Training Workshop on Spectrum Management System for Developing Countries (SMS4DC)

Vientiane – Lao P.D.R, 12- 14 February 2019

Workshop Exercises Sheet

Exercise 1

Start-up with SMS4DC

- Step 1: Set up SMS4DC software according to the Instruction on User manual.
- Step 2: Launch the SMS4DC software using a username and password of SMS4DC.
- Step 3: Choose Country from list (ex Lao)
- Step 4:Using IDWM Status Bar draw Country/Region and Coastal Zones
- Step 4: Launch the DEM view using  toolbar push button.
- Step 6: Go to ⇨ Tools ⇨ ColorMap and select color.
- Step 7: Go to ⇨ Vectors ⇨ Draw country border.
- Step 8: Go to ⇨ Database⇨ Users and then create new account.
- Step 9: Establish station "Test 1"using  and set frequency to 150MHz and antenna height above ground level (AGL) to 40m, and power to 30w.
- Step 10: View SMS4DC installed folders C:\BDT_Soft\SMS4DC

Exercise 2

SMS4DC Antenna Editor

- Step 1: Launch the SMS4DC software.
- Step 2: Launch the DEM view using  toolbar push button
- Step 3: Go to tools select antenna editor
- Step 4:load antenna from antenna libraries C:\BDT_Soft\SMS4DC\Antenna
- Step 5: View E-plane, H-plane, and 3D
- Step 6: Make a suitable modification to the antenna radiation pattern by editing (degrees/attenuation) or Graphically by mouse click on wanted points on the E-Plane or H-Plane display.
- Step 7:Save the modified pattern in antenna libraries. C:\BDT_Soft\SMS4DC\Antenna

Exercise 3

SMS4DC Technical parameters

- Step 1: Launch the SMS4DC software.
- Step 2: Launch the DEM view using  toolbar push button
- Step 3: Establish FX station "Test 2"using  and set the frequency to 150 MHz and antenna height above ground level to 40m, and set power to 30w.
- Step 4: Choose antenna "the antenna which you define in the exercise 2" and check the antenna pattern.
- Step 5: Select Calculation from the top menu and choose "Effective height", then select station "Test2".
- Step 6: Right-click on the effective height figure and select "save effective height (Database)", Then close the effective height window.
- Step 5: Select draw line  from tool bar and connect between "TEST 1" to "TEST 2", then select calculation menu from toolbar and then calculate: Azimuth angle , Elevation angle , and distance.
- Step 6: Select draw line  from tool bar and connect between "TEST 2" to "TEST 1", then select calculation menu from toolbar and then calculate: Azimuth angle , Elevation angle , and distance.
- Step 7: Go to Database ⇨ Licensing ⇨Anonymous station and "TEST 1" and "TEST 2" then go to the level of "antenna" the press modify and then fill the Azimuth and elevation which you obtain from step 5 and 6.

- Step 8: Go to Database ⇨ Licensing Anonymous station and "TEST 1" and "TEST 2" then go to the level of "frequency" then press add receiver then select "point" , then add "TEST 1" and "TEST 2" as receiver to each other.
- Step 9: Go to Tools ⇨Google Earth Export/Display ⇨ links and the select "TEST 1" and "TEST 2.

Exercise 4

Frequency Allocation

- Step 1: Launch the SMS4DC software.
- Step 2: Launch the DEM view using  toolbar push button.
- Step 3: Open the menu “Frequency Allocation” and select “Draw Chart”.
- Step 4: Set the “Region” field to “Region 3”, and set the frequency from 800 to 2400 MHz .
- Step 5: left-click on a colored patch to show its characteristics
- Step 6: From “Edit” menu select “Plan”, then create a new allocation by clicking on the  push button then push save button.
- Step 7: From “Edit” menu select “Footnote” to Show the existing footnotes, and then click on the  push button to add a new footnote then push save button.

