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Wireless Seismic Acquisition: Real Time Data Matters

Gary Jones

Finding Petroleum
Advances in Seismic
January 25, 2011

Eliminating cables: Fewer LTI's

More and safer uptime

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Minimal environmental impact

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Road and river crossings are a breeze

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Cable free means improved efficiency

But what about my data?

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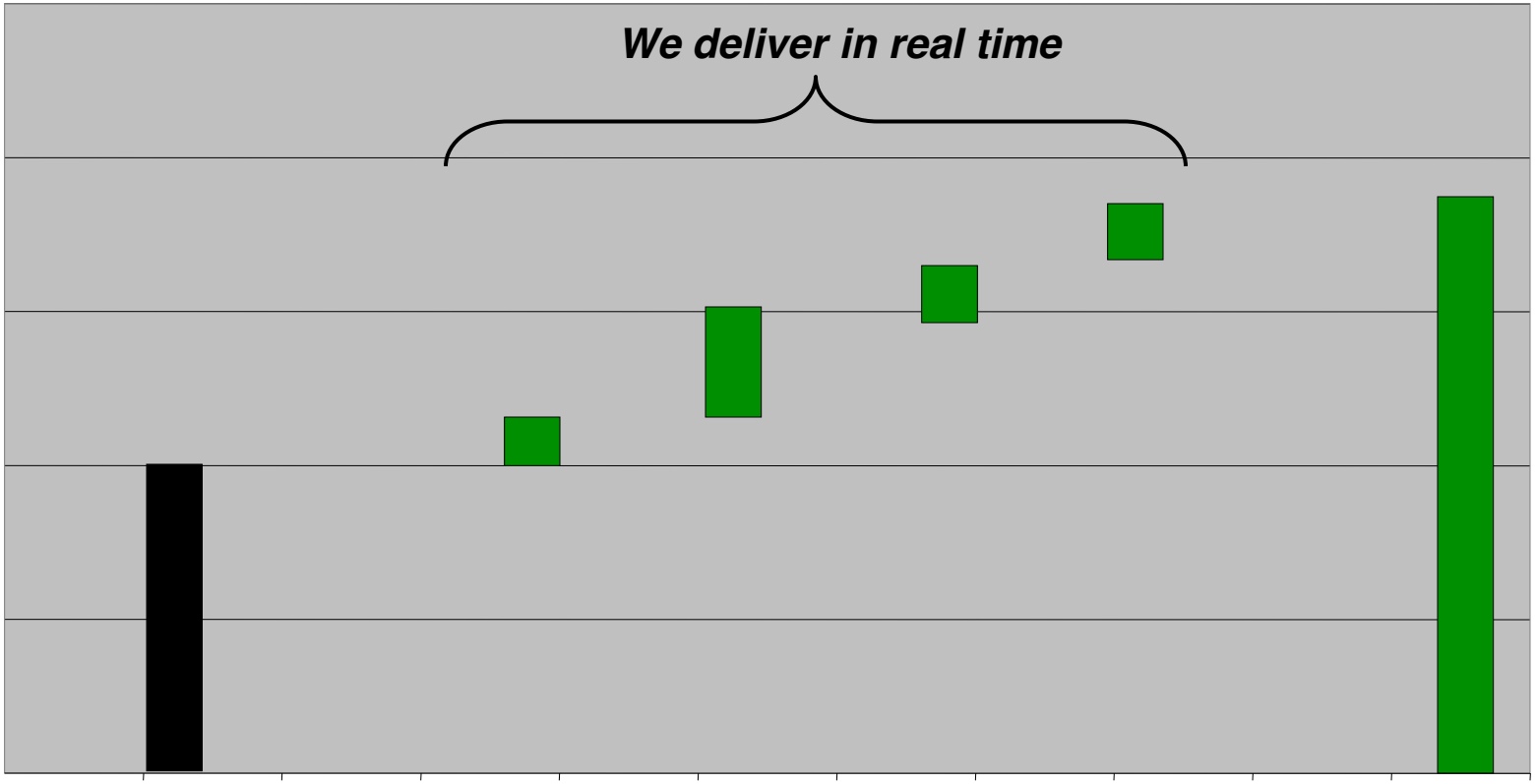
Value Proposition: Real Time Matters



