World Radiocommunication Seminar 2016(WRS-16)
HFBC Exercises

Exercise 1 – HFBC REQ 1.4 - Data Capture

Purpose and objectives:

A simple requirement file for notification to the ITU has to be created and saved using the Data Capture software HFBC REQ 1.4.

Input data:

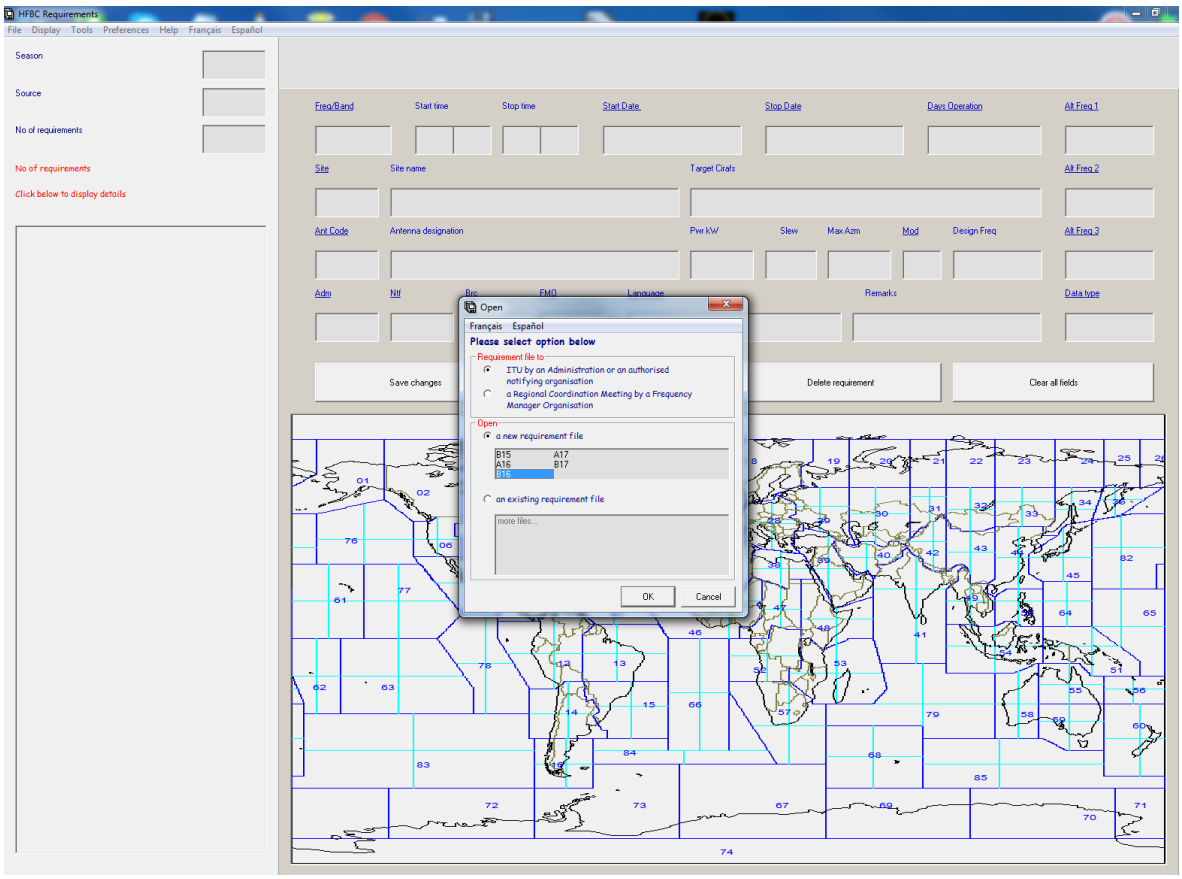
- Requirement file should cover the season B16 (October 2016 – March 2017)
- Administration: Malaysia (MLA)
- First requirement to be included in the notification file:

    - *Frequency: 6050 [MHz]*
    - *Transmission time slot: 00:00-16:00 [UTC]*
    - *Coverage aria: Malaysia, 54 [CIRAF zone]*
    - *Transmitter site location: Kajang, code: KAJ*
    - *Transmitting power: 50 [kW]*
    - *Azimuth of the maximum radiation: 0 [Degrees]*
    - *Antenna slew angle: 0 [Degrees]*
    - *Antenna type: Quadrant antenna HQ1/0.5, antenna code: 926*
    - *Days of operation: From Monday to Sunday, code: 1234567*
    - *Start Date: 30/10/2016*
    - *Stop date: 26/03/2017*
    - *Modulation: Double-side, code: D*
    - *Language used for the transmission: Malay, language code: Mly*
    - *Broadcaster: Radio Television Malaysia, code: RTM*
    - *Frequency manager organization: Radio Television Malaysia, code: RTM*
    - *Alternative frequency: None*
    - *Data type: new requirement, code N*

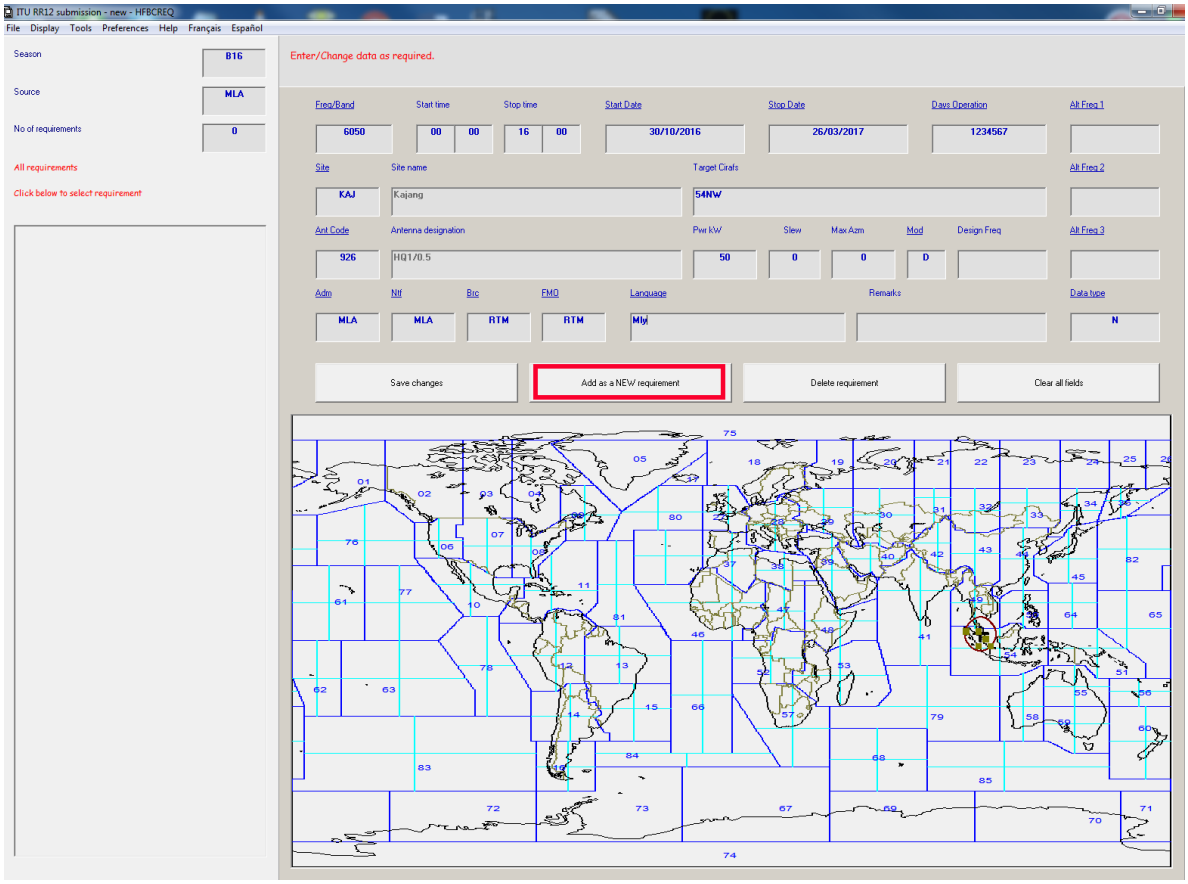
- Second requirement to be included:

