

# Conducting a Site Survey



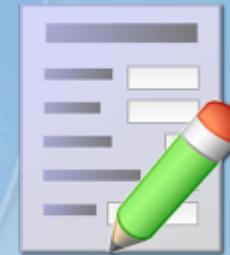
# What is a Site Survey?



- A visit to the project locations early in the planning phase to gather information
- Client description and ground truth can be very different
- “What do you mean there’s a mountain here?”
- “Banana trees? What banana trees?”

# Why Conduct a Site Survey?

- “Look before you leap!”
- Make sure you can provide what the client expects
- Plan accurately
- Avoid confusion and waste
- Save money



# Site Survey Goals

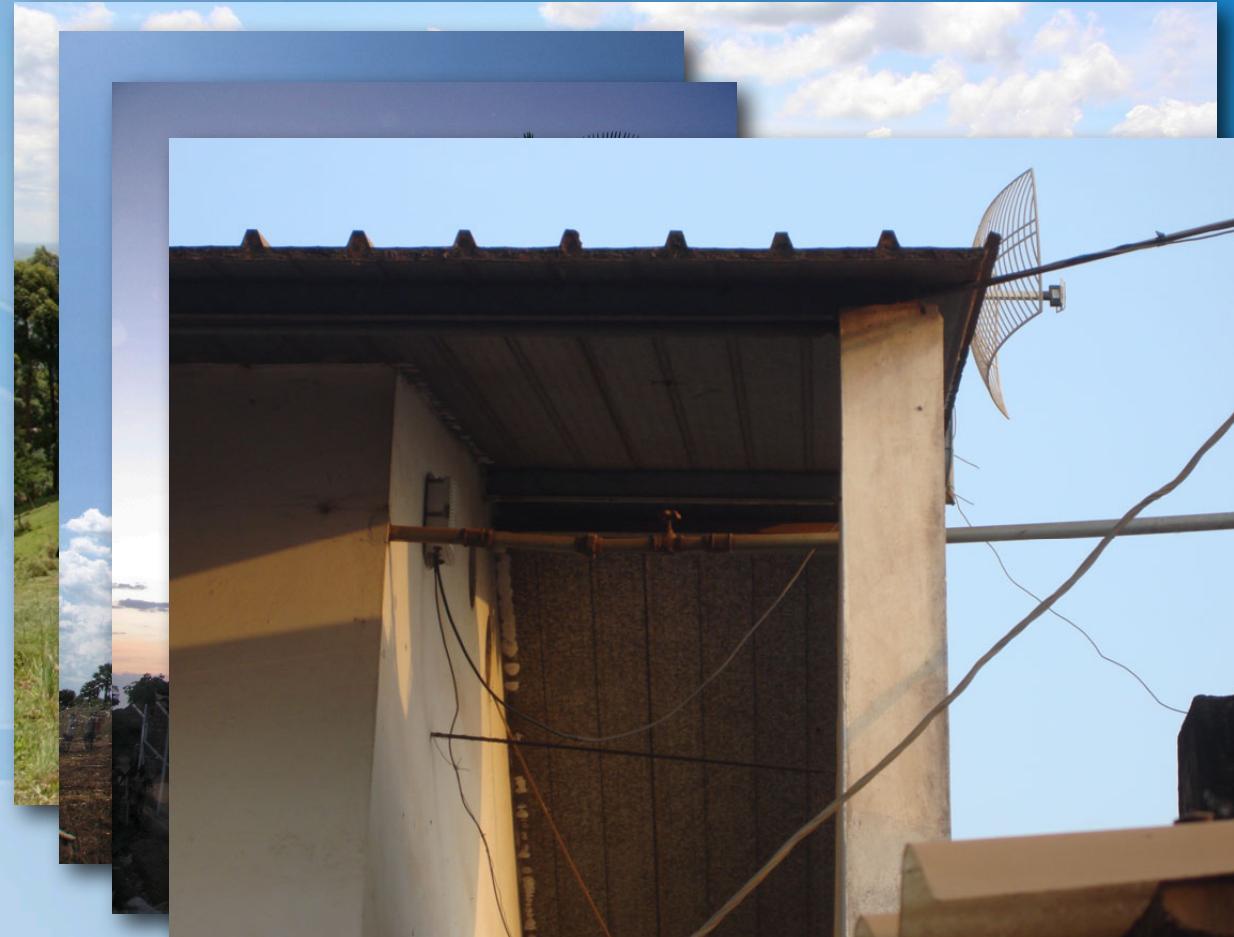
- Identify client expectations:
  - What do they want to accomplish? Is it reasonable?
- Gather accurate data:
  - Don't just ask, *test!*
- Determine equipment requirements:
  - How many computers? How many wifi radios? Is a repeater necessary?