Exercise 5

National Frequency Allocation Table

- Step 1: Launch the SMS4DC software.
- Step 2: Launch the DEM view using  toolbar push button.
- Step 3: Open the menu “Frequency Allocation” and select “Draw Chart”.
- Step 4: Set the “Region” field to “National”,
- Step 5: Go to edit and select service table and then press add new record
- Step 7: Define service code , primary service name , secondary service name, and color and then press save bottom and close this window
- Step 8: Go to edit and select plan and then press add new record 
- Step 9: Add several new records from Lao NAT , primary services, secondary services, service footnotes , and then close the window
- Step 10 : Go to edit and select footnote and then define your Footnotes
- Step 11: Switch to the main window and then check the modifications

Exercise 6

Frequency Arrangement FM

- Step 1: Launch the SMS4DC software.
- Step 2: Launch the DEM view using  toolbar push button.
- Step 3: Open the menu “Frequency Allocation” and select “Frequency Arrangement”.
- Step 4: Create a new Frequency Arrangement by using  push button.
- Step 5: Set Region to Region 1, Service priority to Primary, Service to Broadcasting.
- Step 6: Set Type of frequency to Uniform, Channel spacing 0.3MHz, Reference frequency Fo= 87.6MHz, First channel 0, last channel 67, then click on the  push button to save the new arrangement.
- Step 7: Click on the  push button to view the new arrangement report.

Exercise 7

Frequency Arrangement 900MHz

- Step 1: Launch the SMS4DC software.
- Step 2: Launch the DEM view using  toolbar push button.
- Step 3: Open the menu "Frequency Allocation" and select "Frequency Arrangement".
- Step 4: Create a new Frequency Arrangement by using  push button.
- Step 5: Set Region to Region 1, Service priority to Primary, Service to Land mobile.
- Step 6: Set Type of frequency to Homogeneous, Channel spacing 0.2MHz, Reference frequency Fo= 900MHz, f_{off}=0,f'_{off}=45, First channel 1, last channel 125, then click on the  push button to save the new arrangement.
- Step 7: Click on the  push button to view the new arrangement report.

Exercise 8

Frequency Arrangement UMTS

- Step 1: Launch the SMS4DC software.
- Step 2: Launch the DEM view using  toolbar push button.
- Step 3: Open the menu “Frequency Allocation” and select “Frequency Arrangement”.
- Step 4: Create a new Frequency Arrangement by using  push button.
- Step 5: Set Region to Region 1, Service priority to Primary, Service to Land mobile.
- Step 6: Set Type of frequency to Homogeneous, Channel spacing 5MHz, Reference frequency Fo= 2000MHz, f_{off}=-100 ,f'_{off}=110 MHz, First channel 1, last channel 12, then click on the  push button to save the new arrangement.
- Step 7: Click on the  push button to view the new arrangement report.

Exercise 9

Frequency Arrangement UMTS

- Step 1: Launch the SMS4DC software.
- Step 2: Launch the DEM view using  toolbar push button.
- Step 3: Open the menu "Frequency Allocation" and select "Frequency Arrangement".
- Step 4: Create a new Frequency Arrangement by using  push button.
- Step 5: Set Region to Region 1, Service priority to Primary, Service to Land mobile.
- Step 6: Set Type of frequency to Homogeneous, Channel spacing 6MHz, Reference frequency Fo= 1900MHz, f_{off}=0,f'_{off}=30MHz , First channel 1, last channel 10, then click on the  push button to save the new arrangement.
- Step 7: Click on the  push button to view the new arrangement report.

Exercise 10

Frequency Assignment

- Step 1: Launch the SMS4DC software.
- Step 2: Launch the DEM view using  toolbar push button.
- Step 3: Open the menu “Frequency Allocation” and select “Frequency Assignment” .
- Step 4: Set low freq=87 and high Freq=108
- Step 5: Select “Test 1” station.
- Step 6: Set Freq min= 87 and Freq max=108 and search radius to 200 Km and push OK.
- Step 7: Find a frequency channel without interference and double-click on it to assign to station Test1.

