

# Spectrum Management System for Developing Countries

(SMS4DC)

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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
- New capabilities of the Version 3
- 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

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## Main Functions of SMS4DC

- **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

- **Engineering Analysis Function**
  - 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, i.e. P.1546, P.370, P.530, P.452, P.526, extended HATA models for various service types and P.618-8 for Earth to space total attenuation calculation;
    - Coverage area, field strength, field strength contour, microwave link calculations, network coverage and best server calculation.

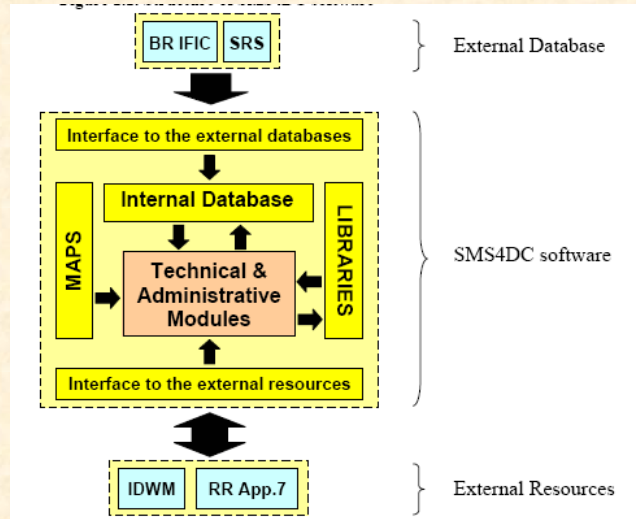


## Main Functions of SMS4DC

- **Geographic Map Display Function**
  - User friendly interface, displaying of DTM, capability of importing standard mapping formats including Globe map and displaying of geographical maps,
  - 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

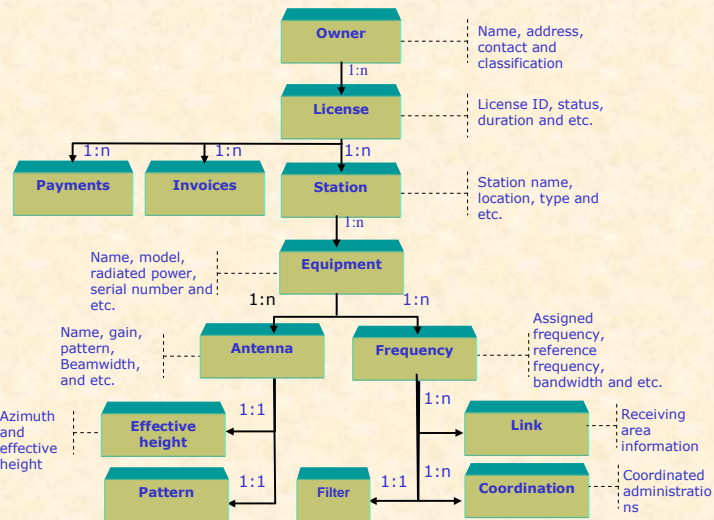


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# User View of Data (terrestrial)

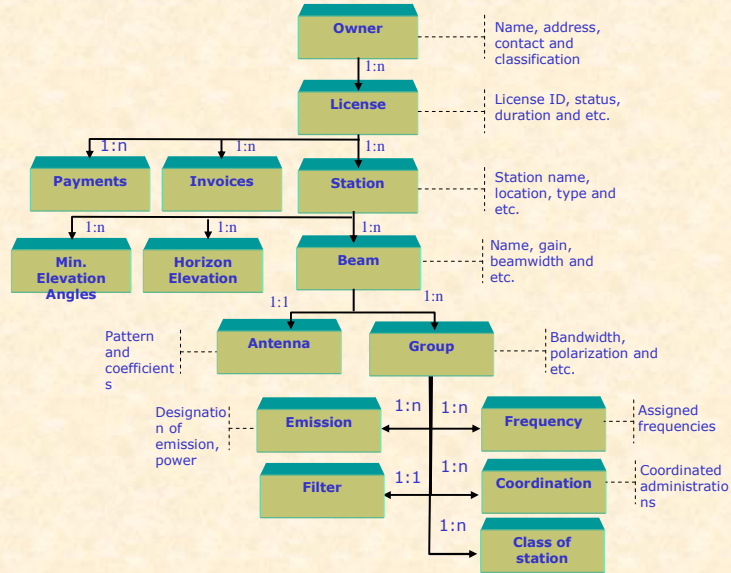


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# User View of Data (earth stations)

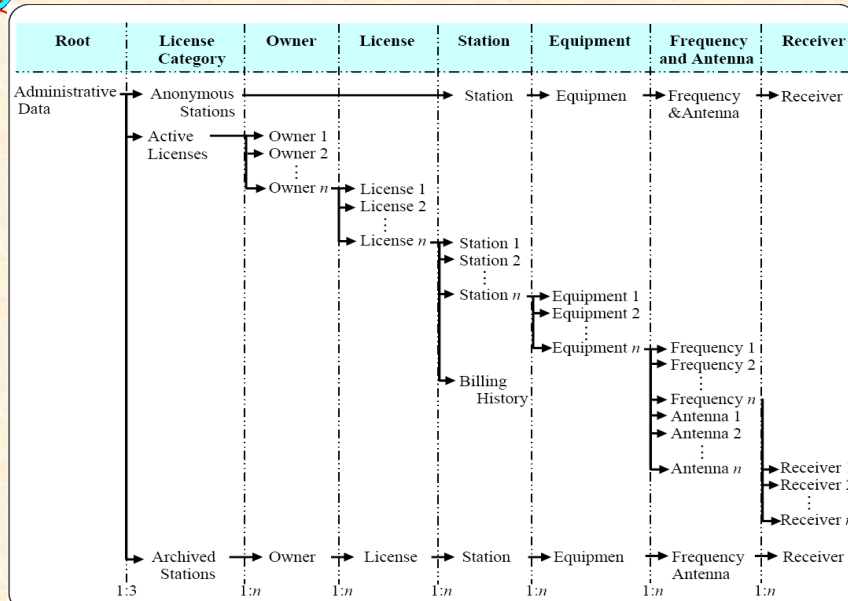


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# Flow of Administrative Data Entry



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## Samples of SMS4DC's Administration Functions

### Supervisory tasks

- User access
- Audit control
- Backup/Restore

**Access levels**

New

User Name:

User Password:

Modify

User Name: SMS4DC

User Password:

Access Level: 4 - Supervisor

Enabled

Delete Save Cancel

**Audit trail**

User Name: All Action: All Table: All

User	Date/Time	Action	Record no.	Table
Saman	2005-10-11 09:24:18	Update equipment	1	Equipment
Saman	2005-10-11 07:29:26	Update frequency	30	Frequency
Saman	2005-12-11 21:50:39	Update frequency	43	Frequency
Saman	2005-12-11 21:51:13	Update frequency	44	Frequency
Saman	2005-12-11 21:52:29	Update frequency	43	Frequency
Saman	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 14:08:54	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	B/CStation
Somebody	2005-11-21 08:52:22	Update broadcasting station	2	B/CStation
Somebody	2005-11-21 10:06:49	Update broadcasting station	2	B/CStation
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

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## Samples of SMS4DC's Administration Functions

### Data capture screens

#### Owner information

Modify Cancel Save

	Value
Owner Name	Admin2
Owner Address	Enghelab 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

Modify Cancel Save

	Value
Nom du propriétaire	Admin2
Adresse du propriétaire	Enghelab 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

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## Samples of SMS4DC's Administration Functions

### Fixed/Base Station Information Data Entry Table

Administrative data 1

Administrative data

- Anonymous Stations
- Active Licenses
  - Owner: Admin1
    - License: 456
    - License: 12345
    - License: 123
  - Owner: Admin2
  - Owner: Another owner
  - Owner: Sample audit
  - Owner: ministry of ICT
  - Owner: Test owner
  - Owner: asdfasdf
- Archived Licenses

#### Fixed/Base station information

	Value	Unit
Admin Ref. ID		
Site ID		
Station Name		
Call Sign		
Class of Station		
Station Type		
<b>Location</b>		
ITU region		
Latitude		Degree
Longitude		Degree
Country		
Radius of Service		km
Height ASL		m
<b>Misc</b>		
Provision		
Area of Trans.		
Network ID		

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## Samples of SMS4DC's Administration Functions

### Mobile Station Information Data Entry Table

Administrative data 1

Administrative data

- Anonymous Stations
- Active Licenses
  - Owner: Admin1
    - License: 456
    - License: 12345
    - License: 123
  - Owner: Admin2
  - Owner: Another owner
  - Owner: Sample audit
  - Owner: ministry of ICT
  - Owner: Test owner
  - Owner: asdfasdf
- Archived Licenses

#### Mobile station information

	Value	Unit
Admin Ref. ID		
Mobile ID		
Mobile Name		
Call Sign		
Class of Station		
Station Type		
<b>Location</b>		
ITU Region		
Latitude		Degree
Longitude		Degree
Country		
Radius of Service		km
<b>Misc</b>		
Number of Sets		
Provision		
Network ID		
<b>Vehicle</b>		
Vehicle Model		
Vehicle Plate		
Vehicle Color		

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## Samples of SMS4DC's Administration Functions

### Broadcasting Station Information Data Entry Table

The screenshot shows a software window titled 'Administrative data1' with a tree view on the left and a data entry table on the right. The table is titled 'Broadcasting station information' and has columns for 'Value' and 'Unit'. The table contains the following rows:

