Equipment
Samam	2005-10-11 07:29:26	Update frequency	30	Frequency
Samam	2005-12-11 21:59:39	Update frequency	43	Frequency
Samam	2005-12-11 21:51:13	Update frequency	44	Frequency
Samam	2005-12-11 21:52:39	Update frequency	43	Frequency
Samam	2005-12-11 21:52:59	Update frequency	44	Frequency
admin	2005-11-13 09:57:54	Delete fixed/base station	42	Station
SMS4DC	2005-11-14 04:47:13	Update antenna	6	Antenna
SMS4DC	2005-11-14 10:48:16	Add payment	6	Payment
SMS4DC	2005-11-14 14:06:54	Delete license	3	License
SMS4DC	2005-11-15 11:48:42	Update frequency	51	Frequency
SMS4DC	2005-11-15 11:48:55	Update frequency	51	Frequency
SMS4DC	2005-11-15 11:49:30	Update frequency	52	Frequency
Somebody	2005-11-21 08:31:46	Update broadcasting station	9	BCStation
Somebody	2005-11-21 08:52:22	Update broadcasting station	2	BCStation
Somebody	2005-11-21 10:06:49	Update broadcasting station	2	BCStation
Somebody	2005-11-21 10:07:22	Add equipment	82	Equipment
Somebody	2005-11-21 10:08:54	Add equipment	83	Equipment
Somebody	2005-11-21 10:10:03	Add antenna	53	Antenna

Access levels

New

User Name:

User Password:

Modify

User Name: SMS4DC

User Password:

Access Level: 4 - Supervisor

☒ Enabled

Delete Save Cancel

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SMS4DC's Administrative Functions

Data capture screens

Owner information

Modify Cancel Save

	Value
Owner Name	Admin2
Owner Address	Engheleb Ave.
City	Tehran
Country	IRN
Telephone	3243541
Telex	
Fax	5123451
Email	x@c.com
Remarks	
Security Category	Y
Address Code	A
Code of Operating Agency	001
Billing	
Billing Name	Admin2
Billing Address	Tehran

Owner information

Modify Cancel Save

	Value
Nom du propriétaire	Admin2
Adresse du propriétaire	Engheleb Ave.
Ville	Tehran
Pays	IRN
Téléphone	3243541
Télex	
Fax	5123451
Email	x@c.com
Remarques	
Niveau de sécurité	Y
Code d'adresse	A
Code de la compagnie exploitante	001
Billing	
Facturation au nom de	Admin2
Adresse de facturation	Tehran

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SMS4DC's Administrative Functions

Broadcasting Station Information Data Entry Table

The screenshot shows the 'Broadcasting station information' data entry table in the SMS4DC Administrative data1 window. The table has columns for 'Value' and 'Unit'. The data is as follows:

Field	Value	Unit
Admin Ref ID	020510463	
Site ID		
Station Name	ADRAR	
Call Sign		
Class of Station	BC	
Station Type	Fixed	
Location		
ITU Region		1
Latitude	+275300.00	DDMMSS.SS
Longitude	+0011660.00	DDMMSS.SS
Country	ALG	
Radius of Service		km
Height ASL	280 m	
Provision	Geneva 2000	
Plan		
Target Latitude		DDMMSS.SS
Target Longitude		DDMMSS.SS
Plan Entry Code	1	
Assignment Code	S	
Assoc. Allot. ID		
Assoc. Allot. SFN ID		
SFN ID		
Conditions Met	No	
Signed Commitment	No	
Notice Type	DS1	

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SMS4DC's Administrative Functions

Dialog box for importing data from BRIFIC (Terrestrial)

The screenshot shows the 'IFIC import' dialog box. It contains several sections for configuring the import process:

- Service:** Checkboxes for FM/TV, LF/MF, and F/M. There is also an 'Allotments' checkbox.
- Administration:** A list of countries (ABW, AFG, AFS, AGL, AIA, ALB, etc.) with 'Add -->' and '<-- Remove' buttons. A 'Clear' button is also present.
- Frequency conditions:** A list of frequency conditions (F = F1, F <> F1, F > F1, F >= F1, F < F1, F <= F1, F > F1 and F < F2, F >= F1 and F <= F2, etc.) with 'Add -->' and '<-- Remove' buttons. There are also input fields for F1 and F2 in MHz.
- Class of Station:** A dropdown menu with 'Add -->' and '<-- Remove' buttons.
- Fragment:** A dropdown menu with 'Add -->' and '<-- Remove' buttons.
- Assign ID:** A dropdown menu with 'Add -->' and '<-- Remove' buttons.
- Import progress:** A progress bar at the bottom.

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SMS4DC's Administrative Functions

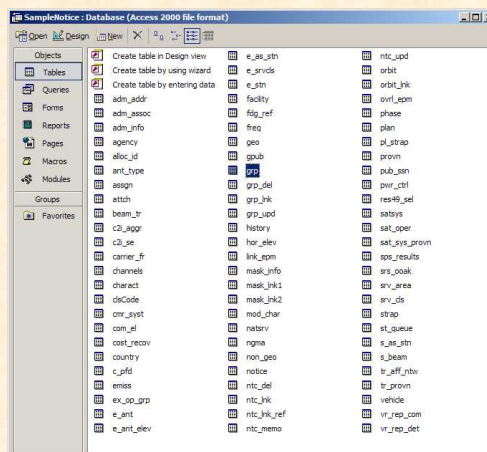
Electronic notices to BR

Fixed, Land mobile, Broadcasting

Earth station

```

STIADD2006-03-11.txt - Notepad
File Edit Format View Help
<HEAD>
t_adm=IRN
t_d_sent=2006-03-11
</HEAD>
<NOTICE>
t_fragment=NTFD_RR
t_notice_type=T13
t_prov=RR11.9
t_action=ADD
t_is_resub=FALSE
t_freq_assign=150.000000
t_freq_carr=150.000000
t_d_muser=2004-11-15
t_call_sign=Hello
t_site_name=Mobile1
t_eml_cls=F3E-
t_bdwth_cde=0K50
t_long=+0500000
t_lat=+300000
t_stn_cls=ML
t_nat_svr=CR
t_op_hh_fr=00:00
t_op_hh_to=24:00
t_addr_code=A
t_op_agcy=001
t_city=IRN
<ANTENNA>
t_pwr_xyz=X
t_pwr_ant=10.000000
t_pwr_dbw=10.000000
t_pwr_svri
</ANTENNA>
<NOTICE>
<TAIL>
t_num_notices=1
</TAIL>
  
