

Conducting a Site Survey



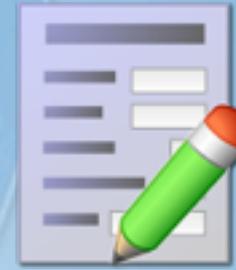
What is a Site Survey?



- 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



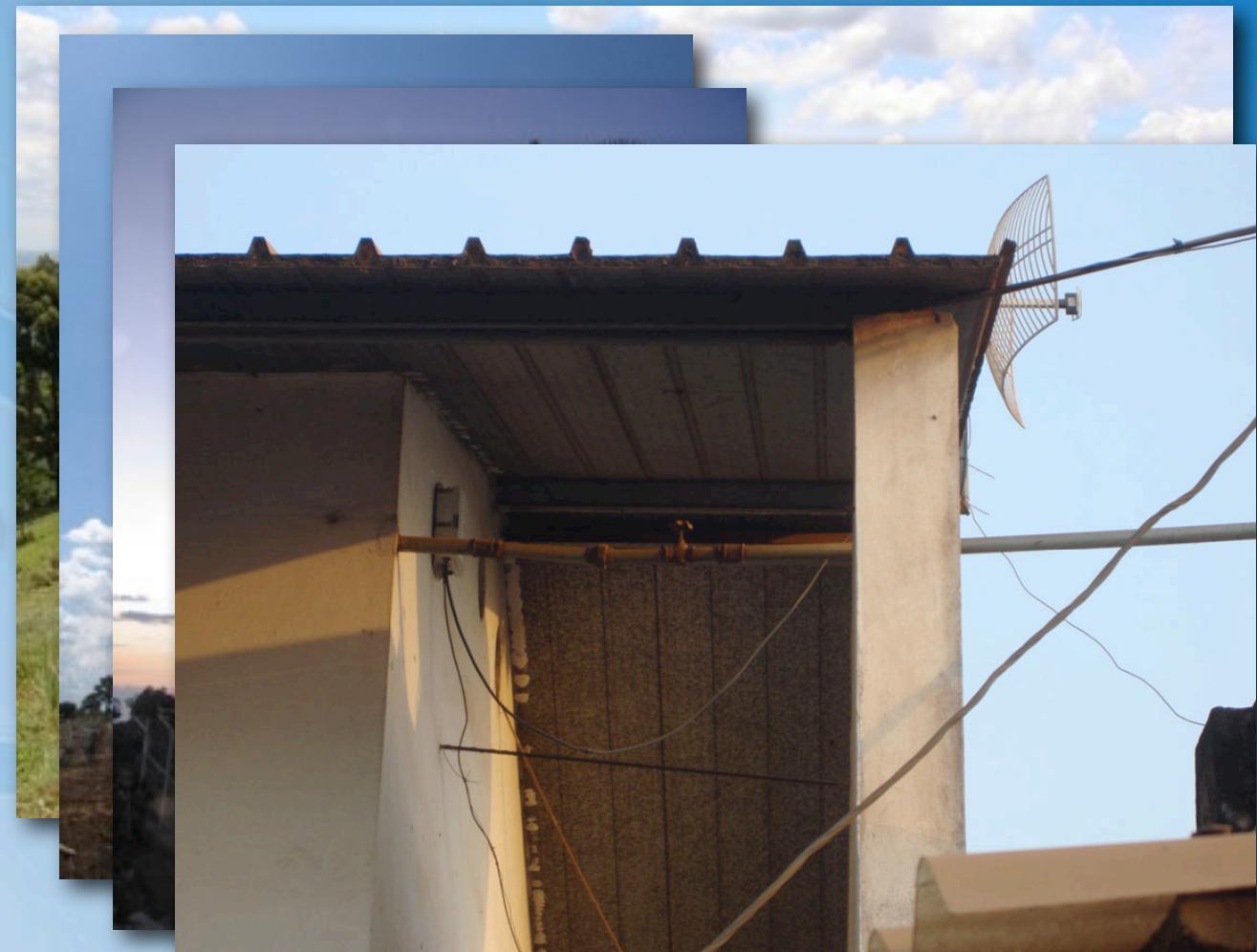
Choosing Locations

- Accessible
- Secure



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	phone #:	+977.1.123.1234
Surveyor's org.:	eVeda Pvt. Ltd.		
Org.'s office location:	Kathmandu		
Total number projected users @site:	300		
Site Name/Identifier:	Syangja CIC	Total no. of rooms @ this location:	2
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 #:	
		email:	+977.1.23654
Person with keys:	(same)	phone #:	
Additional contacts: (Name, Title)	(same)	email:	
		phone #:	
		email:	