	Value	Unit
Admin Ref. ID		
Site ID		
Station Name		
Call Sign		
Class of Station		
Station Type		
Location		
ITU Region		
Latitude		Degree
Longitude		Degree
Country		
Radius of Service		km
Height ASL		m
Misc		
Provision		
Plan		

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## Samples of SMS4DC's Administration Functions

### Dialog box for importing data from BRIFIC (Terrestrial)

The screenshot shows a dialog box titled 'IFIC import' with several sections:

- Service:** Checkboxes for 'FM / TV' (checked), 'LF / MF', and 'FXM'.
- Administration:** A list box containing 'SMP', 'SNG', 'SDM', 'SRL', 'STP', and 'SUI'. 'SUI' is selected. Buttons for 'Add -->', '<-- Remove', and 'Clear' are present. A text field contains 'SUI'.
- Frequency conditions:** A list box with conditions like 'F > F1', 'F >= F1', 'F < F1', etc. A text field shows 'F = Assigned frequency' with a value of '150.000000 MHz <= F or F >= 151.000000 MHz'. Below are input fields for 'F1 = 150 MHz' and 'F2 = 151 MHz' with 'Add -->' and '<-- Remove' buttons.
- Class of Station:** A dropdown menu showing 'BT - Broadcasting station, television'. Below are 'Add -->', '<-- Remove', and 'Clear' buttons. A list box contains 'BC - Broadcasting station, sound' and 'BT - Broadcasting station, television'.
- Fragment:** A dropdown menu showing 'Article 11'. Below are 'Add -->', '<-- Remove', and 'Clear' buttons. A list box contains 'Article 11', 'Article 9', 'Geneva 1984', 'Geneva 1989', and 'Stockholm 1961'.
- Import progress:** A progress bar at the bottom.

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# Samples of SMS4DC's Administration Functions

## Electronic notices

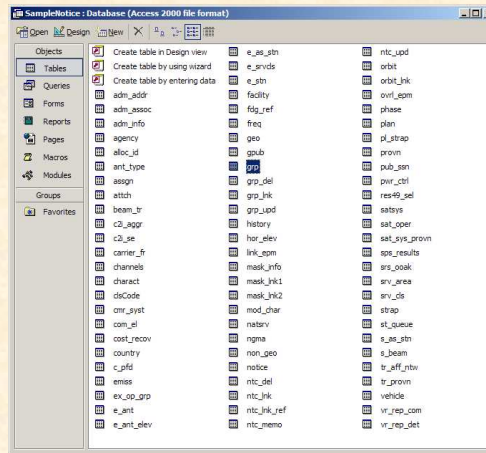
Fixed, Land mobile, Broadcasting

Earth station

```

SLIADD2006-03-11.txt - Notepad
File Edit Format View Help
<HEAD>
t_adm=IRN
t_d_sent=2006-03-11
</HEAD>
<NOTICE>
t_fragment=NITFD_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_unuse=2004-11-15
t_call_sign=Hello
t_site_name=Mobile1
t_eml_cls=F3E-
t_bdwth_cde=BK50
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_ctry=IRN
<ANTENNA>
t_pwr_xyz=X
t_pwr_ant=10.000000
t_pwr_dbw=10.000000
t_pwr_svr=I
</ANTENNA>
</NOTICE>
<TAIL>
t_num_notices=1
</TAIL>

```



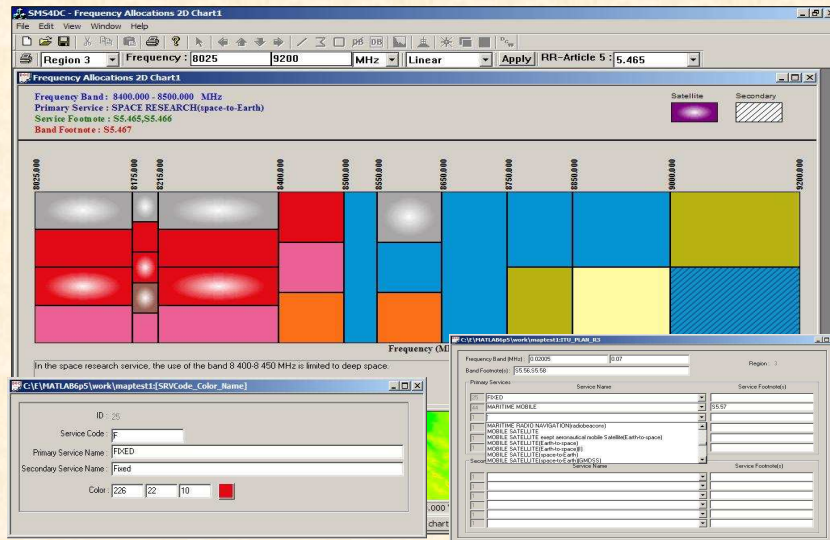
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# Sample of SMS4DC's Engineering Functions

## International & National frequency allocations table (chart)



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## Sample of 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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## Sample of SMS4DC's Engineering Functions

### Frequency arrangement (Uniform & non Uniform)

**Frequency Arrangement**

Frequency Plan ID : 400000.12      Region : Region 2      Service Priority : Primary

Service : Land Mobile

Type of Frequency Plan : Uniform

$F_n = F_o + n \cdot X_S$

Channel Spacing  $X_S$  : 120 MHz

Reference Frequency  $F_o$  : 40000 MHz

Channels:

Number of Channels  $n$  : 5

First : 1    Last : 10    Channel Set : Even

Comment :  
Uniform Channel arrangement in 40 GHz

Frequency List:

No	$F_n$	$F'_n$	BandWidth
2	40000.00000		120
4	40120.00000		120
6	40240.00000		120
8	40360.00000		120
10	40480.00000		120

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**Frequency Arrangement**

Frequency Plan ID : 500000.15      Region : Region 1      Service Priority : Primary

Service : Fixed

Type of Frequency Plan : Non-uniform

Frequency List:

No	$F_n$	$F'_n$	BandWidth
1	49000	51000	150
2	49150	51150	150
3	49300	51300	150
4	49450	51450	150
5	49600	51600	150
6	49750	51750	150
7	49900	51900	150
8	50050	52050	150

Number of Channels  $n$  : 8

Comment :  
Test2

6 of 7    Add Channel    Double Channel

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# Sample of SMS4DC's Engineering Functions

## Frequency assignment parameters & EMC analysis results

**Assignment Parameters**

Fmin(MHz):  Fmax(MHz):

Channel scan range(kHz):

Search Radius(km):

Permissible field strength(dBμV/m):

**Assignment Results**

List of Frequencies:

No	F <sub>n</sub>	F <sub>h</sub>	Bandwidth	Num of Slabons	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	dE1_2
1	55	LW2	Land Mobile	148.050000	049E2630 36N4530	17.4	8.07	11.00	-11.93
2	59	LW5	Land Mobile	148.062500	049E2900 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): LW1  
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:

(a) Frequency assignment parameters

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



# Sample of SMS4DC's Engineering Functions

## Path profile with Fresnel Zone

SMS4DC - Profile9

HT\_agl(m) = 300.0, Hr\_agl(m) = 100.0, Freq.(MHz) = 150.000, k-factor = 4/3, Fresnel Zone Number = 1

**Fresnel Zone Parameters**

Transmitter Height\_AGL (m):

Receiver Height\_AGL (m):

Frequency (MHz):

Fresnel Zone Number:

Ready      Lat(0) : 38° 14' 35.649"    Lon(E) : 047° 54' 26.309"    Alt(m) : 3432    Dist(km) : 10.832    19:40:44



# Sample of SMS4DC's Engineering Functions

Link Calculation Dialog box using different propagation models

The screenshot displays three overlapping windows from the SMS4DC software:

- Link Calculation (P530):** Shows a 2D plot of signal strength (dBm) versus distance (km). The plot shows a main signal path and several reflected paths. Parameters include:
  - Line: 0.724
  - Frequency: 144.384
  - Clear Air Path Loss: 153.864
  - Path Loss Exponent: 4.26214
  - Clear Air Path Loss (dB): 1.579
  - Path Loss Exponent (dB): 0.281
  - Clear Air Path Loss (dB): 0.286
  - Path Loss Exponent (dB): 0.286
- Reflection Points:** A table listing 13 reflection points with their coordinates, distances, and heights.
 

No	Coordinates	Distance (km)	Distance (m)	Height (m)	Dist. (km)	Dist. (m)	Height (m)	Height (m)	Height (m)
1	05IE011 3245241	1.087	35.882	1133.400	0.000	0.000	0.000	0.000	0.000
2	05IE031 3245245	1.552	35.377	1132.541	0.000	0.000	0.000	0.000	0.000
3	05IE034 3245248	1.838	35.041	1132.077	0.000	0.000	0.000	0.000	0.000
4	05IE032 3245250	3.063	23.995	1133.163	0.000	0.000	0.000	0.000	0.000
5	05IE023 3245250	3.122	23.947	1133.255	0.000	0.000	0.000	0.000	0.000
6	05IE033 3245250	3.906	23.063	1133.904	0.000	0.000	0.000	0.000	0.000
7	05IE103 3245253	5.473	31.435	1147.652	0.000	0.000	0.000	0.000	0.000
8	05IE304 3245260	33.525	3.244	1271.425	0.016	0.016	0.016	0.016	0.016
9	05IE281 3245262	28.100	1.300	1452.250	0.014	0.014	0.014	0.014	0.014
10	05IE300 3245265	35.131	1.529	1503.716	0.014	0.014	0.014	0.014	0.014
11	05IE322 3245269	35.370	0.996	1555.516	0.013	0.013	0.013	0.013	0.013
12	05IE323 3245272	35.102	0.817	1593.252	0.012	0.012	0.012	0.012	0.012
13	05IE307 3245273	35.532	0.077	1720.341	0.004	0.004	0.004	0.004	0.004
- P530 - Availability:** Shows rain and multi-path availability data.
 