# SiteSurvey Goals (cont'd)

- Plan Locations:
  - Where will computers go? Antennas? Solar Panels?  
What about security? Can you see there from here??  
GPS everything
- Identify connectivity options:
  - Which ISP? DSL? GSM? VSAT? How fast is it?
- Meet users and authorities:
  - Who will use the computers? Who will take care of  
them? Who owns the land? Do you have permission?

# Choosing Locations

- Accessible
- Secure
- Protected



# Surveying Local Residents

- Interview clients *and* users to understand their needs
- Understand local conditions
  - power profile
  - weather (solar)
- Get names and contact info
  - Who owns the building?
  - Who will maintain the system?



# Site Survey Worksheet

Site Survey Entry Form			Please use a separate form for each location.	
Project name:	Syangja CIC			
Surveyor's name:	Sudip Aryal			
Surveyor's email:	sudip@eveda.org			
Surveyor's org.:	eVeda Pvt. Ltd.			
Org.'s office location:	Kathmandu			
Total number, projected users @site:	300			
		Total no. of rooms @ this location:	2	
<b>Site Name/identifier:</b>	Syangja CIC			
Building name/ID:	Syangja CIC			
Overall description of this site:	Village library, building is locked and has good security. Construction is brick, 10m tall			
Person primarily responsible for site:	Indiver Badal	phone #:	+977.1.23654	
Person with keys:	(same)	phone #:	indiver@syangja.gov.np	
Additional contacts: (Name, Title)	(same)	phone #:		
		phone #:		
		phone #:		
		phone #:		
Days facilities inaccessible:	Weekends	Normal access hours ea. day:	Sunday: Thurs 10am - 6pm Friday: noon - 6pm	
Distance to major airport/port (km):	6 hours/150km	Max. est. temperature @site (°C):	0°C	Min. est. temperature @site (°C): 35°C
Is site easily accessible by road?	yes			
If not, what barriers to access exist?				
Site GPS coordinates:	28.1046°N, 83.879°E			
<b>Existing Power availability:</b>				
AC Grid	<input type="checkbox"/>	Max. outage duration(hours):	16 hours	
Generator	<input type="checkbox"/>	Typical outage duration (hours):	16 hours	
Solar	<input type="checkbox"/>	Max. generator capacity(KW):	n/a	
Wind power	<input type="checkbox"/>	Backup time needed (hours):	8 hours	
Frequency of outages:				
General description of backup power system needed:	Solar system to provide 8 hours operation/day for 2 computers and minimal lighting			
<b>Connectivity:</b>				
What services are available at the site:	none			
New services to be delivered: (for example, voice, internet, lighting, computers)	Internet (wireless), Voice (VOIP), computers (x2), basic light (1 CFL)			
Are any licenses/permits etc required?:	none, the 2.4GHz and 5.8GHz bands are unlicensed in Nepal			

