Process Control
Remote Monitoring
HVAC Control
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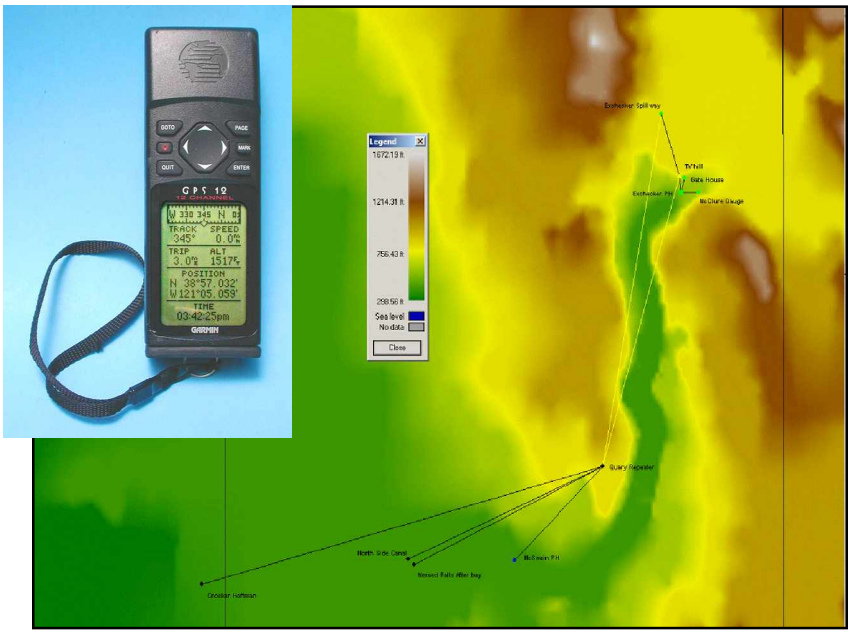
A Radio Path Survey based on GPS coordinates is a simple low-cost way to verify that a radio system will work properly with good margins. These surveys validate the choices of radios, antennas, cables, antenna heights and locations before investing in radio hardware and installation.



GPS Radio Path Survey

- *Validates choices of:*
  - P *radios*
  - P *antennas*
  - P *antenna cables*
  - P *antenna heights*
  - P *locations versus terraign*
- *Easy. Just record GPS readings*
- *Fast. Only seconds per site*
- *No field hardware setup*
- *No expensive equipment*
- *Avoids costly mistakes*
- *Improves system reliability*

A **GPS Radio Path Survey** is reliable low-cost means of checking design choices and verifying the layout of a SCADA radio system, before a single piece of hardware is purchased and installed.

Based on GPS latitude and longitude readings taken at each proposed site, computer software with digital topological maps is used to evaluate the radio systems performance. The software takes into account the performance of the radios, the choice of antennas and cables, and the antenna heights. This information is analyzed against the terrain and sites identified by the GPS data to determine the radio signal strengths and "safety" margins.

Using a GPS Radio Path Study helps to ensure reliable radio system operation under a variety of changeable "real world" field conditions such as weather and foliage growth.

Simple 3-step Process

A GPS Radio Path Study is a simple 3-step process:

1) GPS coordinates and site specific data such as antenna types and heights are recorded into a spreadsheet.

2) The spreadsheet data is run through the site survey software. A full system "topo" map is generated along with "elevation view" diagrams and signal path reports for each radio path.

3) The report results are checked for signal strengths and minimum "fade margin" along each radio path. A good fade margin ensures that the radio system will perform well even under adverse conditions.

Get a "bad" report?

Some studies come back showing problems. Based on the reports and elevation views, you may choose to elevate an antenna, use lower loss cable, move the site or add a repeater. Then, by running the study again, you can verify that your changes worked!