Exercise 11

Effective Height

- Step 1: open the administrative part from “Database-> licensing”.
- Step 2: Select “Active Licenses” and find station BCTest1, and select Provision= Article11 and Notice type=T01.
- Step 3: Open Equipment Information Table of Station BCTest1.
- Step 4: Push the “Modify” Button.
- Step 5: Change the field “FM Transmission code” to 2 and push ENTER then fill fields “Equipment Name” and “Power type”.
- Step 6: Push the “Save” Button.
- Step 7: Close Administrative dialog box.
- Step8: Open The “Database” Menu and select “Station in Desktop”.
- Step 9: Select the record of station (BCTest1).
- Step 10: Push OK button to display station on map.
- Step 11: Open the menu “Calculations” and select “Effective Height” item.
- Step 12: Select the record BCTEST1.
- Step 13: Open the menu “Tools” and select “Background” item.
- Step 14: Open the menu “Tools” and select “Save Effective Height (database)” item.

Exercise 12

Propagation Models

- Step1: Launch the SMS4DC software.
- Step 2: Launch the DEM view using  toolbar push button.
- Step3: Open the "Database'' menu and select "Station in Desktop''.
- Step4: Select the record of station(BCTEST1).
- Step5: Push OK button to display station on map.
- Step6: Draw a Box around BCTEST1 station by using  toolbar push button
- Step7: Open the menu "propagation Models" and select "P.1546" item and select Area.
- Step8: Select the record BCTEST1.
- Step9: Set parameters and push OK then save results .
- Step10: Open the menu "Tools" and select "contour value" item and then set threshold value and push OK then save results.
- Step11: Open the menu "Tools" again and select "remove contour from display"
- Step12: Open the menu "Tools" again and select "coverage Area".
- Step13: Open the menu "window" and select "Main Desktop".
- Step14: Open the menu" Propagation Models" and select "Overlay" then select Area calculation(P1546).
- Step 15: Go to step 7 and select other point to Area Propagation models and repeat steps 8 -14.
- Step 16: create another station near to the 'BCTEST1' station with freq=100 MHZ with the name of 'BCTEST2'.

- Step 17: Draw a Box around ‘BCTEST1’ and ‘BCTEST2’ stations by using  toolbar push button.
- Step 18: Open the menu ” Propagation Models” and select “P.1546” item and then select Network processor and then Maximum field strength .
- Step 19: Select ‘BCTEST1’ and ‘BCTEST2’ stations from list of stations ,perform calculation and overlay the results on the DEM map.
- Step 20: Open the menu ” Propagation Models” and select “P.1546” item and then select Network processor and then Best server.
- Step 21: Select ‘BCTEST1’ and ‘BCTEST2’ stations from list of stations ,perform calculation and overlay the results on the DEM map.
- Step 22: Repeat steps 18-21 for other propagation models .

Exercise 13

Propagation Models LM

- Step 1: launch the SMS4DC Software.
- Step 2: Launch the DEM view using  toolbar push button.
- Step 3: create a base station in land mobile service (FB TEST1) with Service = land mobile and class of station = FB and Freq=300 MHz and antenna height =10m.
- Step 4: Draw a box around FB TEST1 by using  toolbar push button.
- Step 5: Open the menu "propagation Models" Select "P.1546" item and then select area.
- Step 6: Select the record FB TEST1.
- Step 7: Set parameters and push OK to start calculation.
- Step 8: Open the menu "Tools" and Select "Contour value" item and the set threshold value and push OK then save results.
- Step 9: Open the menu "Tools" and select "remove contour from display".
- Step 10: Open the menu "Tools" and select "Coverage area" then set threshold value and push OK.
- Step 11: Open the menu "window" and select "Main Desktop".
- Step 12: Open the menu " propagation Models" and select "Overlay" then select area calculation (P1546).
- Step 13: Go to step 7 and select and select other point to area propagation models and repeat steps 8-13.