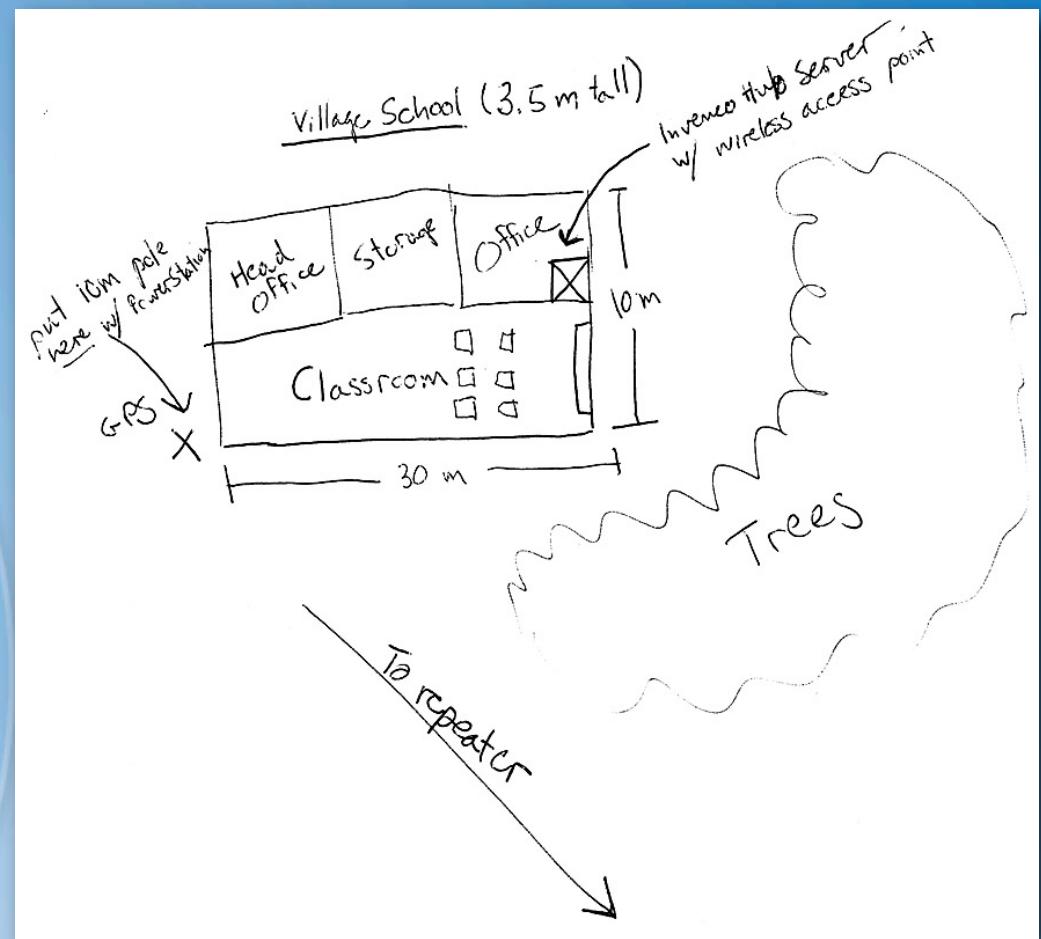
- A tool to help gather and organize information
- Fill out one per location while walking the site
- If you don't write it down while on-site, you may not remember it later
- The worksheet is a guideline, feel free to add and subtract
- Bring plenty of extras!!!

# Sketching the Site

- Diagram buildings and rooms
- Note locations for each piece of equipment
- Note terrain, vegetation, and radio obstacles
  - Trees
  - Hills
  - Buildings
- Record name/location of each GPS waypoint
- Record important distances and dimensions

# Site Survey Sketch

- Doesn't have to be perfect, just capture the important data
- Show where GPS waypoints were recorded, easy to forget

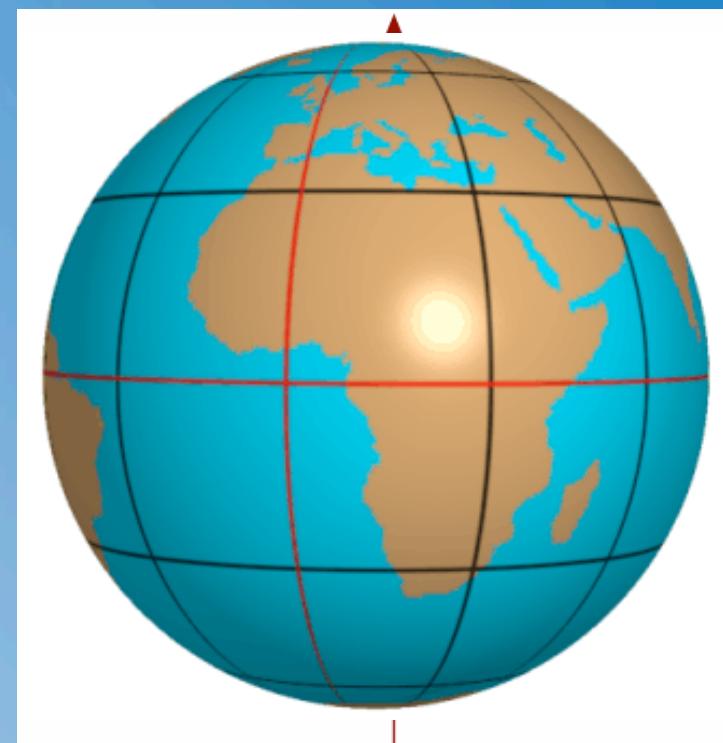


# Where in the world are you?

- Two things:
  - Where are you?
  - Where should you point?

