

# Outdoor Radio Simulation

## An introduction to “Radio Mobile”

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# Goals

- To understand how a simulation software can help you to do a viability study
- Introduce the tool “Radio Mobile”
- Provide the “basics” or “building blocks” of the software to speed up your learning

# The goal is NOT

- To provide a step-by-step guide to the software
- Cover all the “advanced” options

# Table of Contents

- What is Radio Mobile?
- What is SRTM?
- Installing Radio Mobile
- Introduction to Radio Mobile (Building Blocks)
- Practical Demo

# What is Radio Mobile?

- Free Software written in VB by Roger Coudé
- Used to predict performance in outdoor radio links
- Initially written for HAM radio (UHF/VHF)
- Uses a model known as *Irregular Terrain Model (ITM)*
- The model works in the range of 2 – 20 Ghz
- The software can be used in WLAN/WMAN simulations

# What is needed?

- Knowledge of the GPS position of our site
- Digital cartography
- Technical datasheet of the equipment we want/plan to use
- Information about the type of terrain, weather of the area (advanced option)

# What is SRTM?

- Stands for “*Shuttle Radar Topography Mission*”
- A type of digital cartography
- Radar images with a resolution of 30 - 90 meters
- Africa is sampled with 3 arc second
- Images are freely downloadable
- Requires to be online

# Installing Radio Mobile

- Install the Visual Basic Runtime (SP6)
- Download and uncompress 6 ZIP files from:  
<http://www.cplus.org/rmw/download.html>
- Radio Mobile has not an installer
- Radio Mobile does not have lots of documentation
- Radio Mobile is worth the effort to learn!

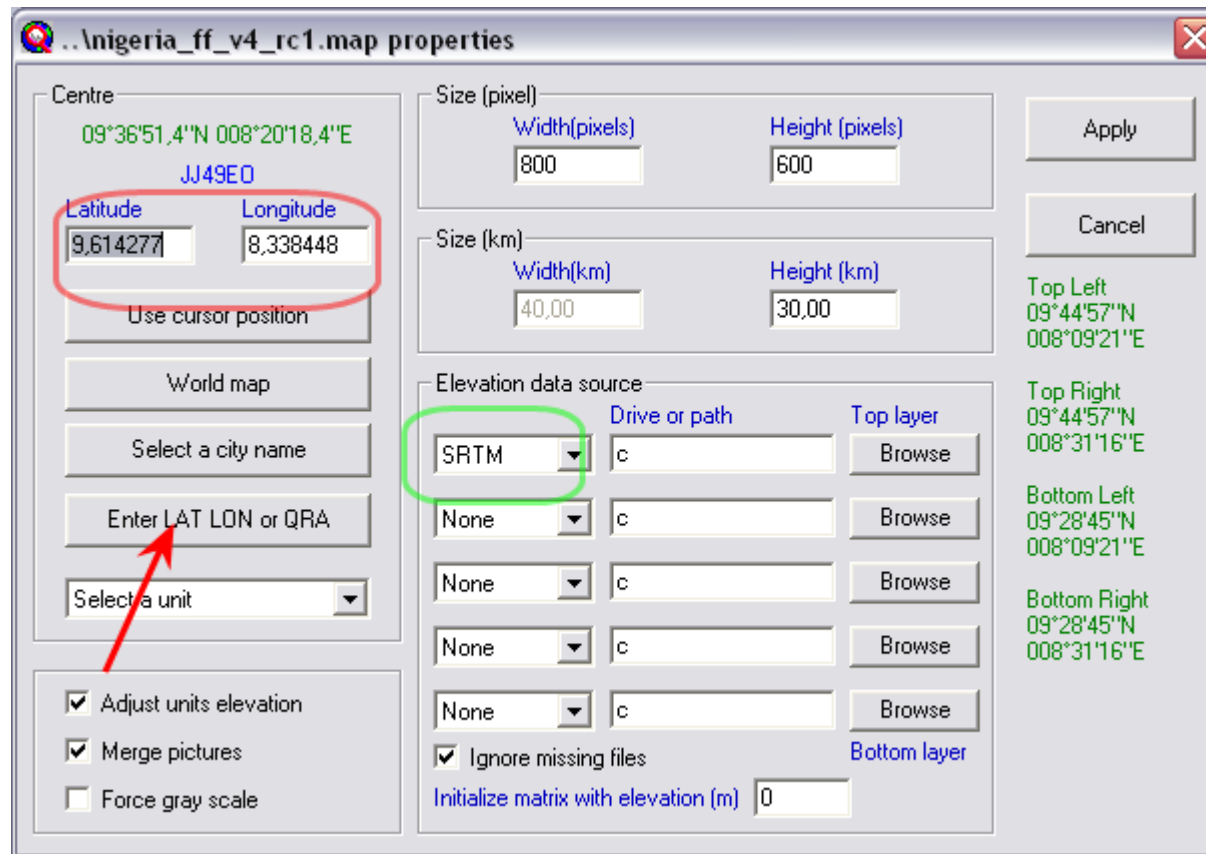
# Radio Mobile Building Blocks

- Position and cartography
  - Where are we?
  - What maps do we want to use?
- Radio Network Properties and Topology
  - What equipment do we want to use?
  - Where do we place the units?

