

Radio Mobile in favour of 2m ARDF reflection simulation.

INSTRUCTION MANUAL (by ON4CHE)

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1. Installation and initialization

A. Installation of the program

Radio Mobile is freeware VE2DBE and can be downloaded:

<http://www.cplus.org/rmw/download/download.html>

Follow the instruction for installation.

For more information, a Yahoo group, dedicated to Radio Mobile, exists:

http://groups.yahoo.com/group/Radio_Mobile_Deluxe/

B. Modification of Map_link.txt

Modify Map_Link.txt with Notepad, remove the accents in front of the different URLs:

'www.expedia.com

'virtualearth.net

'map.access.mapquest.com

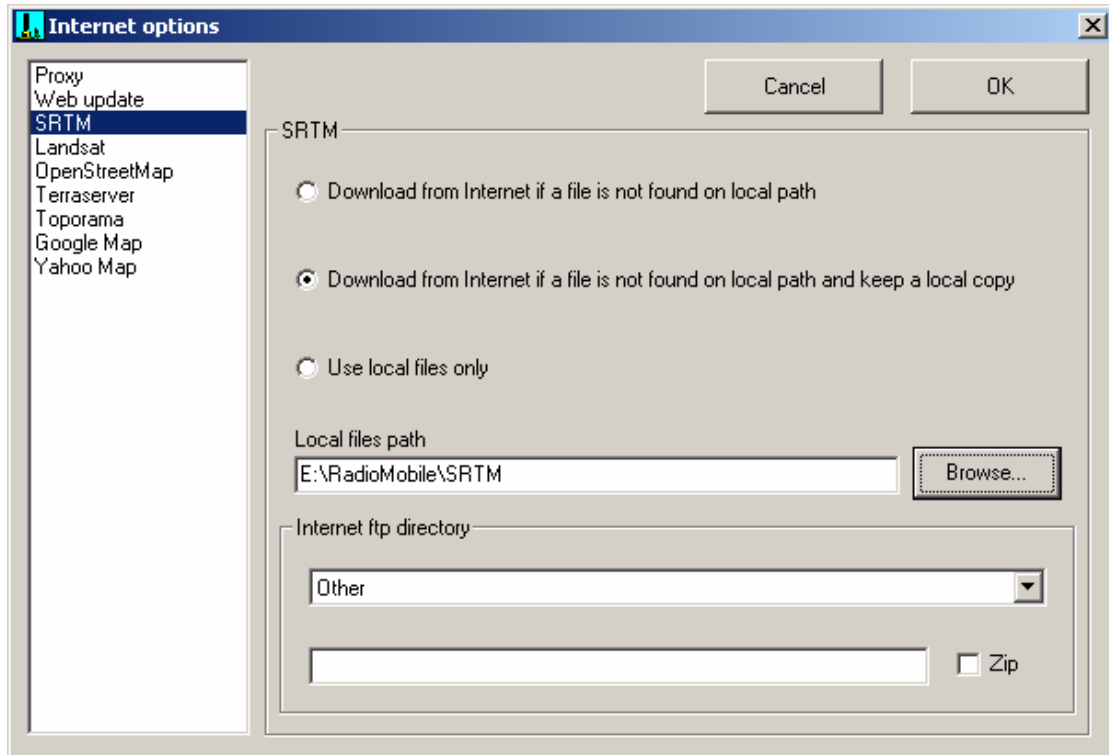
'google.com

'us.maps3.yimg.com/aerial.maps.yimg.com

C. Initialization

Start the program: rmweng.exe.

Go to “ Options – Internet “ and fill in the path where the different maps can be stored locally. Do this for all internet sources.



Be sure that your firewall doesn't block these sides and ports used by these sides!

2. Setup of trainings/competition area.

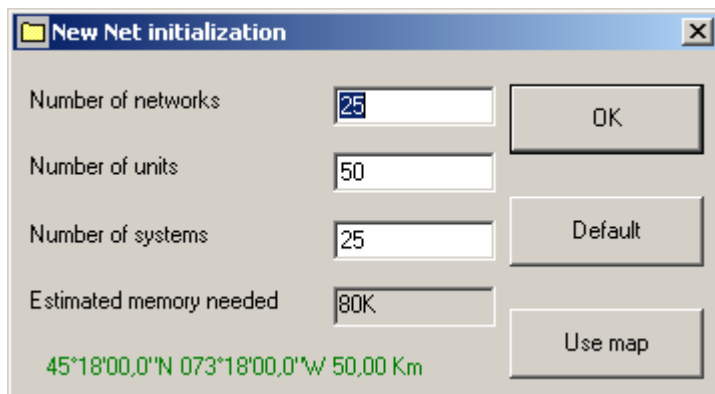
Next step is the creation of the simulation area, beacons and receiver. As Radio Mobile is originally created for the coverage calculation of a network, we have to create a network and define the units (receivers/transmitters) in it. After that, we will define the area where we want to do the simulation.

D. Network creation

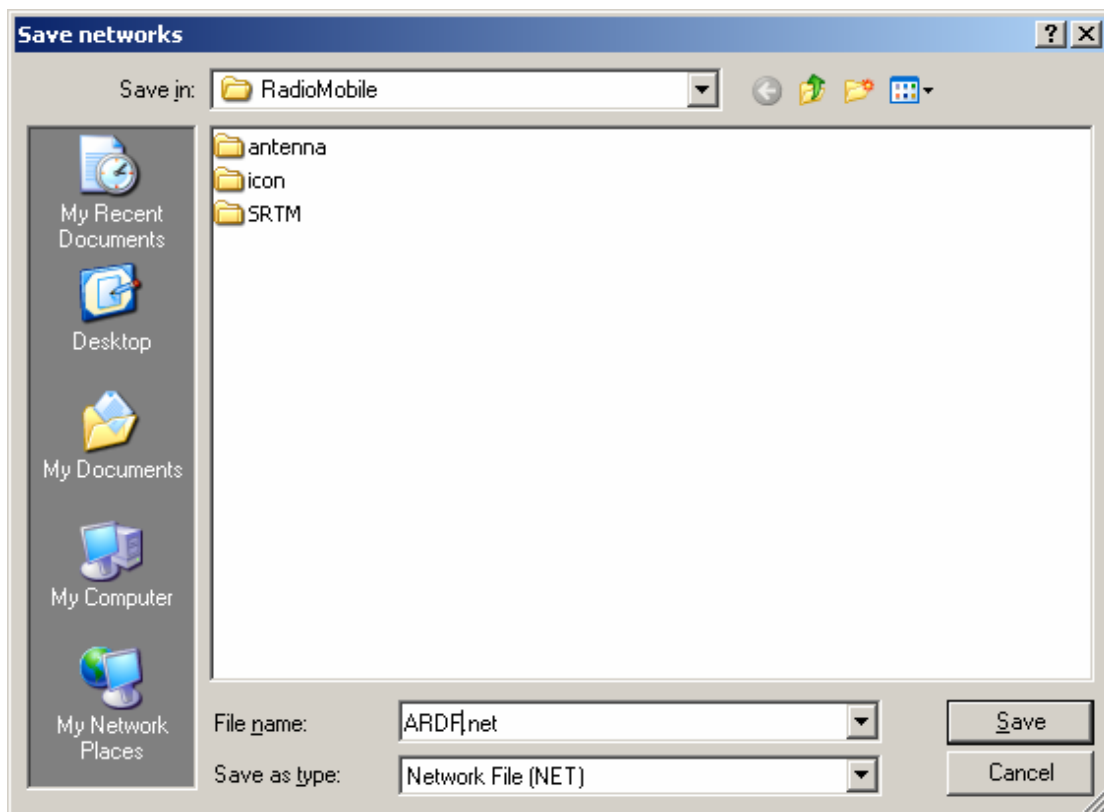
For every different area you want to simulate, we have to define a network.

For every fox (beacon) and every receiver, we need a unit.

The default values are ok to start our first simulation:



Save your net with a new name e.g. ARDF:



Fill in the network properties:

- Net name.
- Band: 144MHz – 145 MHz
- Polarization: Horizontal
- Climate: Maritime temperature over land.