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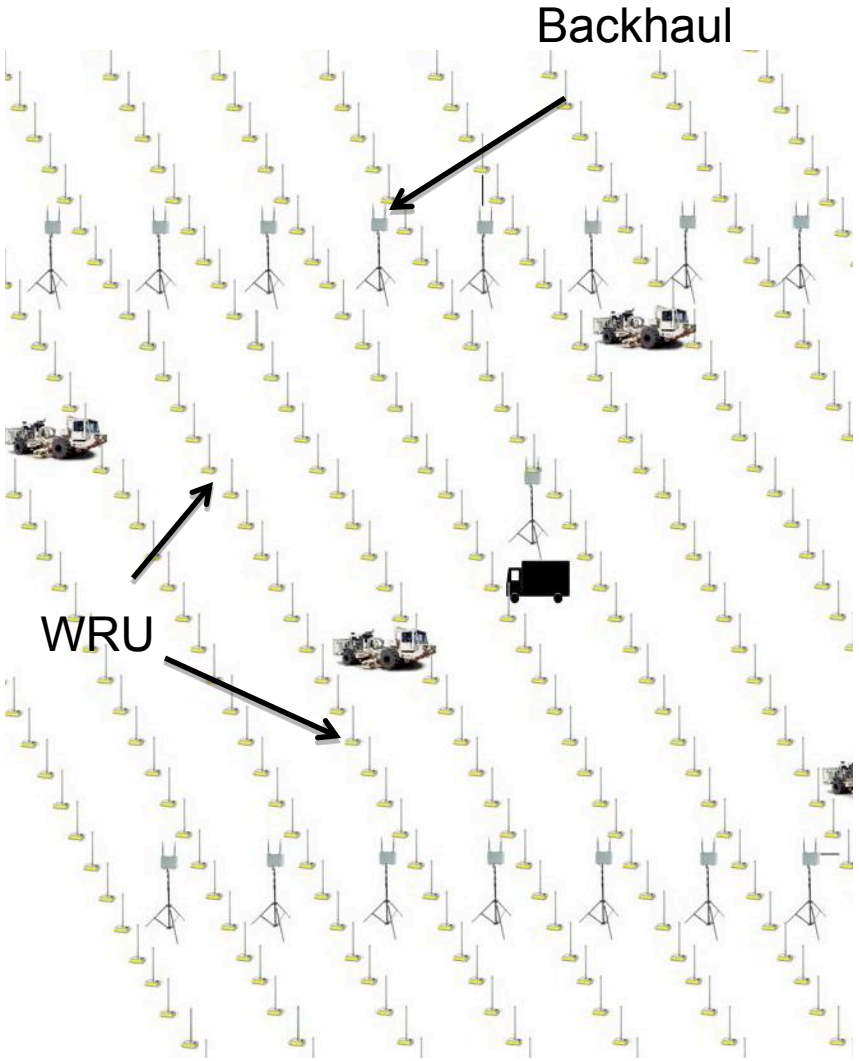
RT 1000 System Overview

- Cable free and Wireless
- System components
  - Wireless Remote Acquisition Units
  - Wireless data backhaul
  - Central recording system
- Real Time Delivery
  - Real time noise monitor
  - Continuous QC
  - No physical data collection or transcription
  - No loss of data via theft or loss of box
  - Seismic data recorded in Real Time