Rain	Availability (%)	Outage (h/Sec)	Outage (h/Min)
WORST MONTH	50.09638	20270.259888	382.944333
ANNUAL	53.73859	84549.712177	1415.82636

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

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# Sample of SMS4DC's Engineering Functions

The finest grid in "Antenna Editor" dialog box

The screenshot displays the 'Antenna Editor' dialog box and two 3D views of an antenna:

- Antenna Editor Dialog Box:** Shows a circular radiation pattern plot on the left and a properties panel on the right. The properties panel includes:
  - Name: ALI5200\_008
  - Frequency Band: 500
  - BeamWidth\_Elevation: 30.34
  - BeamWidth\_Horizontal: 12.57
  - Grid (X): 10.0
  - Grid (Y): 10.0
  - Pattern Data: A table with columns for theta (deg), phi (deg), and gain (dB).
- Antenna 3D View 1:** A 3D rendering of the antenna structure, showing a cylindrical main body and two side lobes.
- Antenna 3D View 2:** A 3D rendering of the antenna structure, showing a different perspective or a different grid resolution.

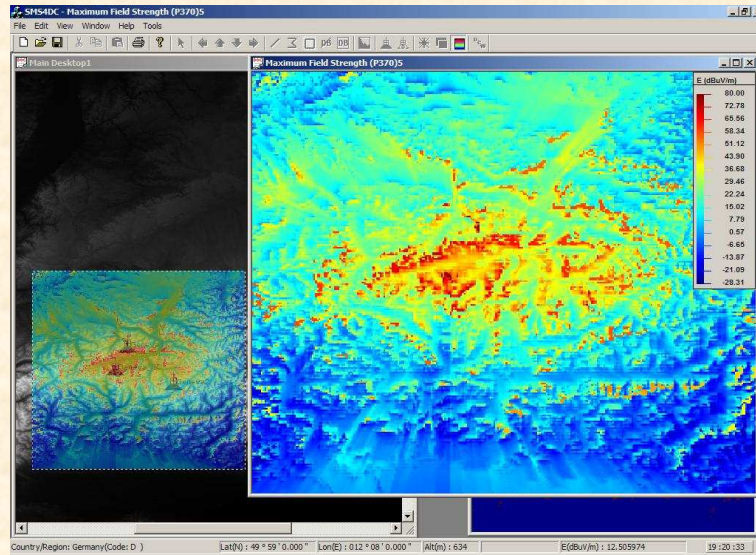
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## Sample of SMS4DC's Engineering Functions

Network Processor : Maximum Field Strength



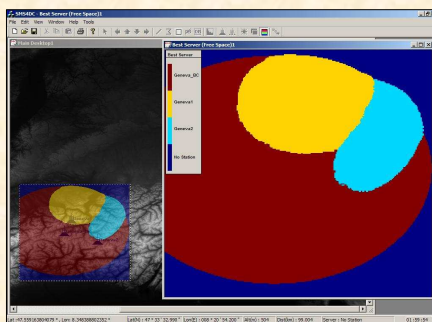
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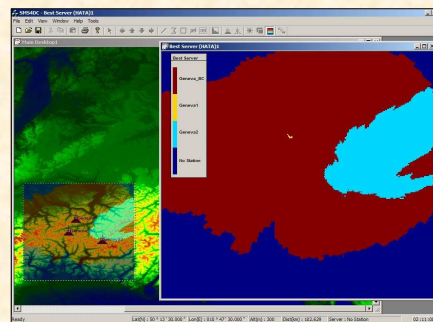


## Sample of SMS4DC's Engineering Functions

Network Processor : Best Server



(a) Free-Space propagation model



(b) Okumura-Hata propagation model

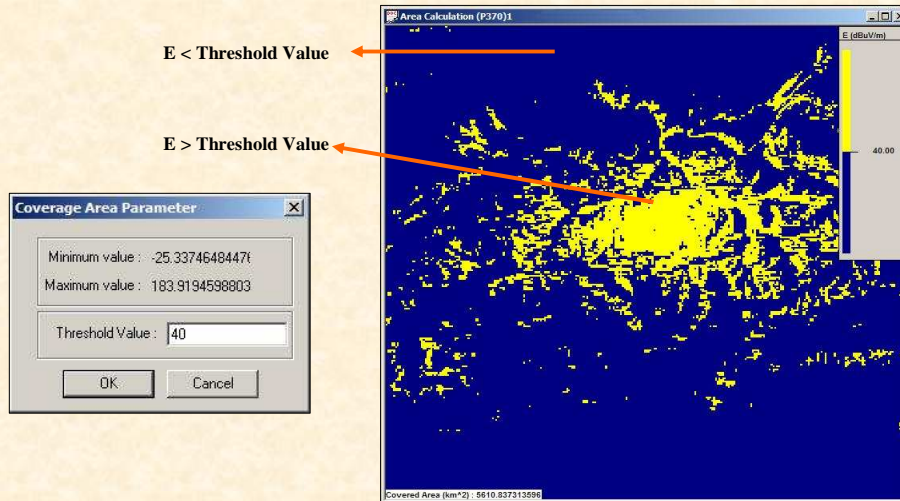
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## Sample of SMS4DC's Engineering Functions

### Coverage Area calculation



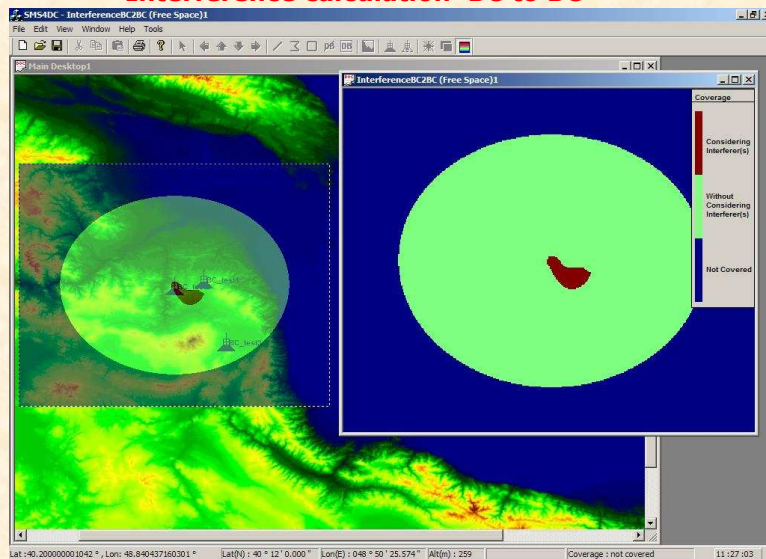
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## Sample of SMS4DC's Engineering Functions

### Interference calculation BC to BC



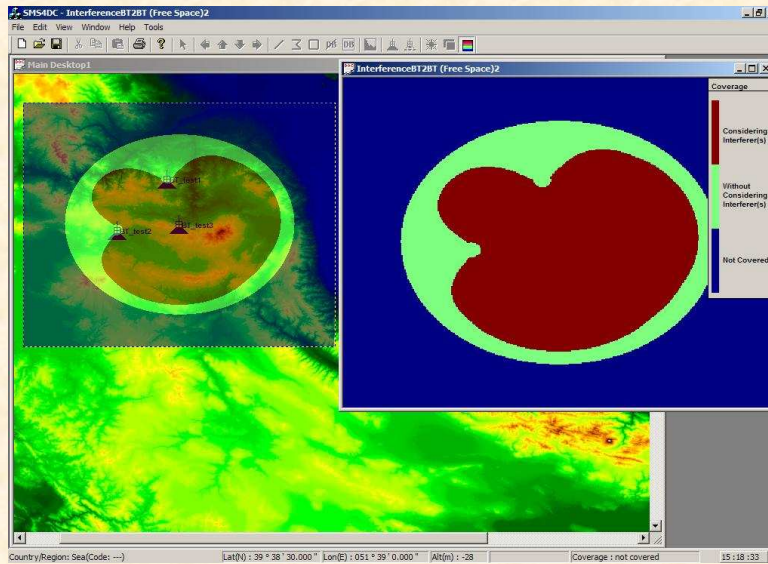
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## Sample of SMS4DC's Engineering Functions

### Interference calculation BT to BT



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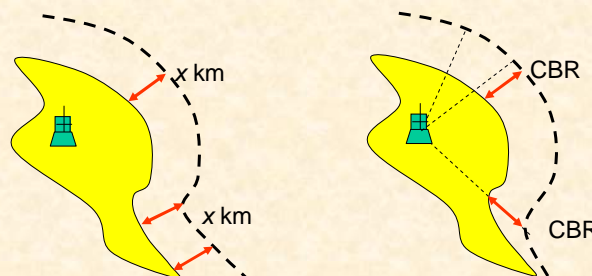
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## Sample of SMS4DC's Engineering Functions

### User define agreement Cross Border Range (CBR) & X-Km

- CBR: Locus of points with identical distance to the border along the line to TX
- X-km: Locus of points with identical distance to the nearest point of border



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## Sample of SMS4DC's Engineering Functions CBR and X-km in SMS4DC