		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
Is site easily accessible by road?	yes	Min. est. temperature @site (°C):	35°C
If not, what barriers to access exist?			
Site GPS coordinates:	28.1046°N, 83.8791°E		
Existing Power availability:	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		
Connectivity:			
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		

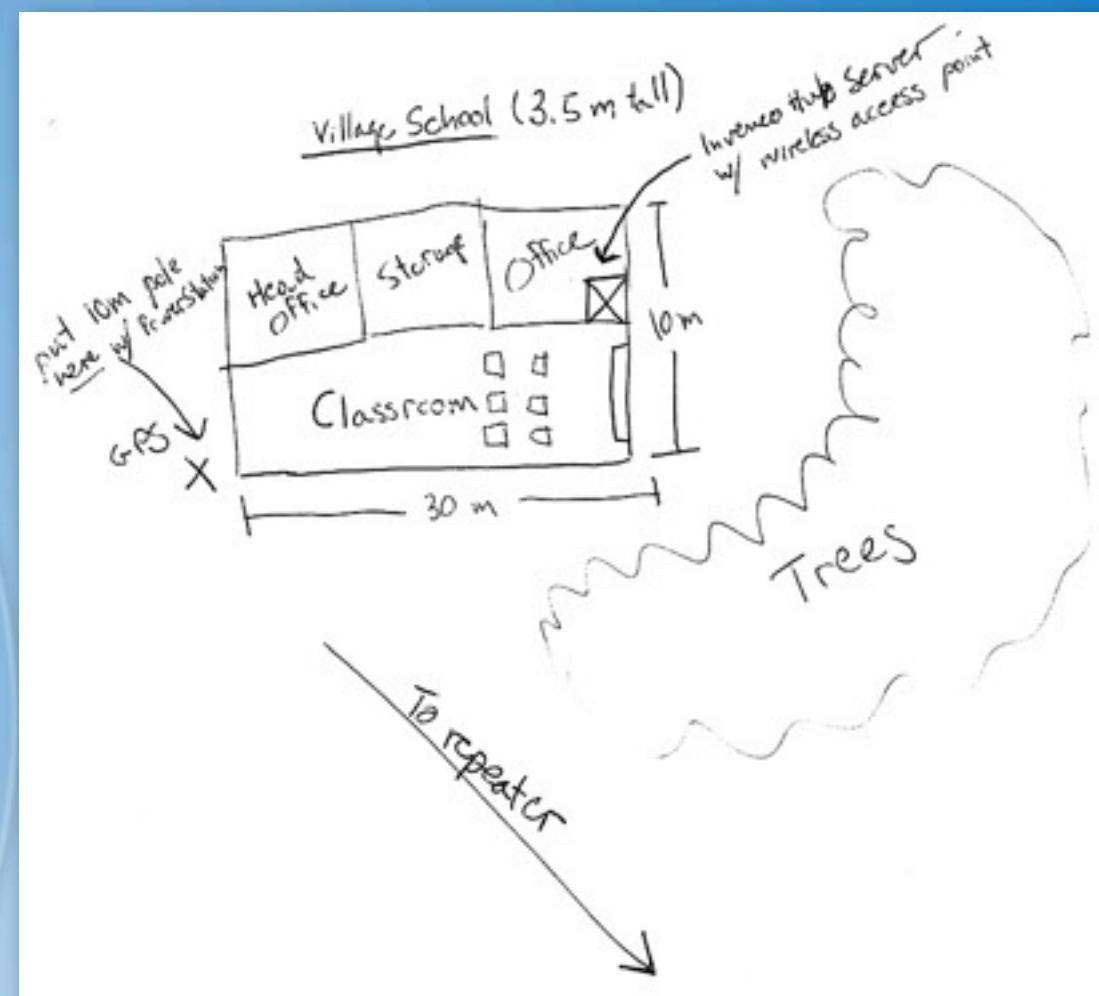
- A tool to help gather and organize information
- Fill out one per location while walking the site
- If you don't write it down while on-site, you may not remember it later
- The worksheet is a guideline, feel free to add and subtract
- Bring plenty of extras!!!