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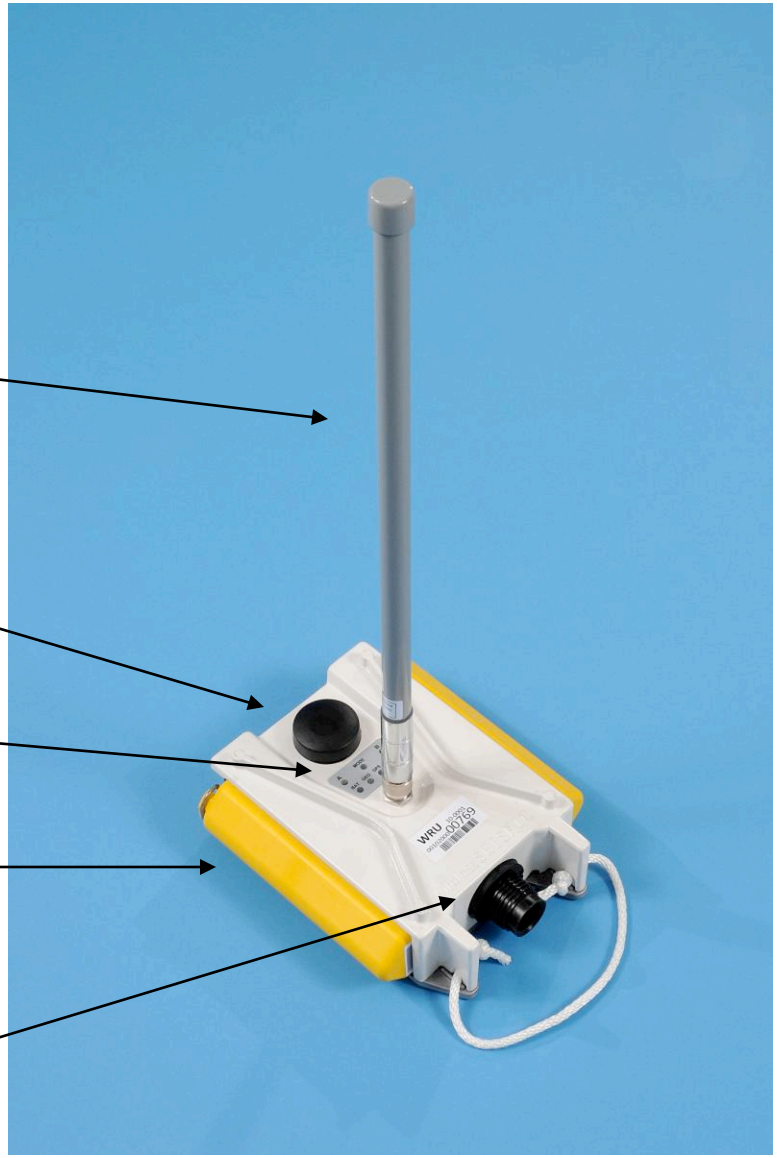
- Wireless Remote Unit
  - Waterproof aluminum case
  - Rugged, 2.4-GHz, high gain antenna
  - Internal GPS w/antenna
  - Status Indicator lights
  - Dual, hot swappable Li-Ion batteries
  - Industry standard connector



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Deployment is easy and quick to learn

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Deployment requires minimal skill

- Hold the unit inverted to turn on power, then set it on the ground
- Self tests, geophone test, check GPS location, connect to wireless array, and display results.

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Batteries & Charging Station

- Smart Batteries and a dumb charger
- Li-Ion battery monitors own charge level, tells you when it's charged, when in use, tells central how much power remains

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Arguably the best performance specifications in the industry – cabled, cable free, or wireless systems

Sample Interval

¼, ½ 1, 2 msec

Total System Dynamic Range

143 dB @ 2 msec

Instantaneous Dynamic Range

125 dB @ x1 gain

124 dB @ x4 gain

117 dB @ x16 gain

106 dB @ x64 gain

Anti-alias filter

Passband edge (0.01dB ripple) 0.75 Nyquist

Stop band attenuation >120 dB at Nyquist

3dB point is at 0.825 Nyquist

Linear or minimum phase

Common Mode Rejection

>100 dB

Equivalent Input Noise @ 2 msec

0.93 µV @ x1 gain

0.27 µV @ x4 gain

0.14 µV @ x16 gain

0.13 µV @ x64 gain

Total Harmonic Distortion

0.0002% @ 7.1825 Hz.

Dimensions

5.8” W x 2.8 ” H x 9.0 ” L

(14.7 cm x 7.2 cm x 22.9 cm)

Weight (w/o battery packs)

4.0lbs.