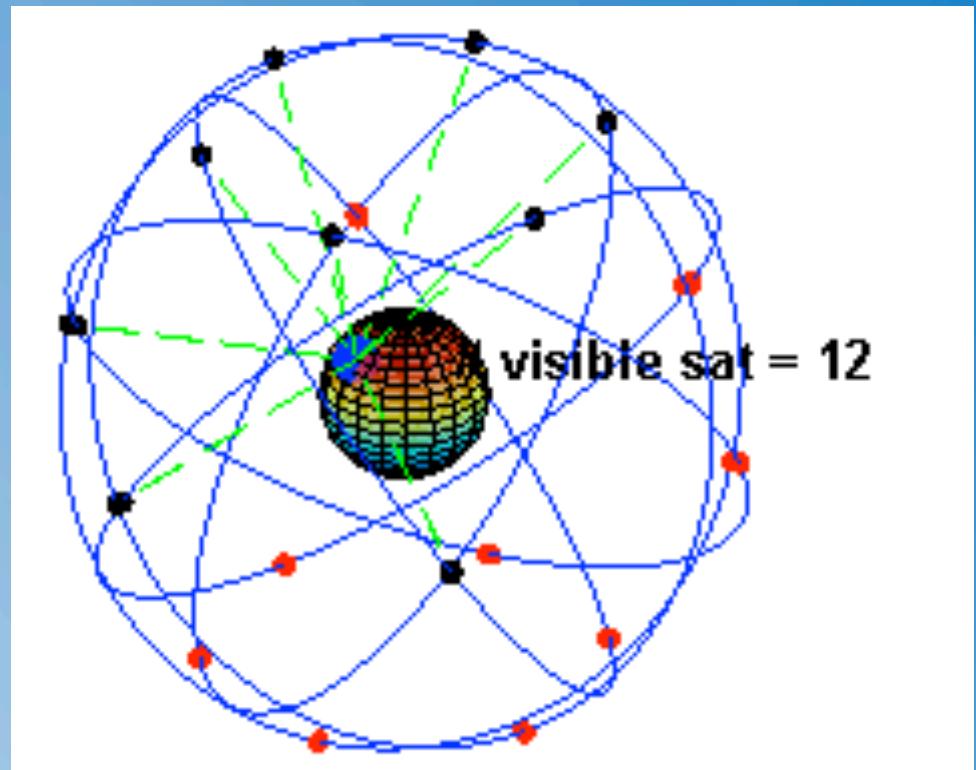
# Latitude and Longitude

- Latitude: how far north/south?
  - Equator:  $0^\circ$  Latitude
  - + is north, - is south
  - must be between  $-90^\circ$  and  $90^\circ$
- Longitude: how far east/west?
  - Prime Meridian:  $0^\circ$  longitude
  - + is east, - is west
  - must be between  $-180^\circ$  and  $180^\circ$
- Know both, you have the exact location
- Degree Formats
  - **dd.ddd** ( $80.235^\circ$ )
  - dd mm.mm ( $80^\circ 14.100'$ )
  - dd mm ss ( $80^\circ 14' 6''$ )



# Global Positioning System (GPS)

- 24-32 satellites orbiting the earth transmitting constantly
- GPS unit must be able to see 3+ to get a location
- Shows you exactly where you are and gives you a way to tell someone else



# Using the GPS Receiver

- Configuring
  - Coordinate format: decimal degrees dddd.dddd
  - Datum: WGS84 *important!*
  - Set timezone
- Acquiring Satellites
  - Clear view of sky
  - Hold flat
  - Check accuracy before marking (15m vs 75m)
- Taking Waypoints
  - Garmin: Mark → Enter
  - Record name/number and location details in notes
  - Take many points!
- Tracks
  - Record by Distance
  - Turn ‘record tracks’ on
  - When receiver is on, tracks are being recorded