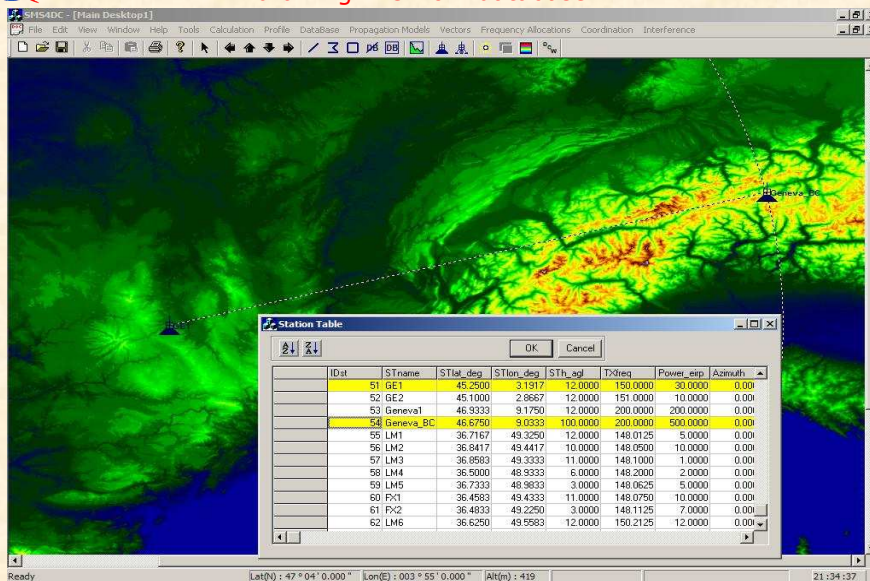


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## Sample of Geographic Map Display functions drawing line from database



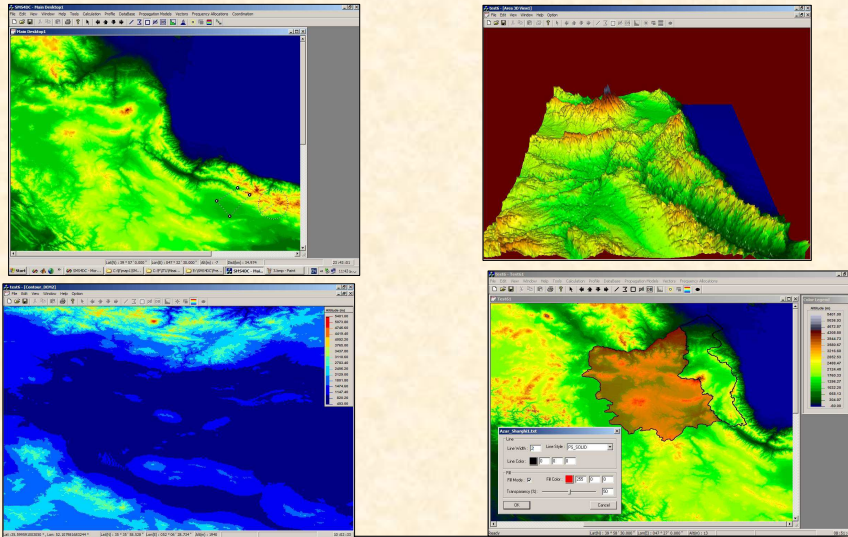
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## Sample of Geographic Map Display functions

Topographical map of a selected area, relevant 3D view and vector overload



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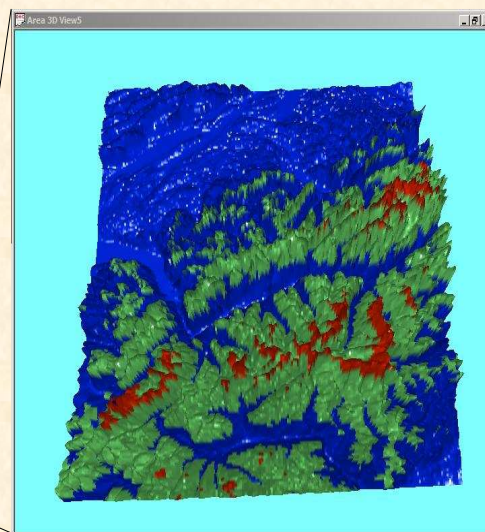
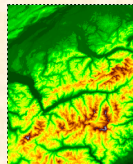
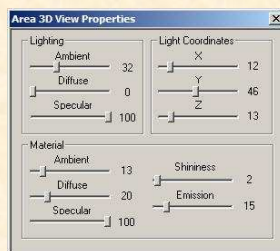
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## Sample of Geographic Map Display functions

3D view of a selected area

Dialog box to adjust visual effects of 3D view

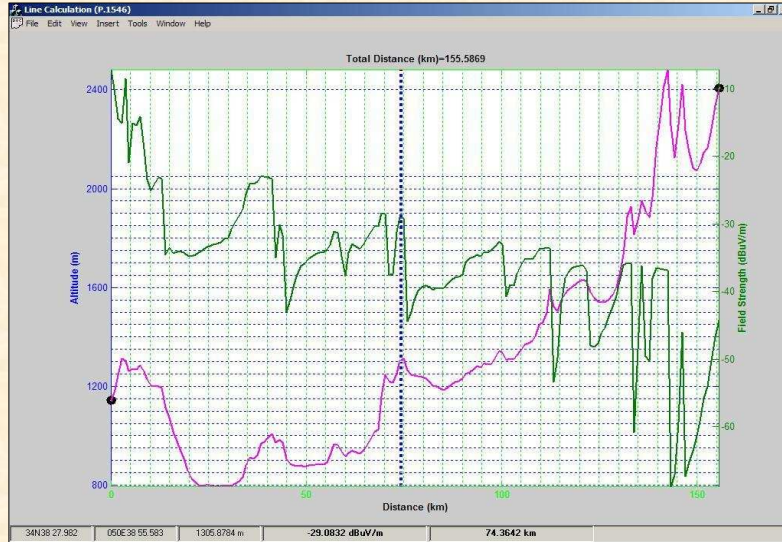


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## Sample of Geographic Map Display functions Field Strength along a line



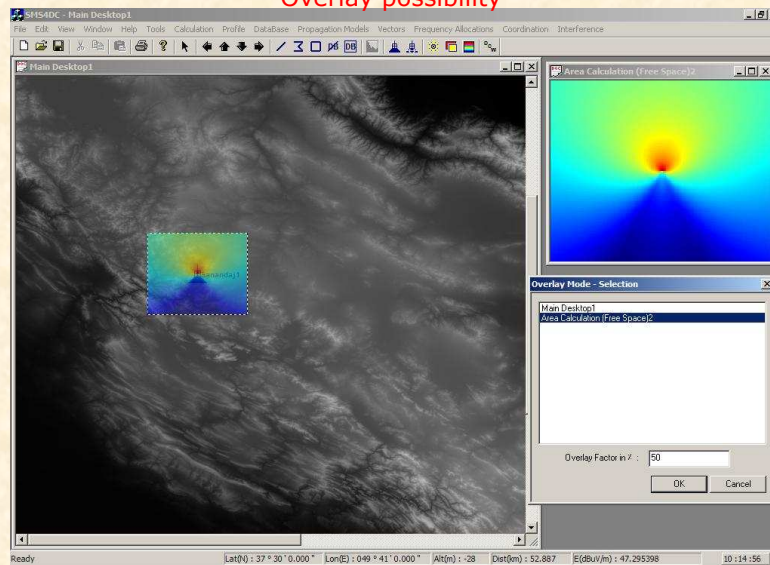
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## Sample of SMS4DC's Engineering Functions

### Overlay possibility



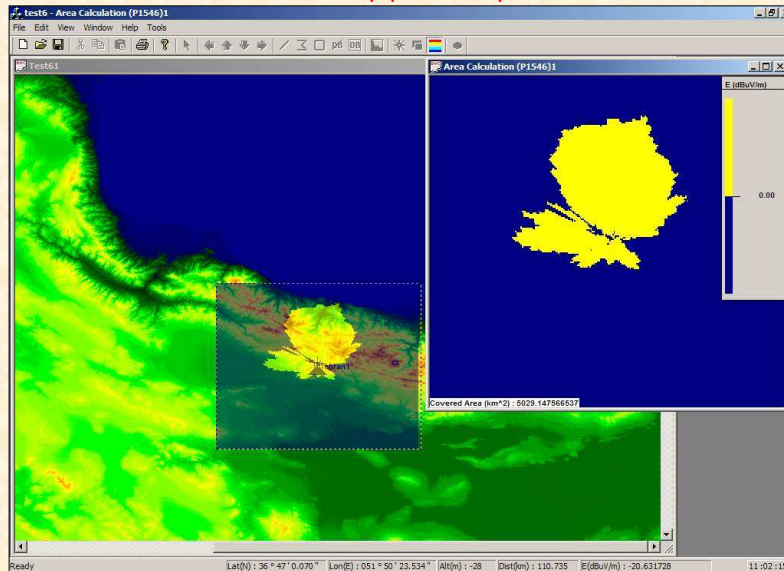
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## Sample of Geographic Map Display functions

Overlay possibility



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## GE06 REGIONAL AGREEMENT

- Relating to the planning of the digital terrestrial broadcasting service in Region 1 (parts of Region 1 situated to the west of meridian 170° E and to the north of parallel 40° S, except the territory of Mongolia) and in the Islamic Republic of Iran, in the frequency bands 174-230 MHz and 470-862 MHz

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## GE06 AGREEMENT CALCULATIONS

### Identification of administrations potentially affected by modifications to the Plans in respect to their

- broadcasting service
- other primary terrestrial services  
(limits in Section I of Annex 4)

### Identification of administrations potentially affected by modifications to the List

- When an administration proposes to change the characteristics of an *existing assignment to other primary terrestrial services*, or to bring into use a new assignment to *other primary terrestrial services* shall seek the agreement of any other administration whose broadcasting service is considered to be affected.