(1.8 Kg.)

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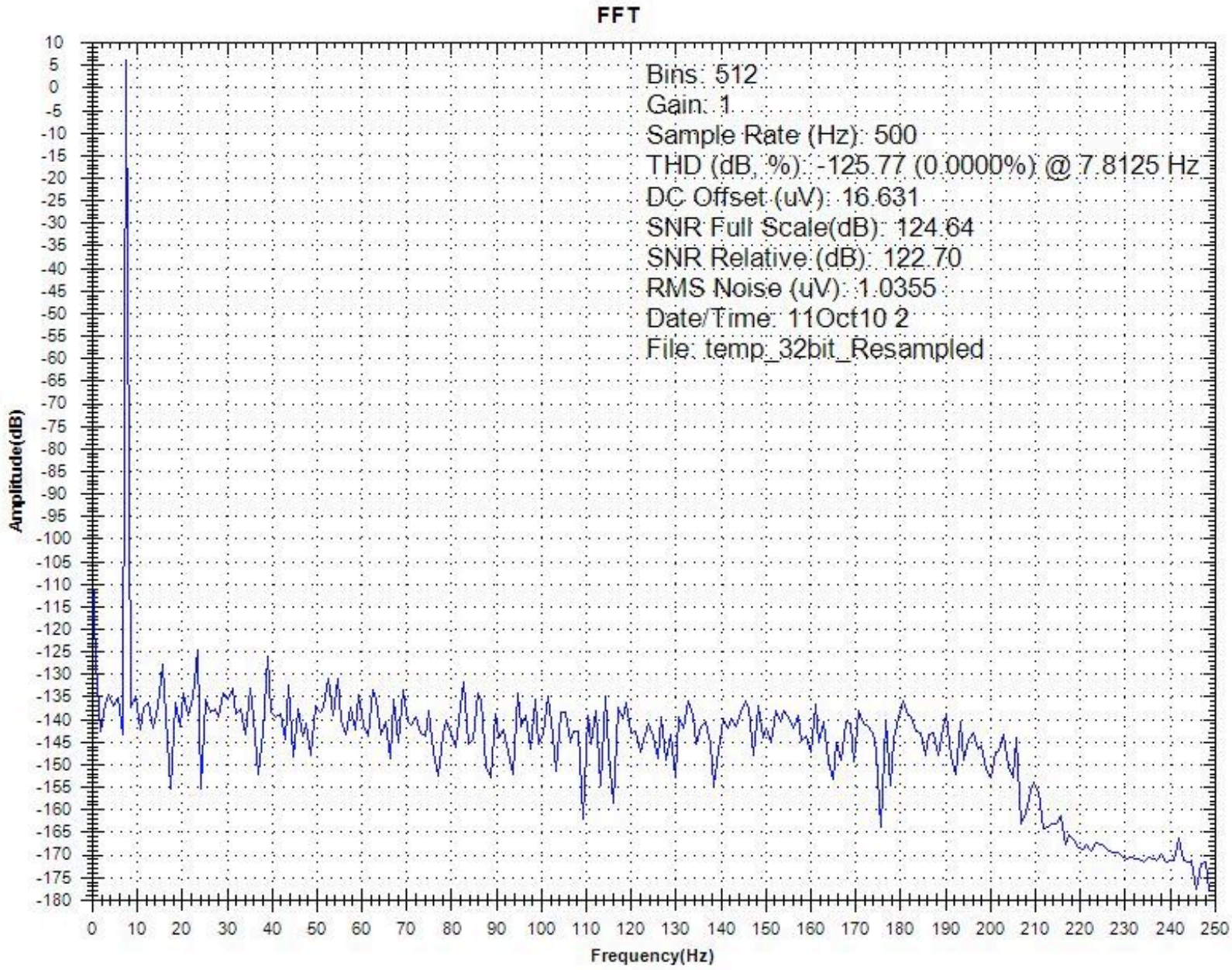