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

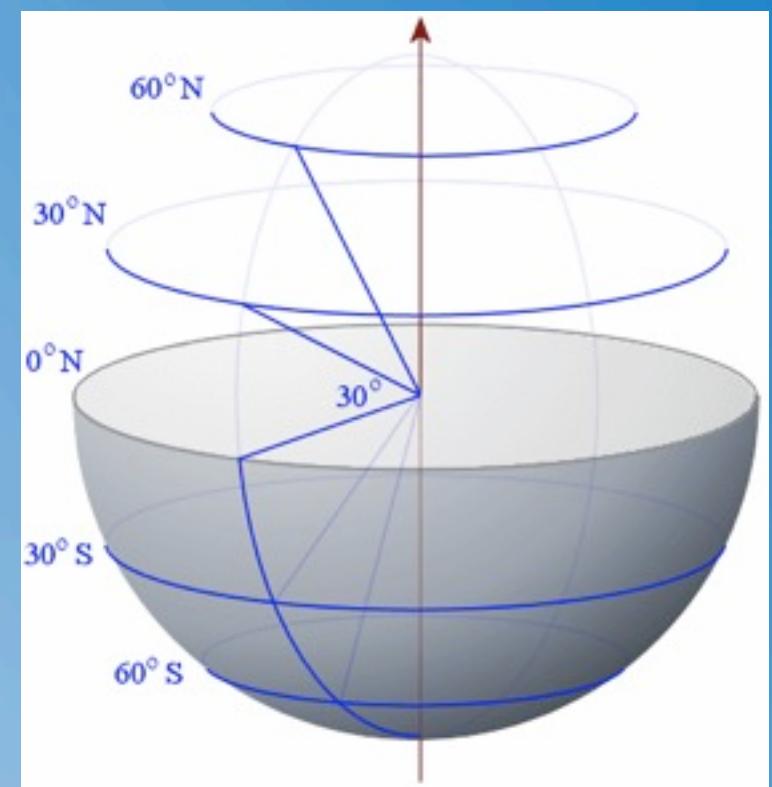
Site Survey Sketch

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



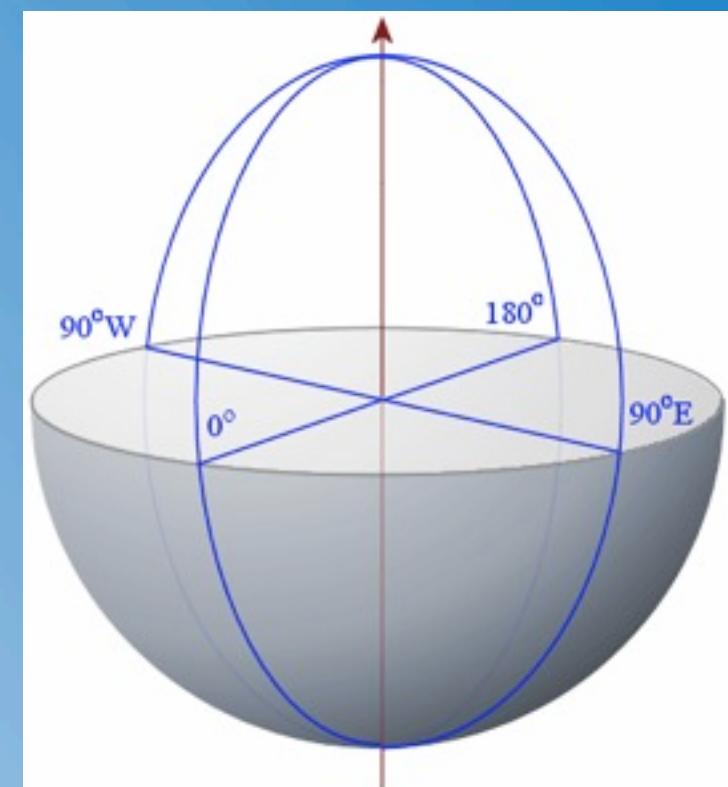
Latitude and Longitude

- Latitude: how far north/south?
 - Equator: 0° Latitude
 - + is north, - is south
 - must be between -90° and 90°