    - *Frequency: 6080 [MHz]*
    - *Transmission time slot: 04:00-07:00 [UTC]*
    - *Coverage aria: Malaysia, 54 [CIRAF zone]*
    - *Transmitter site location: Kajang, code: KAJ*
    - *Transmitting power: 100 [kW]*
    - *Azimuth of the maximum radiation: 0 [Degrees]*
    - *Antenna slew angle: 0 [Degrees]*
    - *Antenna type: Quadrant antenna HQ1/0.5, antenna code: 926*
    - *Days of operation: From Monday to Sunday, code: 1234567*
    - *Start Date: 30/10/2016*
    - *Stop date: 26/03/2017*
    - *Modulation: Double-side, code: D*
    - *Language used for the transmission: Malay, language code: Mly*
    - *Broadcaster: Radio Television Malaysia, code: RTM*
    - *Frequency manager organization: Radio Television Malaysia, code: RTM*
    - *Alternative frequency: None*
    - *Data type: new requirement, code N*
    -

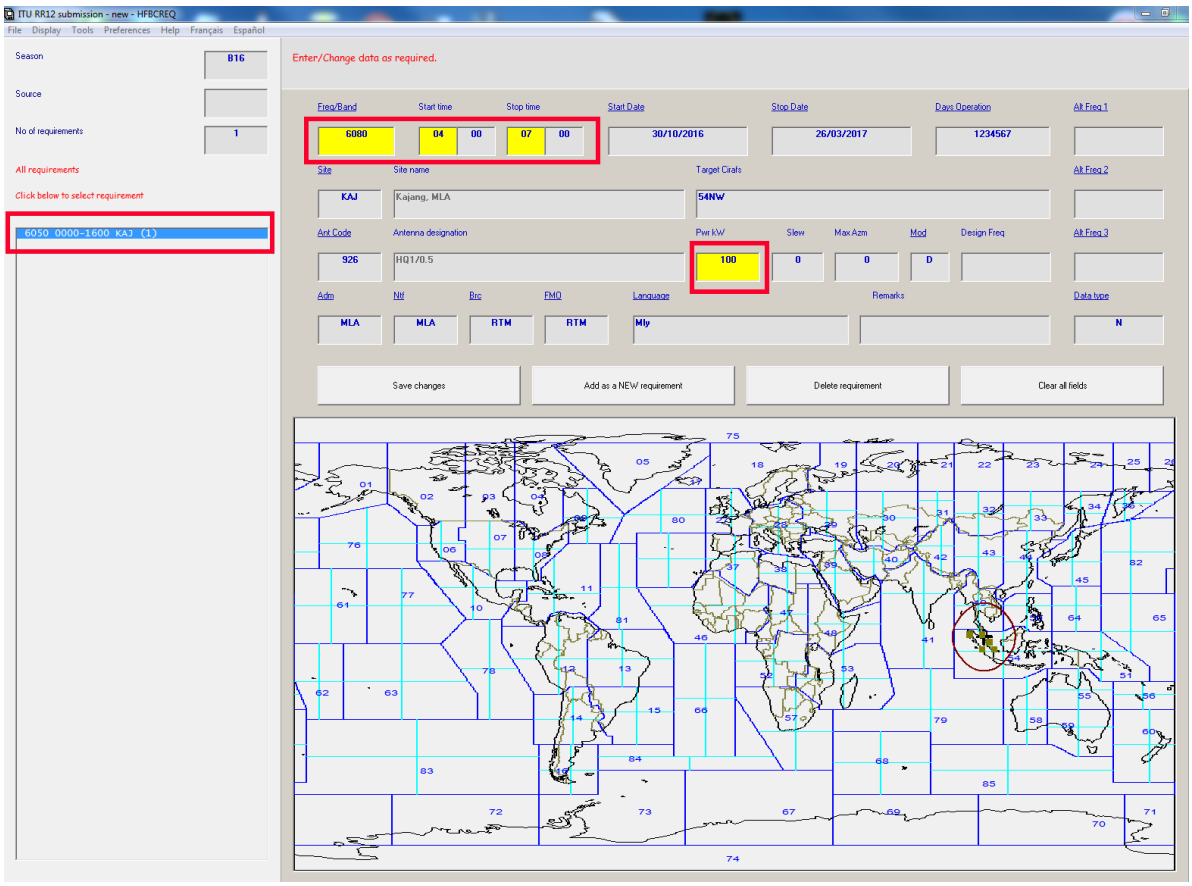
1. Capture the first requirement:



2. Add the first requirement as a new requirement:



3. Modify the first requirement to capture the second one:



4. Save the notification file.

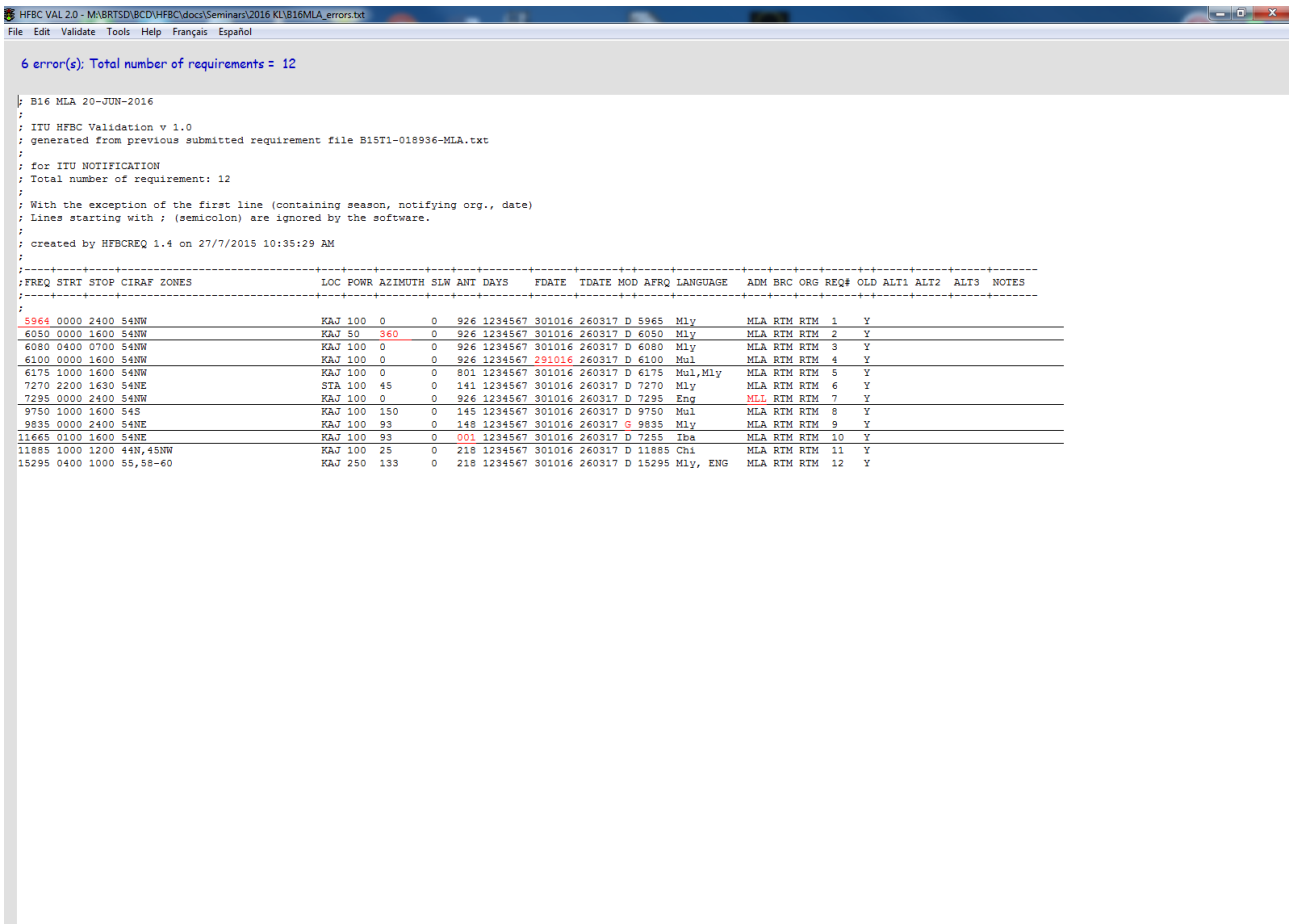
Exercise 2 – HFBC VAL 2.0 - Data validation

Purpose and objectives:

Open an existing requirement file correct and validate it for season B16 using the Data Validation software HFBC VAL 2.0.

