

## 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



## 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



## 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



## 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



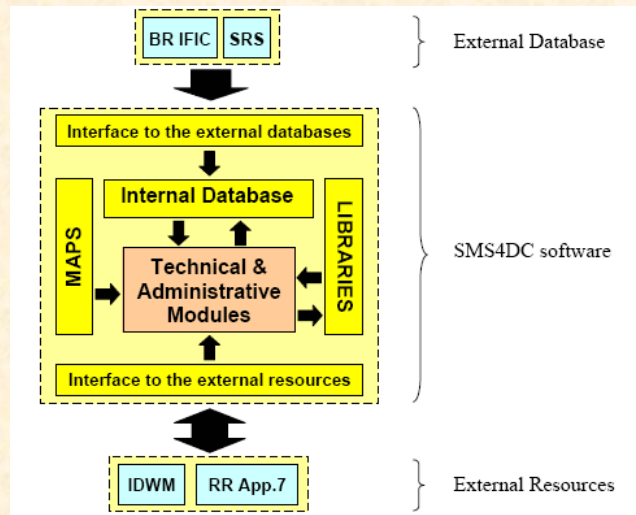
## Main Functions of SMS4DC/3

### 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.



# STRUCTURE OF SMS4DC



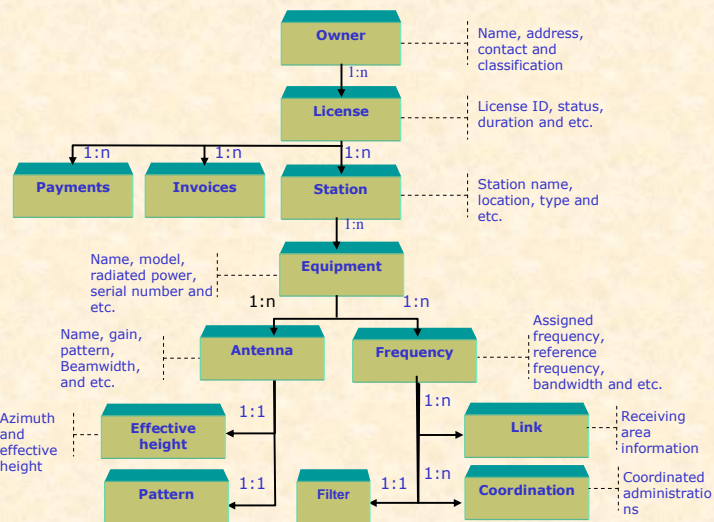
Ex1

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# DATABASE STRUCTURE (terrestrial)

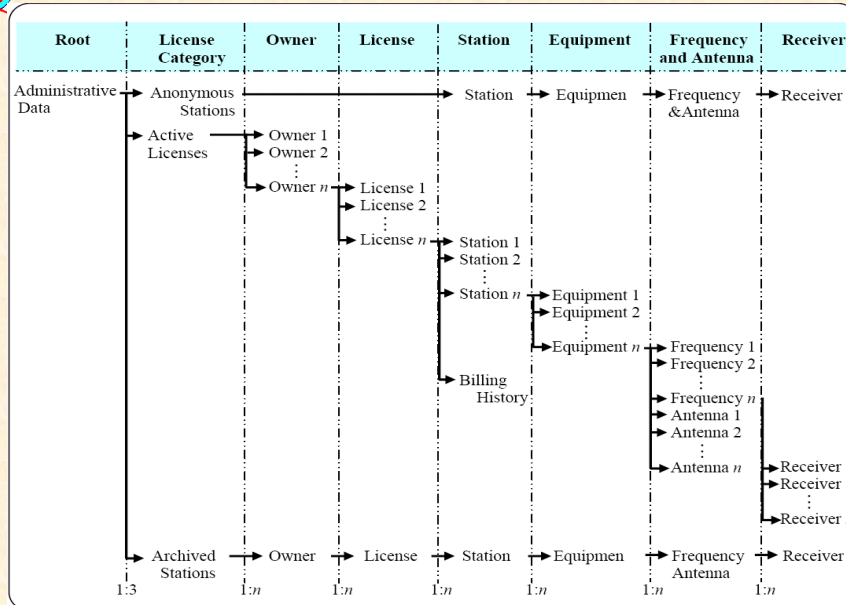


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## Flow of Data Entry



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## SMS4DC's Administrative Functions

### Supervisory tasks

- User access →
- Backup/Restore
- Audit control

User	Date/Time	Action	Record no.	Table
Sanan	2005-10-11 05:24:18	Update equipment	1	Equipment
Sanan	2005-10-11 07:23:26	Update frequency	30	Frequency
Sanan	2005-12-11 21:50:39	Update frequency	43	Frequency
Sanan	2005-12-11 21:51:13	Update frequency	44	Frequency
Sanan	2005-12-11 21:52:39	Update frequency	43	Frequency
Sanan	2005-12-11 21:52:58	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:

User Password:

Access Level:

Enabled

Delete Save Cancel

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# SMS4DC's Administrative Functions

## Data capture screens

### Owner information

Field	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
<b>Billing</b>	
Billing Name	Admin2
Billing Address	Tehran

### Owner information

Field	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
<b>Billing</b>	
Facturation au nom de	Admin2
Adresse de facturation	Tehran



# SMS4DC's Administrative Functions

## Broadcasting Station Information Data Entry Table

The screenshot shows the SMS4DC software interface with a tree view on the left and a data entry table on the right. The tree view is expanded to 'Broadcasting Stations' and then to a specific station entry.