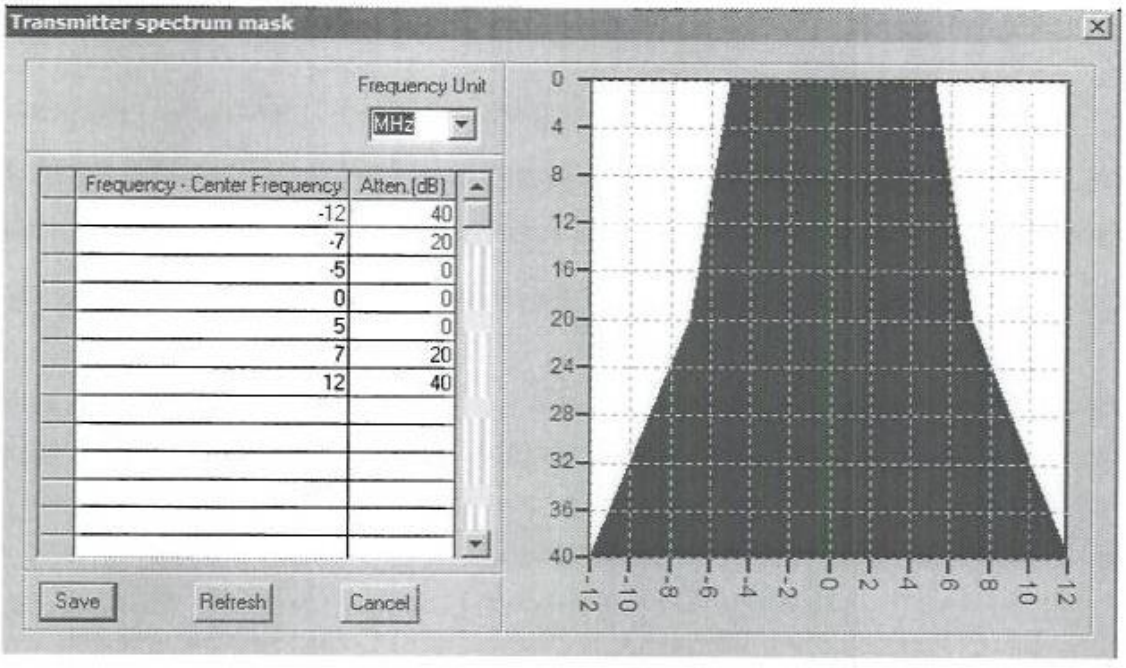
- Step 14: Create another base station in land mobile service near to the “FB TEST1” Station with Freq=300 MHz with the name of “FB TEST2”.
- Step 15: Draw a box around “FB TEST1” and “FB TEST2” Stations by  toolbar push button.
- Step 16: Open the menu “Propagation Models” and select “P.1546” item and then select Network processor and then Maximum field strength.
- Step 17: select “FB TEST1” and “FB TEST 2” Stations and from the list of stations, perform calculation and Overlay the results on DEM map.
- Step 18: Open the menu “Propagation Models” and select “P.1546” item and then select Network processor and then Best Server.
- Step 19: Select “FB TEST1” and “FB TEST2” stations and from the list of stations, perform calculation and Overlay the results on the DEM map.
- Step 20: Repeat steps 18-20 for the other propagation models.