Networks properties

List of all nets

- Sankt Engimar
- Net 2
- Net 3
- Net 4
- Net 5
- Net 6
- Net 7
- Net 8
- Net 9
- Net 10
- Net 11
- Net 12
- Net 13
- Net 14
- Net 15
- Net 16
- Net 17
- Net 18
- Net 19
- Net 20
- Net 21
- Net 22
- Net 23
- Net 24
- Net 25

Default parameters Copy Net Paste Net Cancel OK

Parameters Topology Membership Systems Style

Net name: Sankt Engimar

Surface refractivity (N-Units): 301

Minimum frequency (MHz): 144

Ground conductivity (S/m): 0,005

Maximum frequency (MHz): 145

Relative ground permittivity: 15

Polarization: ☐ Vertical ☒ Horizontal

Mode of variability: ☒ Spot % of time: 50 ☐ Accidental % of locations: 50 ☐ Mobile % of situations: 70 ☐ Broadcast

Additional loss: ☐ City ☐ Forest %: 0

Climate: ☐ Equatorial ☐ Continental sub-tropical ☐ Maritime sub-tropical ☐ Desert ☐ Continental temperate ☒ Maritime temperate over land ☐ Maritime temperate over sea

Networks properties

List of all nets

- Sankt Engimar
- Net 2
- Net 3
- Net 4
- Net 5
- Net 6
- Net 7
- Net 8
- Net 9
- Net 10
- Net 11
- Net 12
- Net 13
- Net 14
- Net 15
- Net 16
- Net 17
- Net 18
- Net 19
- Net 20
- Net 21
- Net 22
- Net 23
- Net 24
- Net 25

Default parameters Copy Net Paste Net Cancel OK

Parameters **Topology** Membership Systems Style

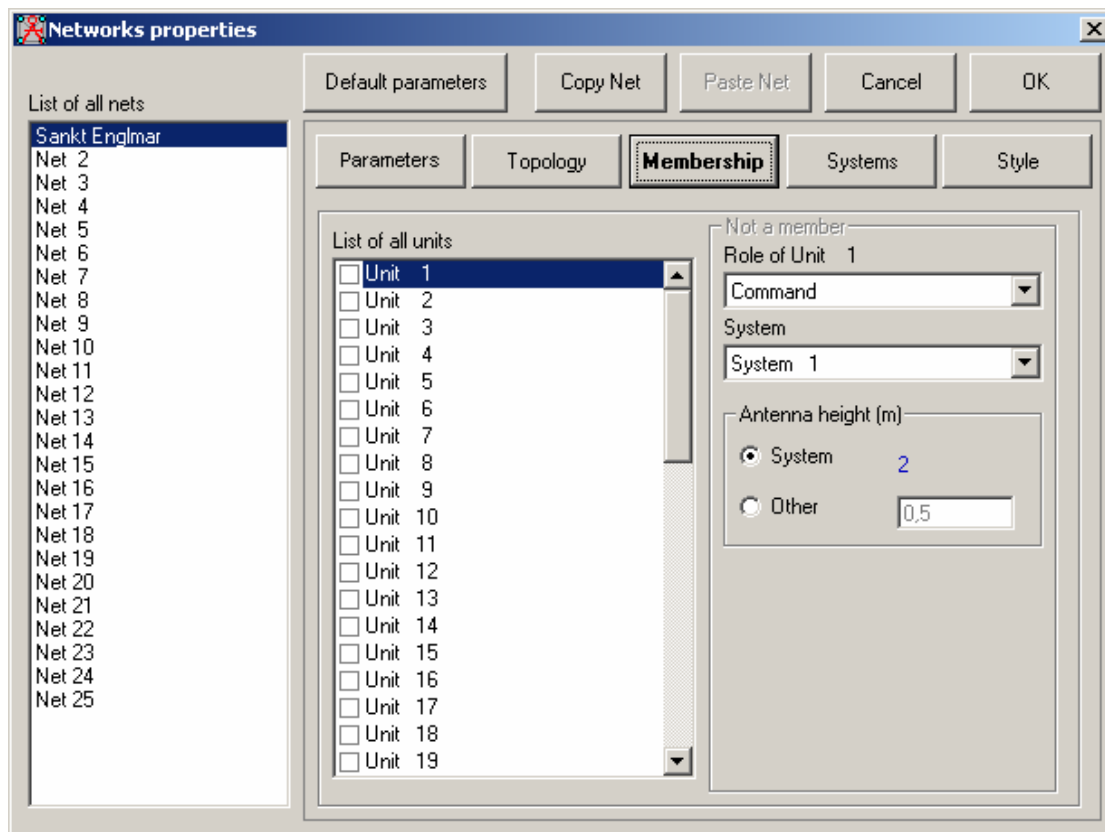
☒ Visible

☒ Voice net (Command/Subordinate/Rebroadcast)

☐ Data net, star topology (Master/Slave)

☐ Data net, cluster (Node/Terminal)

Membership will be defined later. It defines which Rx and Tx is active.



We will define 2 different systems: a receiver and a transmitter:

You can define the receiver with a yagi antenna, but for our purpose, we will use a omni directional antenna to avoid the work to changing always the direction of the antenna.

This is the example with yagi:

Networks properties

Default parameters Copy Net Paste Net Cancel OK

List of all systems

- Receiver
- System 2
- System 3
- System 4
- System 5
- System 6
- System 7
- System 8
- System 9
- System 10
- System 11
- System 12
- System 13
- System 14
- System 15
- System 16
- System 17
- System 18
- System 19
- System 20
- System 21
- System 22
- System 23
- System 24
- System 25

Parameters Topology Membership **Systems** Style

Select from Radiosys.dat

System name: Receiver

Transmit power (Watt): 1E-12 (dBm): -90

Receiver threshold (µV): 1 (dBm): -107

Line loss (dB): 0 (Cable+cavities+connectors)

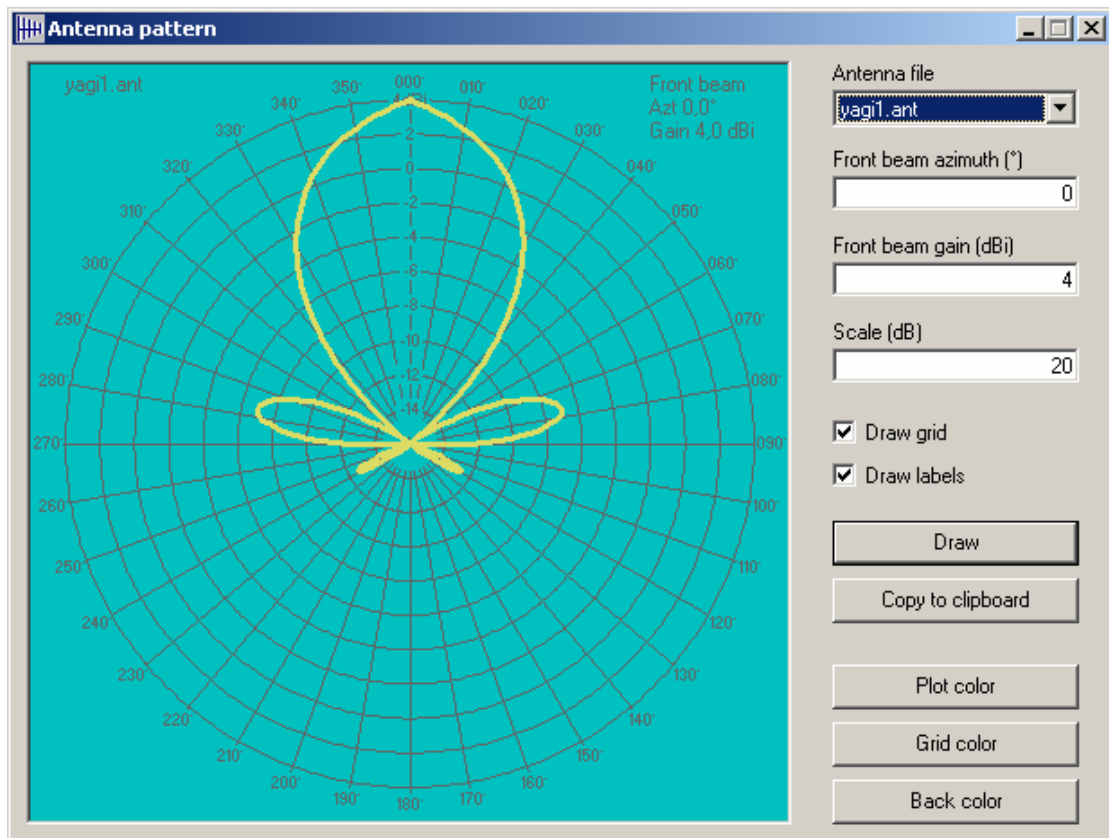
Antenna type: yagi1.ant View

Antenna gain (dBi): 4 (dBd): 1.85

Antenna height (m): 2 (Above ground)