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- Wireless Data Backhaul
  - Commercial 5.8 GHz radio
  - Base Station Unit (BSU) per receiver line to form cross line backhaul
  - Mast is man-deployable in 10 minutes
  - Operates on standard batteries
  - Each BSU supports many WRU's

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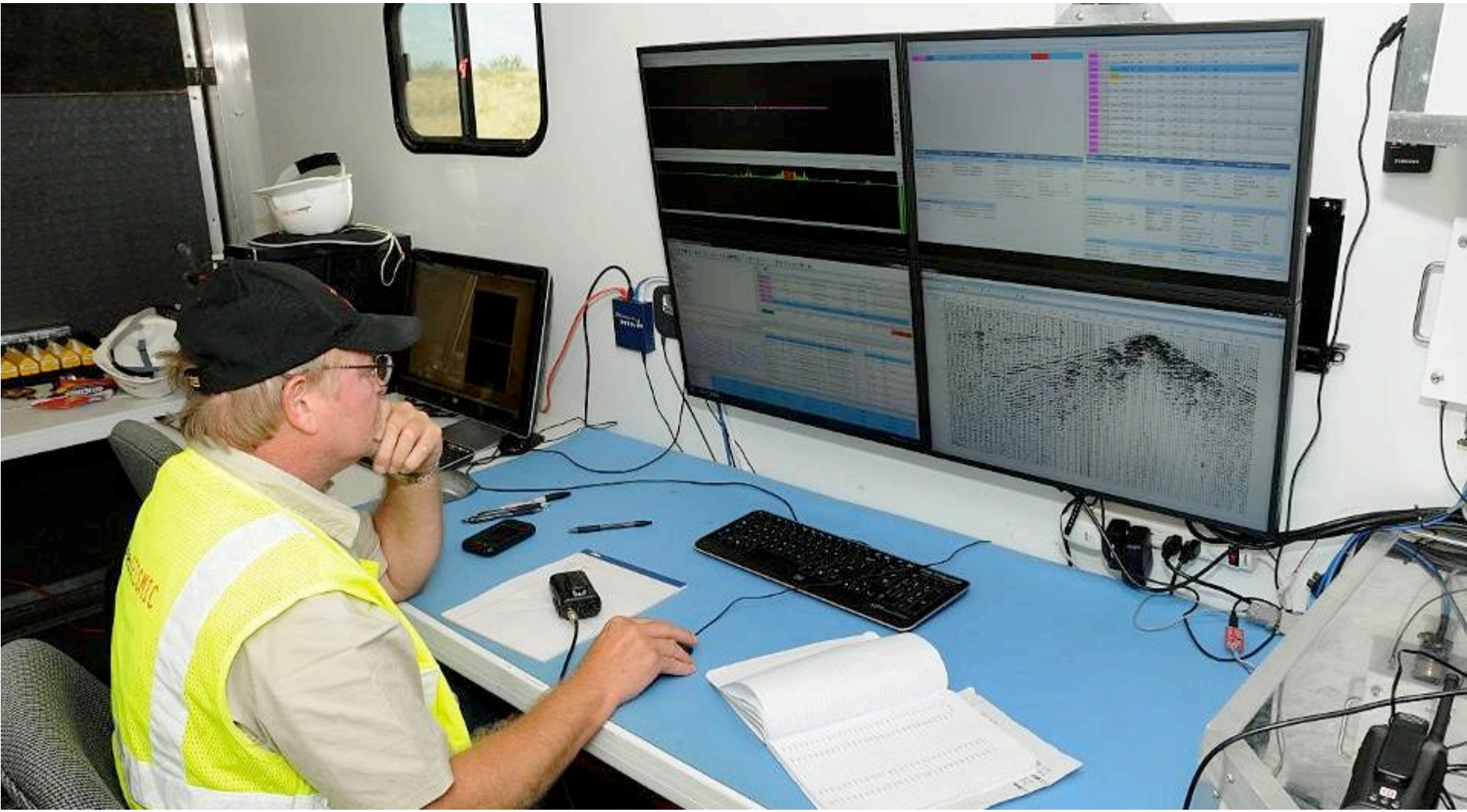
Central Hardware