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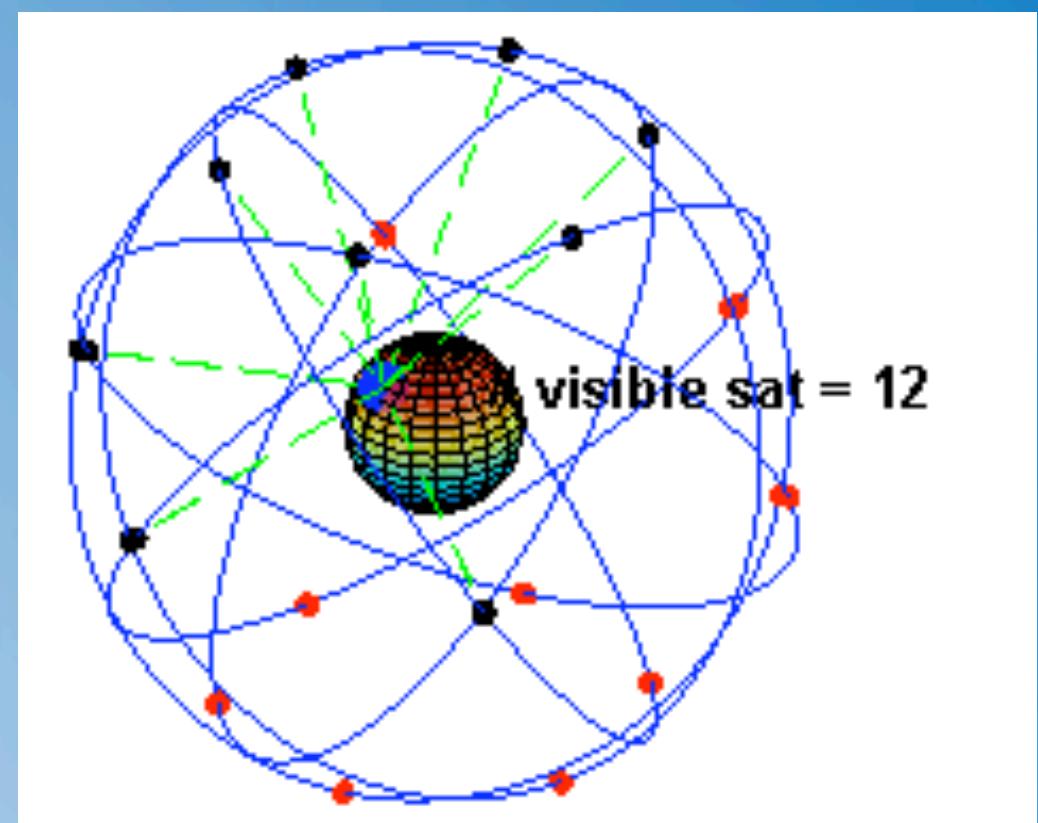
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- Know both, you have the exact location
- Degree Formats
 - **dd.ddd (80.235°)**
 - dd mm.mm ($80^{\circ} 14.100'$)
 - dd mm ss ($80^{\circ} 14' 6''$)