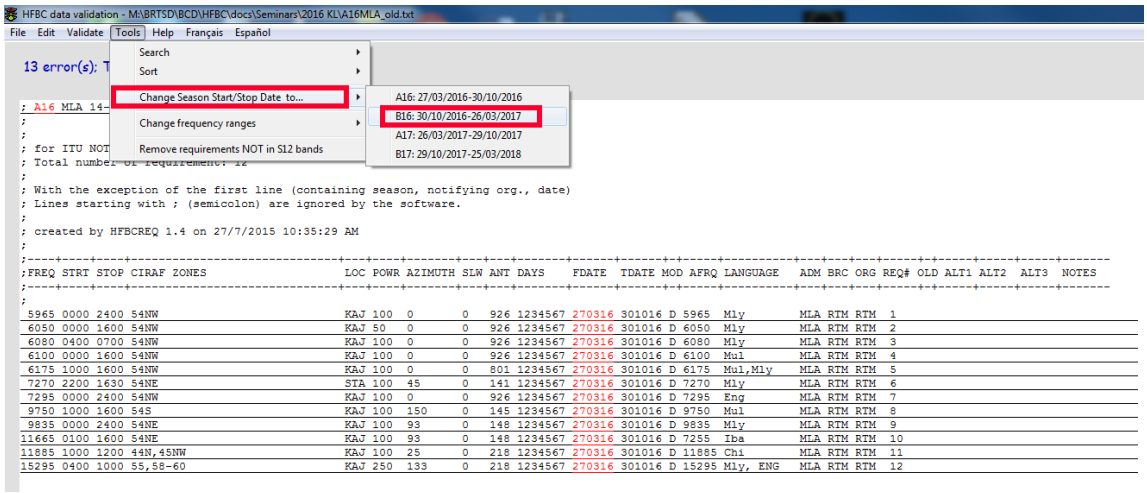
Input data:

- Existing requirement file: B16MLA_errors.txt




```
; B16 MLA 20-JUN-2016
;
; ITU HFBC Validation v 1.0
; generated from previous submitted requirement file B15T1-018936-MLA.txt
;
; for ITU NOTIFICATION
; Total number of requirement: 12
;
; With the exception of the first line (containing season, notifying org., date)
; Lines starting with ; (semicolon) are ignored by the software.
;
; created by HFBCREQ 1.4 on 27/7/2015 10:35:29 AM
;
;----+----+----+--------------------------------+---+----+-------+---+---+-------+------+------+-+-----+----------+---+---+---+-----+-+-----+-----+-----+-------
;FREQ STRT STOP CIRAF ZONES                      LOC POWR AZIMUTH SLW ANT DAYS    FDATE  TDATE MOD AFRQ LANGUAGE   ADM BRC ORG REQ# OLD ALT1 ALT2  ALT3  NOTES
;----+----+----+--------------------------------+---+----+-------+---+---+-------+------+------+-+-----+----------+---+---+---+-----+-+-----+-----+-----+-------
;
 5964 0000 2400 54NW                             KAJ 100  0       0   926 1234567 301016 260317 D 5965  M1y        MLA RTM RTM  1    Y
 6050 0000 1600 54NW                             KAJ 50   360     0   926 1234567 301016 260317 D 6050  M1y        MLA RTM RTM  2    Y
 6080 0400 0700 54NW                             KAJ 100  0       0   926 1234567 301016 260317 D 6080  M1y        MLA RTM RTM  3    Y
 6100 0000 1600 54NW                             KAJ 100  0       0   926 1234567 291016 260317 D 6100  Mul        MLA RTM RTM  4    Y
 6175 1000 1600 54NW                             KAJ 100  0       0   801 1234567 301016 260317 D 6175  Mul,M1y    MLA RTM RTM  5    Y
 7270 2200 1630 54NE                             STA 100  45      0   141 1234567 301016 260317 D 7270  M1y        MLA RTM RTM  6    Y
 7295 0000 2400 54NW                             KAJ 100  0       0   926 1234567 301016 260317 D 7295  Eng        MLL RTM RTM  7    Y
 9750 1000 1600 54S                              KAJ 100  150     0   145 1234567 301016 260317 D 9750  Mul        MLA RTM RTM  8    Y
 9835 0000 2400 54NE                             KAJ 100  93      0   148 1234567 301016 260317 G 9835  M1y        MLA RTM RTM  9    Y
11665 0100 1600 54NE                             KAJ 100  93      0   001 1234567 301016 260317 D 7255  Iba        MLA RTM RTM  10   Y
11885 1000 1200 44N,45NW                         KAJ 100  25      0   218 1234567 301016 260317 D 11885 Chi        MLA RTM RTM  11   Y
15295 0400 1000 55,58-60                         KAJ 250  133     0   218 1234567 301016 260317 D 15295 M1y, ENG   MLA RTM RTM  12   Y
```

Change the start / stop date of the season - Correct and validate the file: A16MLA_old




```
; A16 MLA 14-
;
;
; for ITU NOT
; Total number of requirement: 12
;
; With the exception of the first line (containing season, notifying org., date)
; Lines starting with ; (semicolon) are ignored by the software.
;
; created by HFBCREQ 1.4 on 27/7/2015 10:35:29 AM
;
;----+----+----+--------------------------------+---+----+-------+---+---+-------+------+------+-+-----+----------+---+---+---+-----+-+-----+-----+-----+-------
;FREQ STRT STOP CIRAF ZONES                      LOC POWR AZIMUTH SLW ANT DAYS    FDATE  TDATE MOD AFRQ LANGUAGE   ADM BRC ORG REQ# OLD ALT1 ALT2  ALT3  NOTES
;----+----+----+--------------------------------+---+----+-------+---+---+-------+------+------+-+-----+----------+---+---+---+-----+-+-----+-----+-----+-------
;
 5965 0000 2400 54NW                             KAJ 100  0       0   926 1234567 270316 301016 D 5965  M1y        MLA RTM RTM  1
 6050 0000 1600 54NW                             KAJ 50   0       0   926 1234567 270316 301016 D 6050  M1y        MLA RTM RTM  2
 6080 0400 0700 54NW                             KAJ 100  0       0   926 1234567 270316 301016 D 6080  M1y        MLA RTM RTM  3
 6100 0000 1600 54NW                             KAJ 100  0       0   926 1234567 270316 301016 D 6100  Mul        MLA RTM RTM  4
 6175 1000 1600 54NW                             KAJ 100  0       0   801 1234567 270316 301016 D 6175  Mul,M1y    MLA RTM RTM  5
 7270 2200 1630 54NE                             STA 100  45      0   141 1234567 270316 301016 D 7270  M1y        MLA RTM RTM  6
 7295 0000 2400 54NW                             KAJ 100  0       0   926 1234567 270316 301016 D 7295  Eng        MLA RTM RTM  7
 9750 1000 1600 54S                              KAJ 100  150     0   145 1234567 270316 301016 D 9750  Mul        MLA RTM RTM  8
 9835 0000 2400 54NE                             KAJ 100  93      0   148 1234567 270316 301016 D 9835  M1y        MLA RTM RTM  9
11665 0100 1600 54NE                             KAJ 100  93      0   148 1234567 270316 301016 D 7255  Iba        MLA RTM RTM  10
11885 1000 1200 44N,45NW                         KAJ 100  25      0   218 1234567 270316 301016 D 11885 Chi        MLA RTM RTM  11
15295 0400 1000 55,58-60                         KAJ 250  133     0   218 1234567 270316 301016 D 15295 M1y, ENG   MLA RTM RTM  12
```

Exercise 3 – ITU HFBC 5.3 – Propagation and compatibility analysis

Purpose and objectives:

Analyze the Basic Service Reliability **(BSR)** and Time Service Circuit **(TSC)** for specific group of requirements published in ITU HFBC schedule (**in the list view mode**).