```



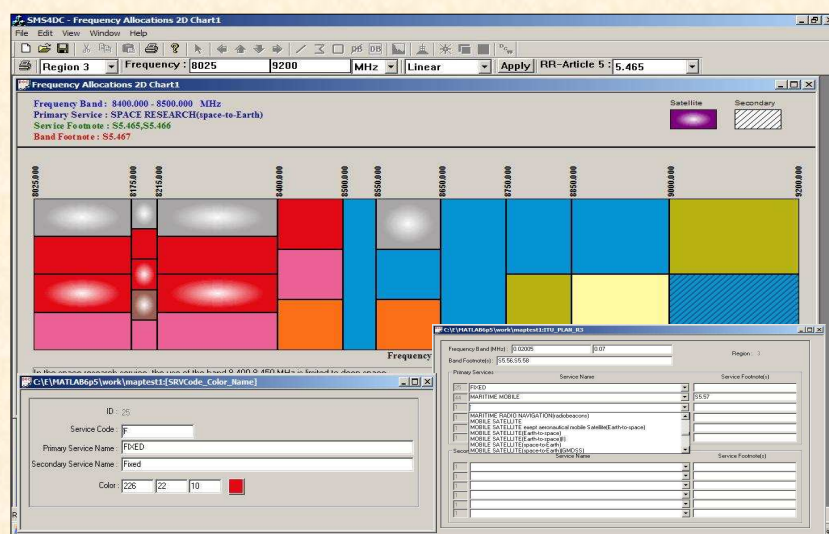
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SMS4DC's Engineering Functions

International & National frequency allocations table (chart)



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 **SMS4DC's Engineering Functions**
Frequency arrangement (Homogeneous)

Frequency Plan

ID : 1 Frequency Plan ID : 382480.13 Region : Region 3 Service Priority: Primary

Service : Fixed

Type of Frequency Plan : Homogeneous

$F_n = F_o + F_{off} + n \cdot X_S$, $F'_n = F_o + F'_{off} + n \cdot X_S$

Channel Spacing X_S : 130 MHz

Reference Frequency F_o : 38248 MHz

Lower Frequency Offset F_{off} : -1260 MHz

Upper Frequency Offset F'_{off} : 0 MHz

Channels

Number of Channels n : 40

First : 1 Last : 40 Channel Set : All

Comment :
CEPT Channel arrangement in 38 GHz Band-Homogeneous

Frequency List:

No	F_n	F'_n	Bandwidth
1	36988	38248	130
2	37118	38378	130
3	37248	38508	130
4	37378	38638	130
5	37508	38768	130
6	37638	38898	130
7	37768	39028	130
8	37898	39158	130
9	38028	39288	130
10	38158	39418	130
11	38288	39548	130
12	38418	39678	130
13	38548	39808	130
14	38678	39938	130
15	38808	40068	130

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 **SMS4DC's Engineering Functions**
Frequency assignment parameters & EMC analysis results

Assignment Parameters

F_{min} (MHz) : 145 F_{max} (MHz) : 155

Channel scan range(kHz) : 15

Search Radius(km) : 50

Permissible field strength(dBμV/m) : 20

OK Cancel

(a) Frequency assignment parameters

Assignment Results

List of Frequencies:

No	F_n	F'_n	Bandwidth	Num of Stations	PlanID	Srv Priority
1	148.0125	150.0125	0.0125	0	1430.0000125	Primary
2	148.025	150.025	0.0125	0	1430.0000125	Primary
3	148.0375	150.0375	0.0125	1	1430.0000125	Primary
4	148.05	150.05	0.0125	2	1430.0000125	Primary
5	148.0625	150.0625	0.0125	3	1430.0000125	Primary
6	148.075	150.075	0.0125	2	1430.0000125	Primary
7	148.0875	150.0875	0.0125	2	1430.0000125	Primary
8	148.1	150.1	0.0125	2	1430.0000125	Primary
9	148.1125	150.1125	0.0125	2	1430.0000125	Primary
10	148.125	150.125	0.0125	1	1430.0000125	Primary

List of Stations:

No	ID	Name(2)	Service	Frequency	Coordinates	Dist_km	E1_2	E2_1	dE1_2
1	56	LM2	Land Mobile	148.050000	049E2630 36N5030	17.4	8.07	11.08	-11.93
2	59	LM5	Land Mobile	148.062500	049E5900 36N4400	30.5	52.07	52.07	32.07
3	60	FX1	Fixed	148.075000	049E2600 36N2730	30.3	3.23	6.24	-16.77

Selected Station:

Service : Land Mobile

Station Name(1) : LM1

Location : 049E1930 36N4300

Emission : 8K30F3E-

Frequency(MHz) : 148.0125

Selected Channel(MHz) : 148.0625

No of Channels:

Total : 40 With Interference : 15

Permissible field strength : 20 (dBμV/m)

Assign Cancel

(b) EMC analysis result for assigning available planned frequencies to a concerned station

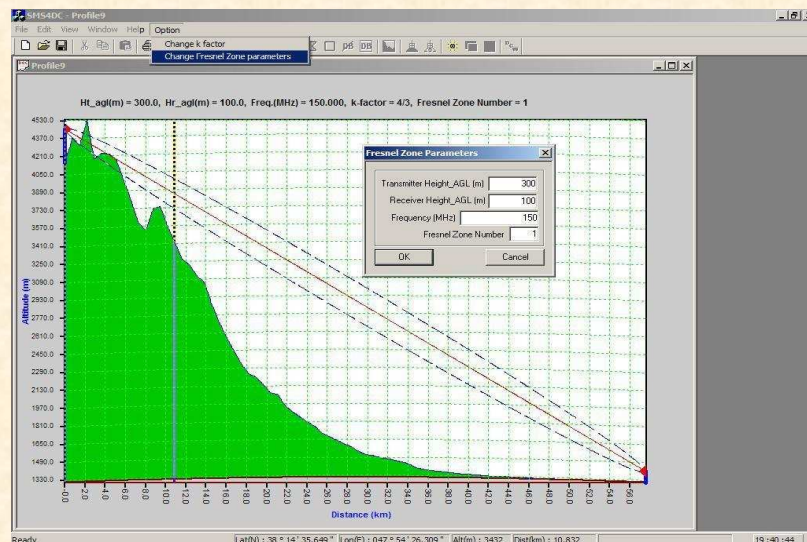
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SMS4DC's Engineering Functions