Field	Value	Unit
Admin Ref. ID	DZDS10463	
Site ID		
Station Name	ADRAR	
Class of Station	BC	
Station Type	Fixed	
<b>Location</b>		
ITU Region		1
Latitude	+275300.00	DDMMSS SS
Longitude	+0001680.00	DDMMSS SS
Country	ALG	
Radius of Service		km
Height ASL	260	m
<b>Plan</b>		
Provision	Geneva 2006D	
Plan Entry Code		1
Assignment Code	S	
Assoc. Alet. ID		
Assoc. Alet. SFN ID		
SFN ID		
Conditions Met	No	
Signed Commitment	No	
Notice Type	DS1	



# SMS4DC's Administrative Functions

Dialog box for importing data from BRIFIC (Terrestrial)

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# SMS4DC's Administrative Functions

Electronic notices to BR

Fixed, Land mobile, Broadcasting

Earth station

```

S:\IAD\2006-03-11.txt - Notepad
File Edit Format View Help
<HEAD>
t_admin=IRN
t_d_sent=2006-03-11
</HEAD>
<NOTICE>
t_fragment=NIFD_RR
t_notice_type=T13
t_prov=RR119
t_action=ADD
t_is_resub=FALSE
t_freq_assgn=150.000000
t_freq_carr=150.000000
t_d_inuse=2004-11-15
t_call_sign=Hello
t_site_name=Mobile1
t_emi_cls=F3E-
t_bdwth_cde=BK50
t_long=+0500000
t_lat=+300000
t_stn_cls=ML
t_nat_svs=CR
t_op_hh_fr=00.00
t_op_hh_to=24.00
t_addr_code=A
t_op_agcy=001
t_chry=IRN
<ANTENNA>
t_pwr_xyz=X
t_pwr_ant=10.000000
t_pwr_dbw=10.000000
t_pwr_bv=1
</ANTENNA>
</NOTICE>
<TAIL>
t_num_notices=1
</TAIL>

```

Objects	Create table in Design view	e_as_sth	ntc_upd
Tables	Create table by using wizard	e_srvds	orbit
Queries	Create table by entering data	e_sth	orbit_link
Forms	adm_addr	facility	ovrl_epm
Reports	adm_assoc	fdg_ref	phase
Pages	adm_grfp	freq	plan
Macros	agency	geo	sl_strap
Modules	alloc_id	gpub	provnt
Groups	ant_type	grp_dcl	pub_ssn
Favorites	assign	grp_lnk	pwr_ctl
	attach	grp_upd	res49_sel
	beam_tr	history	satsys
	c2_aggr	hor_elev	sst_oper
	c2_se	link_gpn	sst_sys_prevm
	carrier_fr	link_gpn	spg_results
	charact	mask_info	srv_posk
	disCode	mask_lnk1	srv_area
	dmr_syst	mask_lnk2	srv_st
	com_sl	mod_char	st_queue
	cost_recov	nabrv	st_as_sth
	country	ngma	s_beam
	c_pfd	non_geo	tr_eff_ntw
	emiss	notice	tr_grov
	evs_gp_grp	ntc_dcl	vehicle
	e_ant	ntc_lnk	vr_req_com
	e_ant_elev	ntc_lnk_ref	vr_req_det
		ntc_memo	

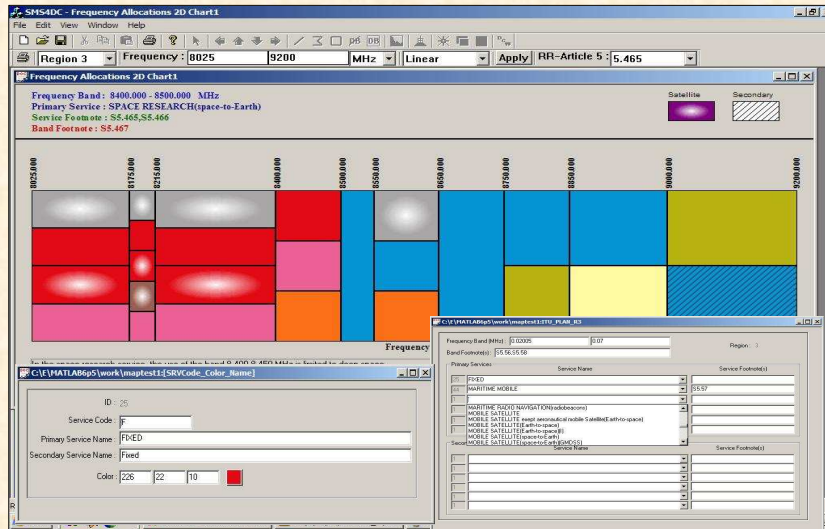
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# SMS4DC's Engineering Functions

International & National frequency allocations table (chart)



Ex3

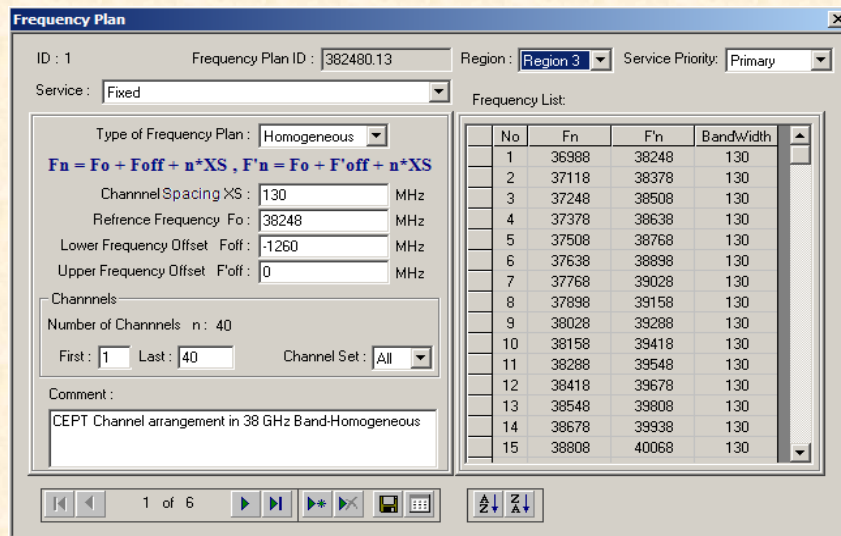
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# SMS4DC's Engineering Functions