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

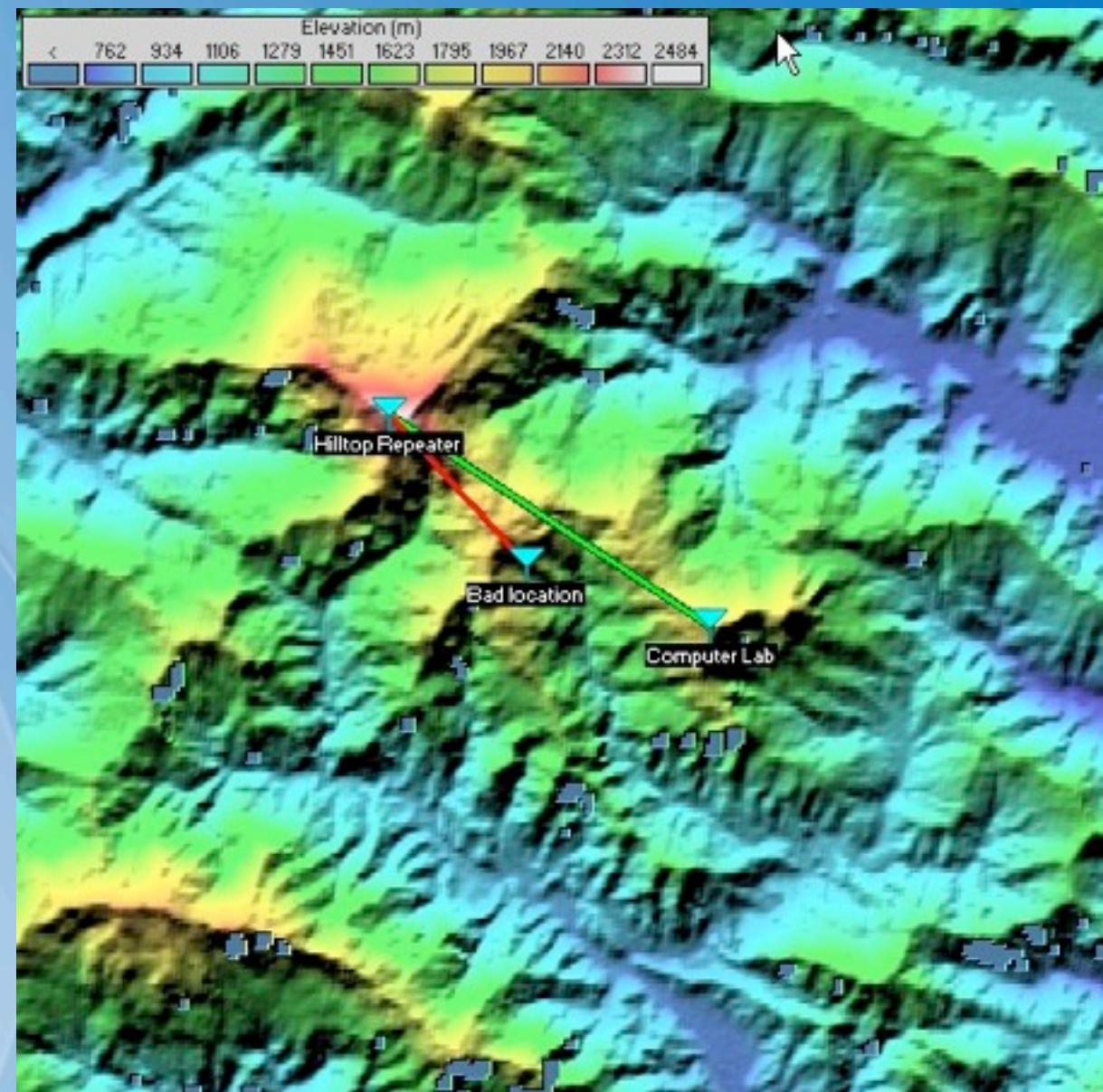


Using GPS Data

- 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??*

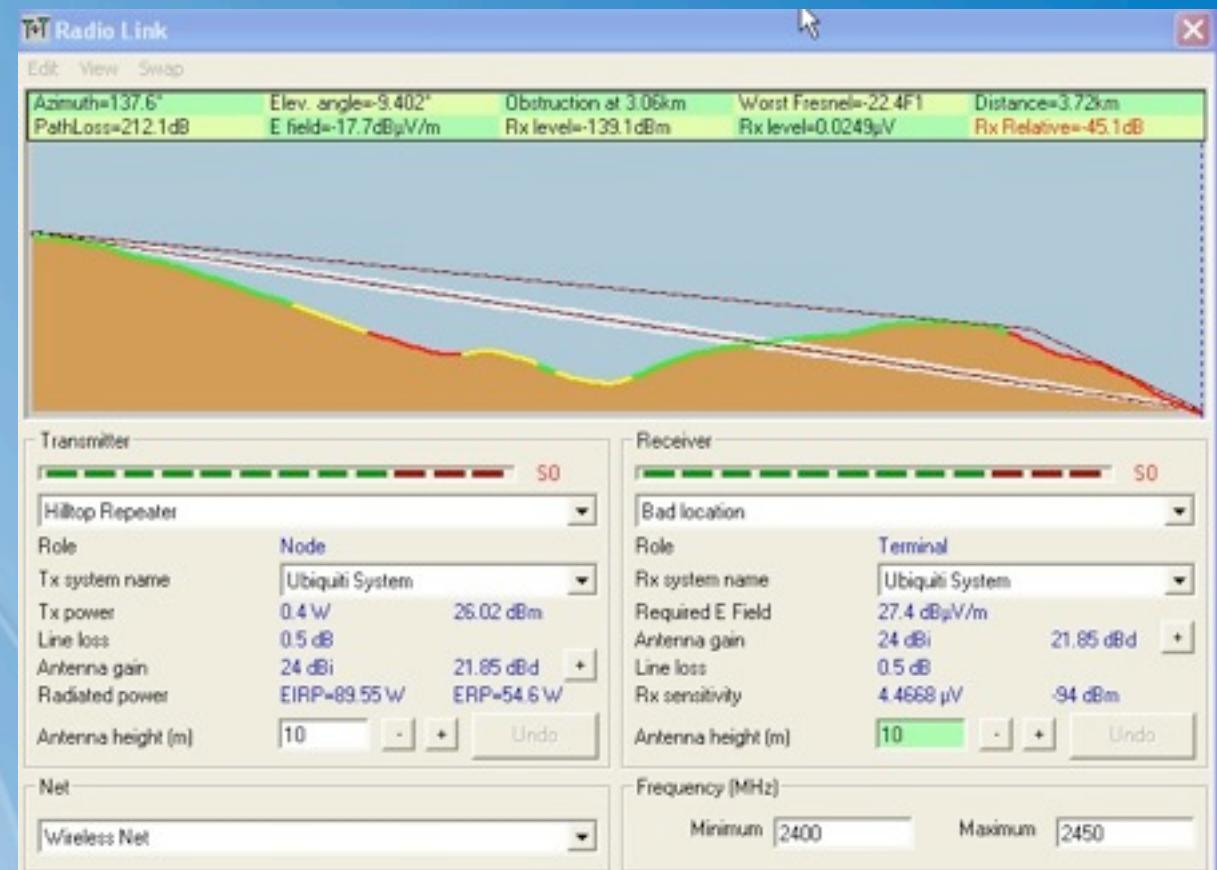
Radio Mobile

- 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



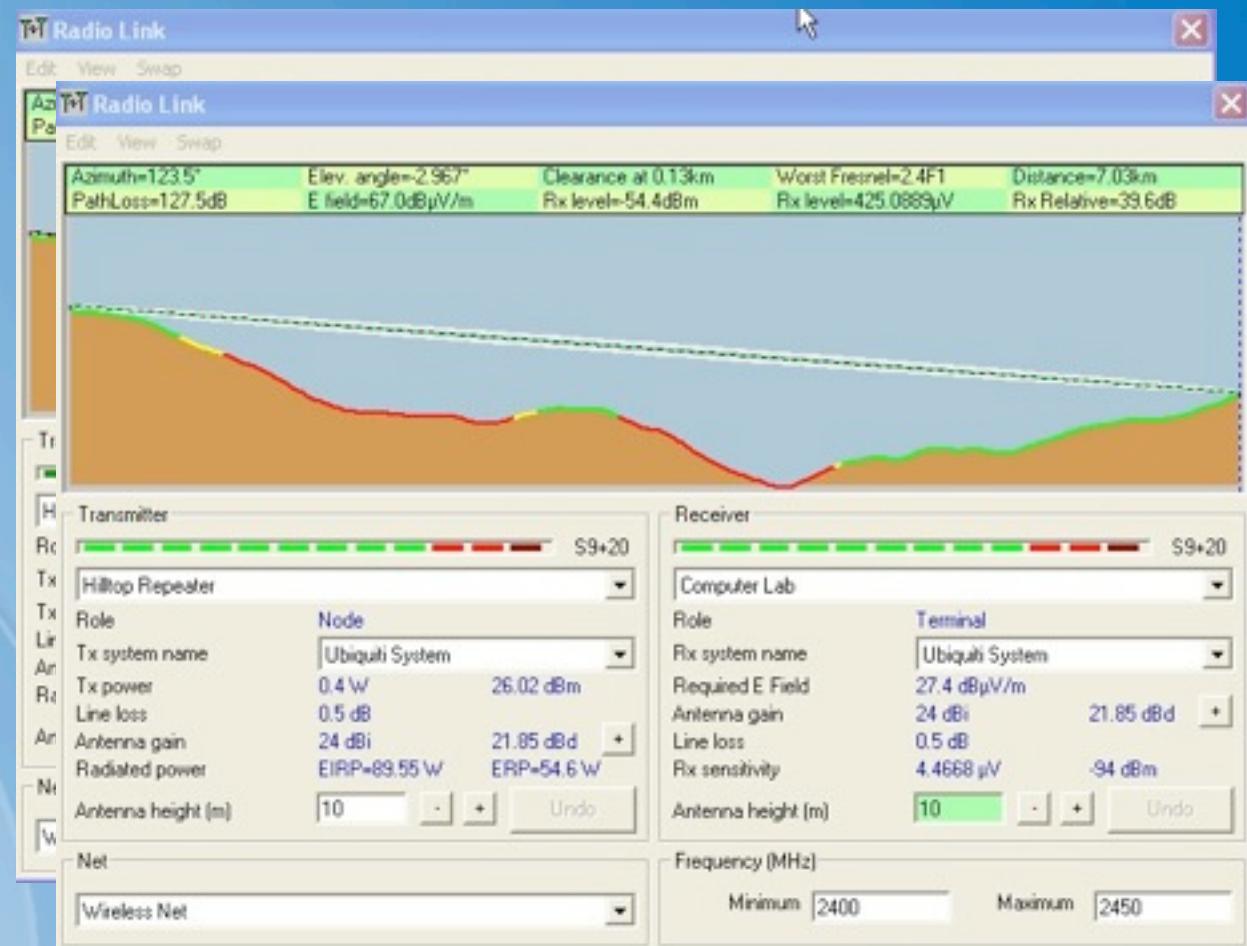
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Setting up Radio Mobile

- Internet Options
 - SRTM
 - *use local files only*
 - (or) *download and save local copy* (needs Internet)
 - Turn **off** direct ftp access
- Map Properties
 - Elevation Data source: SRTM, path to map files

Building a Network - 1

1. Create a new network *file* → *networks properties*

- Net name
- Min/Max Frequency 2400 MHz - 2450 MHz for 802.11 b/g
- Topology: Data Net, Node/Cluster

2. Define Systems (click systems in network properties)

- Transmit Power: 400 mW (+26dBm)
- Receiver threshold: -94 dBm
- Antenna type: Omni (for simulation purposes)
- Antenna gain: 24 dBi (good semi-parabolic)
- Antenna height: 10m (average)