Input date:

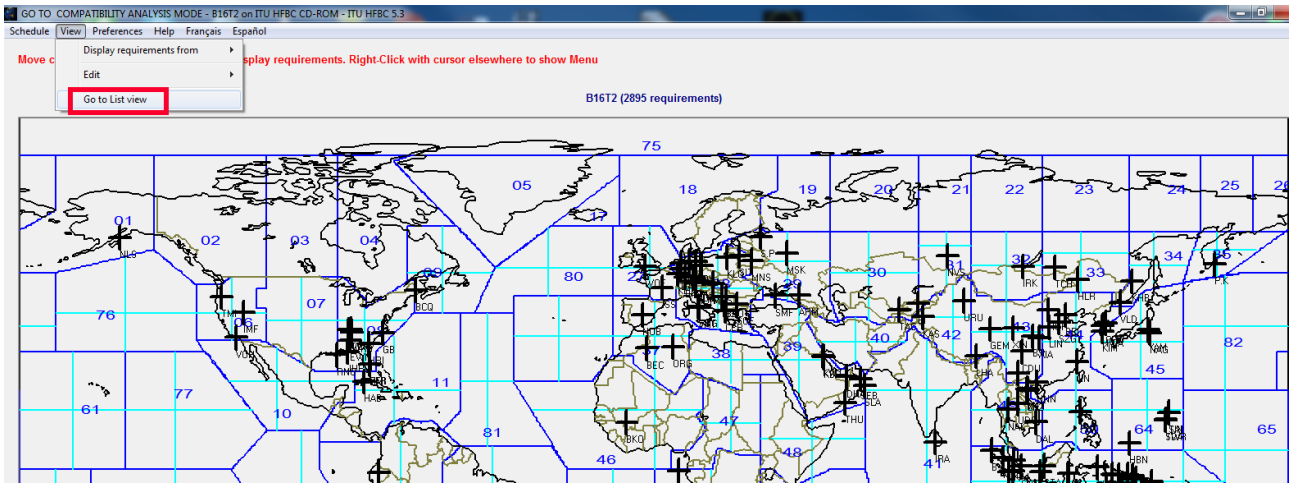
- (CD-ROM) HFBC Schedule B16T2.

Solution - Steps to be followed:

1. Execute ITUHFBC 5.3 software.

2. Open schedule: B16T2

3. Select "List view"



4. The list view is displayed:

5. Display requirements from an administration:
From "View" menu, select "Display Requirements from", then select "Administration: **MLA** (Malaysia)".

6. Click on the MLA (12) to expand the requirements from Malaysia.

```
                                                                                                  B16T2 adm='MLA' (12 requirements)
Administration
 MLA(12)
        (REF)  FREQ M STRT-STOP ADM FMO CIRAF ZONE                    SIT PWR AZM ANTENNA
        (934)  5965 D 0000-2400 MLA RTM 54NW                          KAJ 100 0   HQ1/0.5
        (935)  6050 D 0000-1600 MLA RTM 54NW                          KAJ 50  0   HQ1/0.5
        (936)  6080 D 0400-0700 MLA RTM 54NW                          KAJ 100 0   HQ1/0.5
        (937)  6100 D 0000-1600 MLA RTM 54NW                          KAJ 100 0   HQ1/0.5
        (938)  6175 D 1000-1600 MLA RTM 54NW                          KAJ 100 0   LPH19/5/45/45/1/20/300
        (939)  7270 D 2200-1630 MLA RTM 54NE                          STA 100 45  AHR(S)2/1/0.5
        (940)  7295 D 0000-2400 MLA RTM 54NW                          KAJ 100 0   HQ1/0.5
        (941)  9750 D 1000-1600 MLA RTM 54S                           KAJ 100 150 AHR(S)2/2/0.3
        (942)  9835 D 0000-2400 MLA RTM 54NE                          KAJ 100 93  AHR(S)2/2/1.0
        (943) 11665 D 0100-1600 MLA RTM 54NE                          KAJ 100 93  AHR(S)2/2/1.0
        (944) 11885 D 1000-1200 MLA RTM 44N,45NW                      KAJ 100 25  AHR(S)4/4/1.0
        (945) 15295 D 0400-1000 MLA RTM 55,58-60                      KAJ 250 133 AHR(S)4/4/1.0
```

7. Note the some requirements are displayed in red and some in blue.

8. Note the status bar at the bottom:

```
Requirements in RED have BSR or TSC less than 50%   | RR12 ref tables | Y=2017 | Mon=1 | SSN=27 | S/N=34dB | S/I=17dB | FR=5kHz
```

Requirements in RED color have BSR or TSC less than 50%.
Requirements in BLUE color have BSR or TCS more than 50%.

9. Analyze data for the requirements:

BSR and TSC values are presented as numbers from 0 to 9 (from 0% to 90%) for each transmitting hour and for each seasonal period:

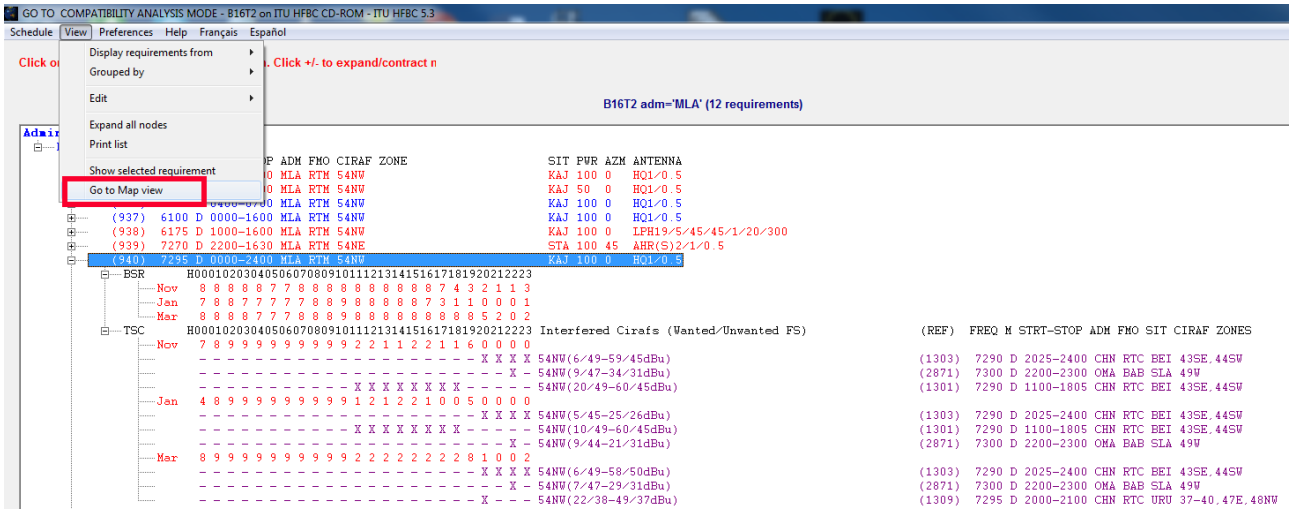
November –beginning of the season;
January –middle of the season;
March –end of the season.