Frequency arrangement (Homogeneous)



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# SMS4DC's Engineering Functions

## Frequency assignment parameters & EMC analysis results

**Assignment Parameters**

Fmin(MHz): 145 Fmax(MHz): 155  
Channel scan range(KHz): 15

Search Radius(km): 50  
Permissible field strength(dBW/m): 20

OK Cancel

**Assignment Results**

List of Frequencies:

No	Fn	Fh	BandWidth	Num of Stations	PlanID	Srv Priority
1	148.0125	150.0125	0.0125	0	1490.0000125	Primary
2	148.025	150.025	0.0125	0	1490.0000125	Primary
3	148.0375	150.0375	0.0125	1	1490.0000125	Primary
4	148.05	150.05	0.0125	2	1490.0000125	Primary
5	148.0625	150.0625	0.0125	3	1490.0000125	Primary
6	148.075	150.075	0.0125	2	1490.0000125	Primary
7	148.0875	150.0875	0.0125	2	1490.0000125	Primary
8	148.1	150.1	0.0125	2	1490.0000125	Primary
9	148.1125	150.1125	0.0125	2	1490.0000125	Primary
10	148.125	150.125	0.0125	1	1490.0000125	Primary

List of Stations:

No	ID	Name(2)	Service	Frequency	Coordinates	Dist_km	E1_2	E2_1	HE1_2
1	55	LM2	Land Mobile	148.050000	049E2630 36N5030	17.4	8.07	11.08	-11.93
2	59	LM5	Land Mobile	148.062500	048E5900 36N4400	30.5	52.07	52.07	32.07
3	60	FX1	Fixed	148.075000	049E2610 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 (dBW/m)

Assign Cancel

(a) Frequency assignment parameters

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

Ex4

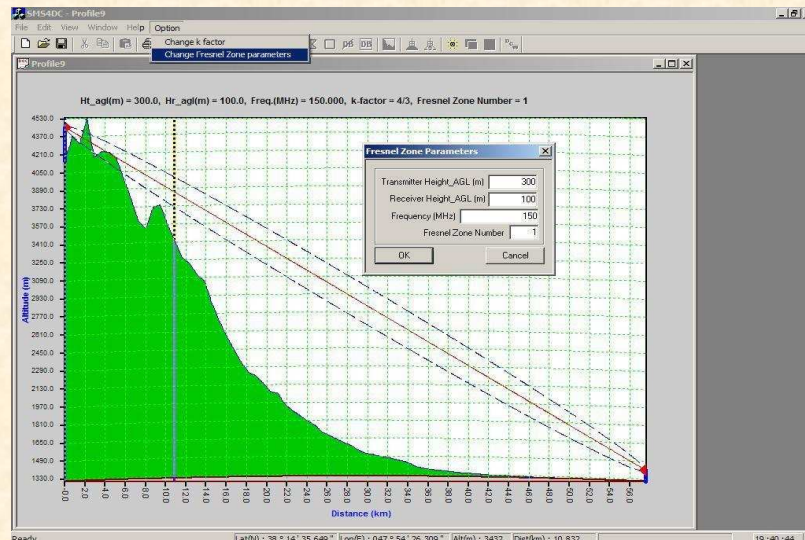
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# SMS4DC's Engineering Functions

## Path profile with Fresnel Zone



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# SMS4DC's Engineering Functions

Link Calculation Dialog box using different propagation models

The screenshot displays the 'Link Calculation (P530)' dialog box with various parameters for a link between two stations. Below it is a 'Reflection Points' table listing 13 ground reflections with their respective coordinates, distances, and heights. To the right, the 'P530 - Availability' dialog box shows calculated availability and outage statistics for rain and multipath conditions.

No.	Coordinates	Distance(m): d1	Distance(m): d2	Height_ASL(m)	H_mts(m)	Grazing Angle(deg)
1	151E011 39N544	1.097	35.882	1133.407	0.000	0.675
2	151E031 39N545	1.522	35.377	1132.541	0.000	0.524
3	151E044 39N546	1.928	35.041	1133.077	0.000	0.457
4	151E053 39N500	3.083	33.886	1133.160	0.000	0.438
5	151E053 39N500	3.122	33.847	1133.355	0.000	0.419
6	151E053 39N500	3.905	33.063	1133.964	0.000	0.414
7	151E105 39N523	5.473	31.496	1147.856	0.000	0.315
8	151E204 39N400	33.525	3.044	1371.425	0.016	2.155
9	151E251 39N404.2	35.130	1.905	1407.260	0.014	3.508
10	151E300 39N404.5	35.331	1.575	1503.716	0.014	3.921
11	151E312 39N404.0	35.370	0.999	1555.576	0.013	4.633
12	151E312 39N404.2	35.142	0.517	1559.252	0.012	5.428
13	151E315 39N404.8	35.522	0.077	1720.341	0.024	9.758

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

Ex5

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# SMS4DC's Engineering Functions

Spreadsheet of stations and  $h_{eff}$  calculation

The screenshot shows the 'Station Table' spreadsheet with columns for Call, Class, Site, Site, Site, Dist, Power, and Status. A 'Selected station' is highlighted. Below it, the 'Effective Height' dialog box is open, showing a circular plot of effective height values. A 'Effective height calculation result' is also shown as a heatmap plot.