## GE06 AGREEMENT CALCULATIONS

### 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 !**

**http://www.itu.int/publ/D-STG-SPEC/en/**

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Resources  
FAQ

**Spectrum Management System for Developing Countries (SMS4DC) - Version 2.0**  
Edition 2008 [Publication Notice with Order Form](#)

The Telecommunication Development Bureau (BDT) of the International Telecommunication Union (ITU) has released the second version of a harmonized, efficient, automated technical administrative tool for spectrum management in developing countries under the brand name SMS4DC (Spectrum Management System for Developing Countries). SMS4DC is a practical, user-friendly tool that is a great advance on the previous ITU spectrum planning product WinBASMS, offering more advanced and powerful functions. This second version of SMS4DC covers terrestrial fixed, mobile, sound and television broadcasting services in the bands above 30 MHz, including GE-06 as well as satellite Earth stations in space service. SMS4DC is sold as an integrated software package on CD-ROM, containing the software, a user manual and a digital terrain map of the world. SMS4DC software is available in English only, with the user manual also in English. No facilities or 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 to discuss specific assistance possibilities.

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ITEM DETAIL	ARTICLE	PRICE	CART
ENGLISH  User Manual - Free of charge		Free of charge	<a href="#">DOWNLOAD</a>
User Manual - Free of charge		Free of charge	<a href="#">DOWNLOAD</a>
CD	32814	4630 CHF	<a href="#">ADD</a>

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## Annual licensing fee

**Annual licensing fee  
in Swiss francs:**

**Catalogue Price (software) annual licensing fee: CHF 4,410.-  
(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 <input type="checkbox"/>	2-3 <input type="checkbox"/>	4-5 <input type="checkbox"/>	6-10 <input type="checkbox"/>
Annual licensing fee (in Swiss francs)	4 410.-	6 615.-	7 497.-	8 820.-

\* Please tick the appropriate box

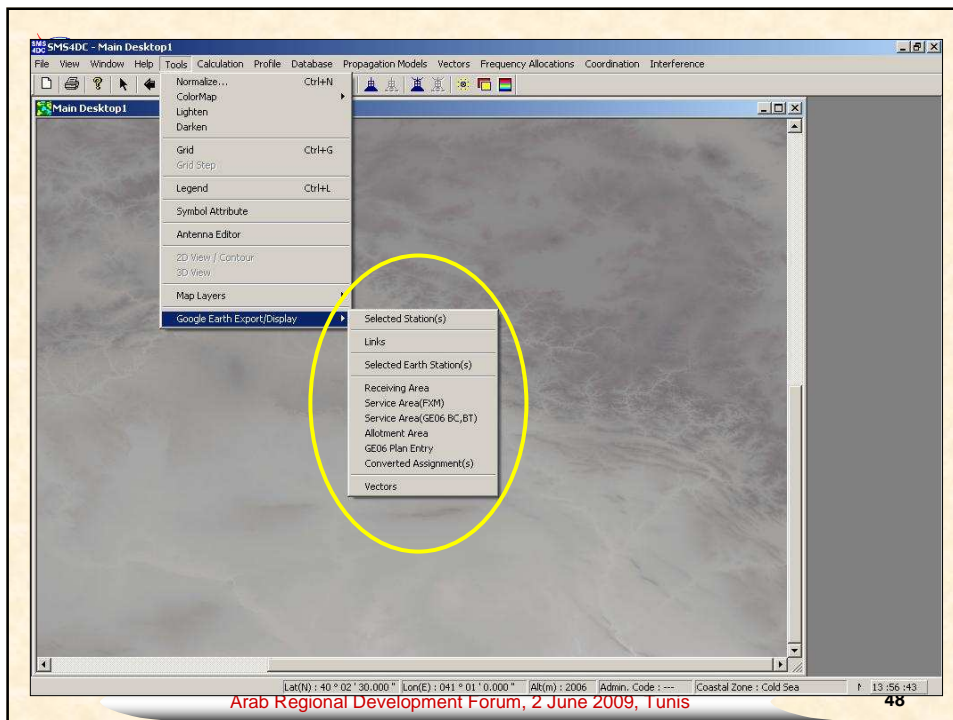


## SMS4DC version 3.0 New/Modified Capabilities



# GoogleEarth Export

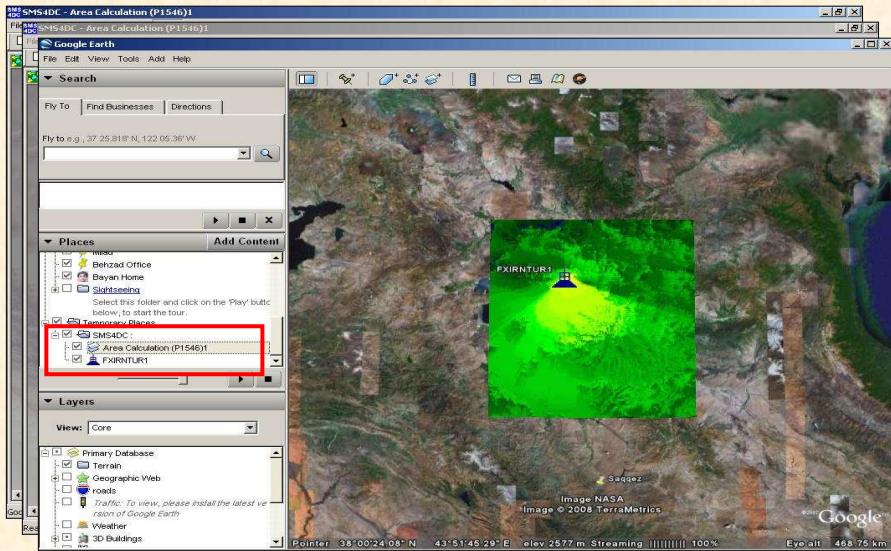
- Selected Stations (Including Earth Stations)
- Selected Links
- Receiving Area
- Service Area
- Allotment Area
- GE06 Plan Entry
- Converted Assignments
- Vectors
- Area Propagation Calculation (Free Space, Line of Sight, Former P.370, P.1546, Okumura-Hata), Maximum Field Strength Calculation, Best Server Calculation, Field Strength Contour
- GE06







## Area Calculation (P.1546)

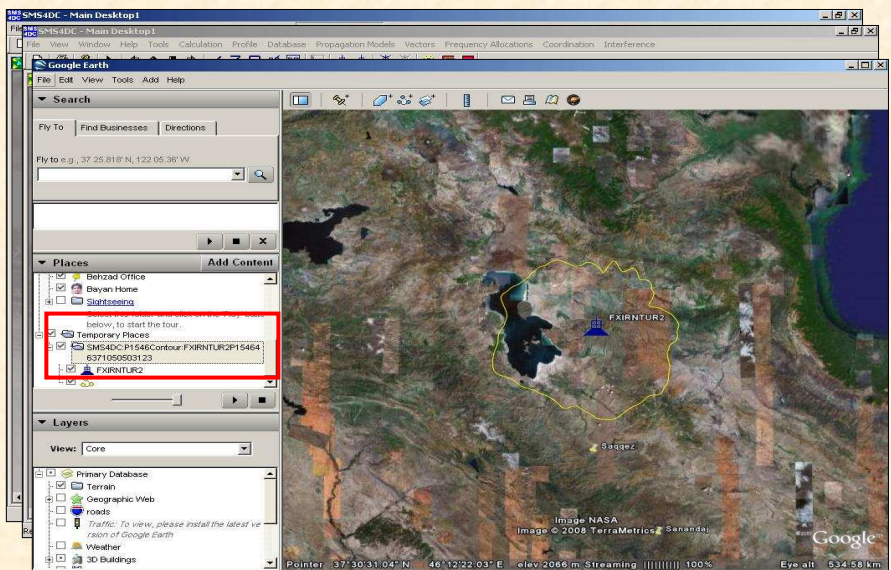


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## Field Strength Contour(P.1546)

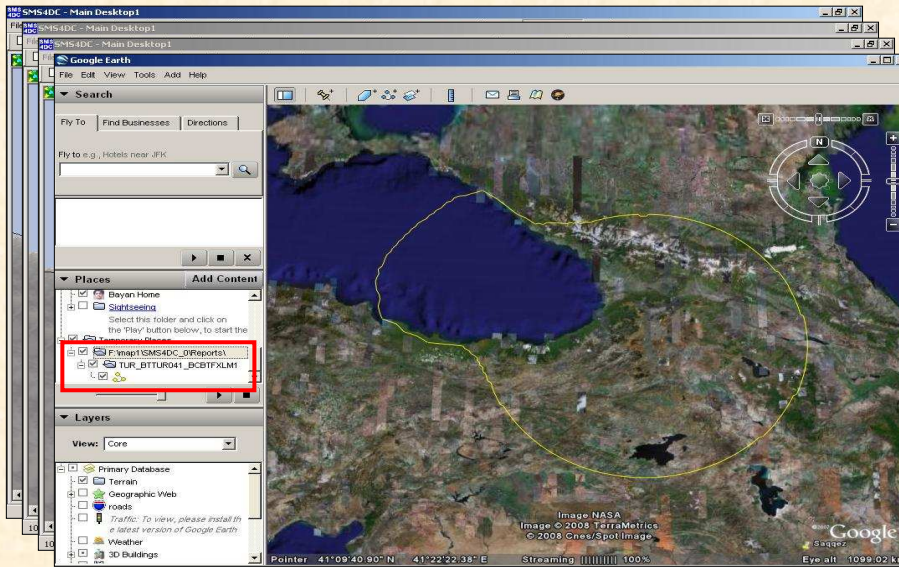


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## GE06 (BCBT2FXLM)