Path profile with Fresnel Zone



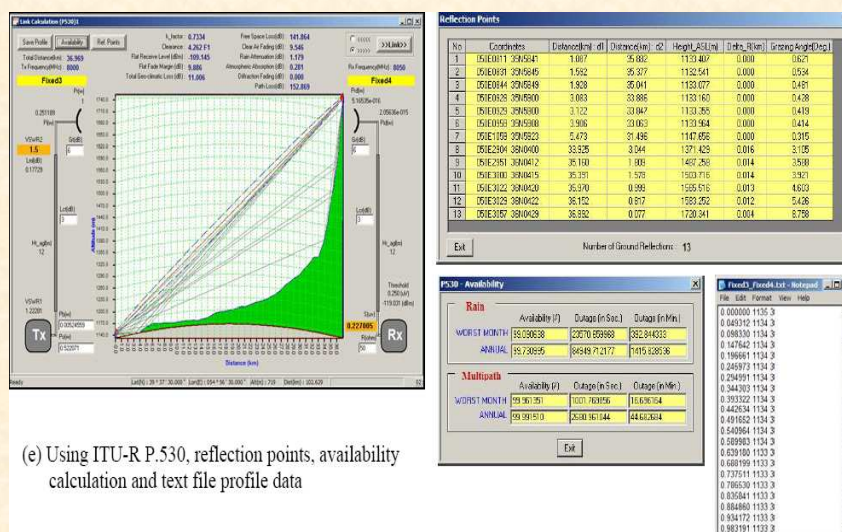
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SMS4DC's Engineering Functions

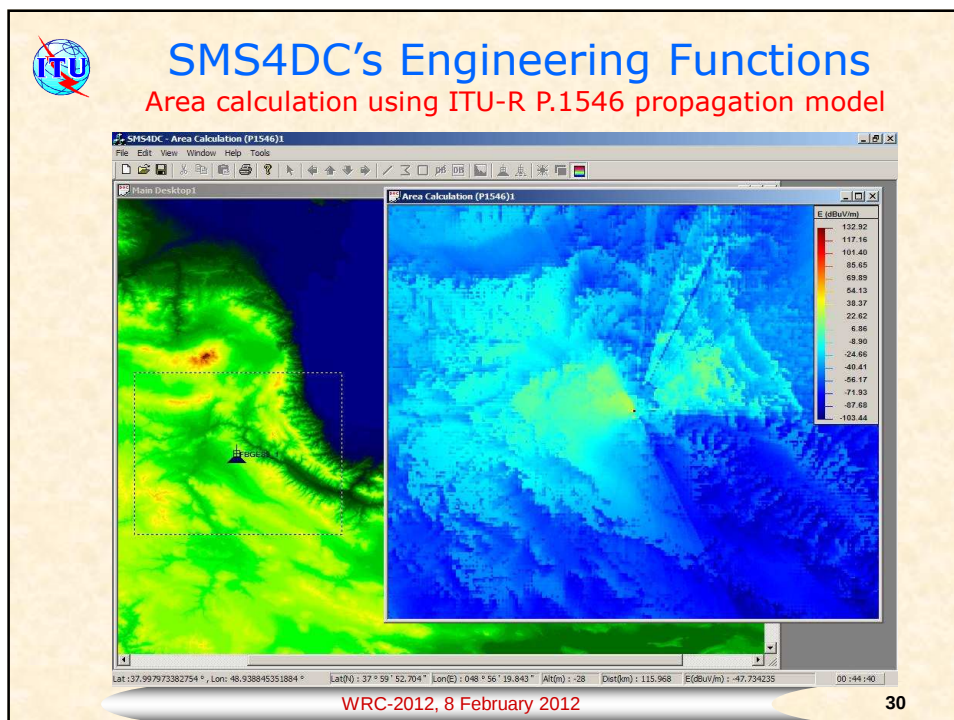
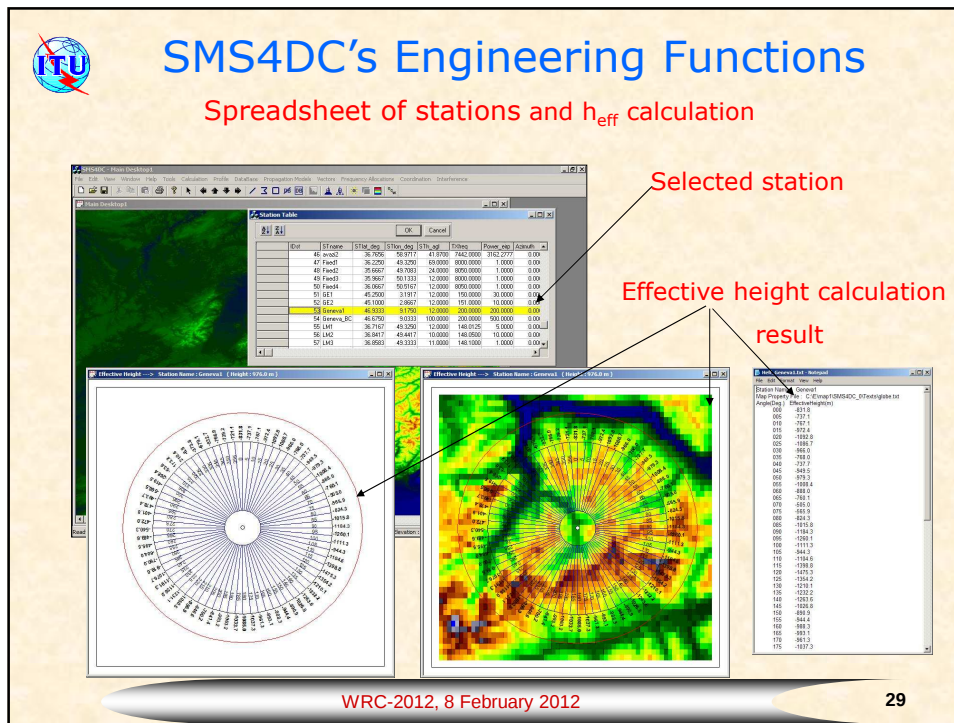
Link Calculation Dialog box using different propagation models