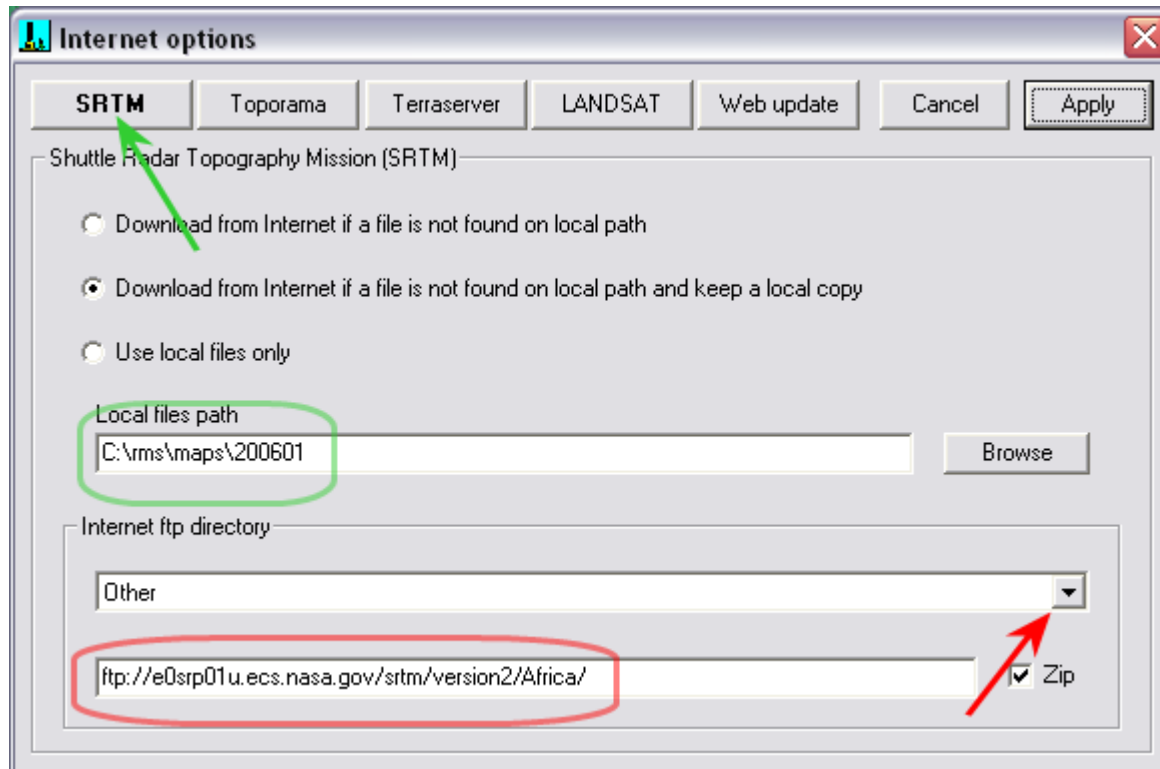
# Radio Mobile Building Blocks

- Radio Link Budget Analysis
  - What performance has every link?
- Coverage Areas
  - What is the maximum distance served by an access point?

# Position and Cartography



# Position and Cartography



# Previous Definitions

- Network: Logical Group of Units
- System: Specification of “radio kits”. Not the units. See them as “templates”
- Unit: The Physical units associated to a certain “system” type
- Membership: Define (1) the units belong to a network and (2) the type of system that each unit operates.

# Radio Network Properties and Topology

1. Create a new logical network

File > Network Properties > Parameters

2. Define the types of systems that will be in the network

File > Network Properties > Systems

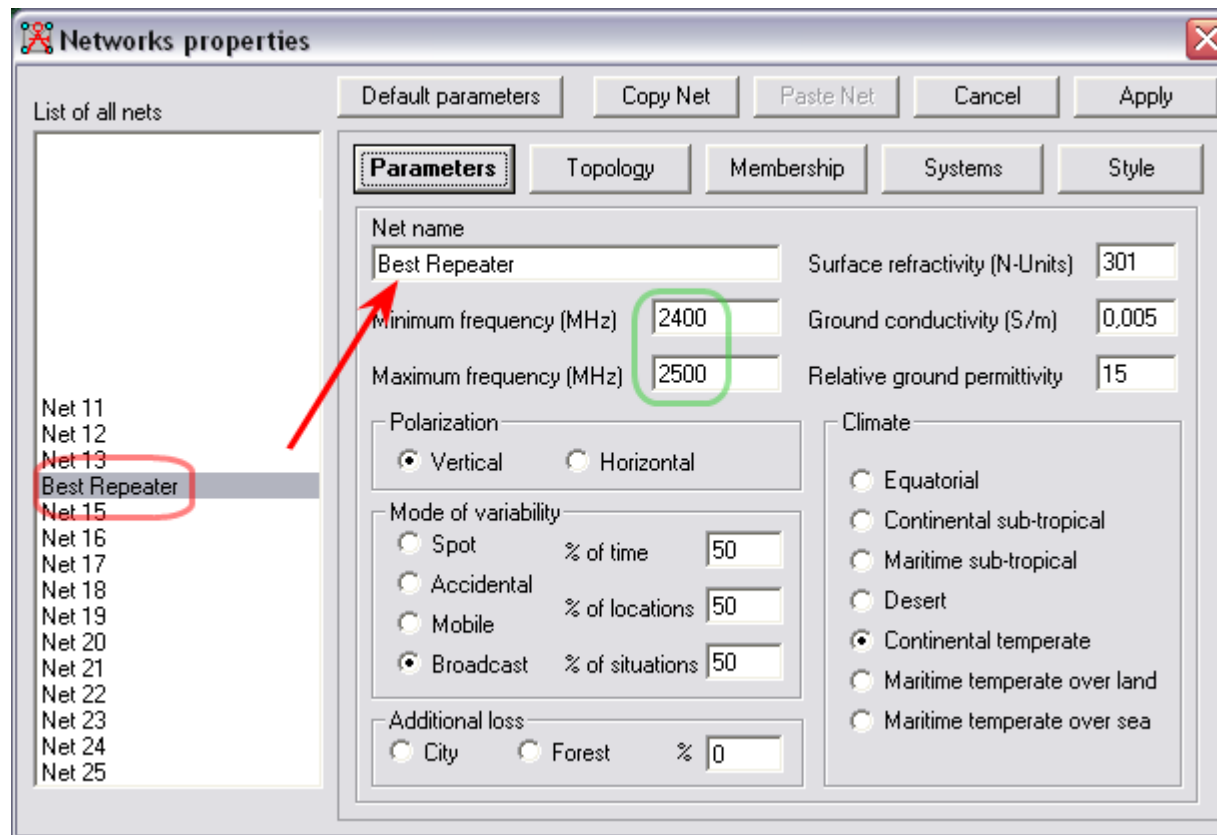
3. Create and place Units in a physical position