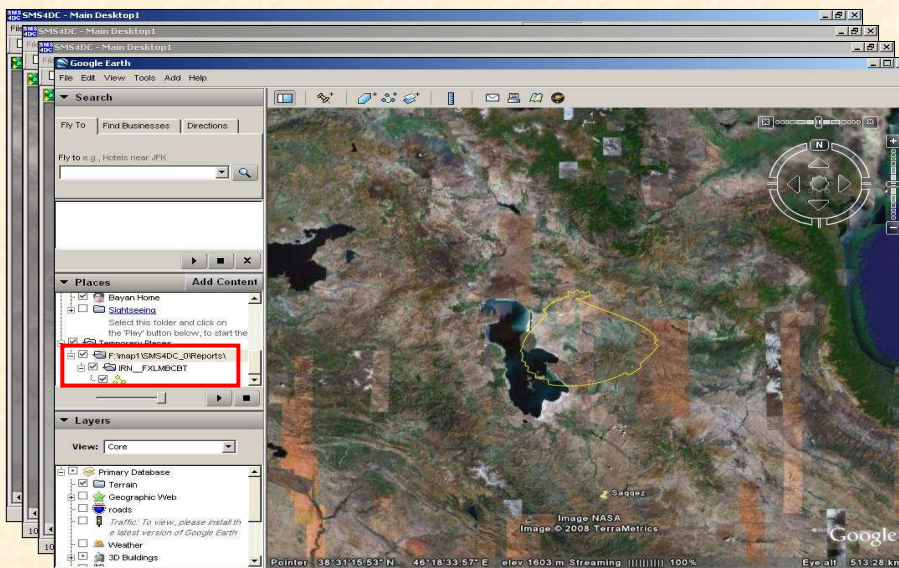


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## GE06 (FXLM2BCBT\_Tx)

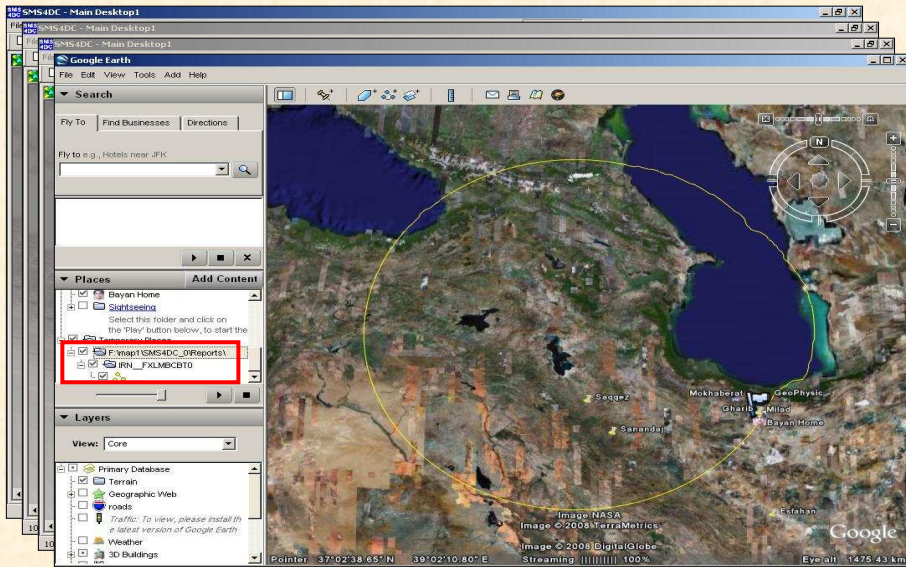


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## GE06 (FXLM2BCBT\_Rx)

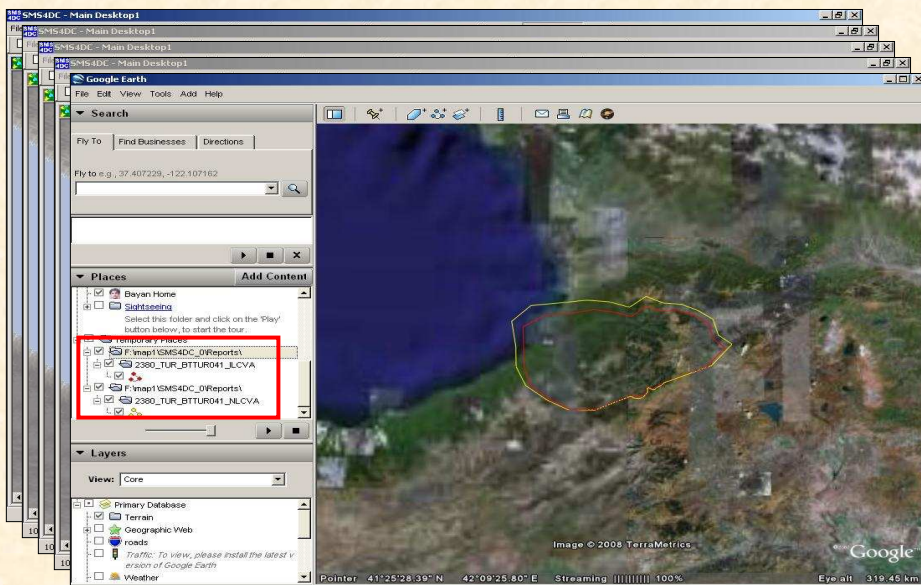


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## GE06 (CoverageArea)



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ITU GE06 (ServiceArea)

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## Other Changes/Additions

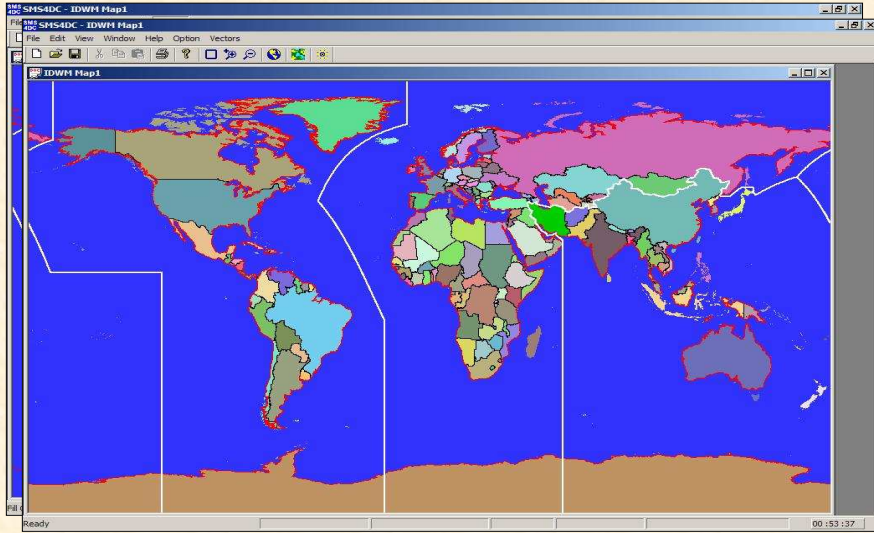
- Fill countries
- Horizon Elevation Calculation for ES
- Azimuth to GSO Satellite Calculation
- Elevation to GSO Satellite Calculation
- BR-IFIC Import

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## Fill countries

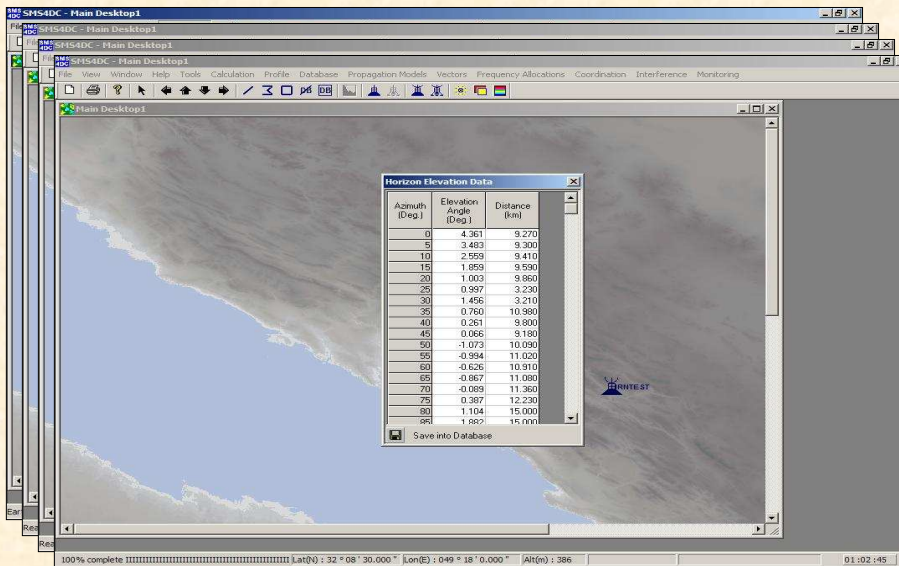


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## Horizon Elevation Calculation for ES