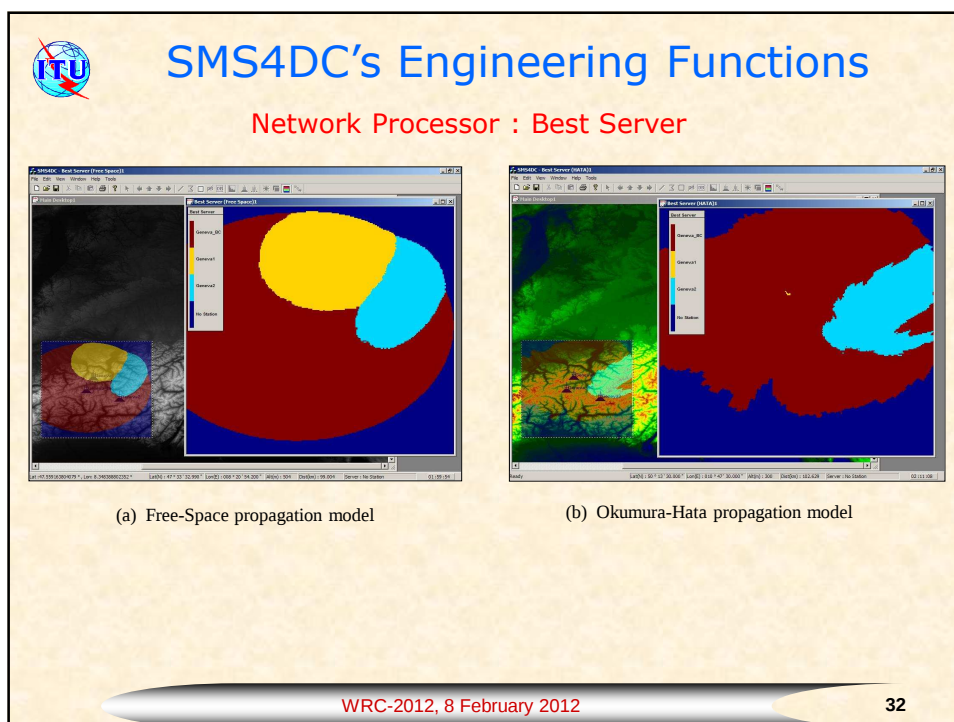
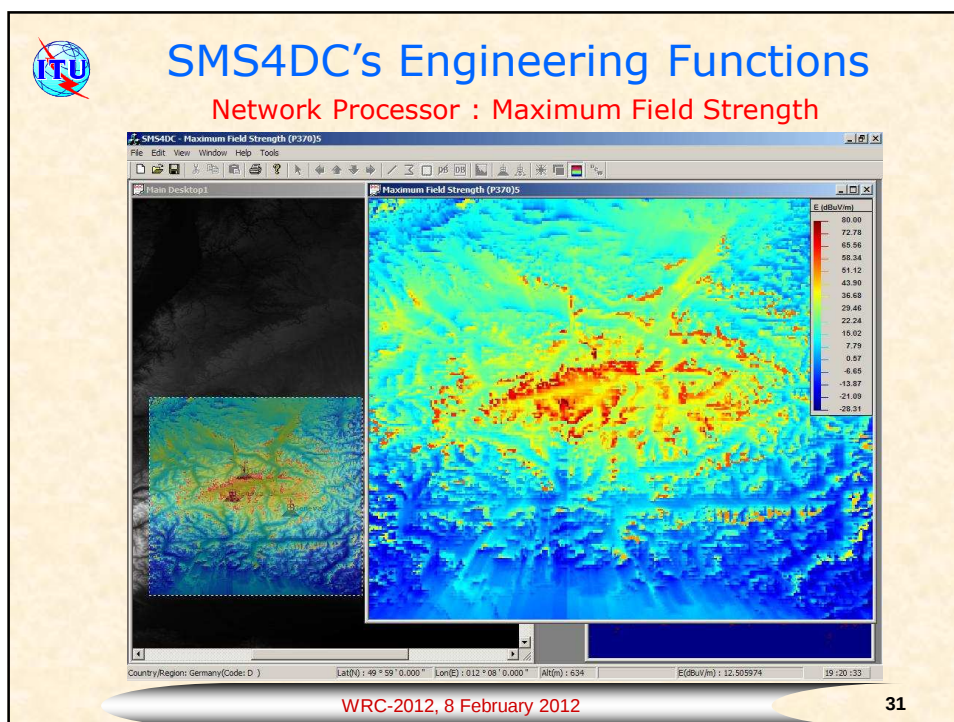


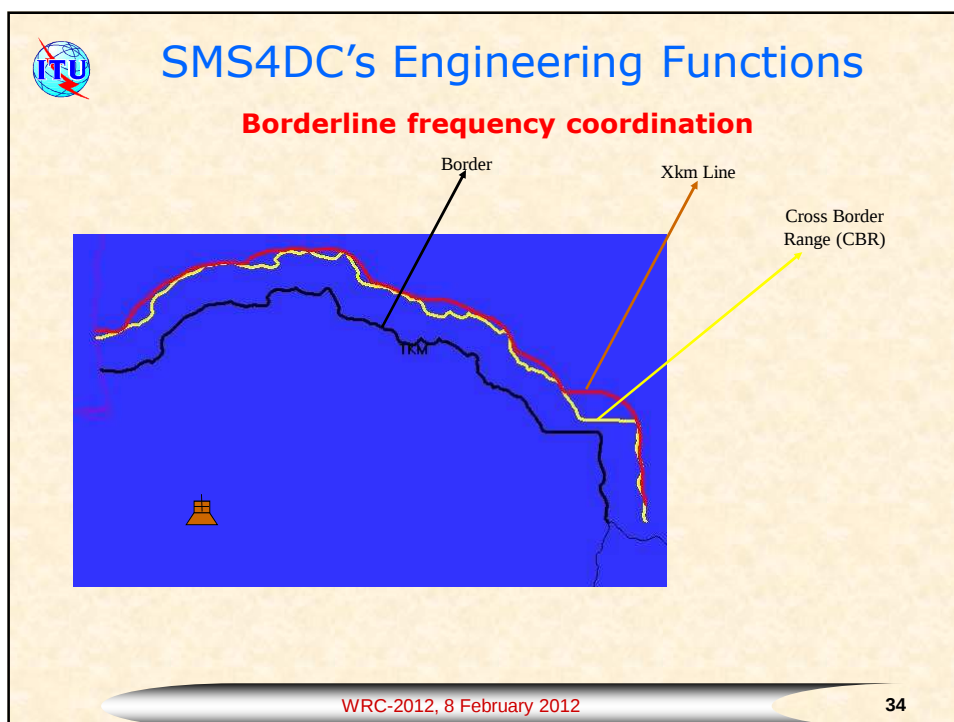
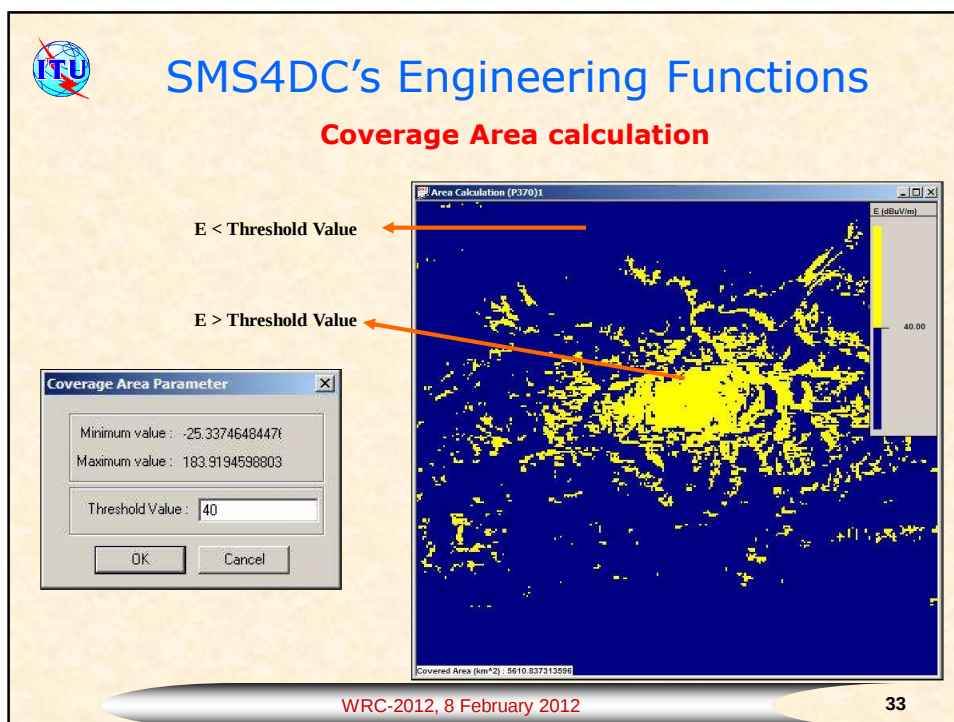
(e) Using ITU-R P.530, reflection points, availability calculation and text file profile data