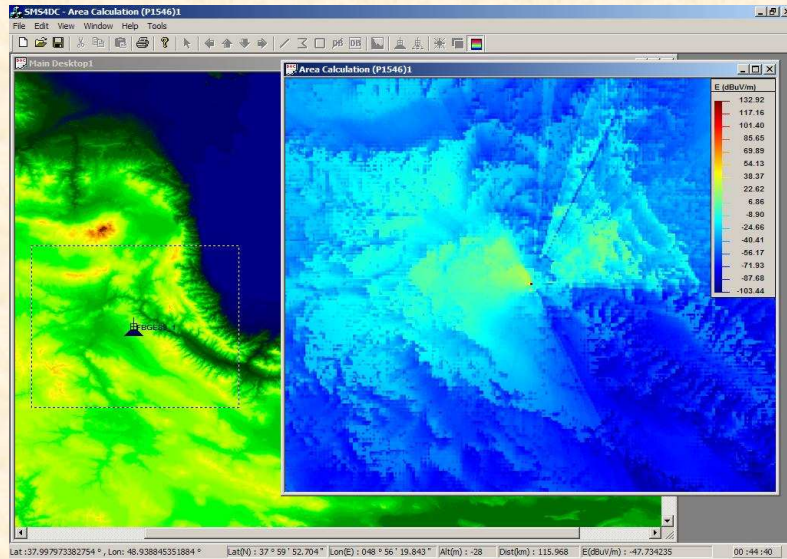
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## SMS4DC's Engineering Functions

Area calculation using ITU-R P.1546 propagation model



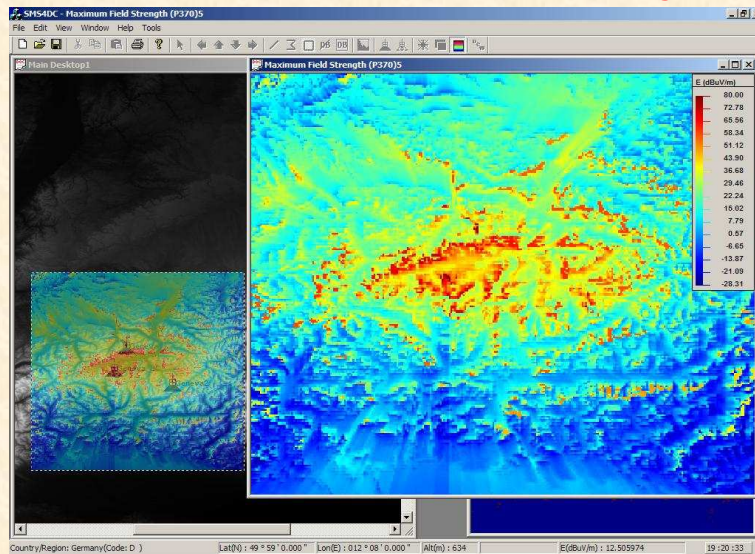
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## SMS4DC's Engineering Functions

Network Processor : Maximum Field Strength



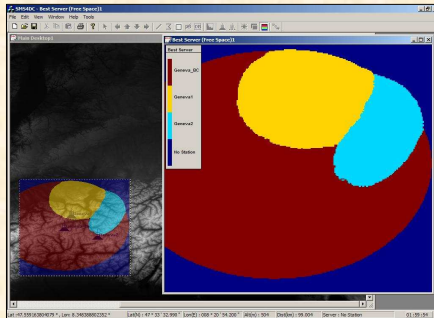
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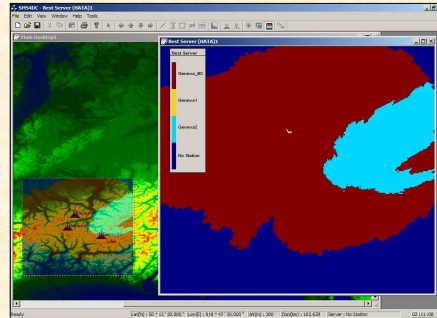