# Using GPS Data

- Transferring data to PC
  - May need USB → serial adapter
  - Google Earth now supports GPS download
  - Garmin MapSource (PC Only)
  - Manual entry (last resort, easy to make mistakes)
- Using Data
  - Google Earth - Project planning/overview
  - Radio Mobile - Calculates lines of sight: *will your network work??*

# Using a Compass

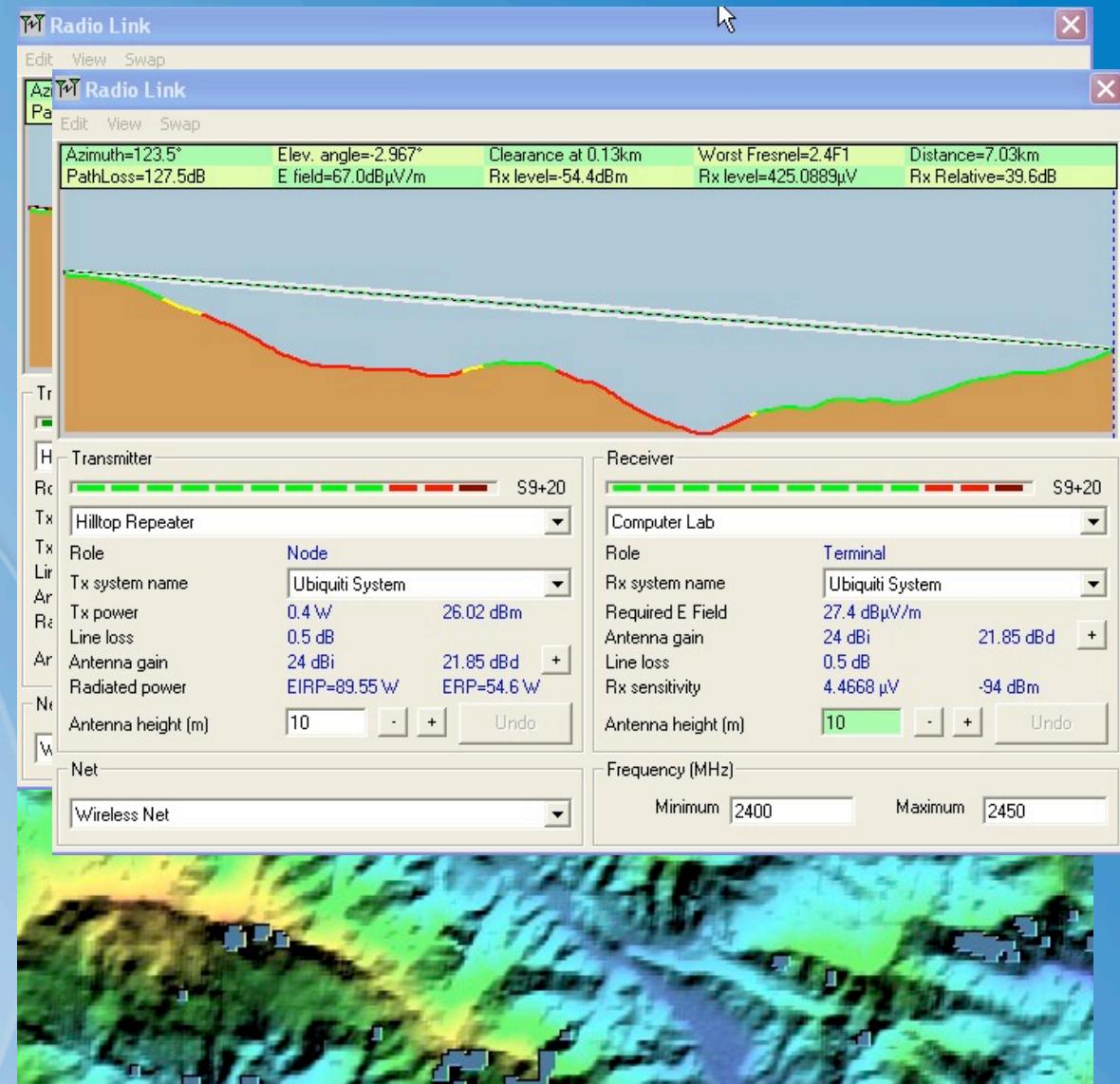
- We know where, now we need direction
- Bearing...what does it mean?
  - True
  - Magnetic