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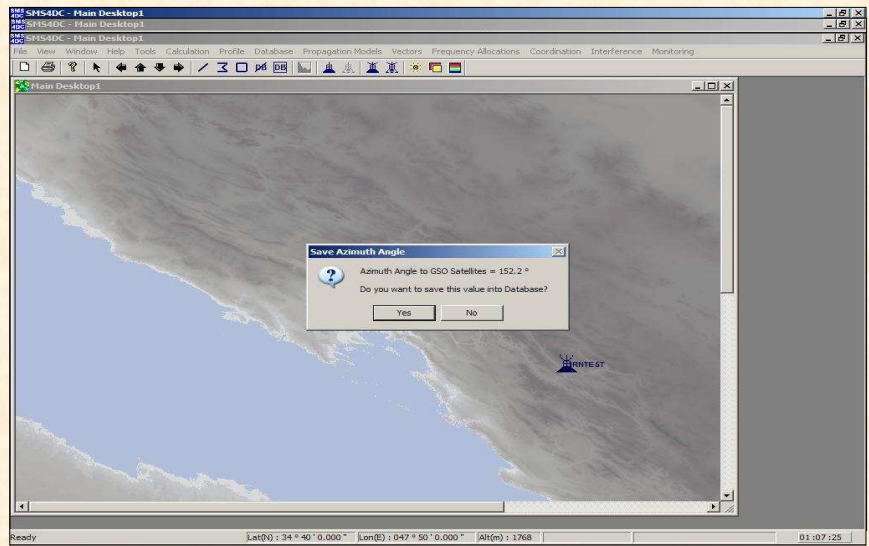
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 **SMS4DC's Engineering Functions**
ES horizon elevation, azimuth, elevation



The screenshot shows the SMS4DC software interface. A dialog box titled "Save Azimuth Angle" is displayed over a map of the Middle East. The dialog box contains the text: "Azimuth Angle to GSO Satellites = 152.2 °" and "Do you want to save this value into Database?". There are "Yes" and "No" buttons. The status bar at the bottom of the window shows coordinates: Lat(N) : 34 ° 40 ' 0.000 " Lon(E) : 047 ° 50 ' 0.000 " Alt(m) : 1768 and a timestamp: 01:07:25.

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 **SMS4DC's Engineering Functions**
Calculations according to the Final Acts of the GE06 Plan

Coverage and service area calculation
 Stage 1 – Calculation of noise-limited coverage area
 Stage 2 – Identification of interferers
 Stage 3 – Calculation of the test points for the interference-limited coverage

Calculation of interference caused by Interferer Station/ Assignment/Allotment to Victim Stations/Assignments/ Allotments

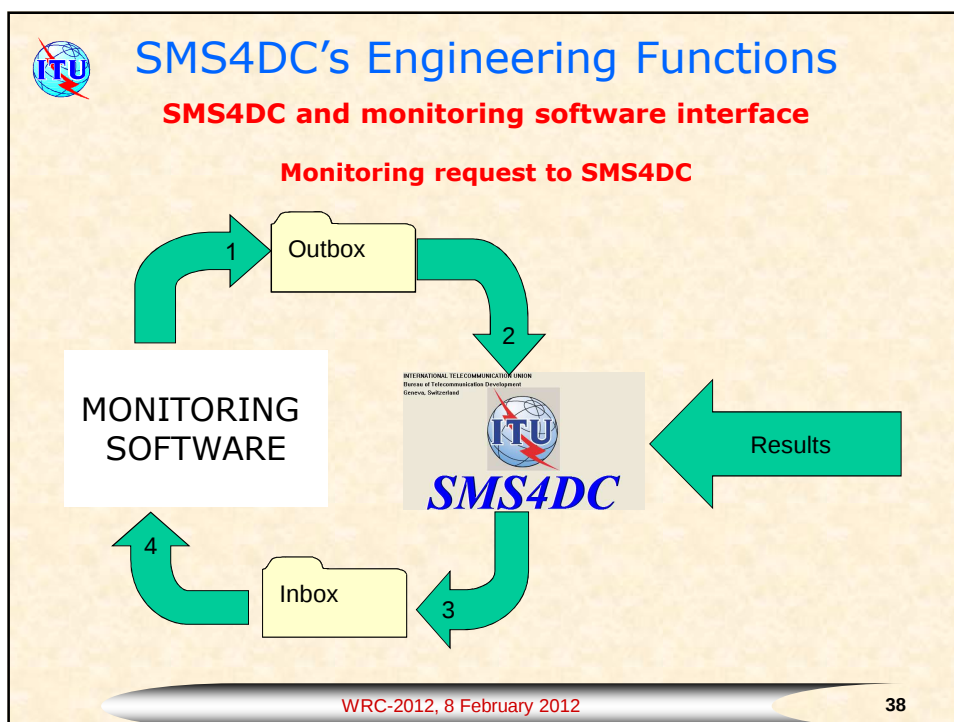
- BCBT to Digital BCBT or to Analogue BT;
- FXM to Digital BCBT or to Analogue BT;
- BCBT to FXM