3. Membership

- Mark all the locations that will be in the actual network

Building a Network - 2

4. Add Units (*File → Unit Properties*)

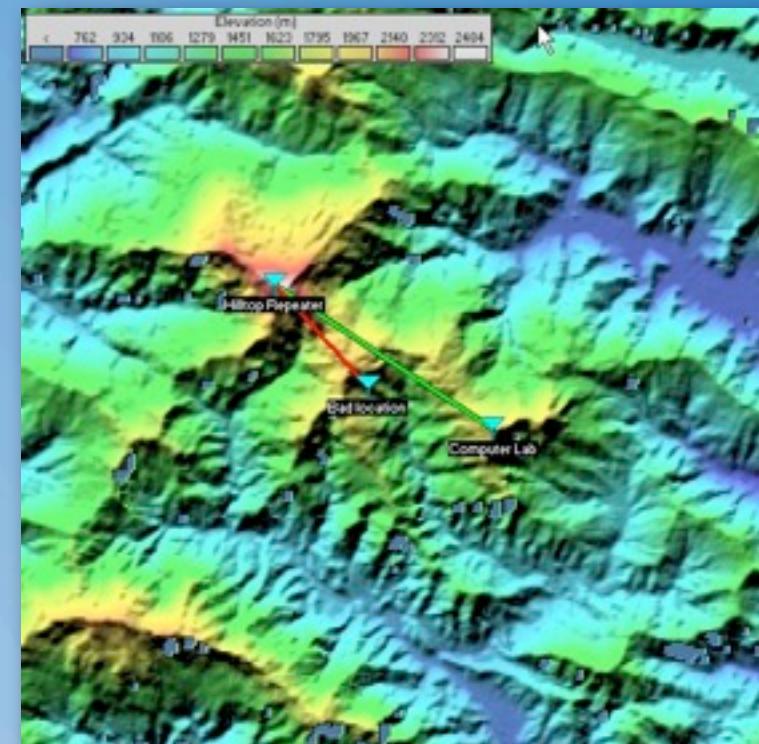
- ENTER LAT/LON coordinates (place unit at cursor position also helpful)
- Name of site

5. Draw a map (*File → Map Properties*)

- ‘*Edit → Fit Map to Units*’
- ‘*adjust units elevation*’ set to YES
- Click ‘*show networks*’

6. Evaluate Network

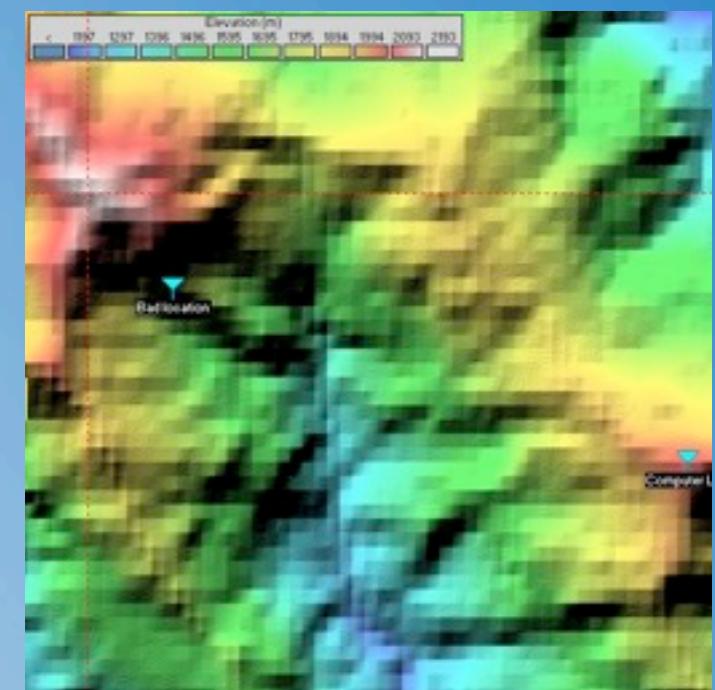
- ‘*Tools → Radio Link*’
- Green is good, Red is bad.



Building a Network - 3

7. Make adjustments

- Adjust antenna height (in radio link window)
- Find high points (shrink map, use ‘*view → find peak elevation*’)
- Place possible new units at high points (‘*File → Unit properties → Place unit at cursor position*’)
- Adjust until you see green everywhere, or until the maximum number of green links is reached



Building a Network - Exercise

1. Create a Radio Mobile map centered on our present location showing the surrounding 30 km².
2. Place one unit named *Base* representing a Ubiquiti Power Station at our present location.
3. Place two other units (named *Field1* and *Field2*) representing Power Stations at locations on the map at least 15 km away.
4. Check radio link strength between Base → Field1 and Base → Field2. Adjust field locations for good links.

Questions?