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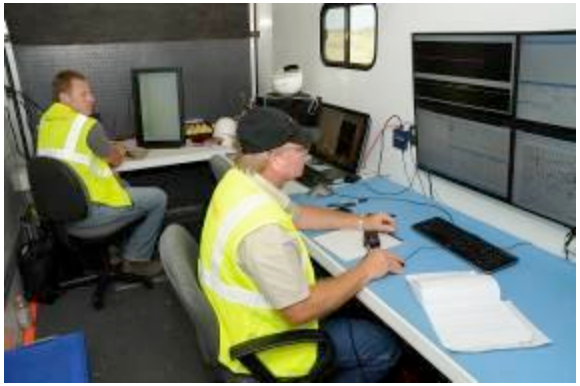
RT 1000 Central

Observer Workstations



5.8 GHz to WRU

TCP/IP
Interface

Communication Bus

Layout Event Manager

Shot Queue Manager

System Health Monitor

Seismic Data Manager

Ground Electronics Relational Database

High Speed Seismic Sample Database

Seg Y / Seg D

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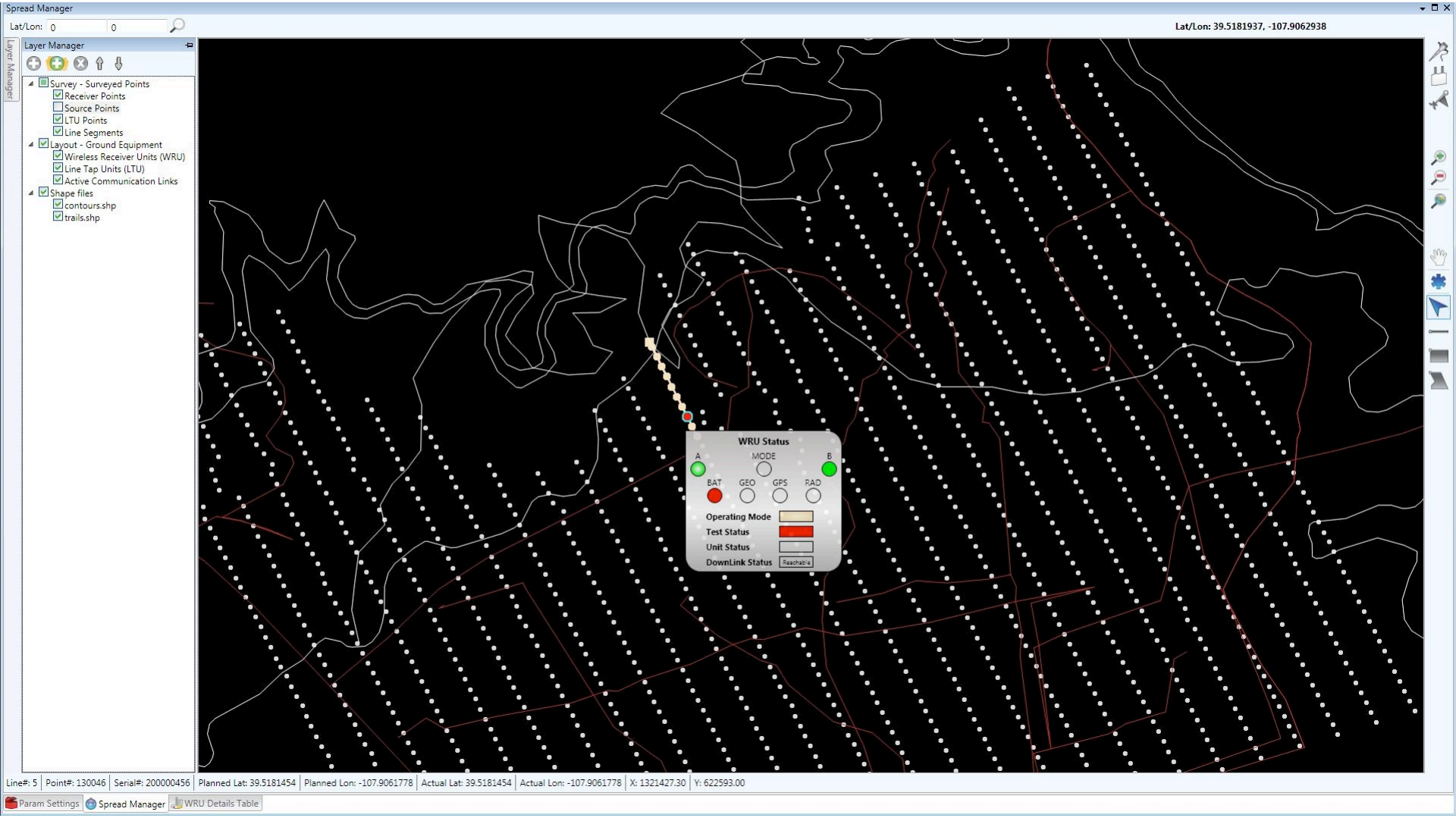
Real-time diagnostics and QC of individual units