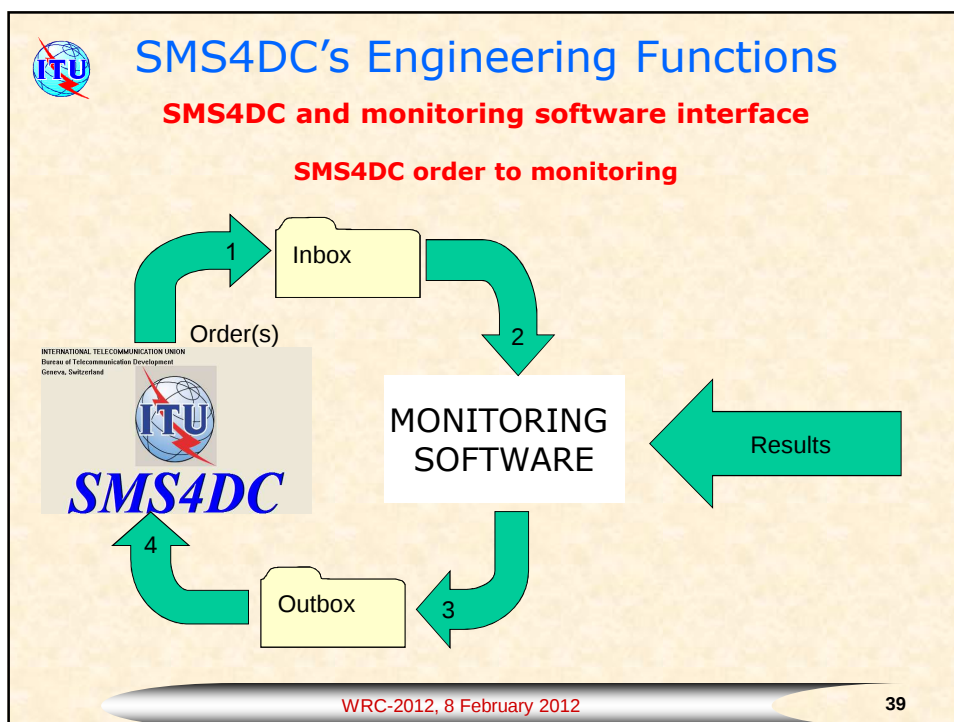
Official results from the BR !

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SMS4DC's Engineering Functions
SMS4DC and monitoring software interface

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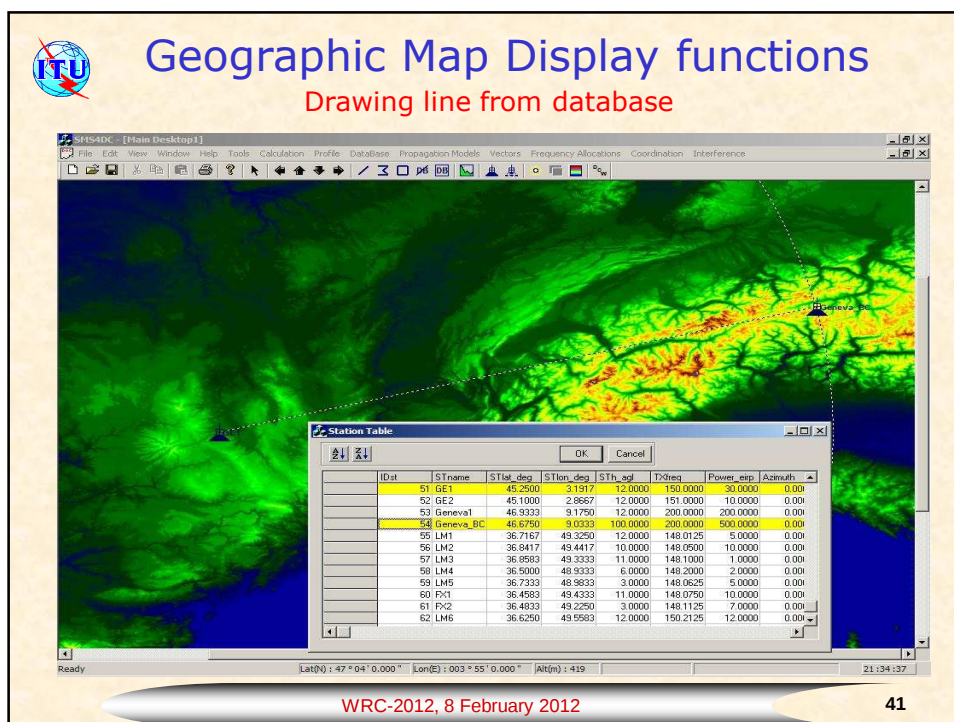


SMS4DC's Engineering Functions
SMS4DC and monitoring software interface description

- Experiences from the development of the interface to the two systems
- General interface description
- Provided to ITU-R WP1/C, September 2010