10. Click on a requirement (935) and (936) to display detailed results:

```
                                                                                                  B16T2 adm='MLA' (12 requirements)
Administration
 MLA(12)
        (REF)  FREQ M STRT-STOP ADM FMO CIRAF ZONE                    SIT PWR AZM ANTENNA
        (934)  5965 D 0000-2400 MLA RTM 54NW                          KAJ 100 0   HQ1/0.5
        (935)  6050 D 0000-1600 MLA RTM 54NW                          KAJ 50  0   HQ1/0.5
          BSR      H000102030405060708091011121314 15
                Nov   8 8 7 6 6 5 5 5 6 7 7 8 8 8 8 8
                Jan   8 7 7 6 5 5 5 6 7 7 8 8 8 8 8 8
                Mar   8 7 7 6 5 4 5 5 6 7 8 8 8 8 8 8
          TSC      H000102030405060708091011121314 15 Interfered Cirafs (Wanted/Unwanted FS)          (REF)  FREQ M STRT-STOP ADM FMO SIT CIRAF ZONES
                Nov   9 9 9 9 9 9 9 9 9 9 9 7 2 3 0 6
                      - - - - - - - - - - - - - - X - 54NW(39/61-58/54dBu)                          (1125)  6055 D 1400-1500 CHN RTC NNN 49SE
                      - - - - - - - - - - - - X X - - 54NW(37/41-58/46dBu)                           (820)  6045 D 1200-1400 THA IBB UDO 43,44
                      X X X X X X X X X X X X X X X 54NW(38/34-50/33dBu)                             (467)  6055 D 0000-2400 J   NHK NAG 45
                Jan   9 9 9 9 9 9 9 9 9 9 7 6 2 2 0 4
                      - - - - - - - - - - - - - - X - 54NW(36/60-57/55dBu)                          (1125)  6055 D 1400-1500 CHN RTC NNN 49SE
                      - - - - - - - - - - - - X X - - 54NW(36/41-58/47dBu)                           (820)  6045 D 1200-1400 THA IBB UDO 43,44
                      X - - - - - - - - - - - - - - - 54NW(27/31-27/31dBu)                            (578)  6050 D 0030-0100 EQA HCJ QUI 11,12
                Mar   9 9 9 9 9 9 9 9 9 9 8 6 3 3 0 6
                      - - - - - - - - - - - - - - X - 54NW(39/60-58/54dBu)                          (1125)  6055 D 1400-1500 CHN RTC NNN 49SE
                      - - - - - - - - - - - - X X - - 54NW(40/43-59/46dBu)                           (820)  6045 D 1200-1400 THA IBB UDO 43,44
                      X X X X X X X X X X X X X X X 54NW(39/35-35/19dBu)                             (467)  6055 D 0000-2400 J   NHK NAG 45
        (936)  6080 D 0400-0700 MLA RTM 54NW                          KAJ 100 0   HQ1/0.5
          BSR      H040506
                Nov   7 6 6
                Jan   6 6 6
                Mar   6 6 6
          TSC      H040506
                Nov   9 9 9
                Jan   9 9 9
                Mar   9 9 9
        (937)  6100 D 0000-1600 MLA RTM 54NW                          KAJ 100 0   HQ1/0.5
        (938)  6175 D 1000-1600 MLA RTM 54NW                          KAJ 100 0   LPH19/5/45/45/1/20/300
        (939)  7270 D 2200-1630 MLA RTM 54NE                          STA 100 45  AHR(S)2/1/0.5
        (940)  7295 D 0000-2400 MLA RTM 54NW                          KAJ 100 0   HQ1/0.5
        (941)  9750 D 1000-1600 MLA RTM 54S                           KAJ 100 150 AHR(S)2/2/0.3
        (942)  9835 D 0000-2400 MLA RTM 54NE                          KAJ 100 93  AHR(S)2/2/1.0
        (943) 11665 D 0100-1600 MLA RTM 54NE                          KAJ 100 93  AHR(S)2/2/1.0
        (944) 11885 D 1000-1200 MLA RTM 44N,45NW                      KAJ 100 25  AHR(S)4/4/1.0
        (945) 15295 D 0400-1000 MLA RTM 55,58-60                      KAJ 250 133 AHR(S)4/4/1.0
```

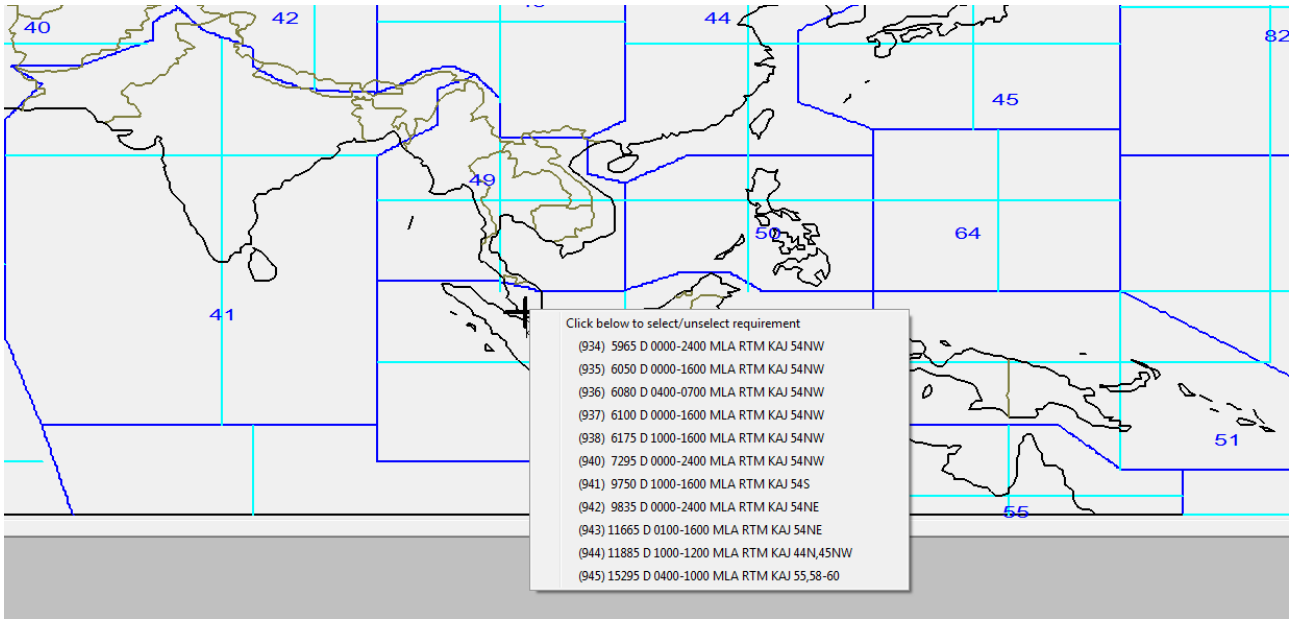
11. Determine the potential interference received from other requirements:
Interfered CIRAF zones, Wanted /unwanted FS, requirements causing interference.