# SMS4DC's Engineering Functions

## Network Processor : Best Server



(a) Free-Space propagation model

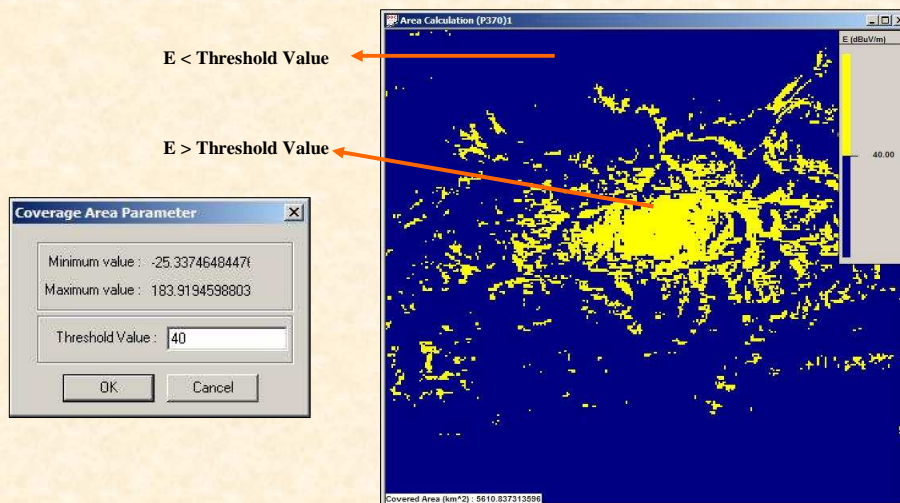


(b) Okumura-Hata propagation model



# SMS4DC's Engineering Functions

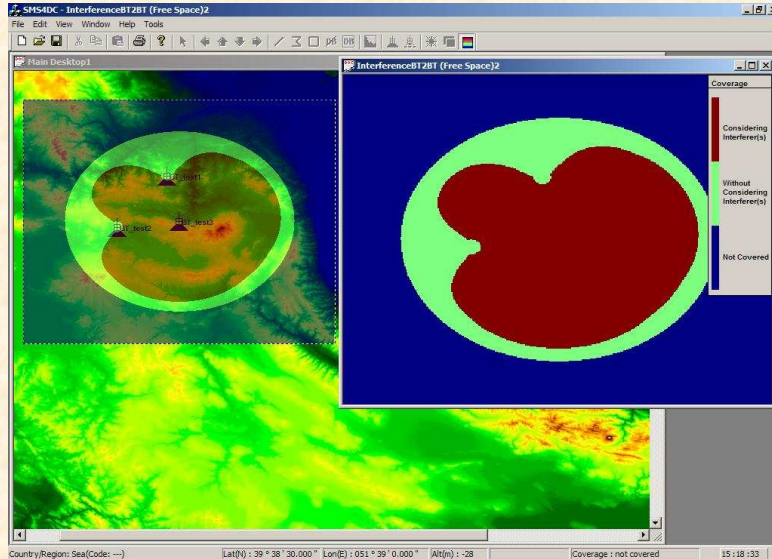
## Coverage Area calculation





# SMS4DC's Engineering Functions

## Interference calculation BT to BT



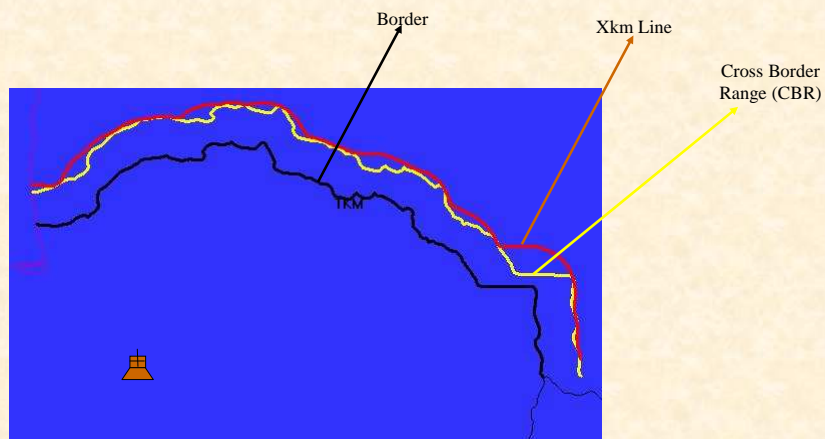
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# SMS4DC's Engineering Functions

## Borderline frequency coordination



Ex7

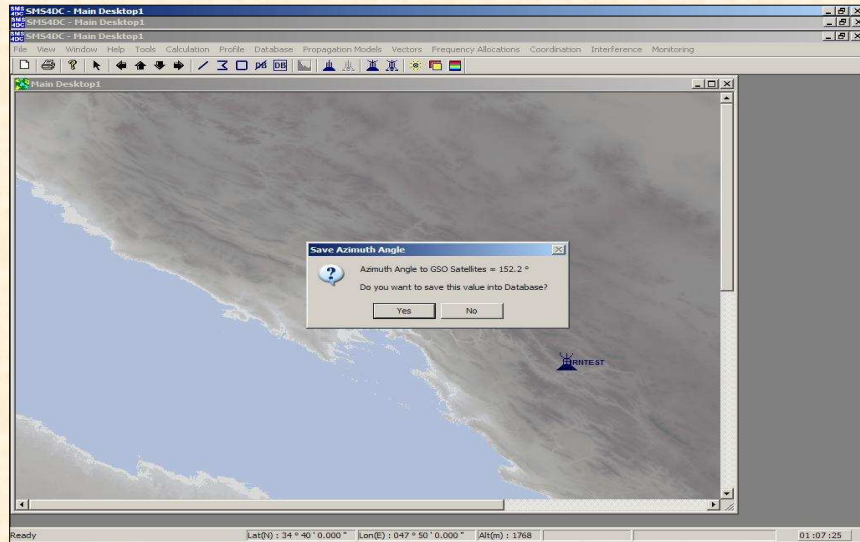
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## SMS4DC's Engineering Functions

### ES horizon elevation, azimuth, elevation



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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

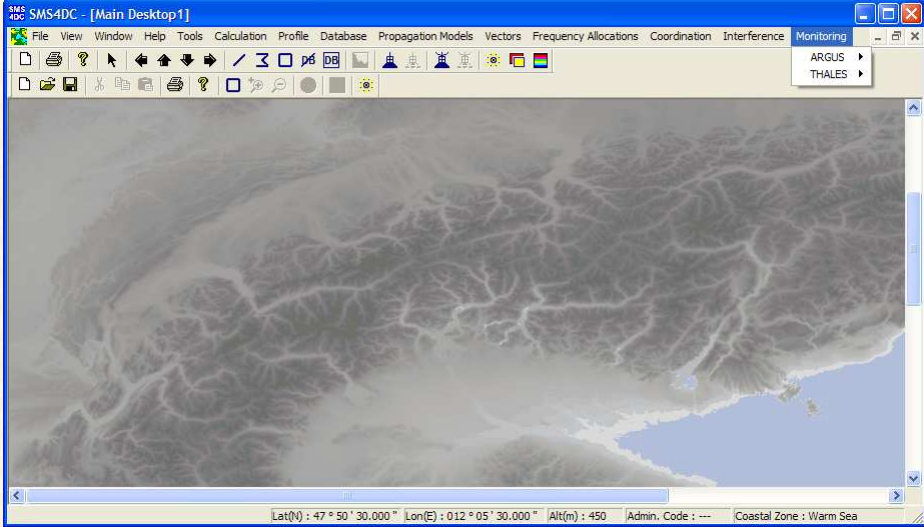
- BCBT to Digital BCBT or to Analogue BT;
- FXM to Digital BCBT or to Analogue BT;
- BCBT to FXM