File > Unit Properties

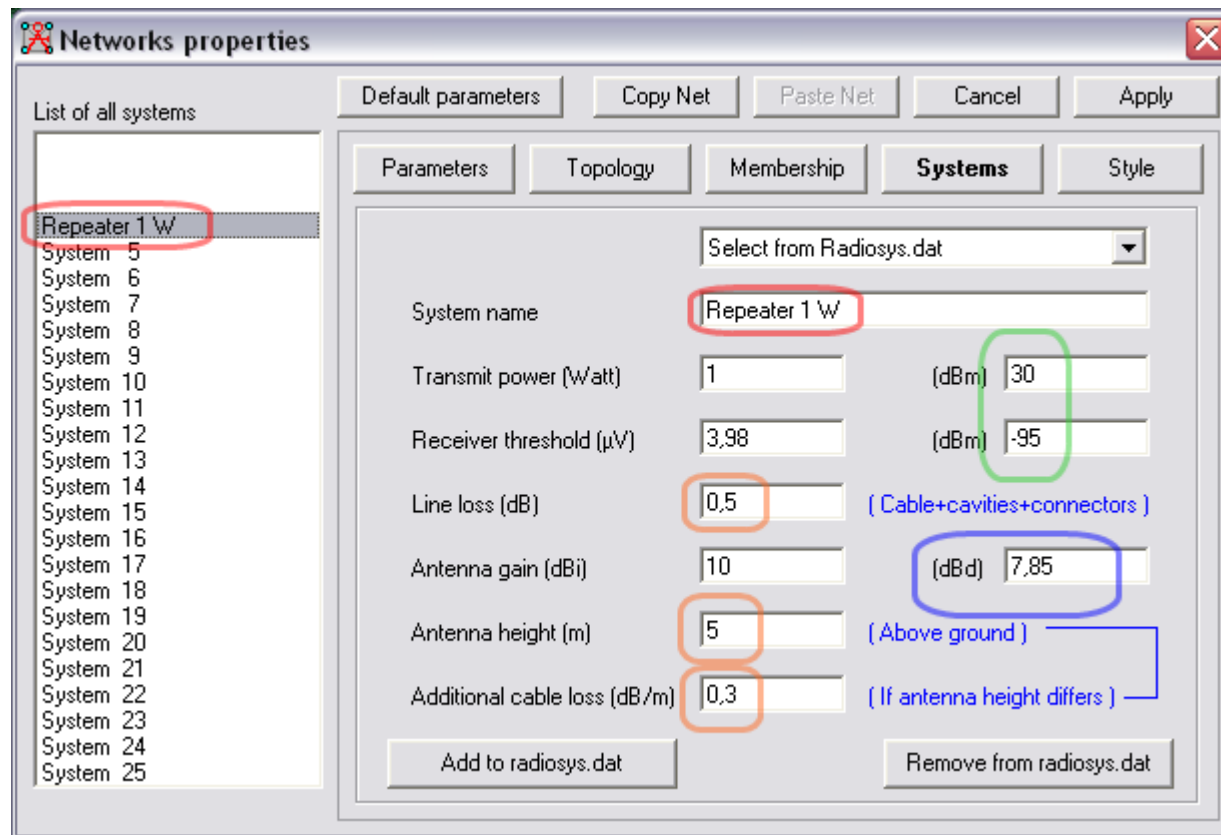
4. Associate Units to a network

File > Network Properties > Membership

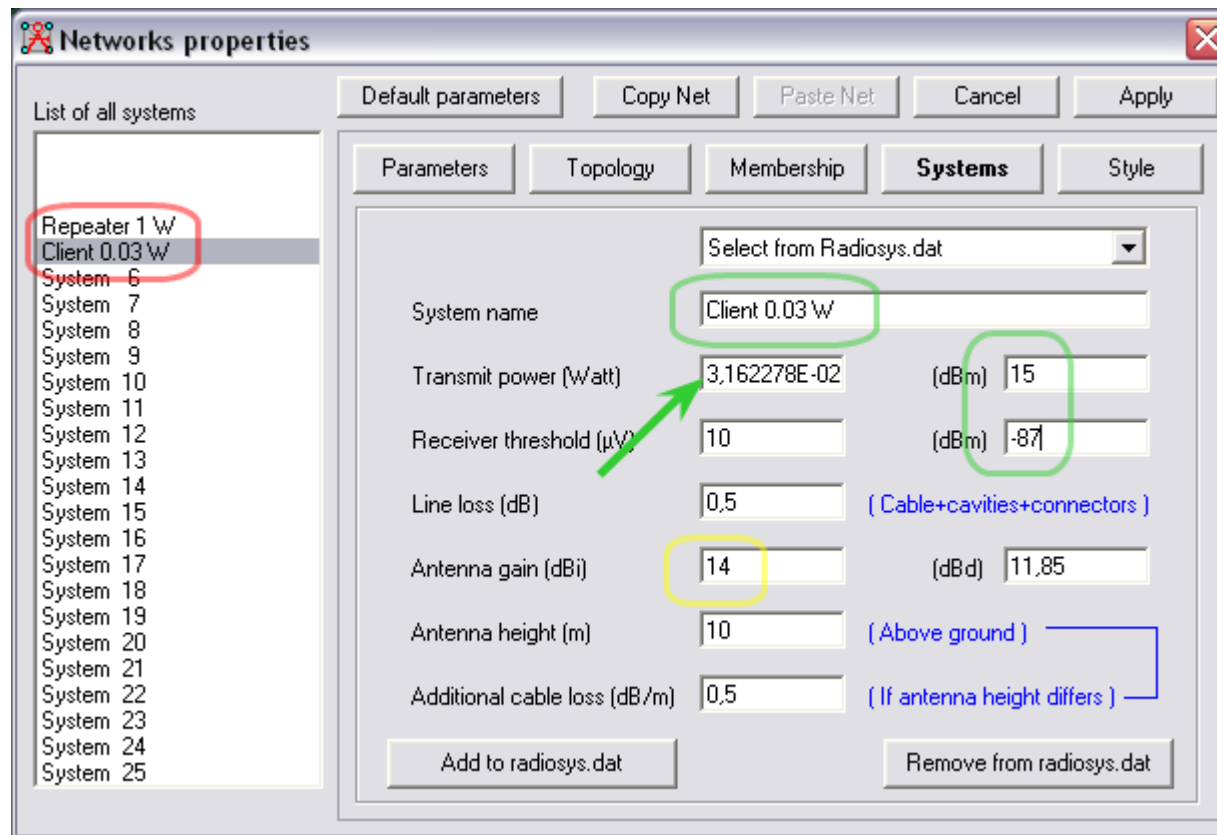
# Network Parameters



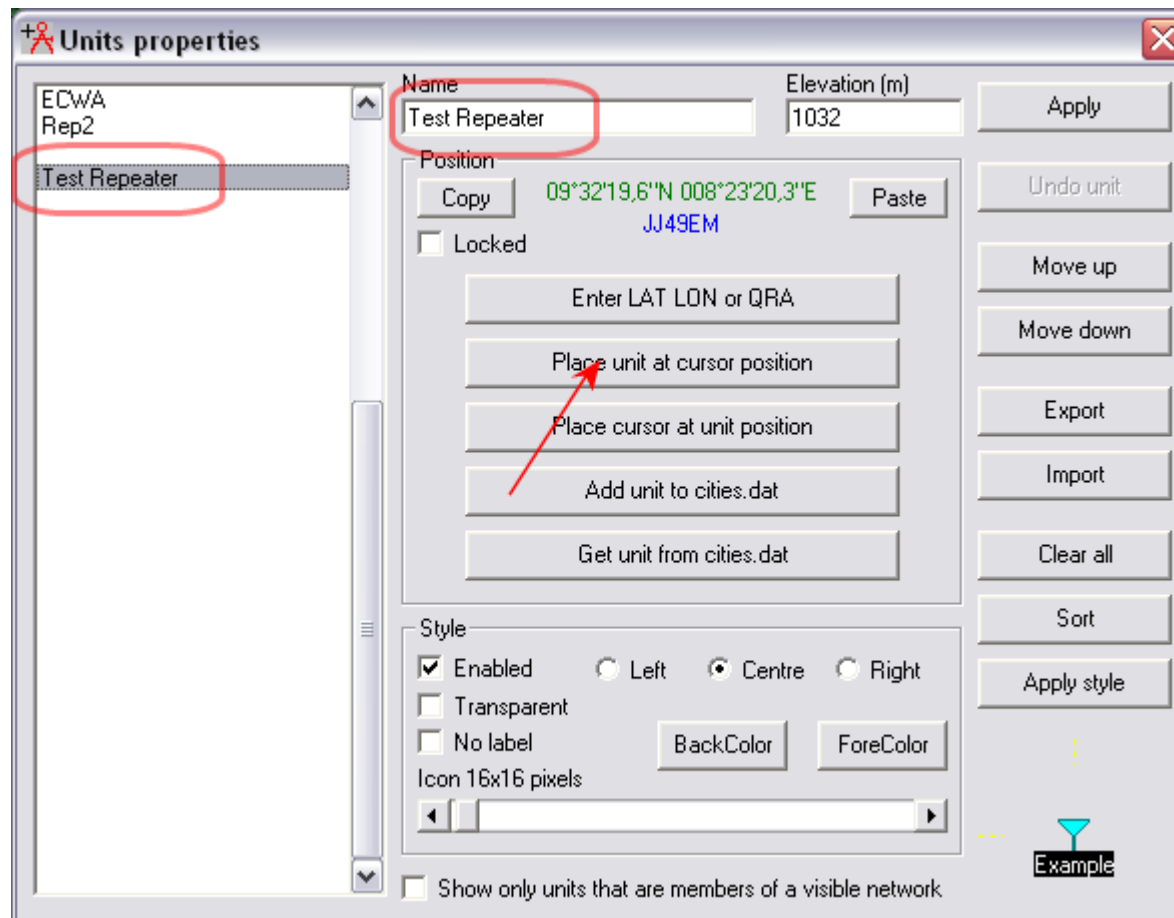