12. From “View” menu, select “Go to Map view”,

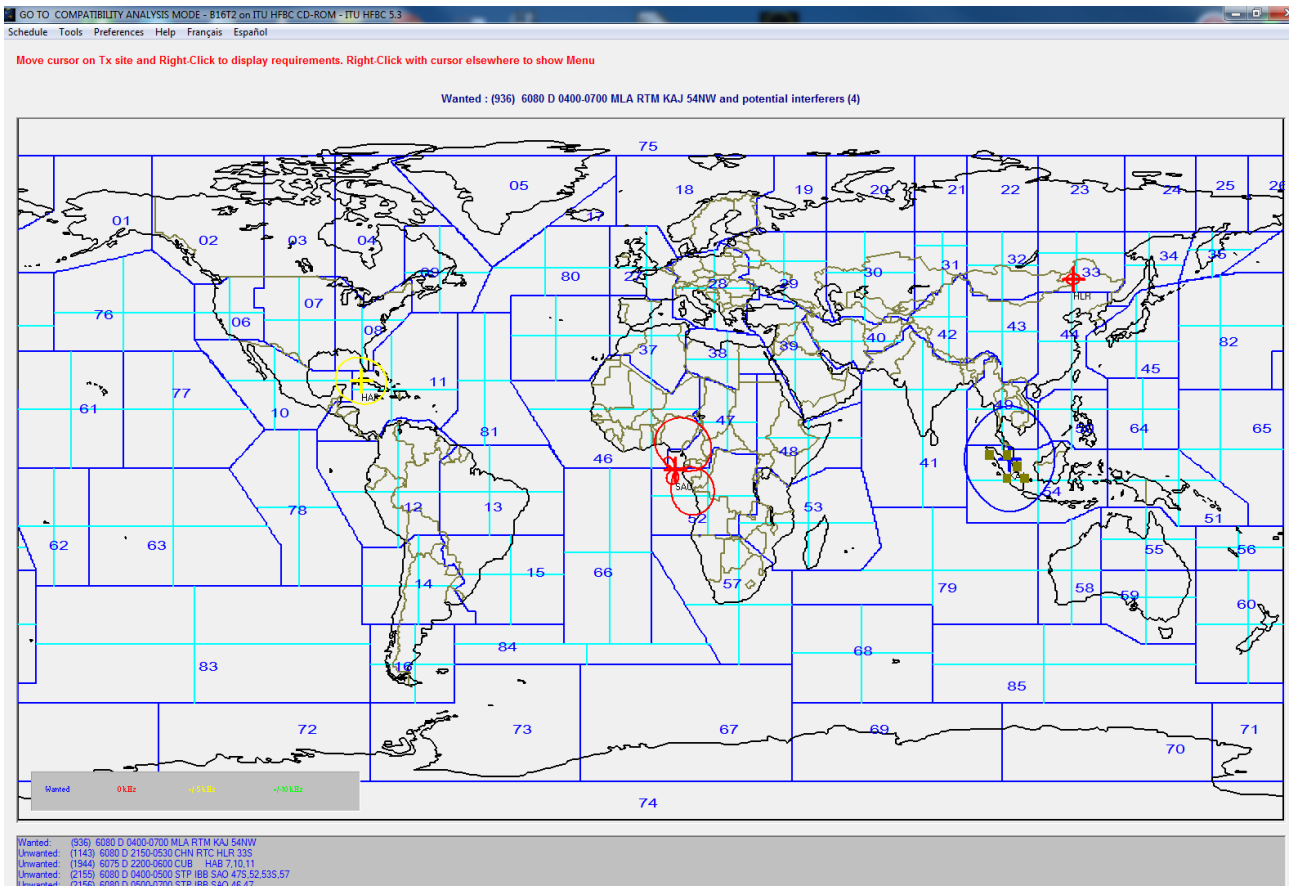


13. Display requirements from a specific administration: MLA (Malaysia)
Note that the location of the transmitter sites is shown on the map. You may use “zoom”: click in the specific region, inside Asia.

14. Right click the transmitter site KAJ to display all requirements from that site:



and select the requirement REF. (936) from the list of the MLA requirements.

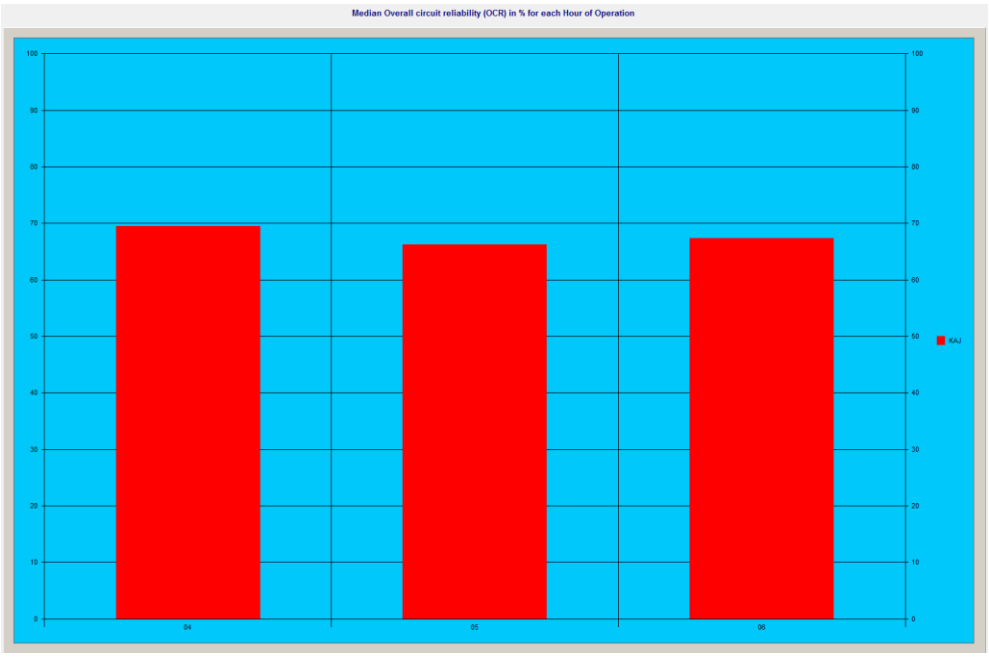


The antenna pattern of the selected requirement (936) is displayed on the map in blue. The requirement appears in the list as Wanted. Other “Unwanted” requirements are indicated as potential interferes. Potential interfering requirements on the same channel are displayed in red, those on the adjusting channels +/- 5 kHz in yellow, and those in on +/- 10 kHz channels in green.