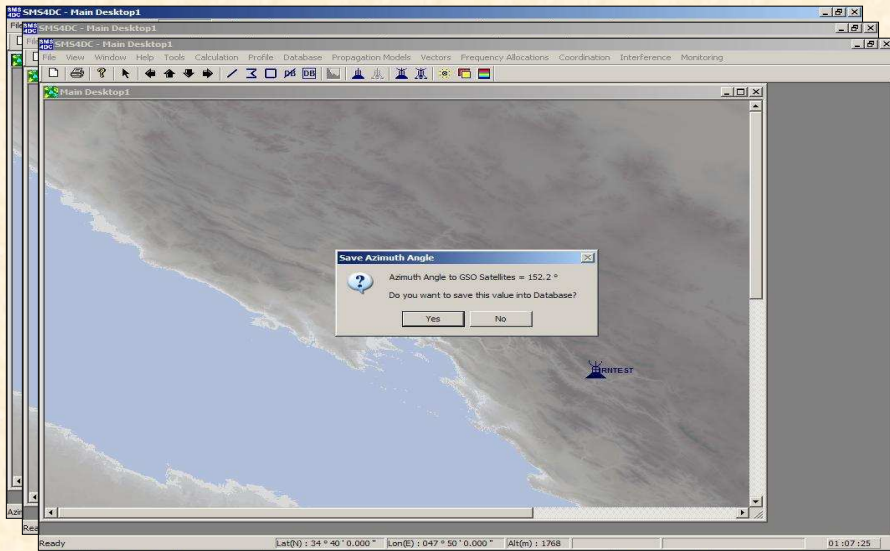


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## Azimuth to GSO Satellite Calculation

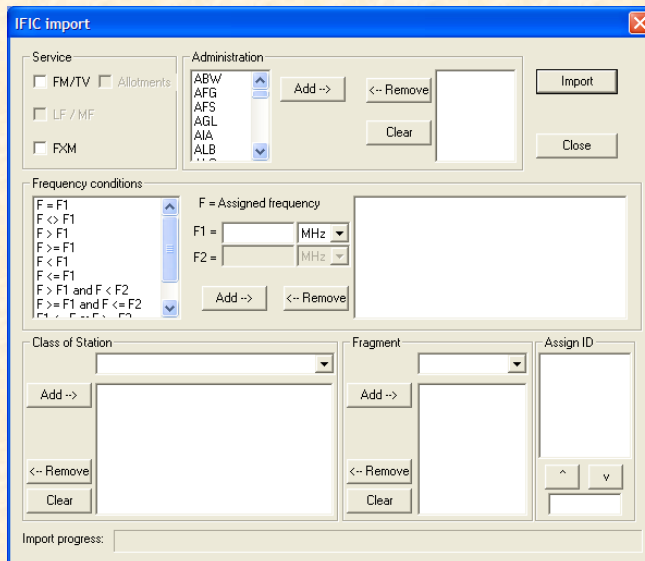


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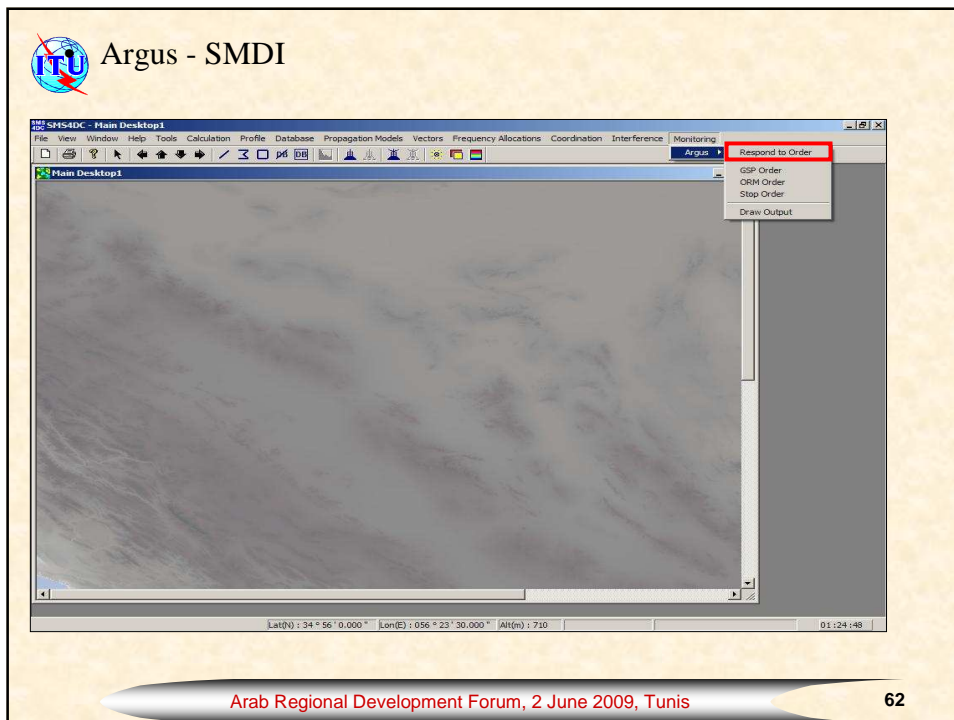
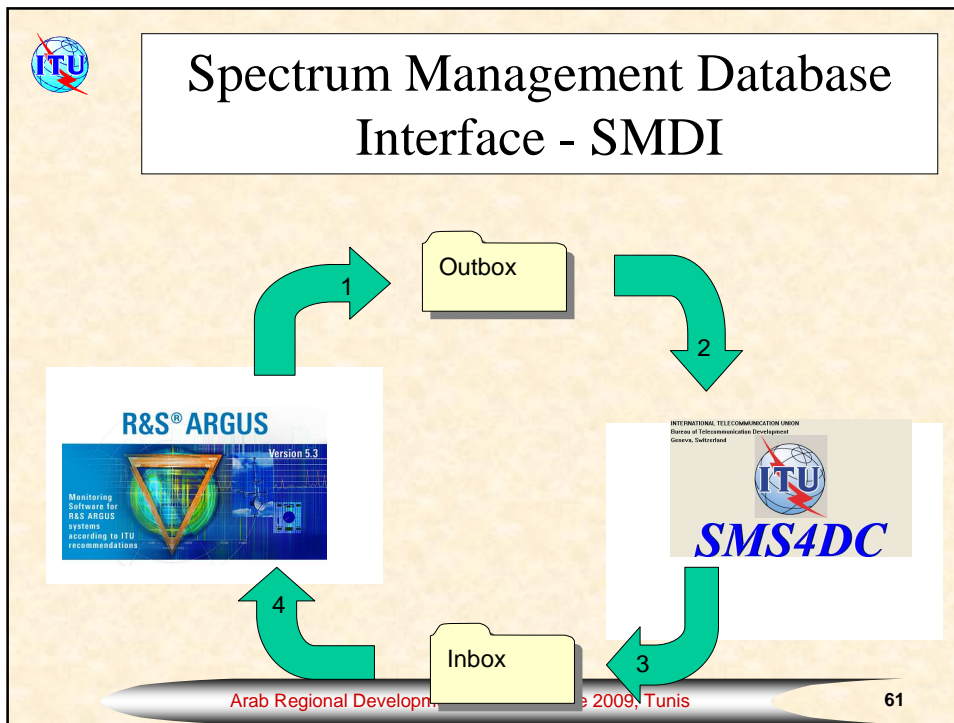


## BR-IFIC Import



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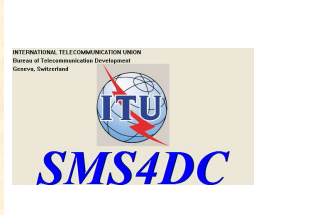
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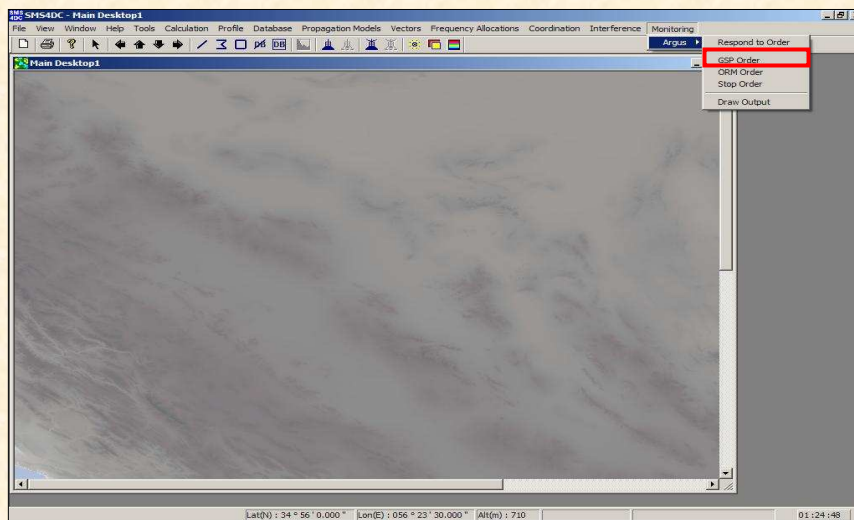