### Official results from the BR !

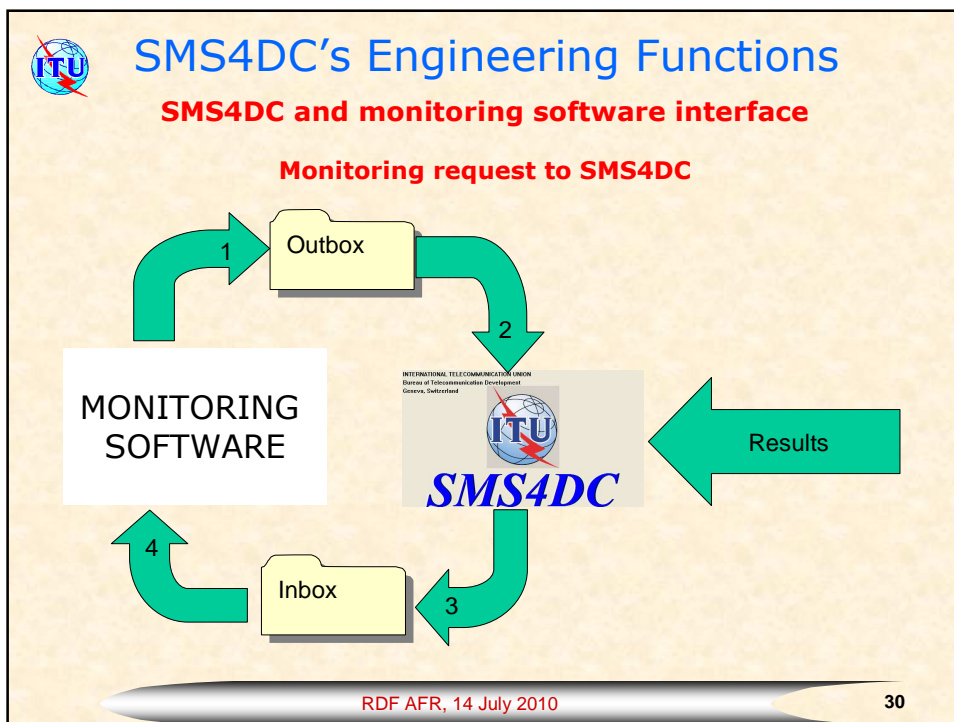
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 **SMS4DC's Engineering Functions**  
**SMS4DC and monitoring software interface**



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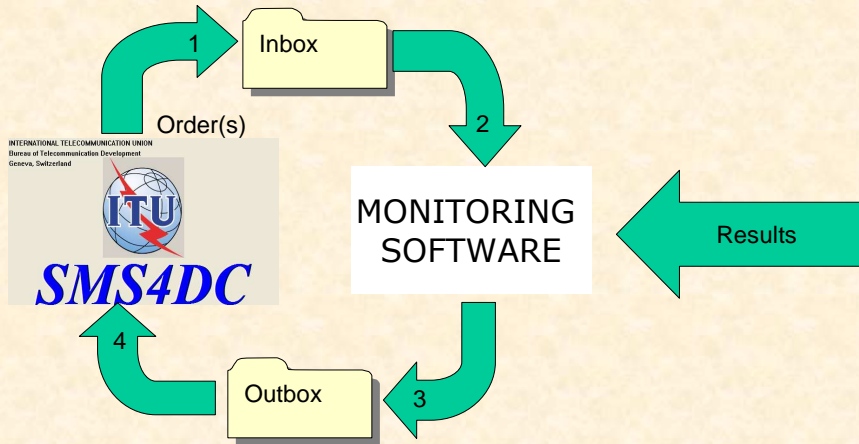