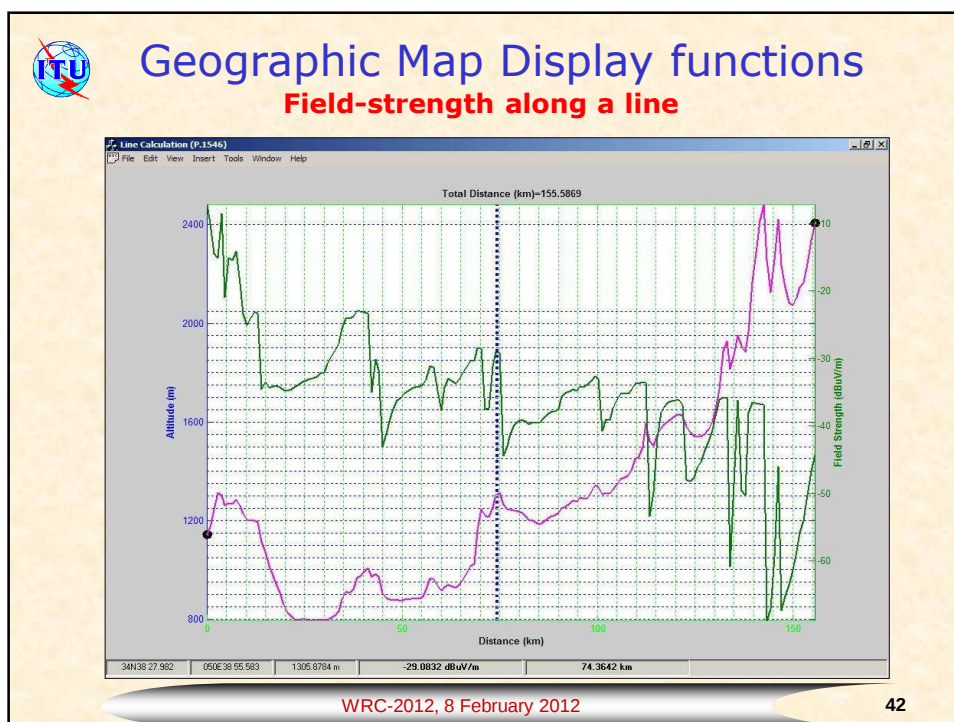
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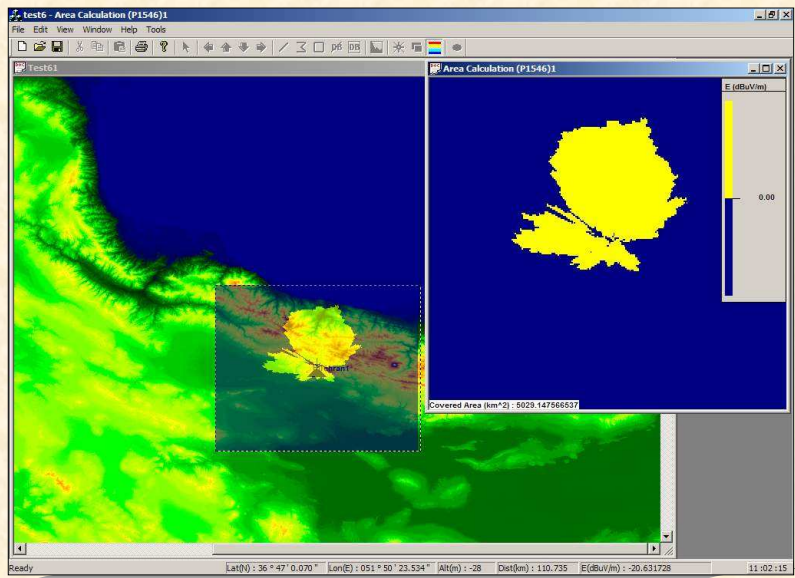
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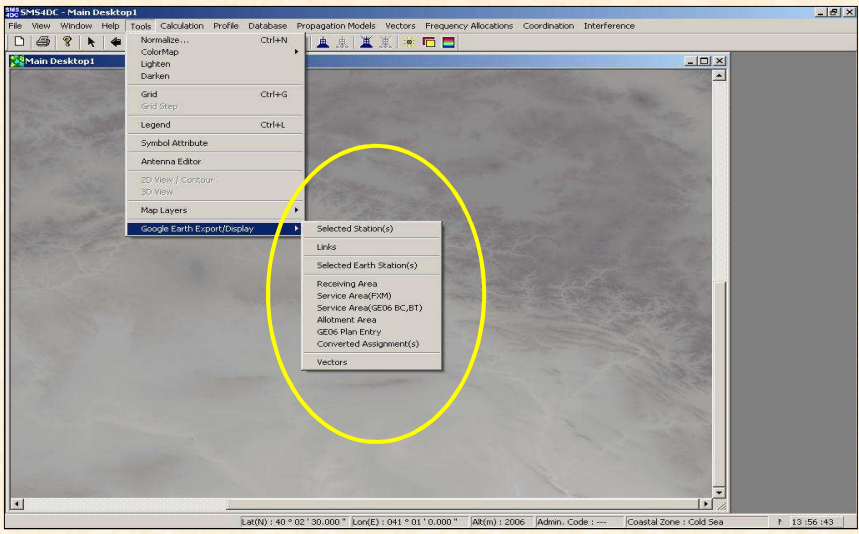
 **Geographic Map Display functions**
Overlay possibility



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 **Geographic Map Display functions**
Google Earth export



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Geographic Map Display functions

Google Earth – results to export

- Selected Stations (Including Earth Stations)
- Selected Links
- Receiving Area
- Service Area
- Allotment Area
- GE06 Plan Entry
- GE06 Converted Assignments
- Vectors
- Area Propagation Calculation
- Maximum Field Strength Calculation
- Best Server Calculation
- Field Strength Contour

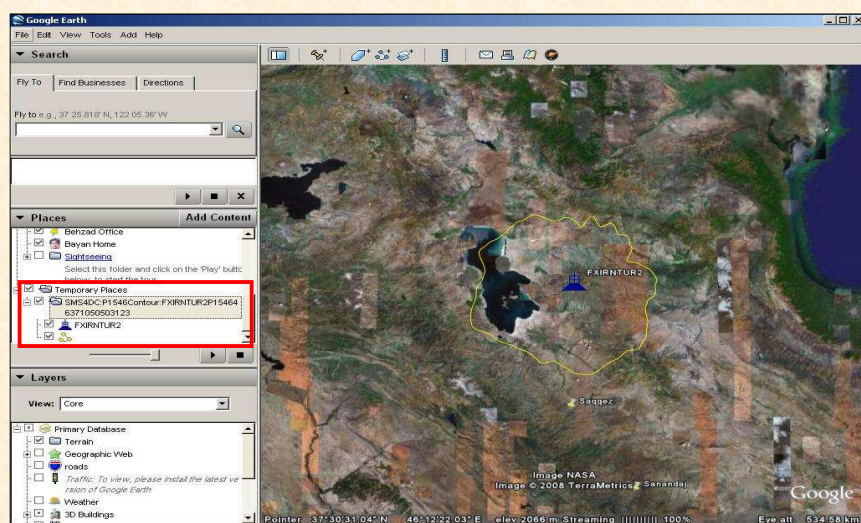
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Geographic Map Display functions

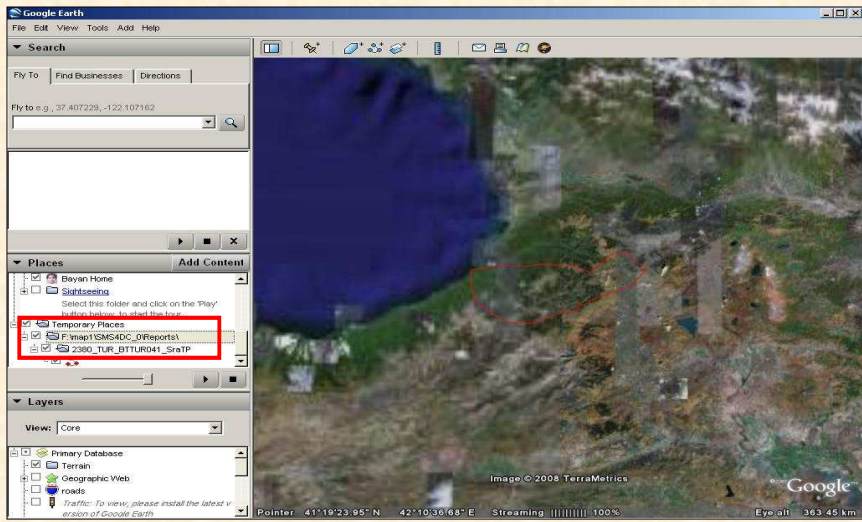
Google Earth Display - Field Strength Contour (P.1546)