Additional cable loss (dB/m): 0 (If antenna height differs)

Add to radiosys.dat Remove from radiosys.dat



This without yagi:

Networks properties

Default parameters Copy Net Paste Net Cancel OK

List of all systems

- Receiver
- Transmitter
- System 3
- System 4
- System 5
- System 6
- System 7
- System 8
- System 9
- System 10
- System 11
- System 12
- System 13
- System 14
- System 15
- System 16
- System 17
- System 18
- System 19
- System 20
- System 21
- System 22
- System 23
- System 24
- System 25

Parameters Topology Membership **Systems** Style

Select from Radiosys.dat

System name Receiver

Transmit power (Watt) 1E-12 (dBm) -90

Receiver threshold (µV) 1 (dBm) -107

Line loss (dB) 0 (Cable+cavities+connectors)

Antenna type omni.ant View

Antenna gain (dBi) 4 (dBd) 1.85

Antenna height (m) 1 (Above ground)

Additional cable loss (dB/m) 0 (If antenna height differs)

Add to radiosys.dat Remove from radiosys.dat

And the transmitter:

Networks properties

Default parameters Copy Net Paste Net Cancel OK

List of all systems

- Receiver
- Transmitter
- System 3
- System 4
- System 5
- System 6
- System 7
- System 8
- System 9
- System 10
- System 11
- System 12
- System 13
- System 14
- System 15
- System 16
- System 17
- System 18
- System 19
- System 20
- System 21
- System 22
- System 23
- System 24
- System 25

Parameters Topology Membership **Systems** Style

Select from Radiosys.dat

System name Transmitter

Transmit power (Watt) 1 (dBm) 30

Receiver threshold (µV) 1 (dBm) -107

Line loss (dB) 0 (Cable+cavities+connectors)

Antenna type omni.ant View

Antenna gain (dBi) 4 (dBd) 1.85

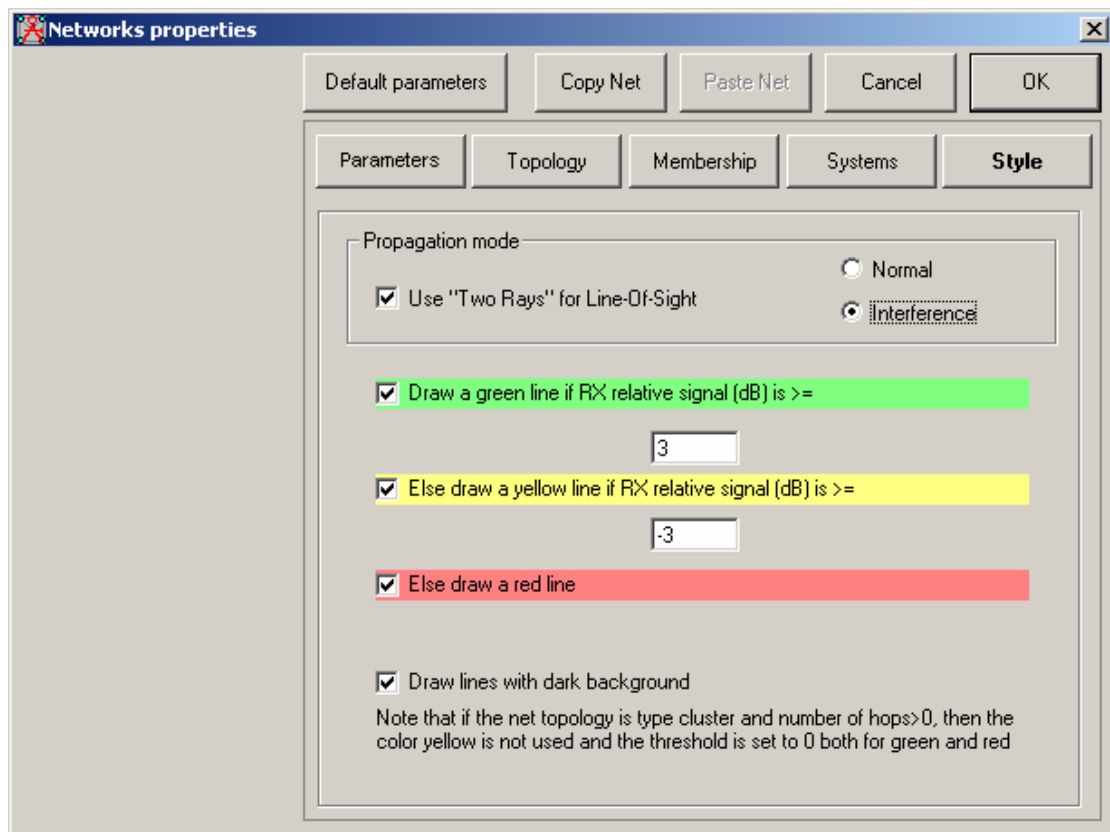
Antenna height (m) 2 (Above ground)

Additional cable loss (dB/m) 0 (If antenna height differs)

Add to radiosys.dat Remove from radiosys.dat

Style:

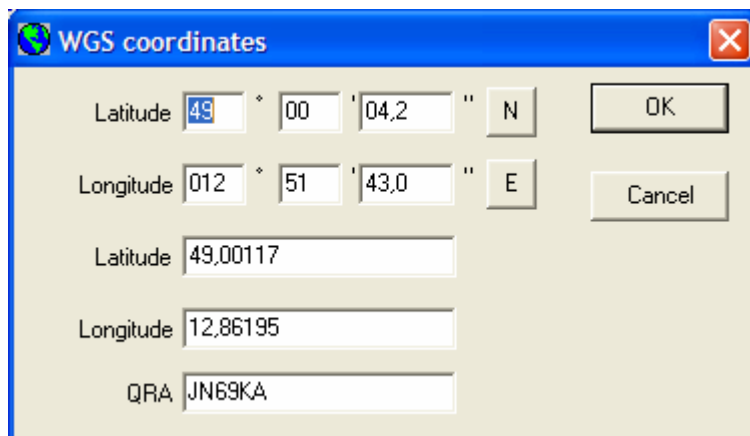
- Propagation mode: Use “Two Rays” for Line-Of-Sight with interference.



Save everything by pushing “OK” button.

E. Area selection

Choose the right area in the map properties: file – map properties.



Properties of ..\sankt englar.map

Centre
 49°00'04,2"N 012°51'43,0"E
 JN69KA
 Latitude: 49.00117 Longitude: 12.86195
 Use cursor position
 World map
 Select a city name
 Enter LAT LON or QRA
 Select a unit

Size (pixel)
 Width(pixels): 1280 Height (pixels): 1024

Size (km)
 Width(km): 6.25 Height (km): 5.00

Elevation data source

	Drive or path	Top layer
SRTM	c:\geodata\srtm1	Browse...
None	c:\geodata\gtopo30	Browse...
None	c	Browse...
None	c	Browse...
None	c	Browse...