Exercise 14

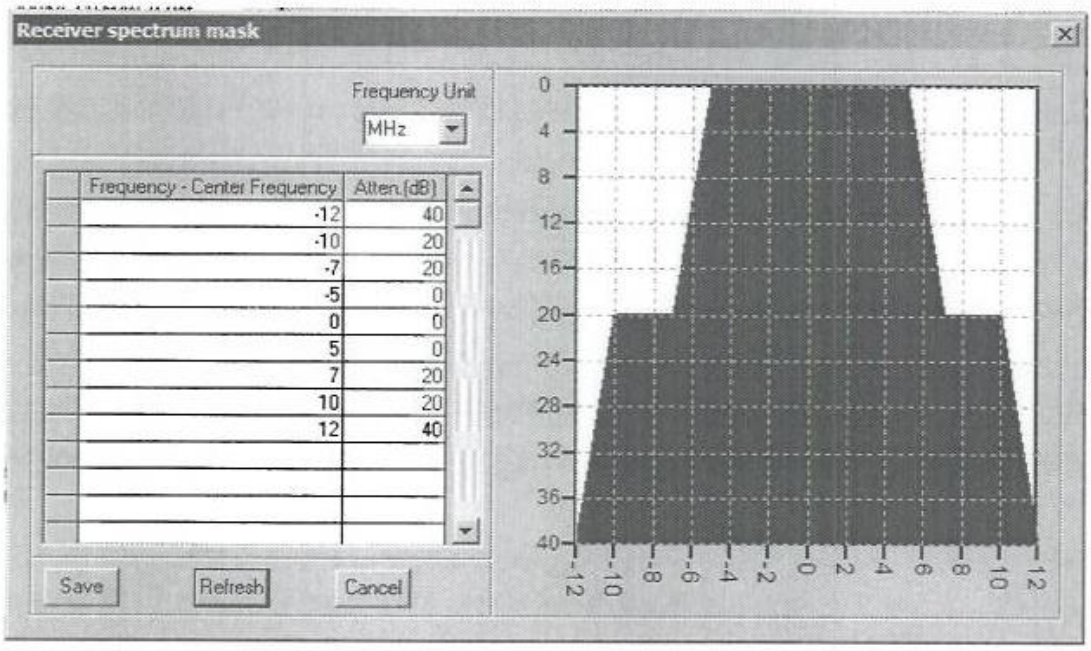
Propagation Models, Point to Point

- Step 1: launch the SMS4DC Software.
- Step 2: Launch the DEM view using  toolbar push button.
- Step 3: Establish Fixed station " A" using  Set the frequency to 2000 MHz
- Step 4: Choose antenna "ant_ALE8603_806" and check the antenna pattern.
- Step 5: Establish an other Fixed station " B" using  Set the frequency to 2000 MHz.
- Step 6: Choose antenna "ant_ALE8603_806" and check the antenna pattern.
- Step 7: Open the Administrative part from "Database-> Licensing".
- Step 8: Select "Anonymous Station" and find Station B.
- Step 9: Open Antenna Information Table of station B and set Azimuth and Elevation angles toward station A.
- Step 10: Push the "Save" Button.
- Step 11: Open Antenna Information Table of station A and set Azimuth and Elevation angles toward station B.
- Step 12: Find the station A and go to the level of "Frequency".
- Step 13: Push the "Add receiver" button top of the "frequency information" table of station A. The "Add receiver" dialog box will appear.
- Step 14: Select the "Point" Radio button. All the selectable receivers will be displayed in relevant spreadsheet.
- Step 15: Choose the station B from table under POINT section and push ok.
- Step 16: Close Administrative dialog.

- Step 17: Open the "data base" menu and select "Display Link".
- Step 18: Select the record of new established hop.
- Step 19: push OK button to display stations of selected hop on map.
- Step 20: open the menu "propagation Model" and select Link item under the ITU-R P.370 propagation model.
- Step 21: Repeat step 20 for p.530 propagation model. See the different calculated results.
- Step 23: Use mouse drag to change antenna height and mange reflection points.
- Step 24: push "Reflection Points" button to see spreadsheet of reflection points.
- Step 25: push "Availability" button to see the availability calculation result.
- Step 26: For stations A and B go to Frequency level, and by using of right click select TX filter and shape it same as following figure.