15. From “Tools” menu, select “Calculate”, then “Run compatibility analysis”.

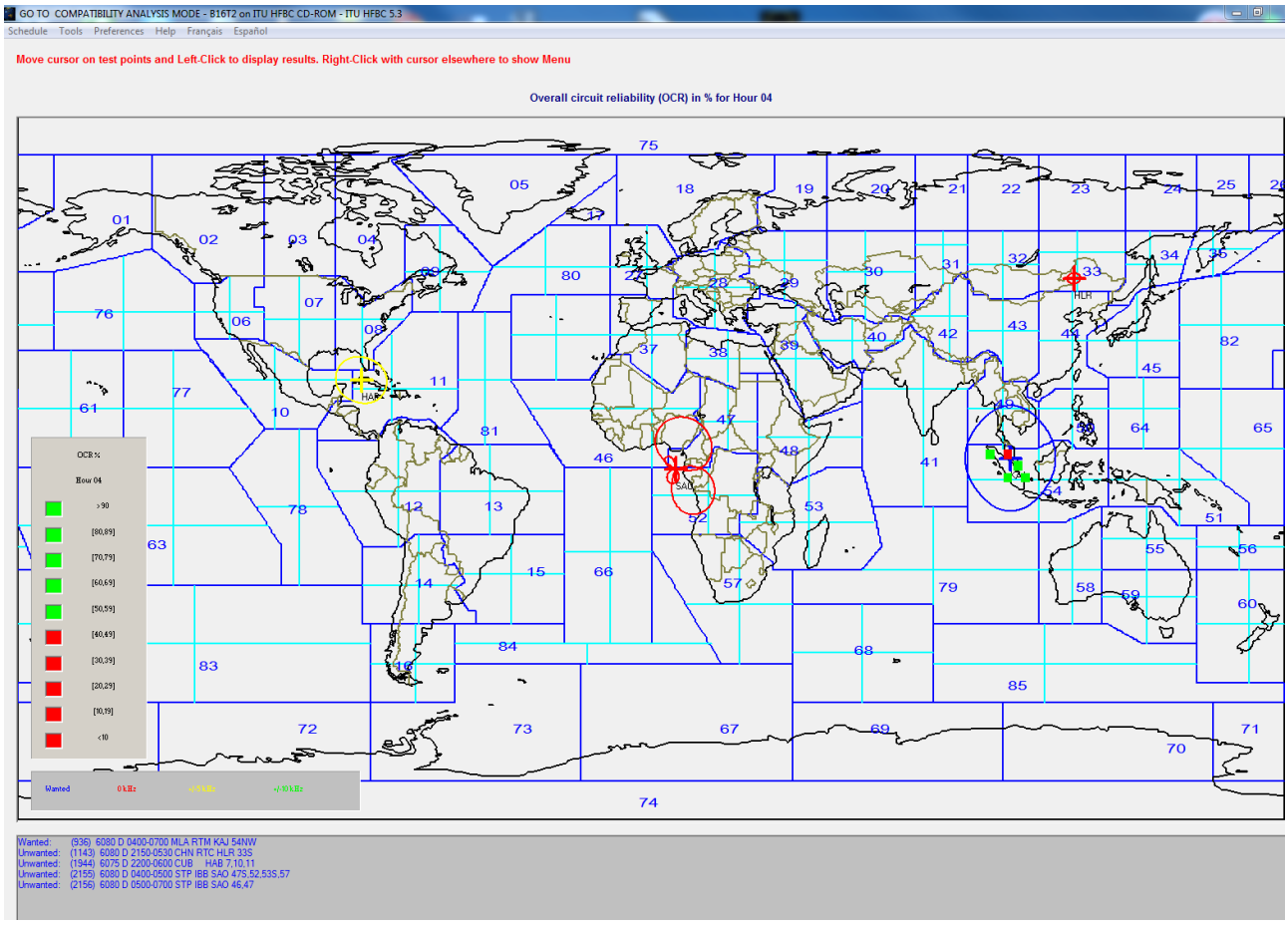
The software calculates…

16. A chart of the median Overall Circuit Reliability (OCR) in % for each hour of operation is displayed:



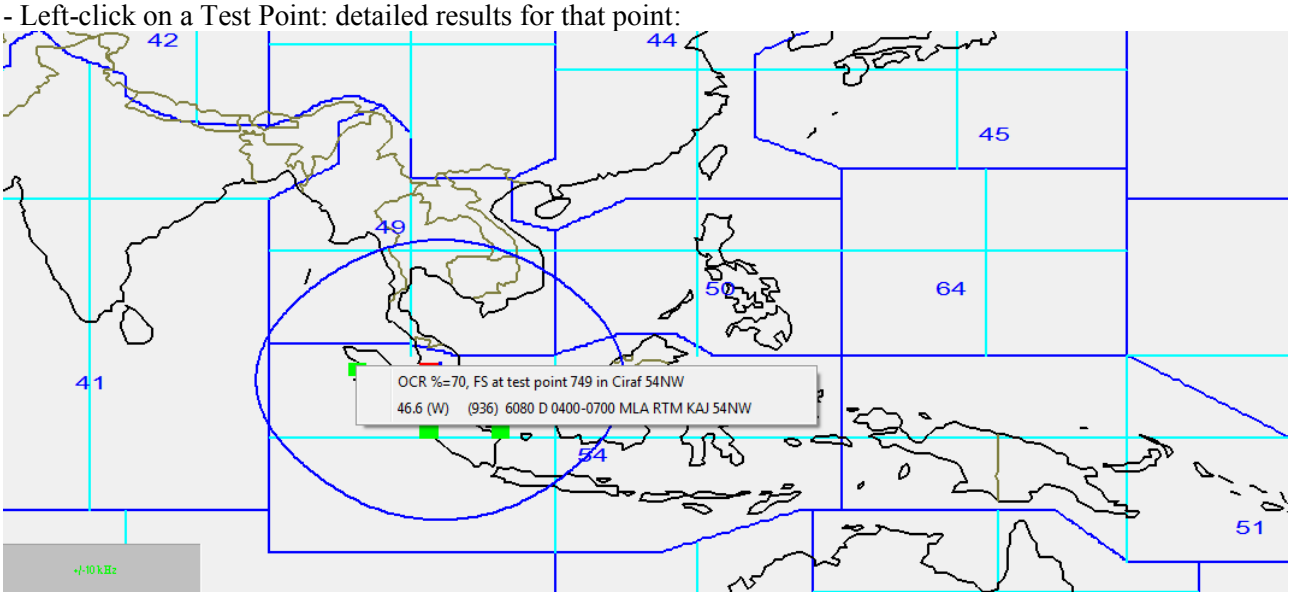
No interference is expected….

17. Display the compatibility analysis on the map:
From “Tools”, select “Show Map”.



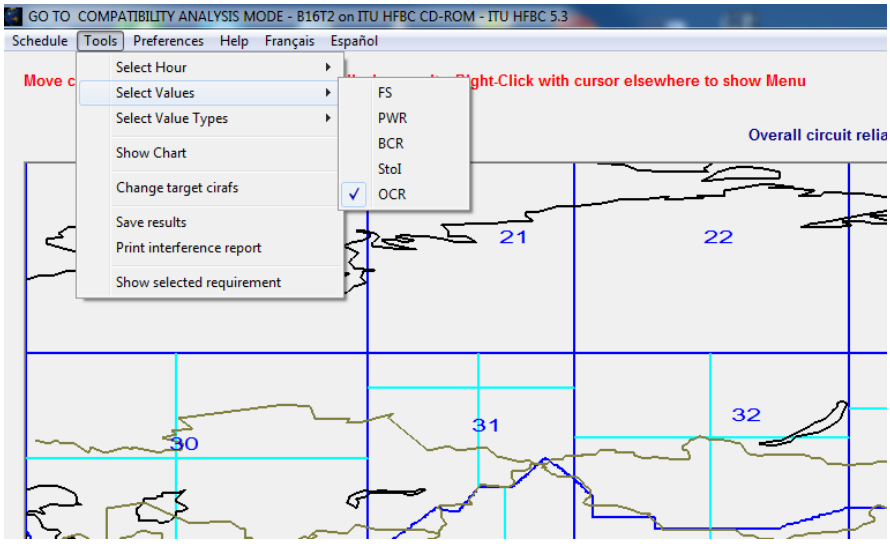
18. Detailed results:

- Left-click on a Test Point: detailed results for that point:



- Display the other parameters: Field Strength, Power received, Basic circuit reliability, Signal to Interference, Overall circuit reliability.

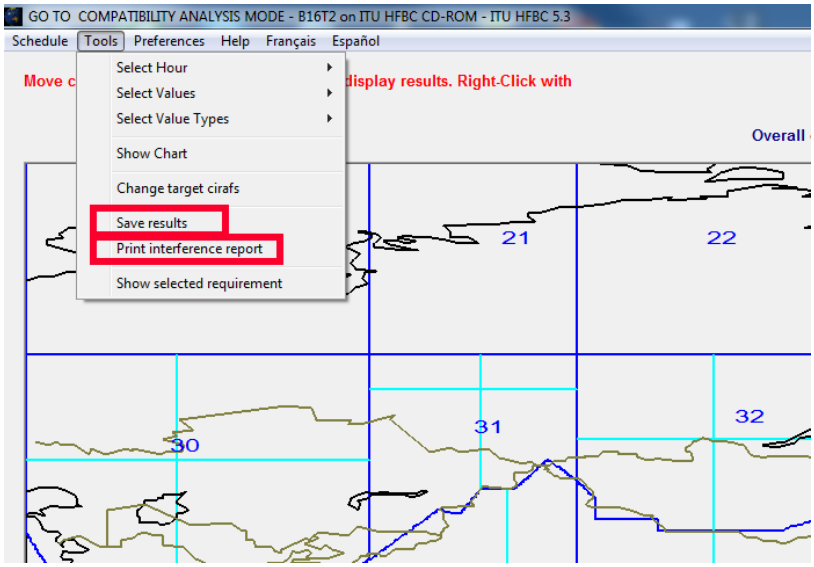
From “Tools”, select “Select Values”, then:
- “FS” – Field Strength
- “PWR” – Power received
- “BCR” – Basic circuit reliability
- “StoI” – Signal to Interference
- “OCR” – Overall circuit reliability