# Systems



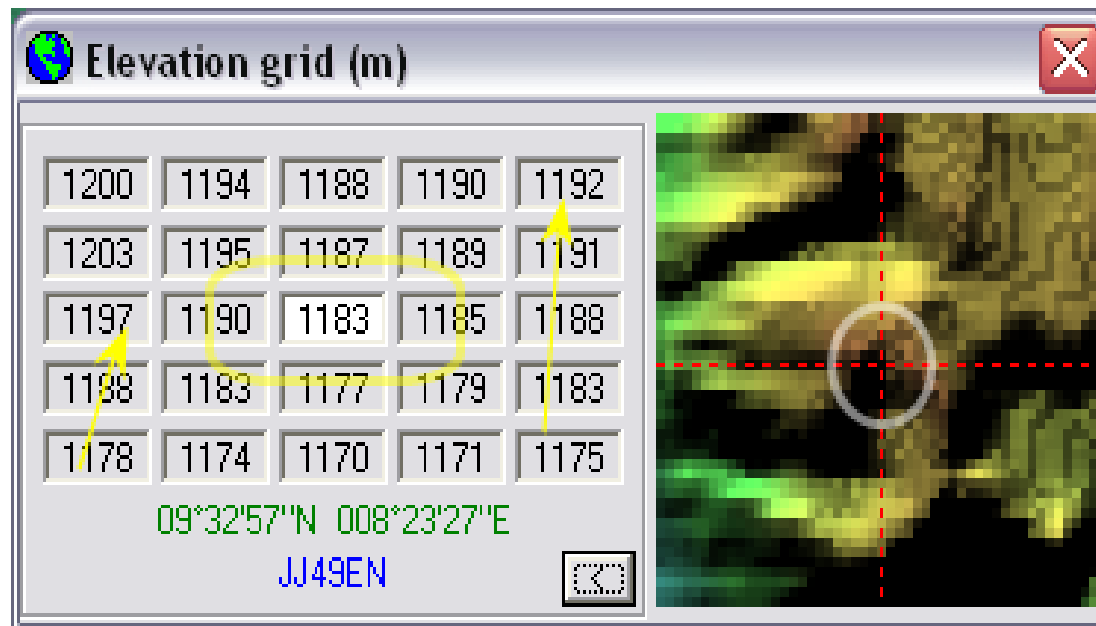
# Systems



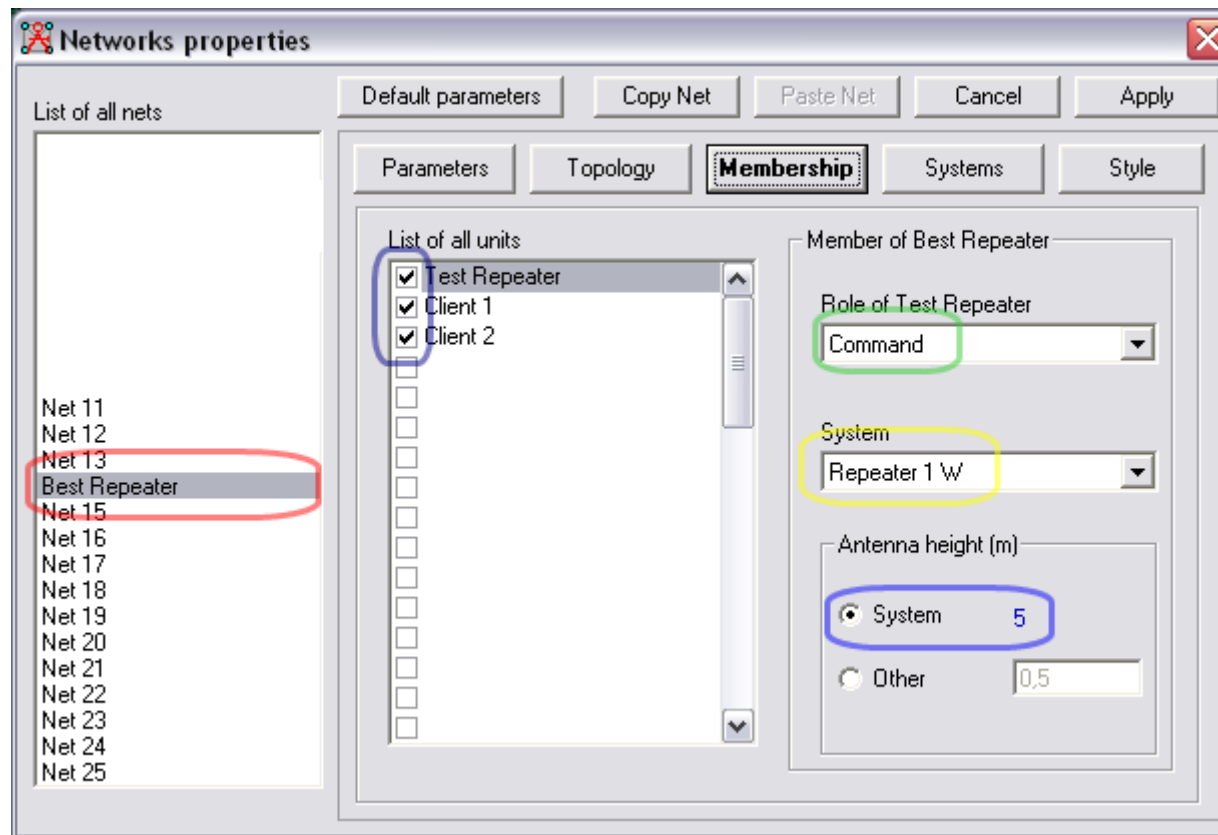
# Unit Properties



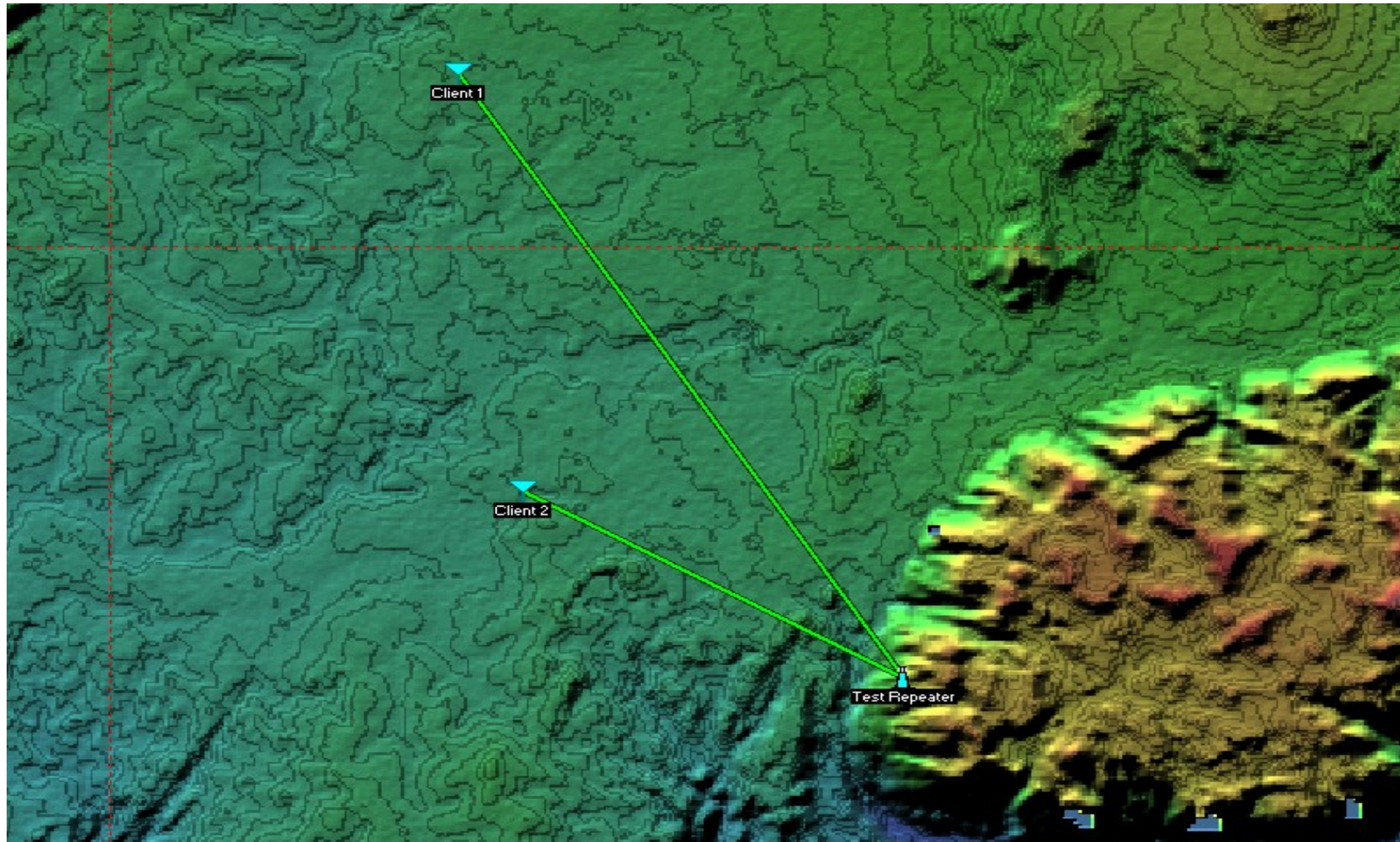
# Unit Properties



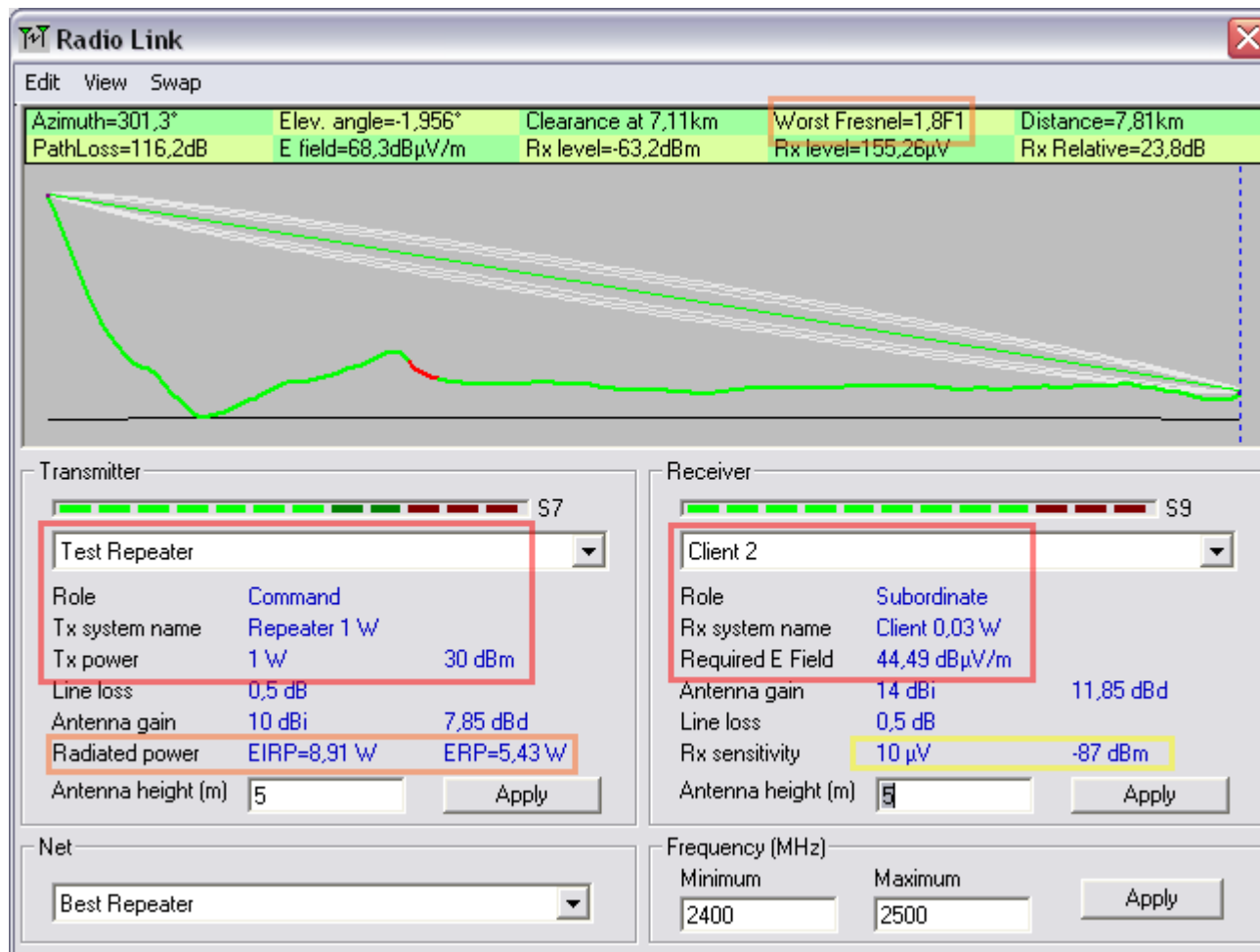