## SMS4DC's Engineering Functions

### SMS4DC and monitoring software interface

#### SMS4DC order to monitoring



## SMS4DC's Engineering Functions

### SMS4DC and monitoring software interface

#### Output examples

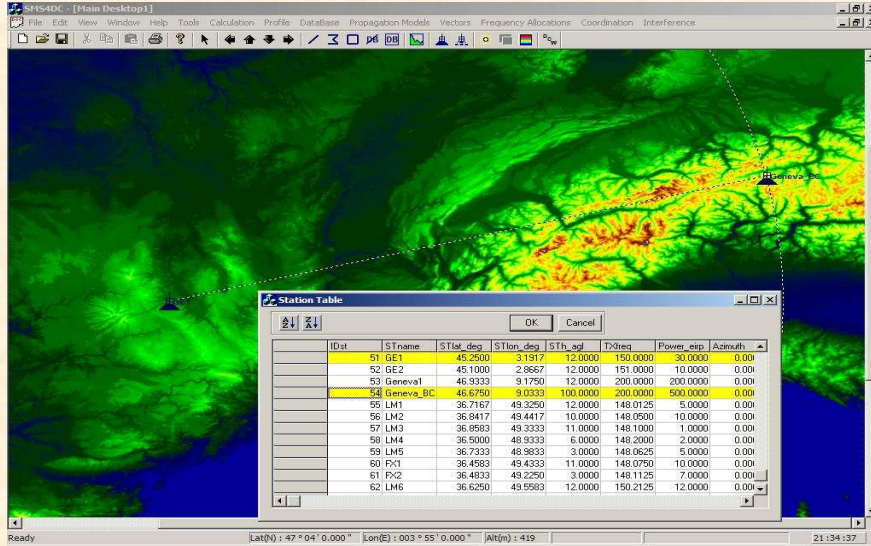
**See during the demonstrations**





# Geographic Map Display functions

Drawing line from database



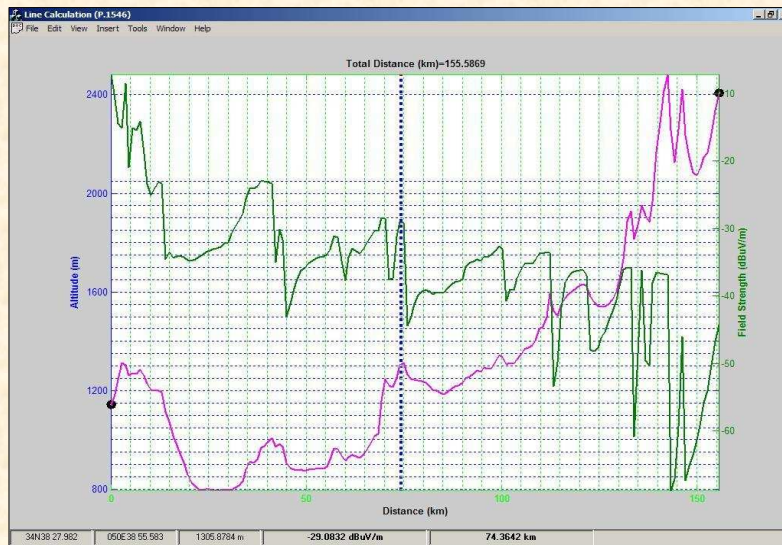
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# Geographic Map Display functions

Field-strength along a line



Ex8

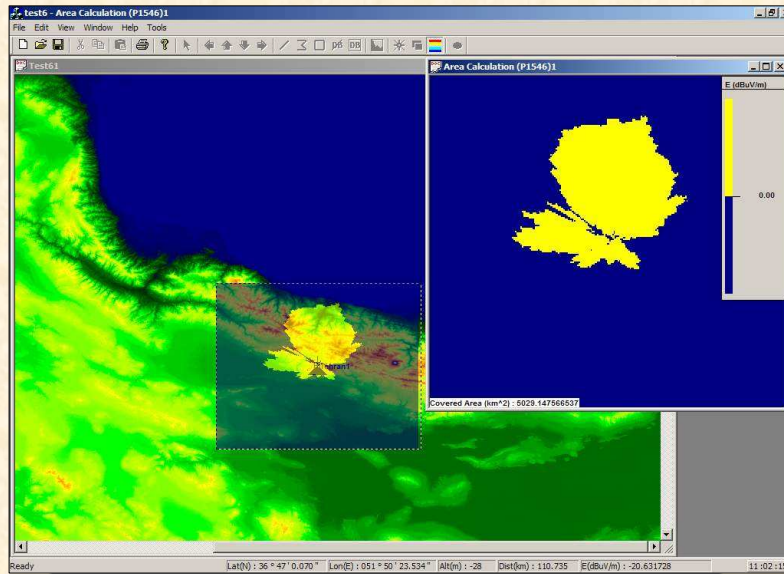
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## Geographic Map Display functions

Overlay possibility



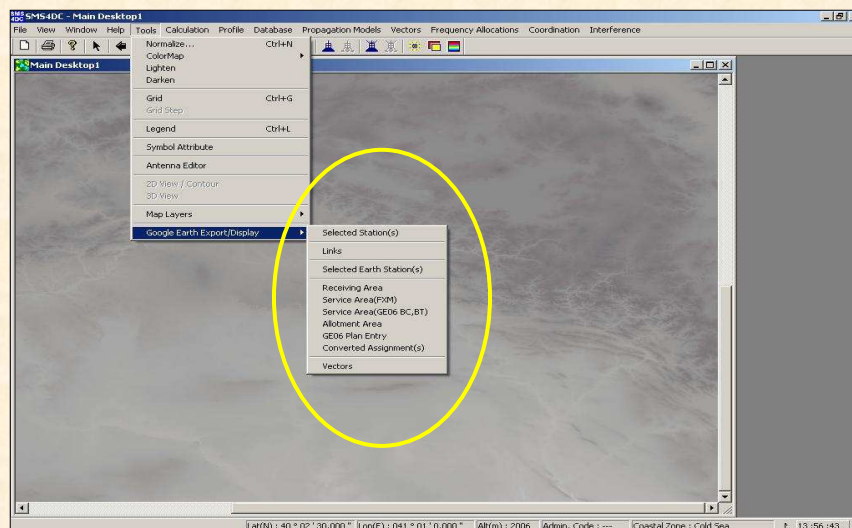
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## Geographic Map Display functions

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

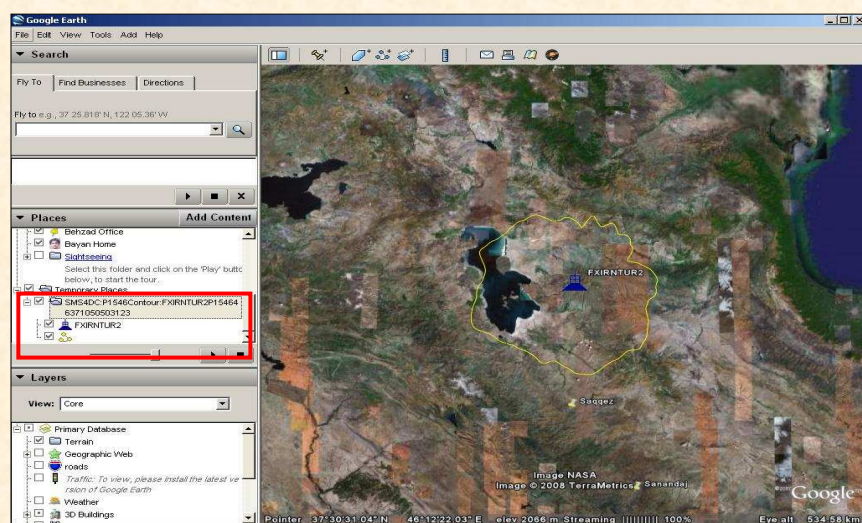
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## Geographic Map Display functions