☒ Ignore missing files

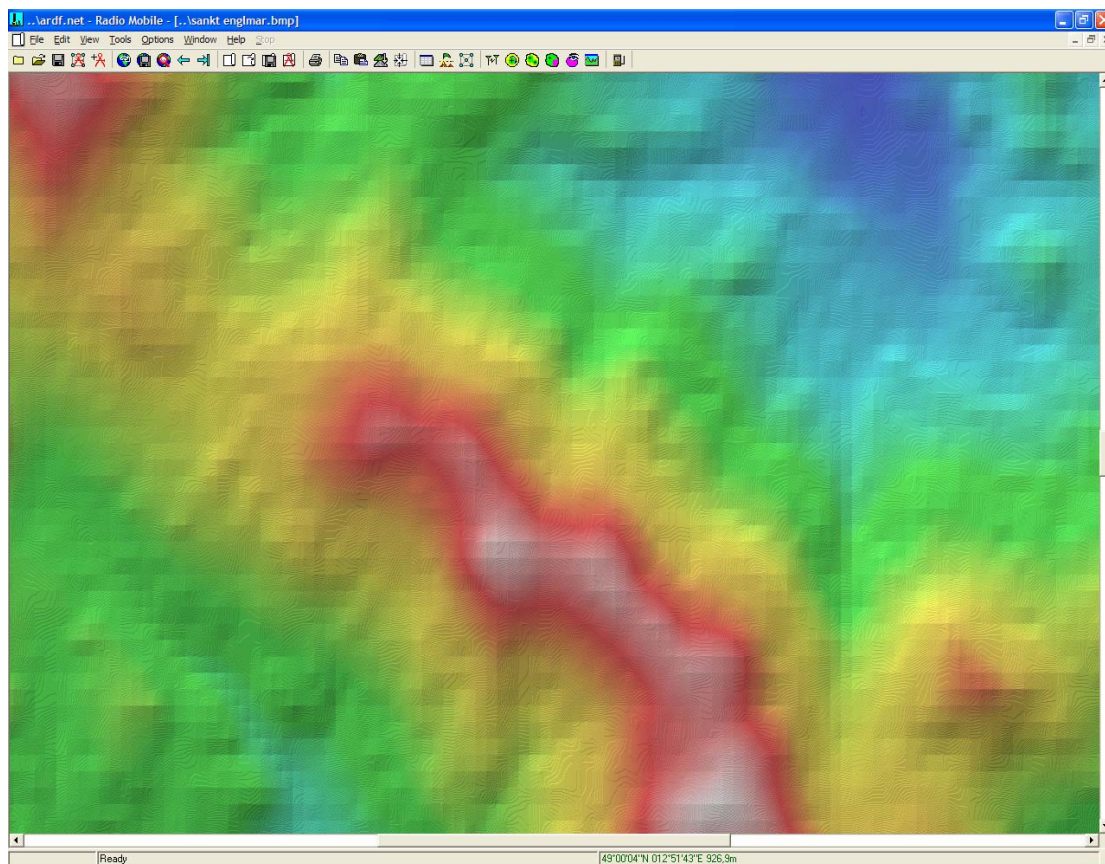
Bottom layer
 Initialize matrix with elevation (m): 0

Extract
Cancel

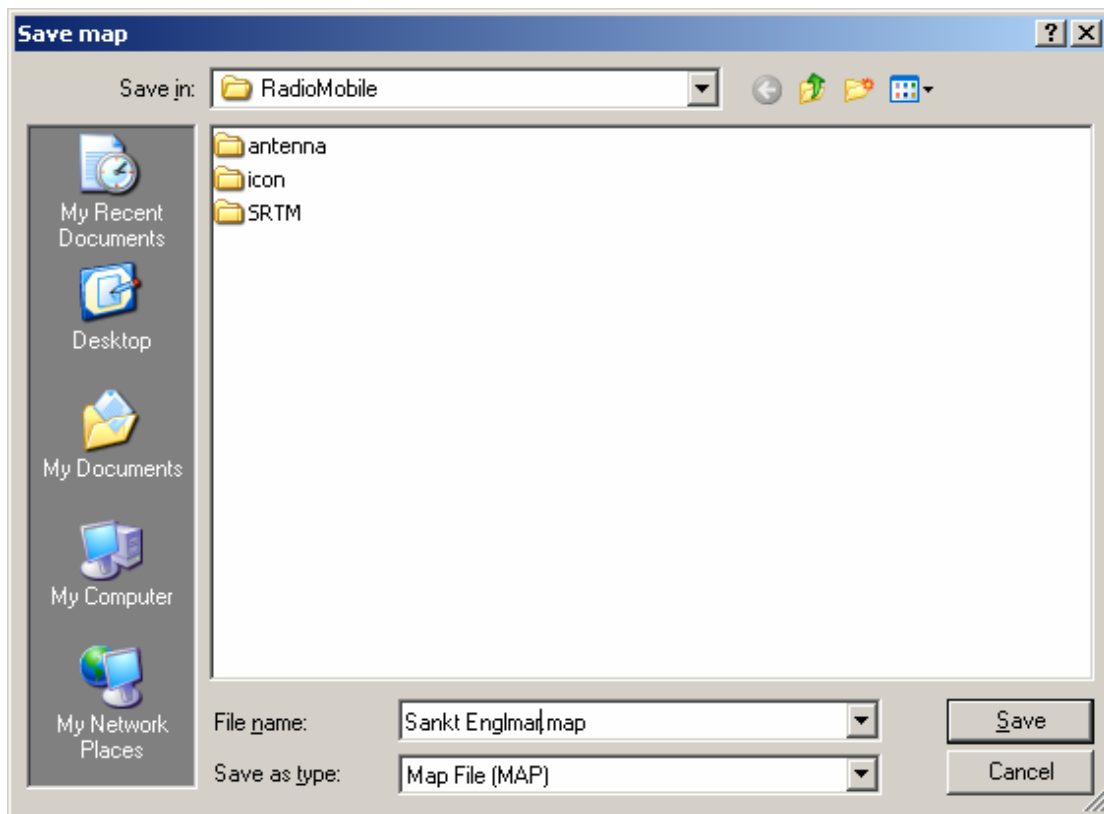
Top Left: 49°01'25"N 012°49'09"E
 Top Right: 49°01'25"N 012°54'17"E
 Bottom Left: 48°58'43"N 012°49'09"E
 Bottom Right: 48°58'43"N 012°54'17"E

☐ Adjust units elevation
☐ Merge pictures
☐ Force gray scale

Pushing the Extract button, we become the elevation data:

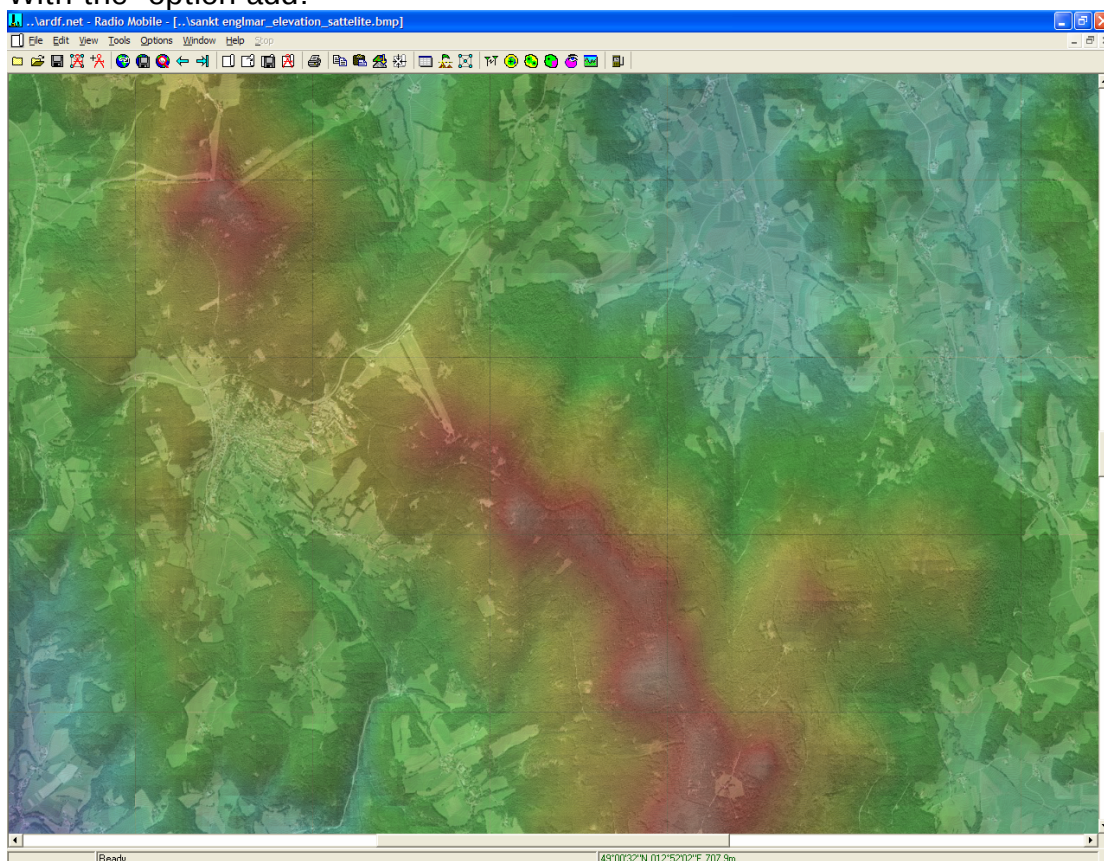


And save the new map information:



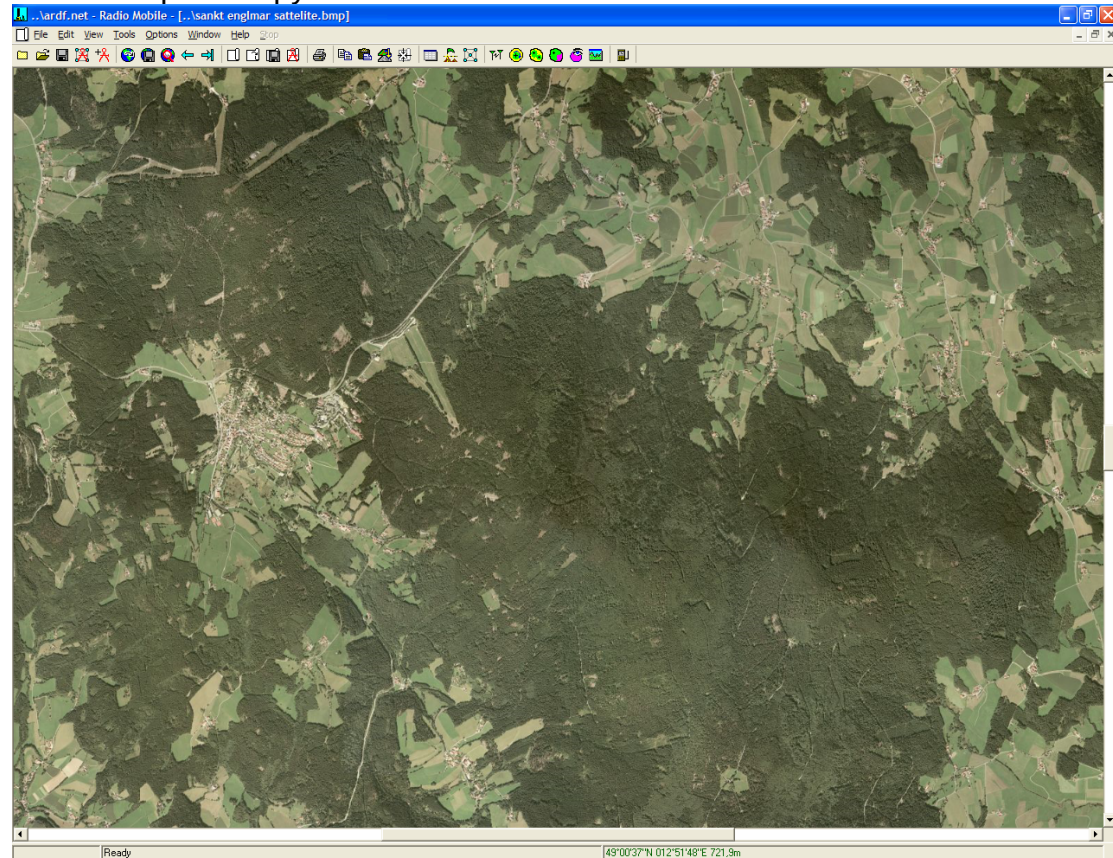
To get the satellite photo from the same area, switch on the “Merge picture” flag. Adjust the scale to get the satellite photo from one of the sources (in this case VirtualEarth).

With the option add:



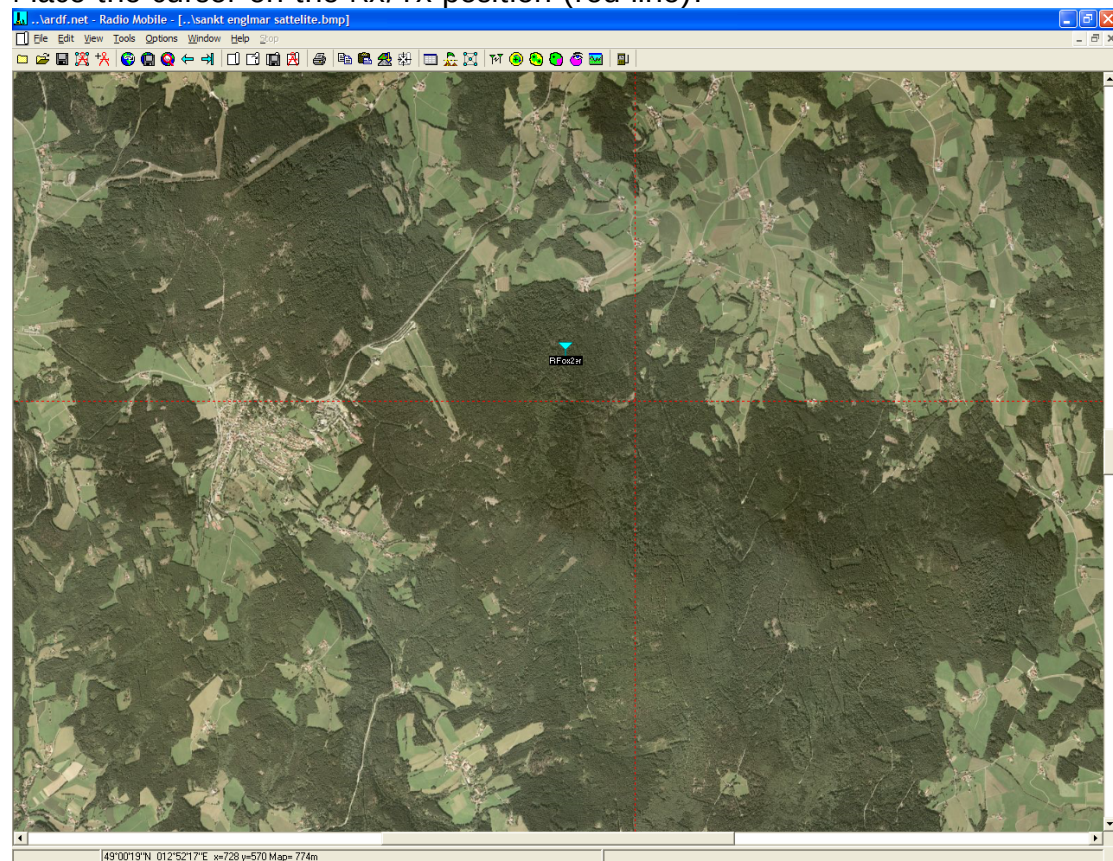
(save the new picture)

With the option copy:

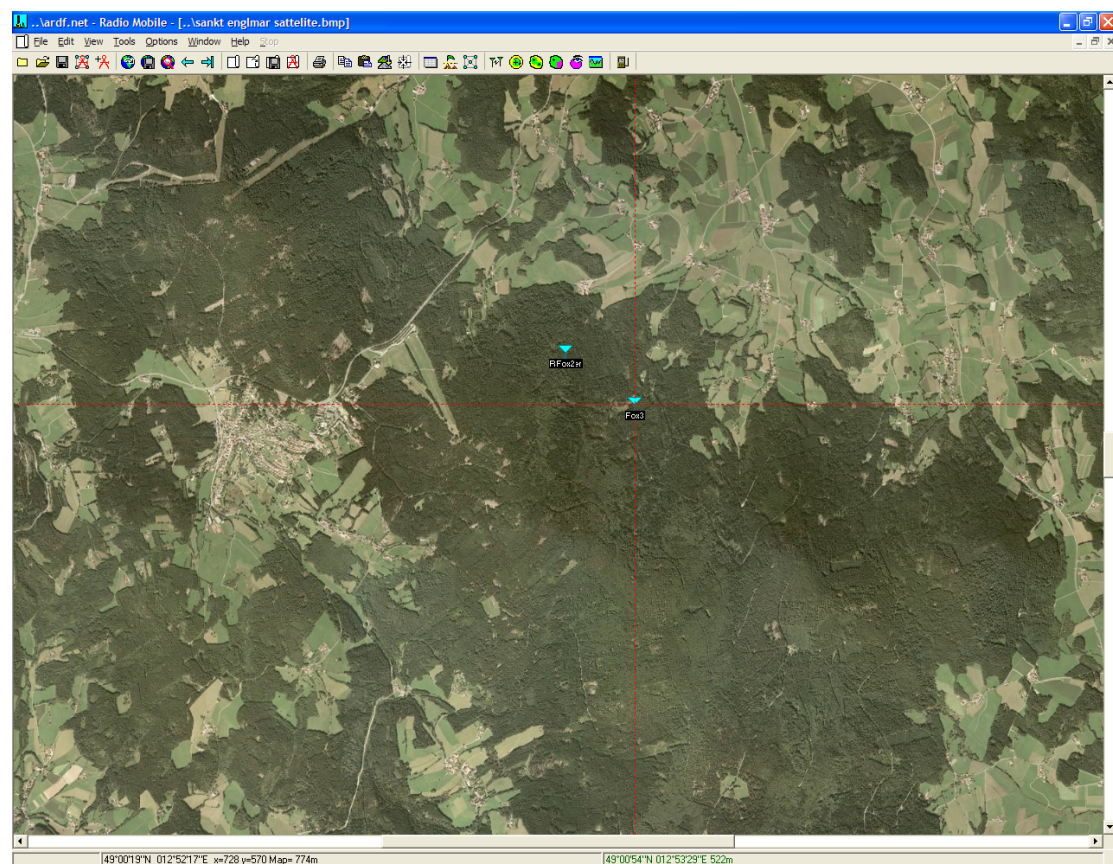


F. Define Rx/Tx position

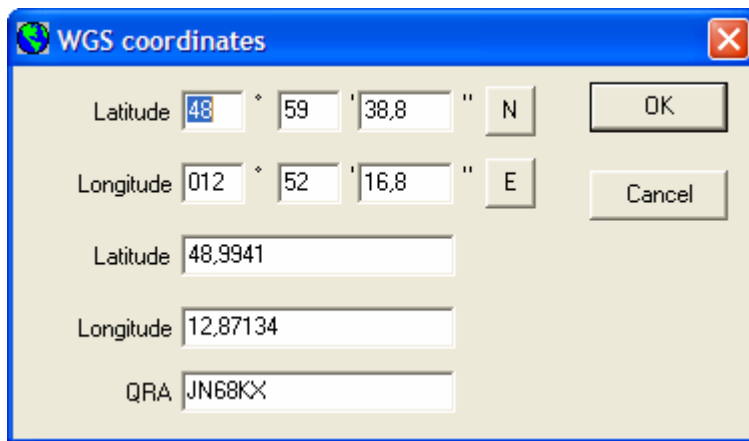
Place the cursor on the Rx/Tx position (red line):



Select: file – unit properties (select unit at cursor position):



It's also possible to enter the fox position by his coordinates:



WGS coordinates

Latitude ° ' " N

Longitude ° ' " E

Latitude

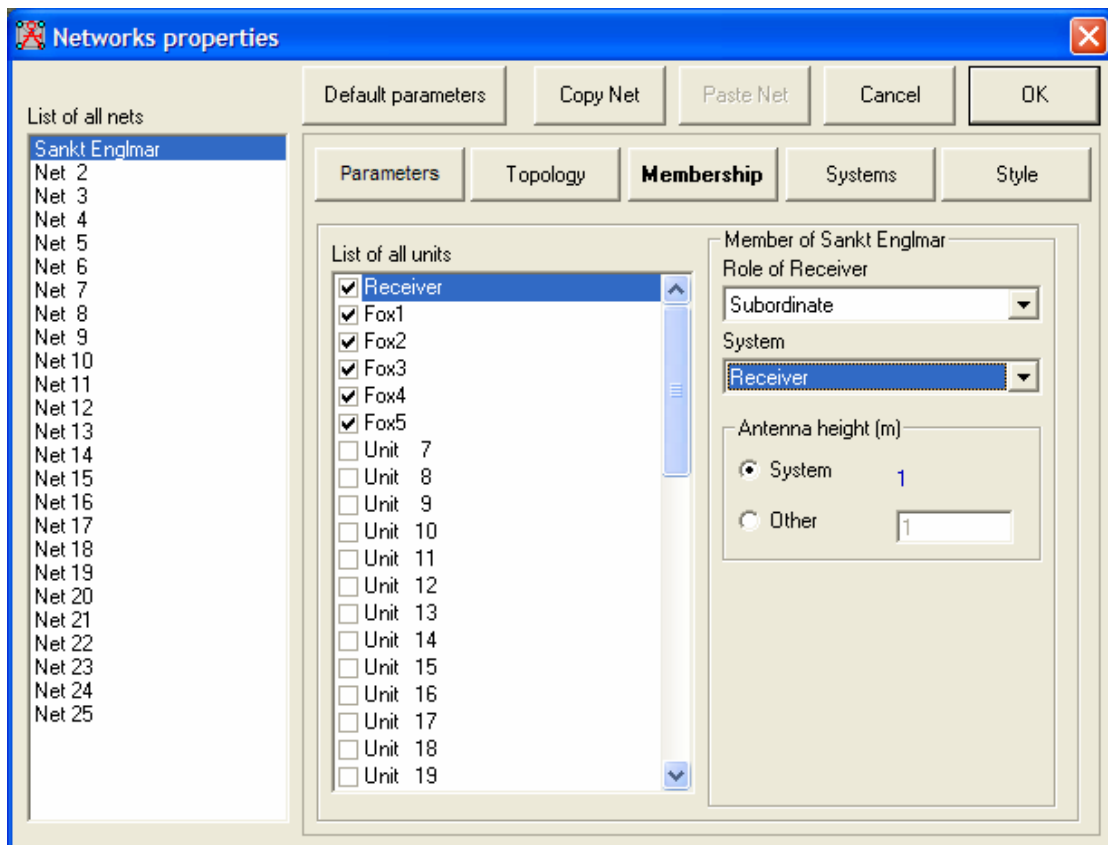
Longitude

QRA

G. Add Rx/Tx to the network:

Add the receiver and foxes to the network in the network properties option:

For the receiver:



Networks properties

List of all nets

- Sankt Englmar
- Net 2
- Net 3
- Net 4
- Net 5
- Net 6
- Net 7
- Net 8
- Net 9
- Net 10
- Net 11
- Net 12
- Net 13
- Net 14
- Net 15
- Net 16
- Net 17
- Net 18
- Net 19
- Net 20
- Net 21
- Net 22
- Net 23
- Net 24
- Net 25

Default parameters Copy Net Paste Net Cancel OK

Parameters Topology **Membership** Systems Style

List of all units

- ☒ Receiver
- ☒ Fox1
- ☒ Fox2
- ☒ Fox3
- ☒ Fox4
- ☒ Fox5
- ☐ Unit 7
- ☐ Unit 8
- ☐ Unit 9
- ☐ Unit 10
- ☐ Unit 11
- ☐ Unit 12
- ☐ Unit 13
- ☐ Unit 14
- ☐ Unit 15
- ☐ Unit 16
- ☐ Unit 17
- ☐ Unit 18
- ☐ Unit 19