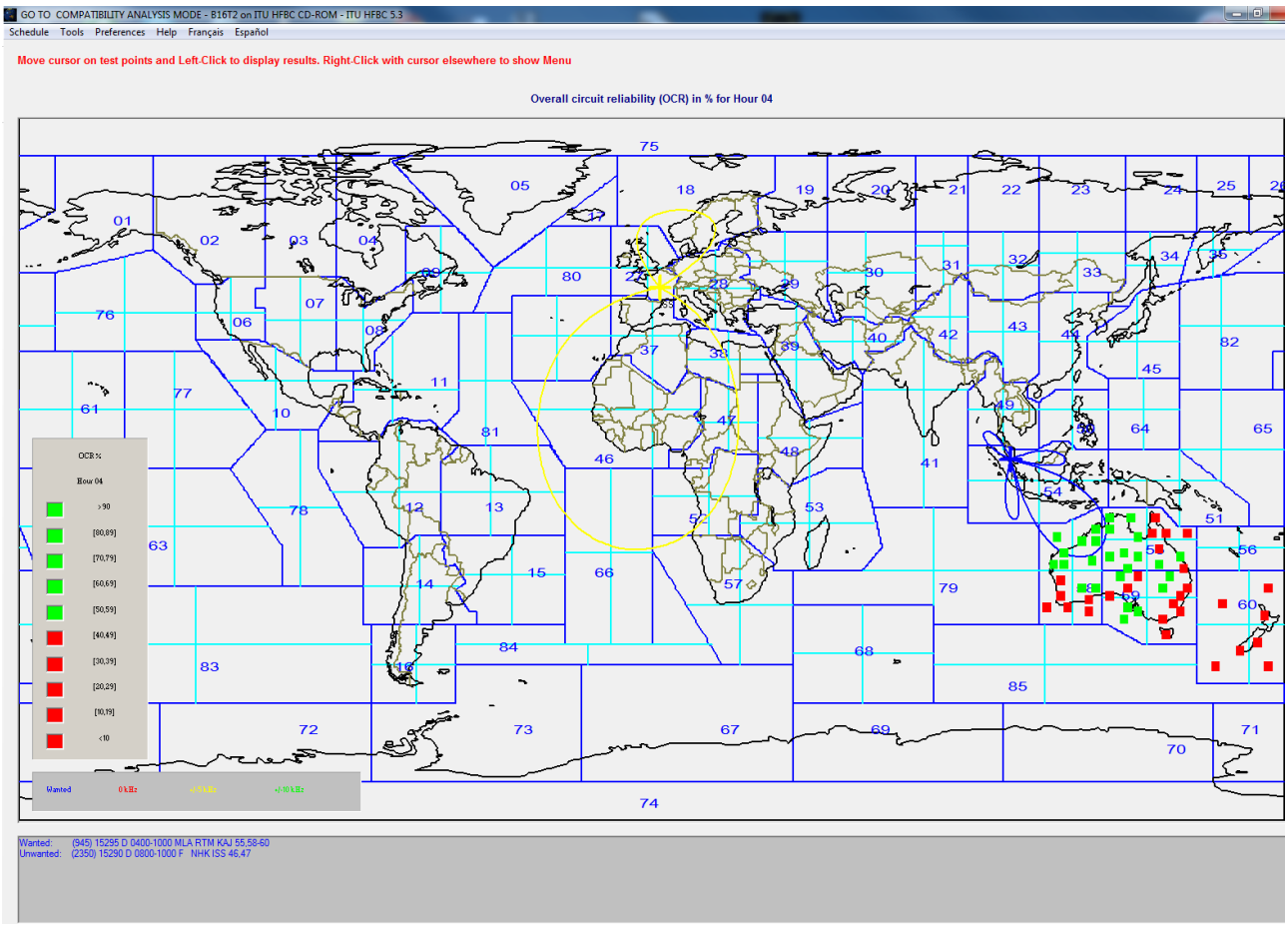
- Switch between the different types values: Minimum, Median, and Maximum of the currently displayed parameter.

From “Tools” menu, select “Select Values Types”, then “Minimum”/”Median”/”Maximum”.

19. Save results and print report:



20. Examine another requirement Ref. (945)
- From “Tools” – Show selected requirement.
- From “Tools” – Show all requirements
- Repeat steps from 14 to 18.



- "Skip" zones…..
- Change colors:
- Spectrum occupancy mode:
  Shows requirements targeting specific CIRAF zones in specific bands for specific hours

Exercise 4 – HFBC ANT 1.0 – HF transmitting antennas

Purpose and objectives:

Display horizontal and vertical patterns of an antenna.

Input data:

- Curtain antenna, half-wave dipole array, dual band, centre-fed, no reflector. Antenna type: CH1/1/0.3, antenna code: 700

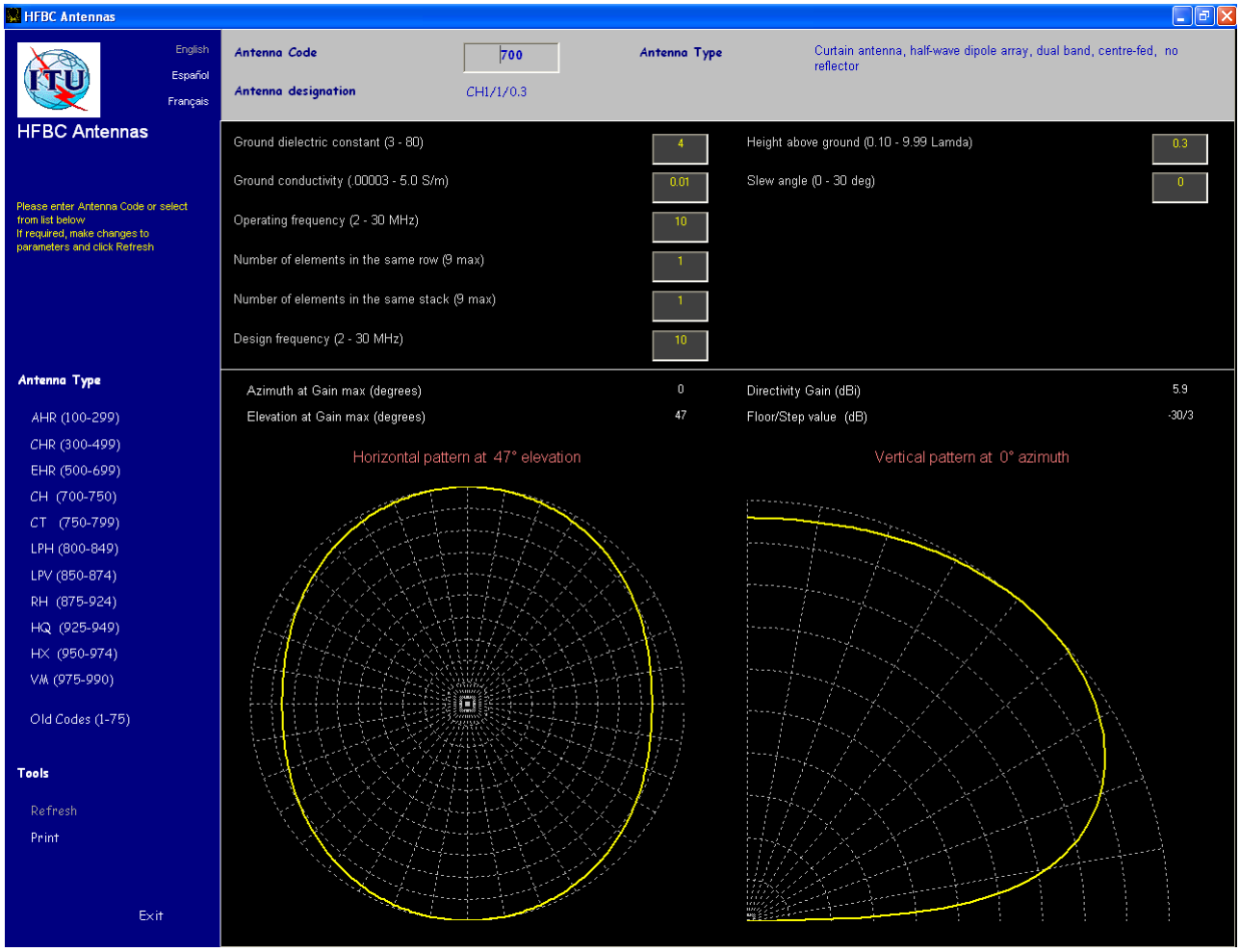
This software is often used to determine the code, the description, and the parameters of the commonly used HF transmission antennas.

Solution - Steps to be followed:

1. Execute the HFBC ANT 1.0 software.

2. Select the type of the antenna:

From the left menu "Antenna type", select "CH (700-750)", then from the list select "700 CH1/1/0.3".



The selected antenna and its characteristics are displayed.

3. Select an antenna by specifying its code:
Type the code in the "Antenna code box":

4. Print the antenna parameters:
From the left menu, click on “Print”.

5. Mouse-over the diagrams, display the attenuations.