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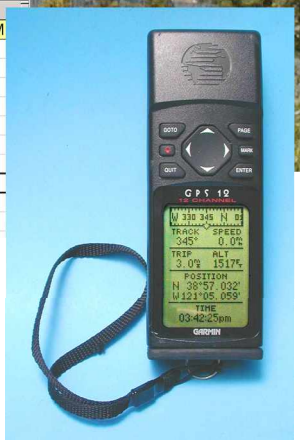
GPS Radio Path Survey

STEP 1 - Get your Site Data

Record latitude and longitude readings from a GPS into a spreadsheet. Identify possible elevated antenna mounting opportunites such as building roofs, telephone poles (with permission!) or tanks.

	A	B	C	D
1	Name	Latitude*	Longitude*	Alt (ft.)
2	McSwain PH	120.31022	37.52227	357
3	North Side Canal	120.33397	37.52255	310
4	Merced Falls After bay	120.33265	37.52157	385
5	Crocker Hoffman	120.38013	37.51823	324
6	Quary Repeater	120.29042	37.53813	976
7	TV hill	120.27325	37.58678	1032
8	Gate House	120.27207	37.58643	915
9	McClure Gauge	120.26893	37.58407	859
10	Exchecker Spillway	120.27728	37.59725	910
11	Exchecker PH	120.2729	37.58403	398



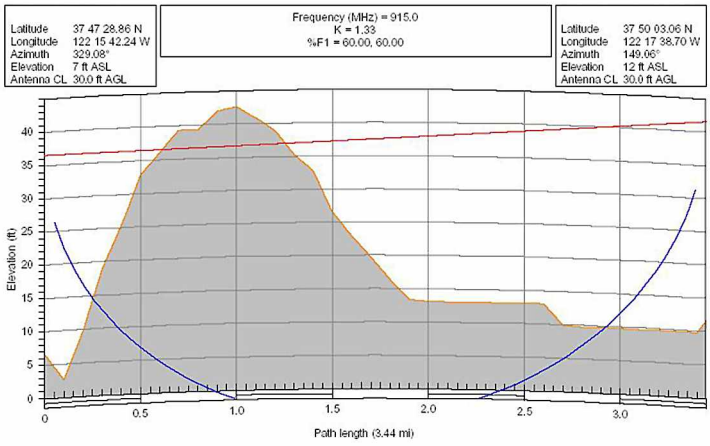
STEP 2 - Computer Analysis

Your site data will be run through a computer program that analyzes the radio paths using digital mapping data and specifications for the radios, cables and antennas that that you're looking at using.

Elevation (ft)	6.56	11.60
Latitude	37 47 28.86 N	37 50 03.06 N
Longitude	122 15 42.24 W	122 17 38.70 W
True azimuth (°)	329.08	149.06
Vertical angle (°)	0.06	-8.63E-03
Antenna model	EAN0905WB	EAN0905WB
Antenna height (ft)	30.00	30.00
Antenna gain (dBi)	7.15	7.15
(dBd)	5.00	5.00
TX line type	LMR-240	LMR-240
TX line length (ft)	30.00	30.00
TX line unit loss (dB /100 ft)	9.00	9.00
TX line loss (dB)	2.70	2.70
Frequency (MHz)	915.00	
Polarization	Vertical	
Path length (mi)	3.44	
Free space loss (dB)	106.57	
Diffraction loss (dB)	24.30	
Net path loss (dB)	121.97	121.97
Radio model	DGRO9XXX	DGRO9XXX
TX power (watts)	1.00	1.00
(dBm)	30.00	30.00
Eff. Radiated Power (Watts)	1.70	1.70
(dBm)	32.30	32.30
RX Sensitivity Criteria	10	10
RX Sensitivity (µv)	0.89	0.89
(dBm)	-108.00	-108.00
RX Signal (µv)	5.64	5.64
(dBm)	-91.97	-91.97
RX Field Strength (µv/m)	100.57	100.57
Fade Margin (dB)	16.03	16.03

STEP 3 - Check the Path Study Reports

What you get back is an overall system "topo" map, plus a detailed report on each path along with an elevation view graphic of the terrain. A "Fade Margin" of 15dB or more means that you should have a solid reliable radio link.



ORDER PART NUMBER:

98-9901 **GPS Radio Path Survey** Computer analysis of radio system based on customer supplied GPS data (order one per site)

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