Member of Sankt Englmar

Role of Receiver

Subordinate

System

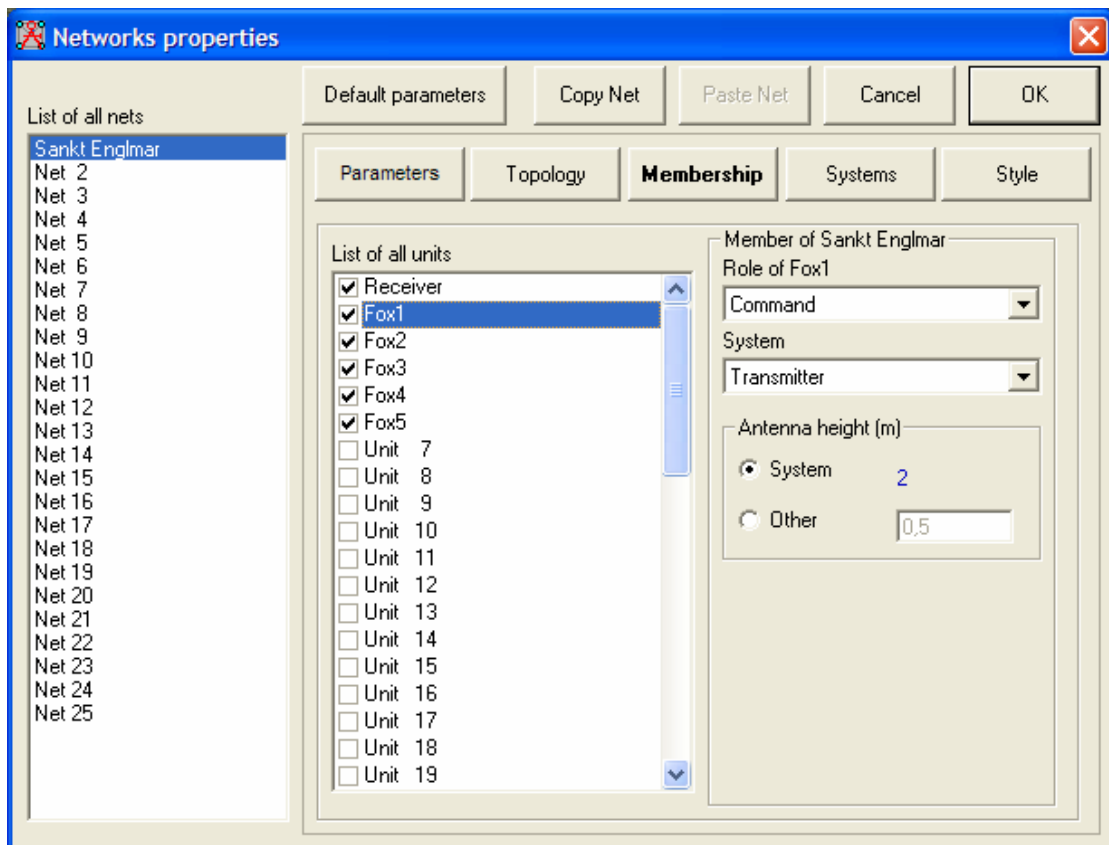
Receiver

Antenna height (m)

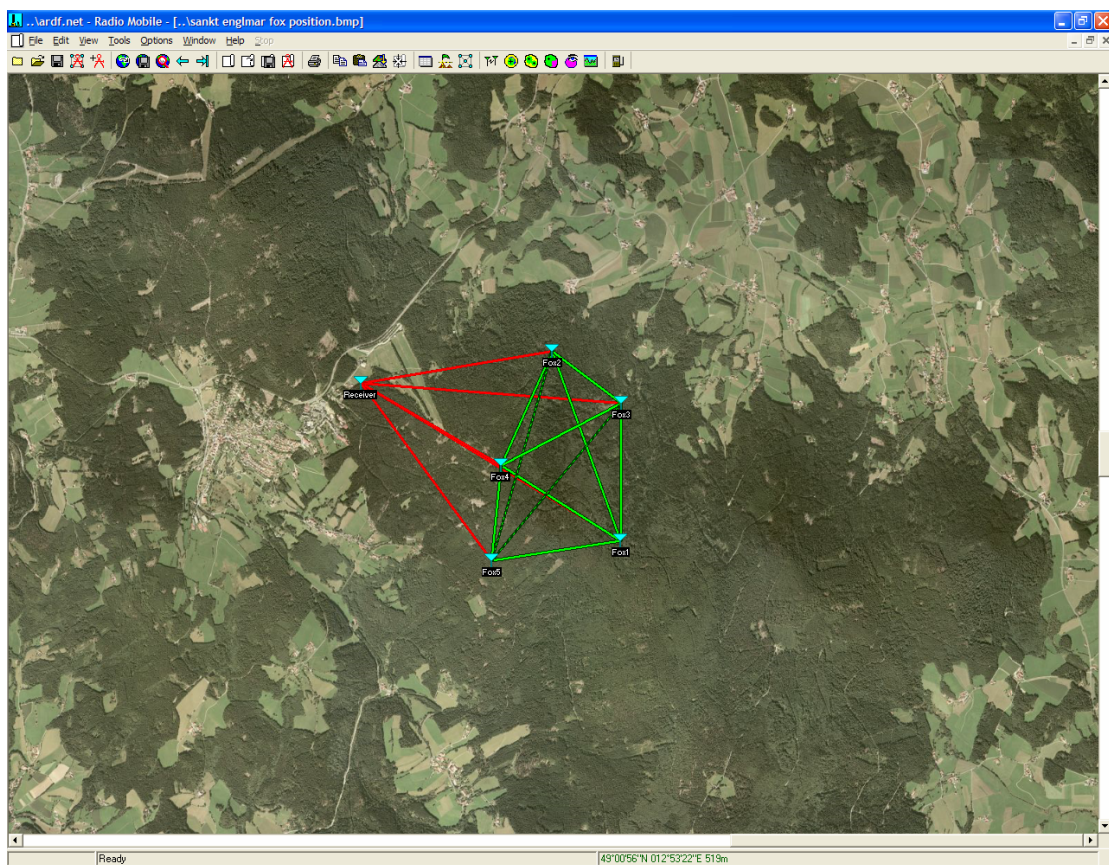
☒ System 1

☐ Other

For the foxes:



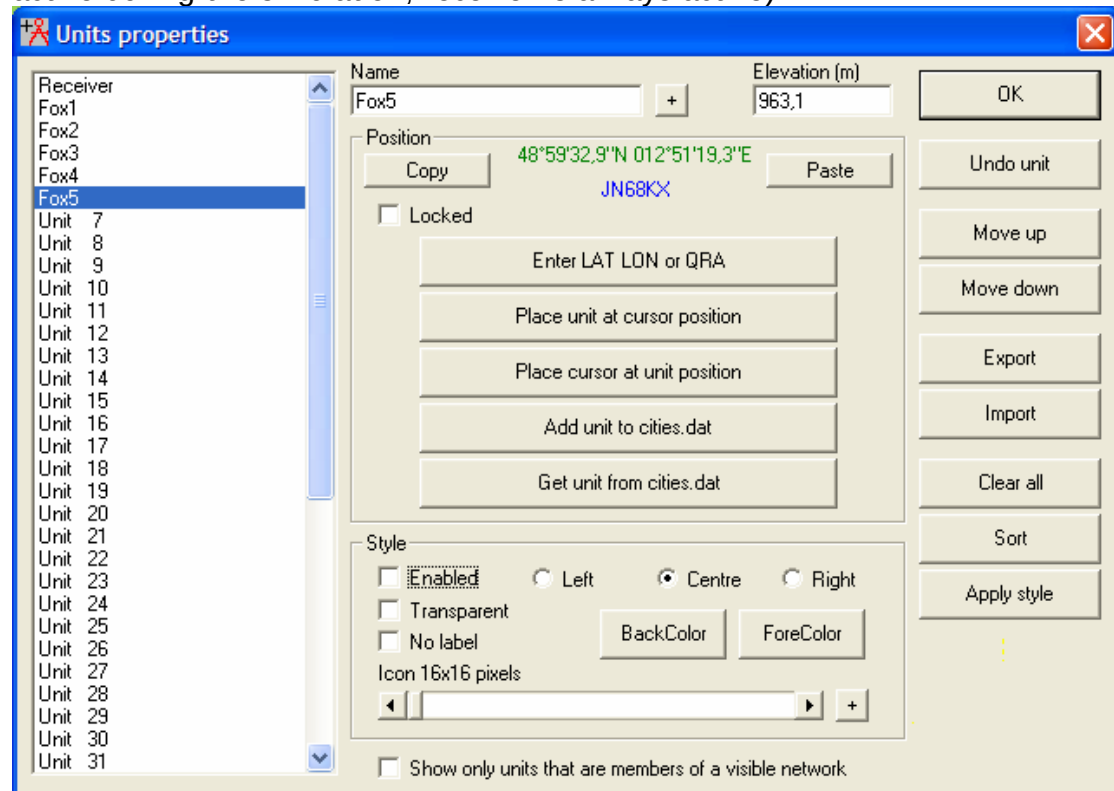
And everything is ready to start the simulation:



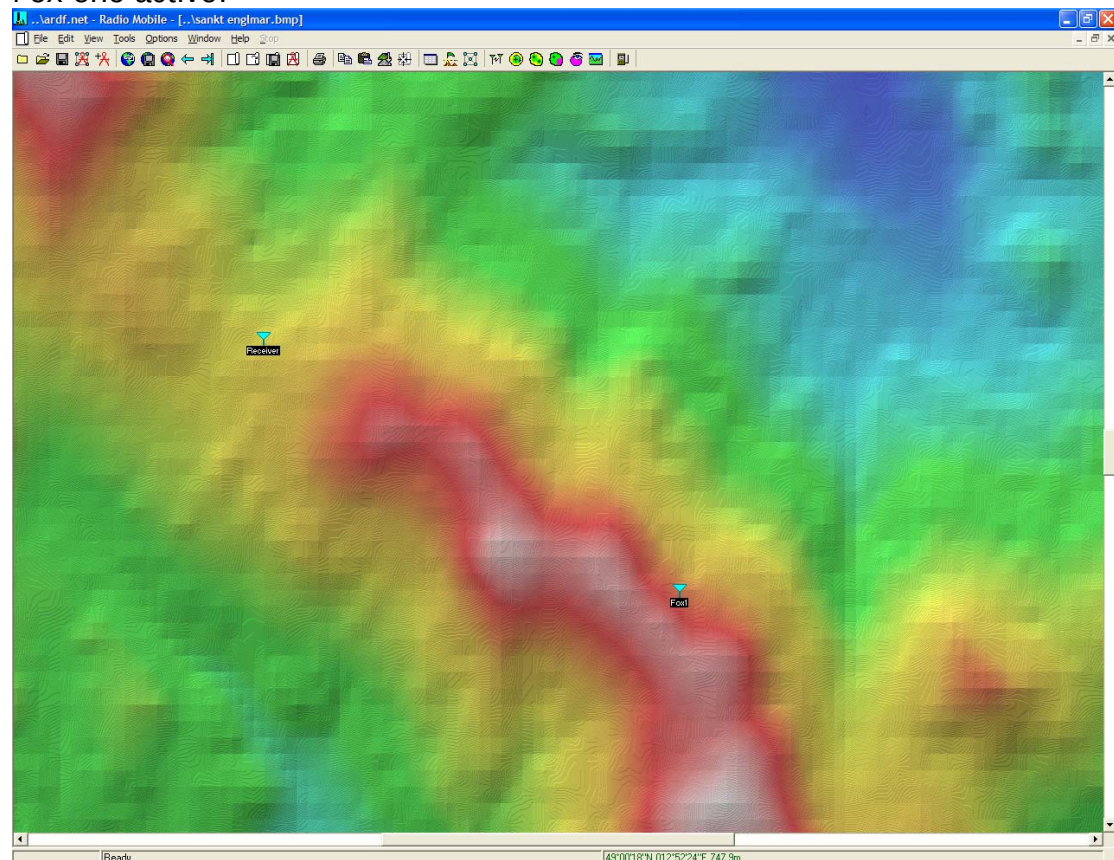
3. Reflection simulation

H. Activation/Deactivation of a transmitter/receiver

Select the unit properties to enable or disable the foxes (only one fox should be active during the simulation, receiver is always active):



Fox one active:



1. Start simulation

Select “Polar radio coverage” to start the simulation:

Single polar Radio coverage

Centre unit: Fox1 Draw

Mobile unit: Receiver Cancel

Network: Sankt Englmar

Link Direction:
☒ Centre Tx - Mobile Rx
☐ Centre Rx - Mobile Tx

Radial Range (km)
Minimum: 0,01 Maximum: 10

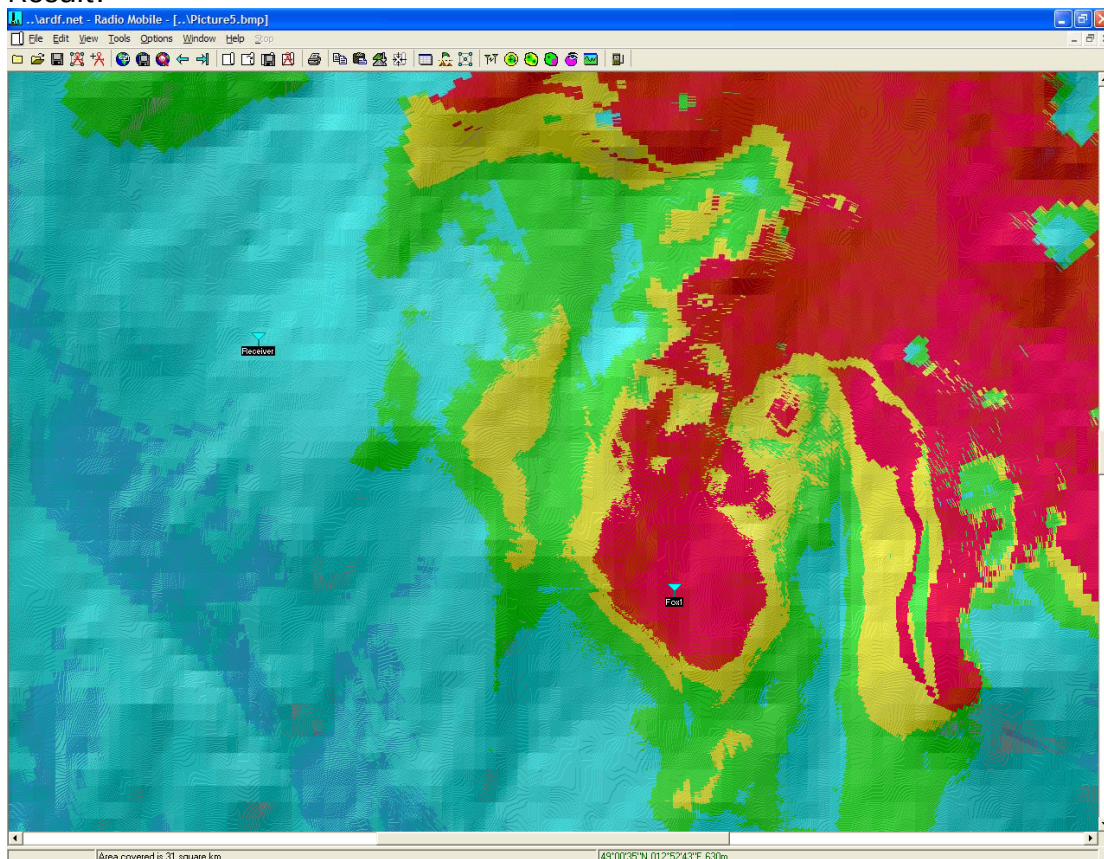
Plot:
☒ Contour line Color
☒ Fill area Color
☒ Rainbow
☐ Solid ☐ Blur

Threshold:
☒ S-Unit ☒ Auto set
☐ dBm From: 1
☐ μ V To: ☐
☐ dB μ V/m 40

Azimuth Range (°)
Minimum: 0 Maximum: 360 Step: 1

Antenna pattern:
omni.ant
☒ Use network antenna settings
Beam azimuth(°): 0 View pattern
☐ Draw ☒ Draw background
☐ Small

Result:



J. Redraw the units on the simulated results

Redraw the units on the simulated result by selecting the unit properties and pushing immediately on OK.

K. Saving the results

Save the simulation in a new picture (save picture as ...).

Open a picture (file – new picture) with only elevation data before starting a second simulation!