# Using a Compass

- Declination can be important:
  - Difference between magnetic heading and true heading
  - Declination: Take the true bearing you want to find and subtract the declination value
  - Magnetic Declination in Sierra Leone is 8 degrees west (-8°)
  - [www.magnetic-declination.com](http://www.magnetic-declination.com)

# Radio Mobile

- Core concepts
  - Systems: kinds of radios
  - Units: specific radios
  - Networks: groups of radios
- Tells you if your network will work
  - Location
  - Elevation
  - Transmitter/receiver properties



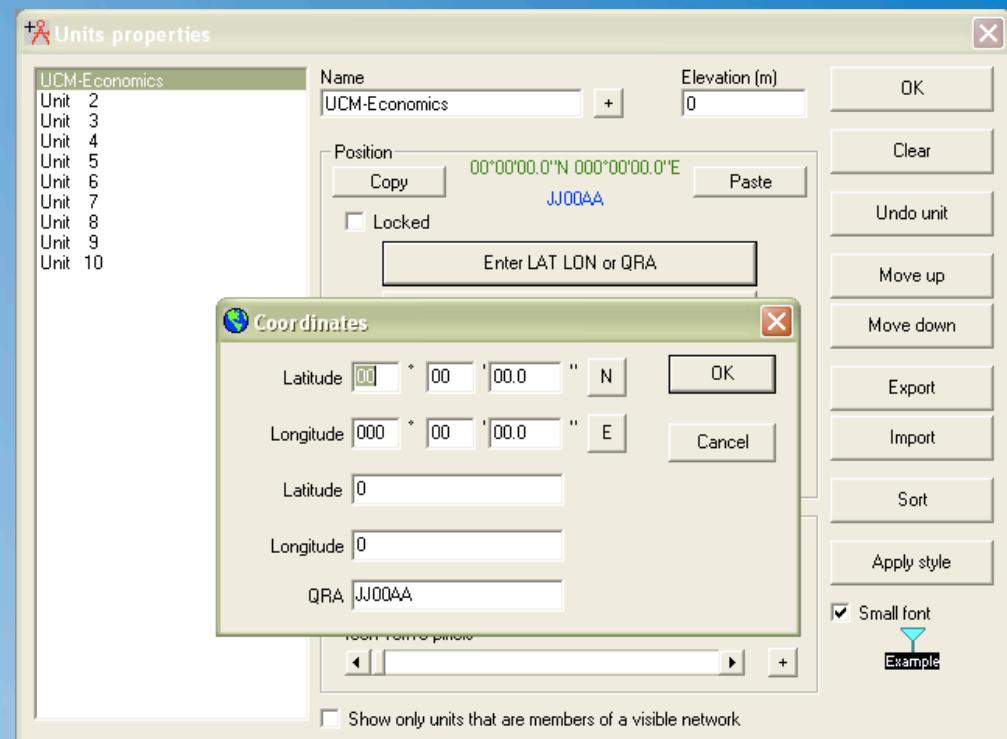
# Install Radio Mobile

Note: Visual Basic, which is already installed, is required.

1. Unzip the RadioMobile.zip file to C:\
2. Now you should have C:\Radio Mobile
3. Move the Africa file into C:\Radio Mobile. All of the Africa files should be in C:\Radio Mobile\Africa.
4. In the folder C:\RadioMobile right click rmweng.exe
5. Select Send to > Desktop (create shortcut)
6. Launch Radio Mobile from the desktop icon
7. Options > Internet > SRTM > Use local files only.
8. Local files path - C:\RadioMobile\Africa
9. Internet ftp directory - USGS Africa - 3 arcsecond