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



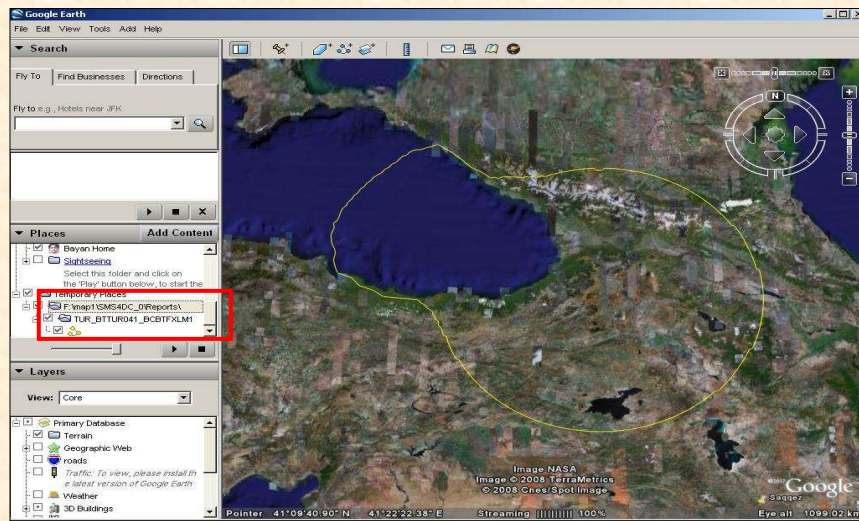
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# Geographic Map Display functions

Google Earth Display - GE06 (BCBT2FXLM)



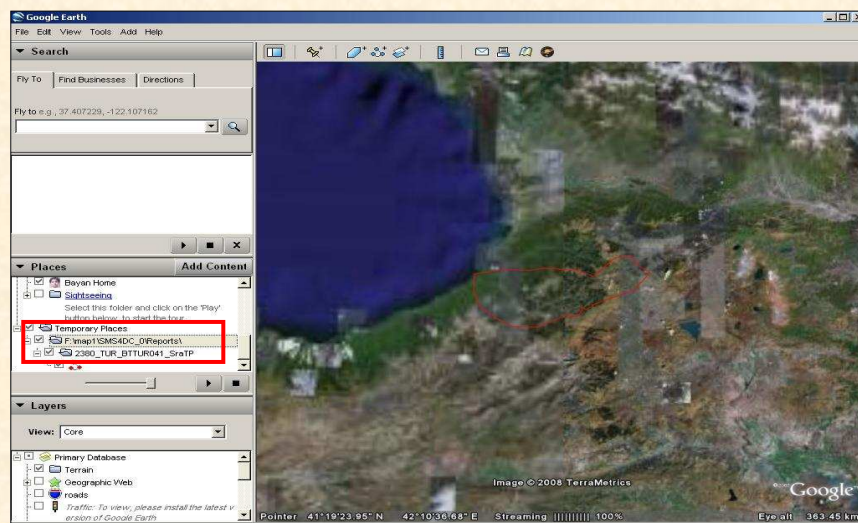
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# Geographic Map Display functions

Google Earth Display - GE06 Service area



Ex9

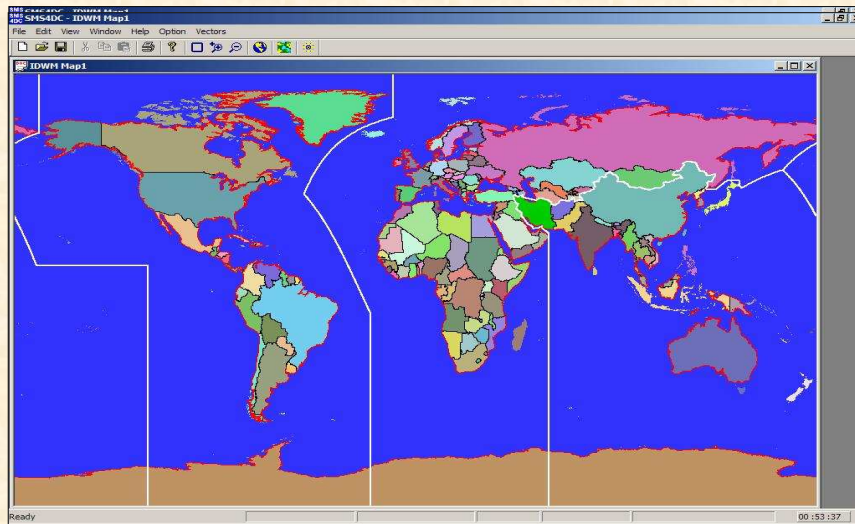
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# Geographic Map Display functions

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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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 ([bdmail@itu.int](mailto:bdmail@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	<a href="#">DOWNLOAD</a>
	CD	34309	4860 CHF	<a href="#">ADD</a>
	Part.1 User's Guide - Free of charge		Free of charge	<a href="#">DOWNLOAD</a>

[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.–



## Future developments

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



*Thank you!*

*istvan.bozsoki@itu.int*

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

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