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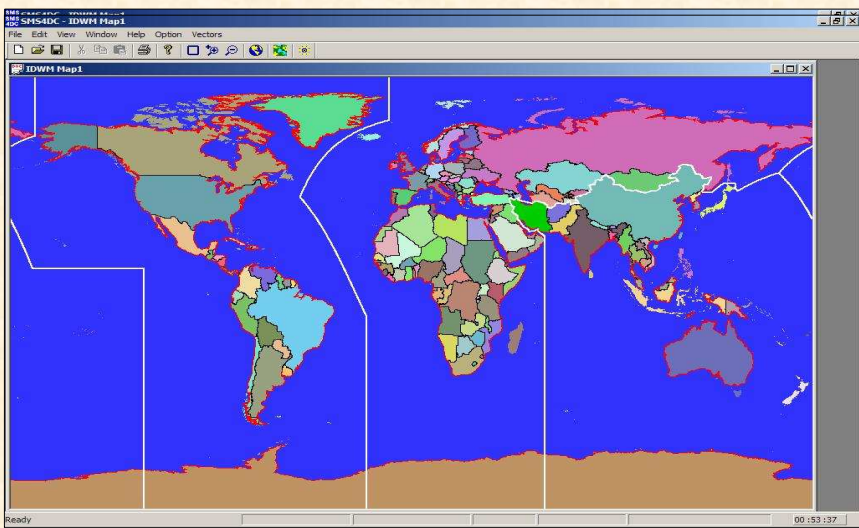
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 **Geographic Map Display functions**
Google Earth Display – GE06 Service area



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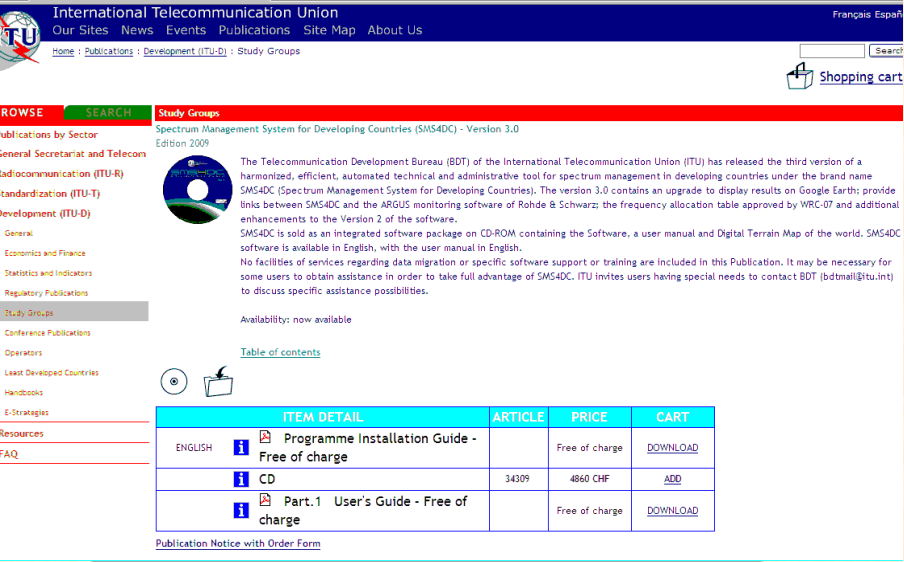
 **Geographic Map Display functions**
Fill countries



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How to order SMS4DC

<http://www.itu.int/publ/D-STG-SPEC-2009-V3.0/en>



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- Radiocommunication (ITU-R)
- Standardization (ITU-T)
- Development (ITU-D)

Development (ITU-D)

- General
- Economics and Finance
- Statistics and Indicators
- Regulatory Publications
- Study Groups**
- Conference Publications
- Operators
- Least Developed Countries
- Handbooks
- E-Strategies
- Resources
- FAQ

Spectrum Management System for Developing Countries (SMS4DC) - Version 3.0
Edition 2009

The Telecommunication Development Bureau (BDT) of the International Telecommunication Union (ITU) has released the third version of a harmonized, efficient, automated technical and administrative tool for spectrum management in developing countries under the brand name SMS4DC (Spectrum Management System for Developing Countries). The version 3.0 contains an upgrade to display results on Google Earth; provide links between SMS4DC and the ARGUS monitoring software of Rohde & Schwarz; the frequency allocation table approved by WRC-07 and additional enhancements to the Version 2 of the software.

SMS4DC is sold as an integrated software package on CD-ROM containing the Software, a user manual and Digital Terrain Map of the world. SMS4DC software is available in English, with the user manual in English.

No facilities of services regarding data migration or specific software support or training are included in this Publication. It may be necessary for some users to obtain assistance in order to take full advantage of SMS4DC. ITU invites users having special needs to contact BDT (bd@mail.itu.int) to discuss specific assistance possibilities.

Availability: now available

[Table of contents](#)

ITEM DETAIL	ARTICLE	PRICE	CART
ENGLISH Programme Installation Guide - Free of charge		Free of charge	DOWNLOAD
CD	34309	4860 CHF	ADD
Part.1 User's Guide - Free of charge		Free of charge	DOWNLOAD

[Publication Notice with Order Form](#)

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How to order SMS4DC

Annual licensing fee

Annual licensing fee in Swiss francs	Catalogue Price (software) annual licensing fee: CHF 4 860.- (for a single workstation)			
	Member State Administrations and Sector Members: -15%			
	Administrations of the least developed countries: -80%			
	Libraries of educational institutions: -80%			

Price for software installed on one single or multiple workstation(s)

Number of workstations	1	2-3	4-5	6-10
Annual licensing fee (in Swiss francs)	4 860.-	7 290.-	8 260.-	9 720.-

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Version 4

- French
- Additional monitoring system

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Future developments

- Addition of new services (e.g. radionavigation, maritime mobile)
- SMS4DC web-site
- Purchase follow-up
- On-line training material

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<http://www.itu.int/ITU-D/tech/spectrum-management/SMS4DC.html>

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ITU: Committed to connecting the World

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