# Membership



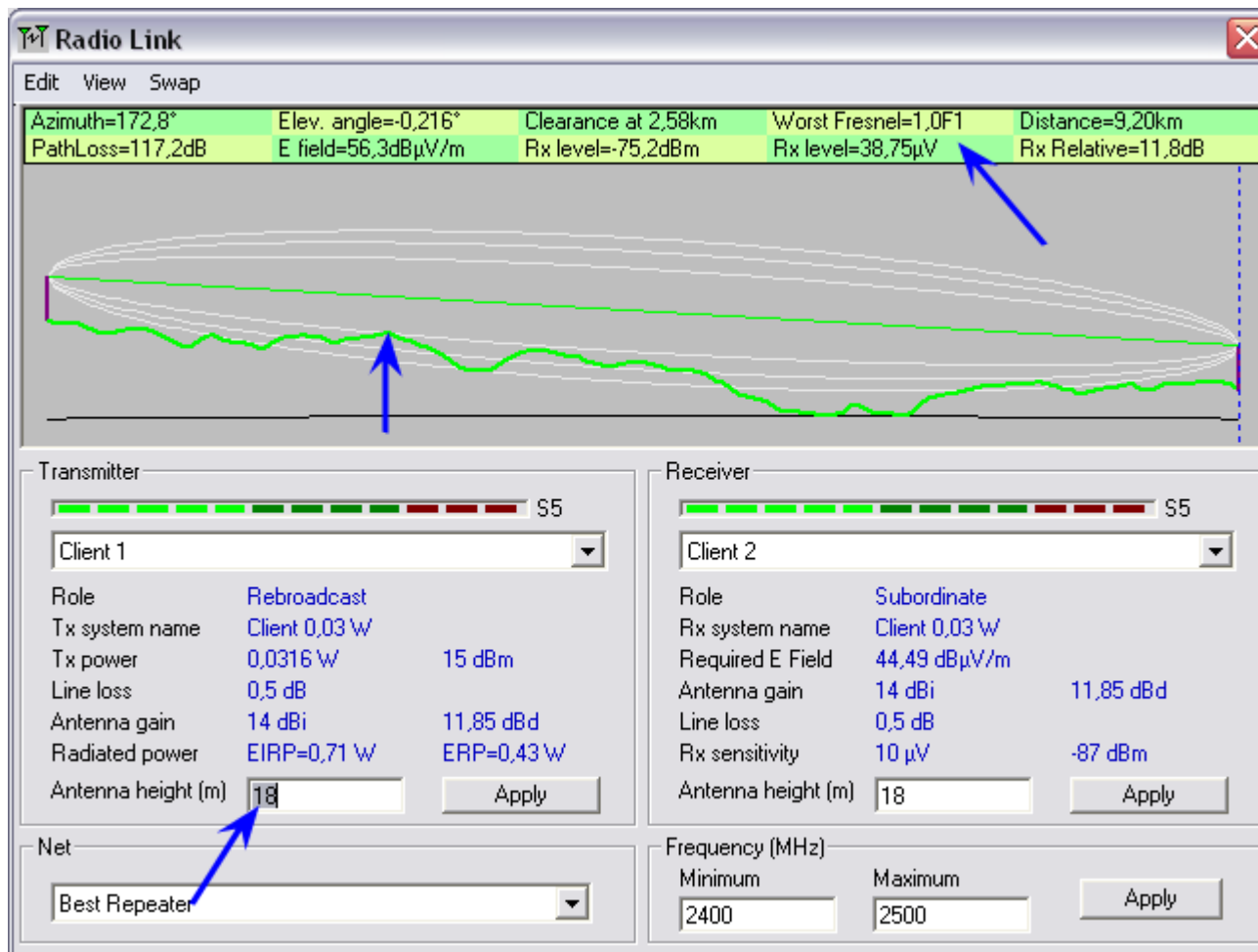
# Radio Link Budget Analysis



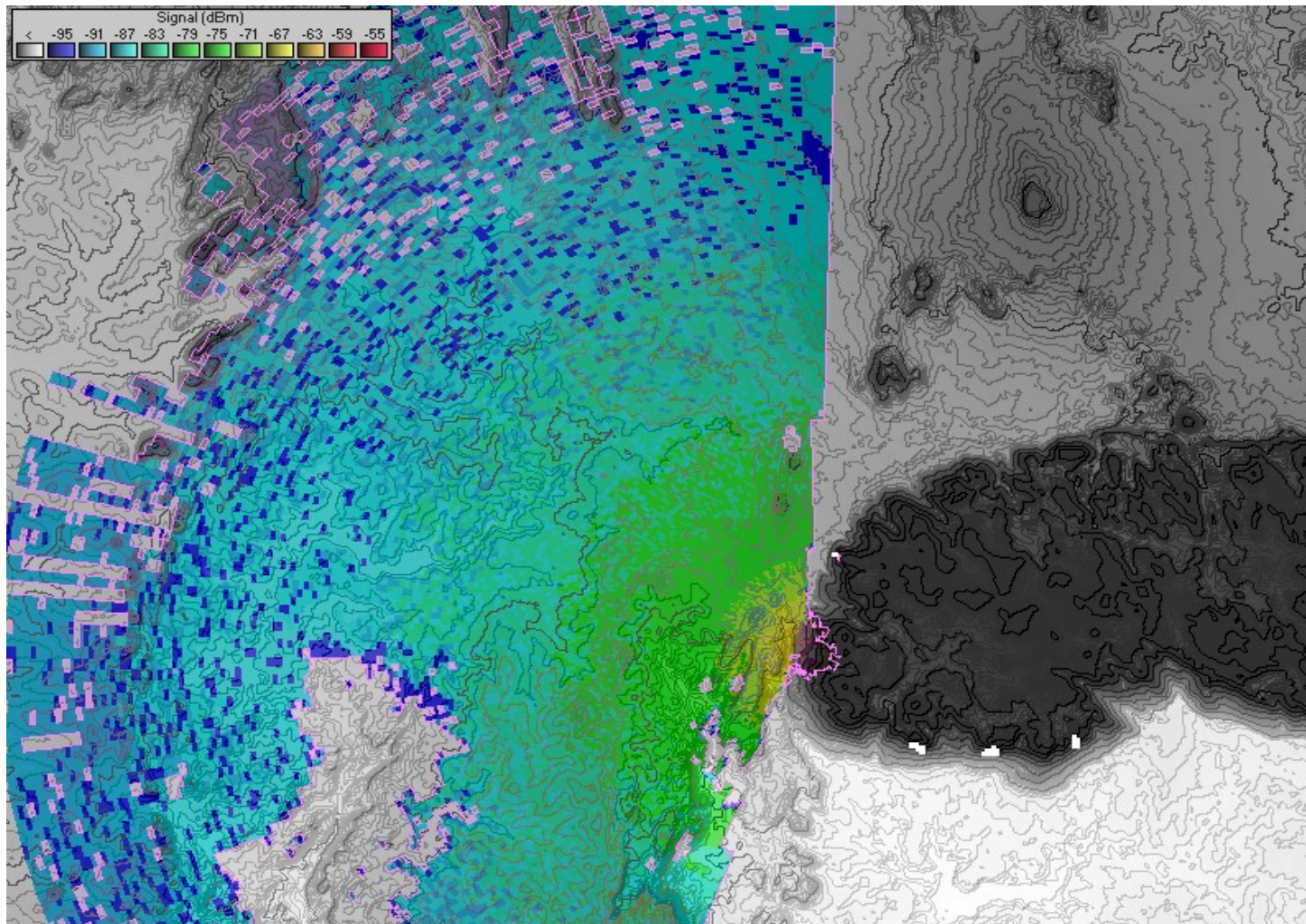
# Radio Link Budget Analysis



# Radio Link Budget Analysis



# Coverage Area



# Conclusions

- Consider including an “outdoor radio simulation” to your viability study
- A simulation software can be of great help to create your first network design and plan the initial field trials

# Conclusions

- Learn to input your position and select the source and type of maps you want to use
- Define the “systems” that you want to implement in your network
- Place the radio units in the your target positions and associate a type of system and a role to each of them
- Study each of the simulated “Radio Link Budgets” and change your settings to optimize your design
- Use the Radio Coverage Tools to see your coverage areas and potential sources of interferences