# Order Report Module – ORM – 1

## A- Get System Parameters (GSP)



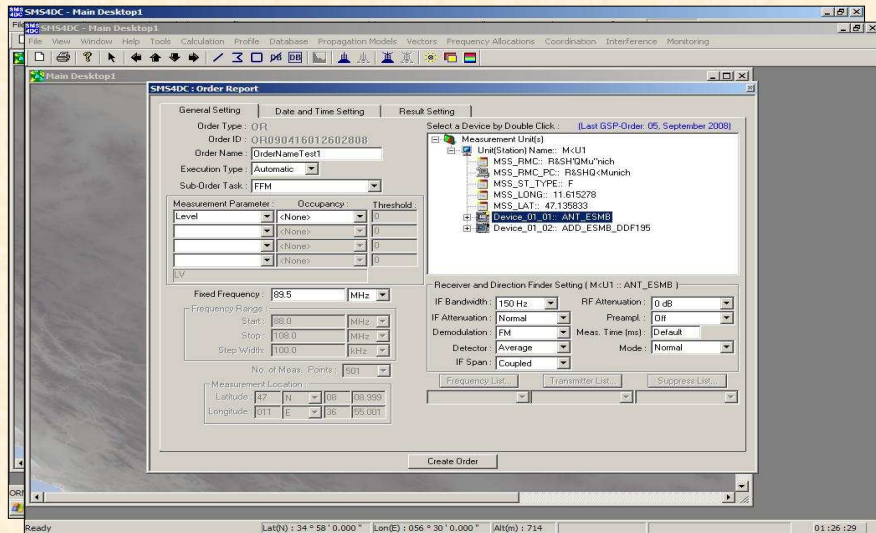
## Argus - GSP







## Argus - ORM

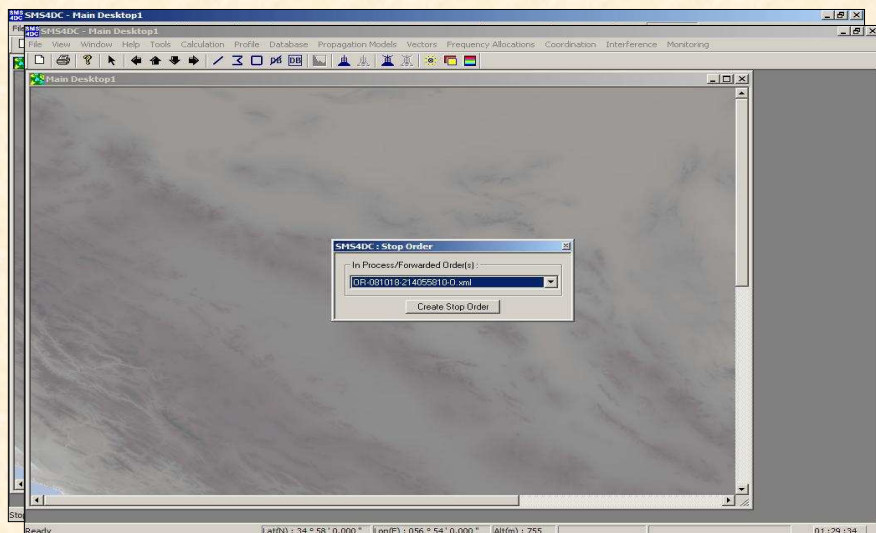


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## Argus - STOP Order

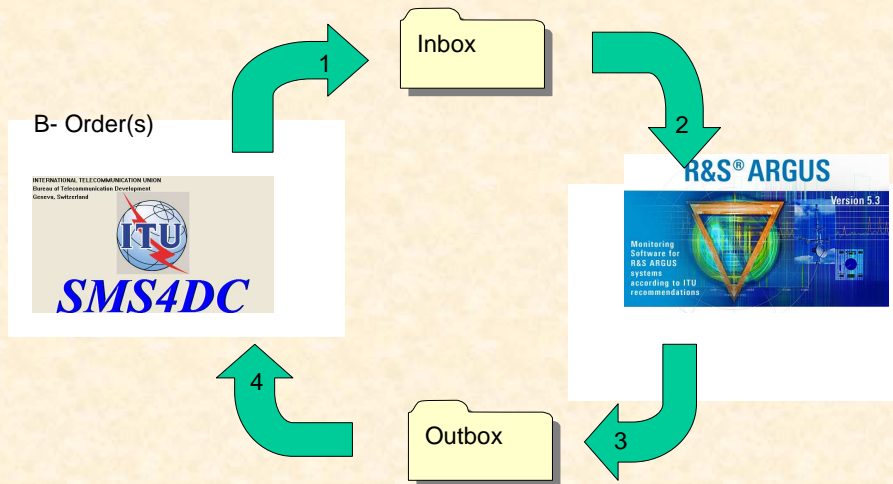


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# Order Report Module – ORM – 2



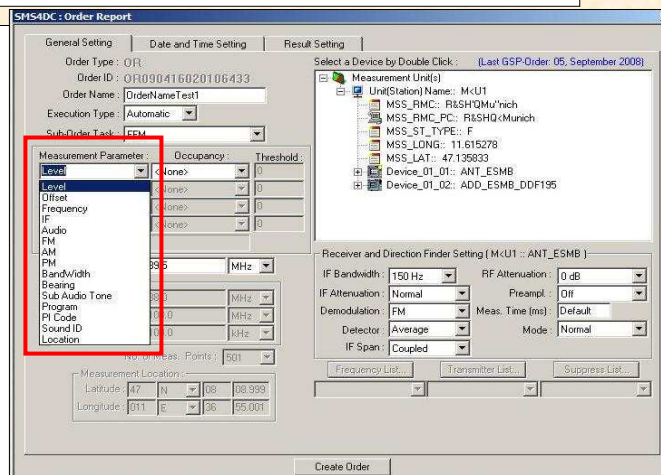
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# ORM - parameters

- Level
- Offset
- Frequency
- IF
- Audio
- AM
- FM
- PM
- BandWidth
- Bearing
- Sub Audio Tone
- Program
- PI Code
- Sound ID
- Location

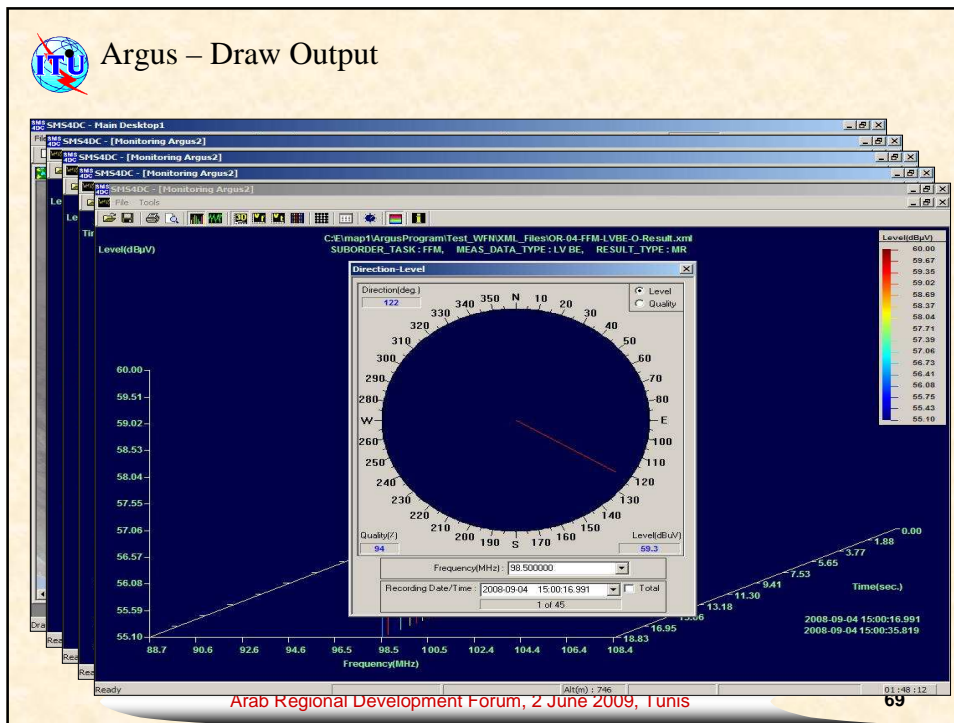


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## Argus – Draw Output

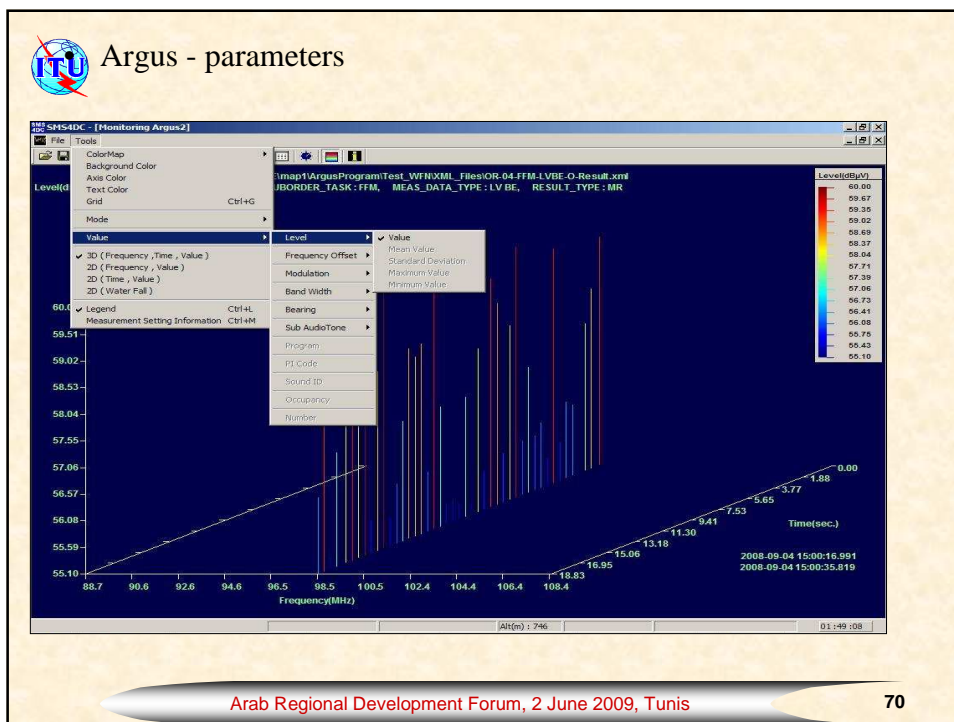


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## Argus - parameters



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## Future developments

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