# Using Radio Mobile

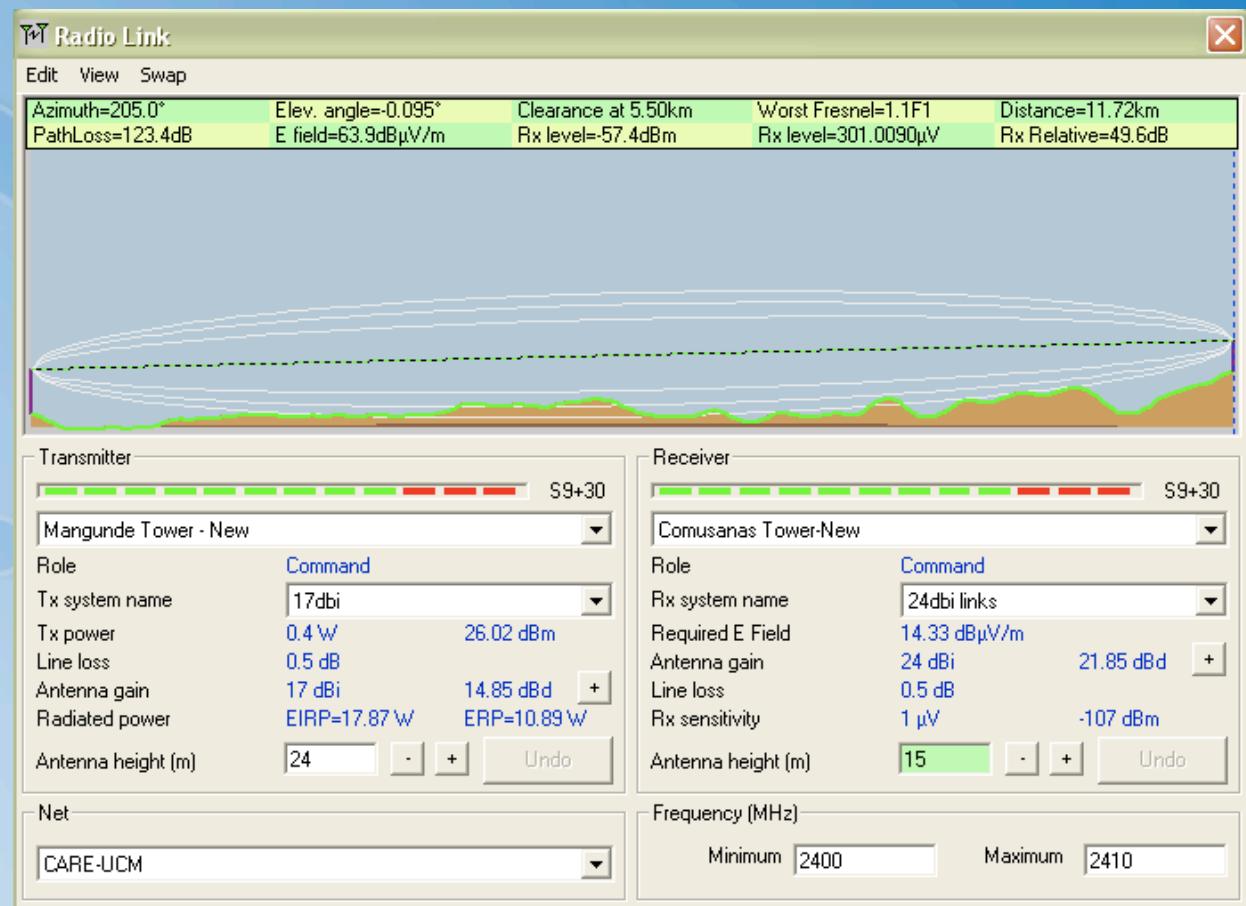
1. File > New Networks
2. Under New Net initialization
  - Number of networks = 1
  - Number of units = 50
  - Number of systems = 10
3. File > Units properties.
4. Under Name, give Unit 1 a meaningful name.
5. Click Enter LAT LON or QRA
6. Enter the coordinates for one site from the GPS.
7. Click OK > OK
8. For each site visited, enter the GPS coordinates in a new Unit.



9. File > Network properties > Parameters. Under Net name, give the network a descriptive name of the network, usually based on location and/or client.
10. Click the Systems button
11. Enter the data for the type of antenna the network will use.
12. Click the Membership button
13. Check the boxes next to all the units you created earlier
14. Click OK
15. Edit > Fit Map to Units
16. Check Adjust units to elevation
17. Under Elevation data source, make sure the first box is set to SRTM and the Drive or path is c:\radio mobile\africa
18. Click Extract
19. You should now see a map of the GPS coordinates you collected

# Evaluate Wireless Links

Check the links by clicking the Radio Link button





# Questions?