- Step 27: For Stations A and B go to frequency level, and by using right click select RX Filter and shape it same as following figure.



- Step 28: Repeat step 20 for p.452 propagation model. See the different calculated.

Exercise 15

Creating licenses

- Step 1: Launch the SMS4DC software.
- Step 2: Launch the DEM view using  toolbar push button.
- Step 3: Establish BC station "BCTest1"using  and set the frequency to 100 MHz and antenna height above ground level to 50m.
- Step 4: Choose antenna "DEFAULT" and check the antenna pattern.
- Step 5: Select Calculation from the top menu and choose "Effective height", then select station "BCTest1".
- Step 6: Right-click on the effective height figure and select "save effective height (Database)", Then close the effective height window.
- Step 7: Open the administrative part from "Database-> Licensing".
- Step 8: Select "anonymous Station" and find station "BCTest1".
- Step 9: Right-click on administrative data and select "New Owner", then complete Owner information fields.
- Step 10: Go to "Active Licenses" and find the crated owner.
- Step 11: Right-click on the Owner's name and select "New License", then complete License information fields.
- Step12: Right-click on the License's name and select "Move Anonymous Station", then select station "BCTest1".
- Step13: Select "Billing History" to show the billing information of the owner.
- Step 14: Right-click on the "Billing History" and add a new payment to the owner.

Exercise 16

Frequency Assignment

- Step 1: Launch the SMS4DC software.
- Step 2: Launch the DEM view using  toolbar push button.
- Step 3: Open the menu “Frequency Allocation” and select “Frequency Assignment” .
- Step 4: Set low freq=87 and high Freq=108
- Step 5: Select “BCTest 1” station.
- Step 6: Set Freq min= 87 and Freq max=108 and search radius to 200 Km and push OK.
- Step 7: Find a frequency channel without interference and double-click on it to assign the channel it to station “BCTest 1”.
- Step8: Create other station within this range and repeat step 3 to 7.

Exercise 17

BC to BC Interference

Optional

- Step 1: create YEMBC1 station with freq=107MHZ,power=10W,and antenna height=10m.
- Step 2: create YEMBC2 station near to YEMBC1 station with freq=107MHZ, power=10W,and antenna height=10m.
- Step 3: open (database) menu and select licensing.
- Step 4 :set provision of YEMBC1and YEMBC2 station to article 11 and notice type to T01.
- Step 5: open the menu (interference) and select(BC 2 BC)item.
- Step 6: select YEMBC1 station and push OK.
- Step 7: set search radius ,and Min. FS and push OK.
- Step 8: select YEMBC2 station as interferer station and state calculation .
- Step 9: compare coverage area with and without interference .
- Step 10: change to main window and from propagation model select overlay item and choose the interference BC 2 BC results.

Exercise 18

BT to BT Interference

Optional

- Step 1: create YEMBT1 station with :
  - assign freq=714MHz.
  - power=1000W
  - antenna height=10m
  - provision=article 11
  - notice type=T02
  - vision freq=711.25MHz
  - sound freq=716.75.
  - color=pal.
  - power ratio=10
  - TVsys =G
  - class of EMISSION=C3E
  - bandwidth=8000KHz.
- Step 2: create YEMBT2station with:
  - assign freq=714MHz
  - power=1000w
  - antenna height=10m
  - provision=article 11
  - notice type=T02
  - vision freq=711.25MHz
  - sound freq=716.75

- color=pal
- power ratio=10
- TV sys =G
- class of EMISSION=C3E
- bandwidth=8000KHz.

- Step 3: open the menu (interference)and select(BT 2 BT)item.
- Step 4 : select YEMBT1 station and push OK.
- Step 5: set search radius, and Min. FS and push OK.
- Step 6: select YEMBT2 station as interferer station and state calculation .
- Step 7: compare coverage area with and without interference.
- Step 8: change to main window and from propagation model select overlay item and choose the interference BT 2 BT results.