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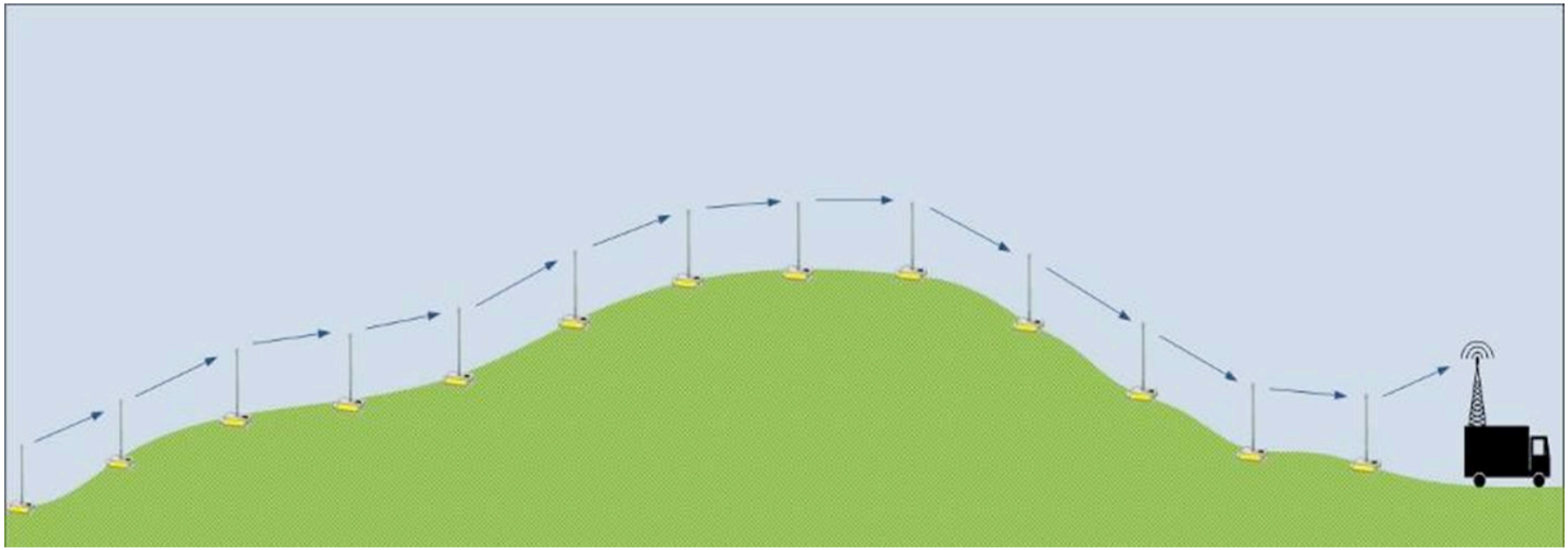
So, how to move a lot of data a long ways?

One short hop at a time.



- Each WRU is a data acquisition module and a radio relay
- Data is only transmitted for a short distance—the group interval
- Radios are simple 2.4 GHz and low-power
- Timing is sent upstream disciplined by clock in BSU

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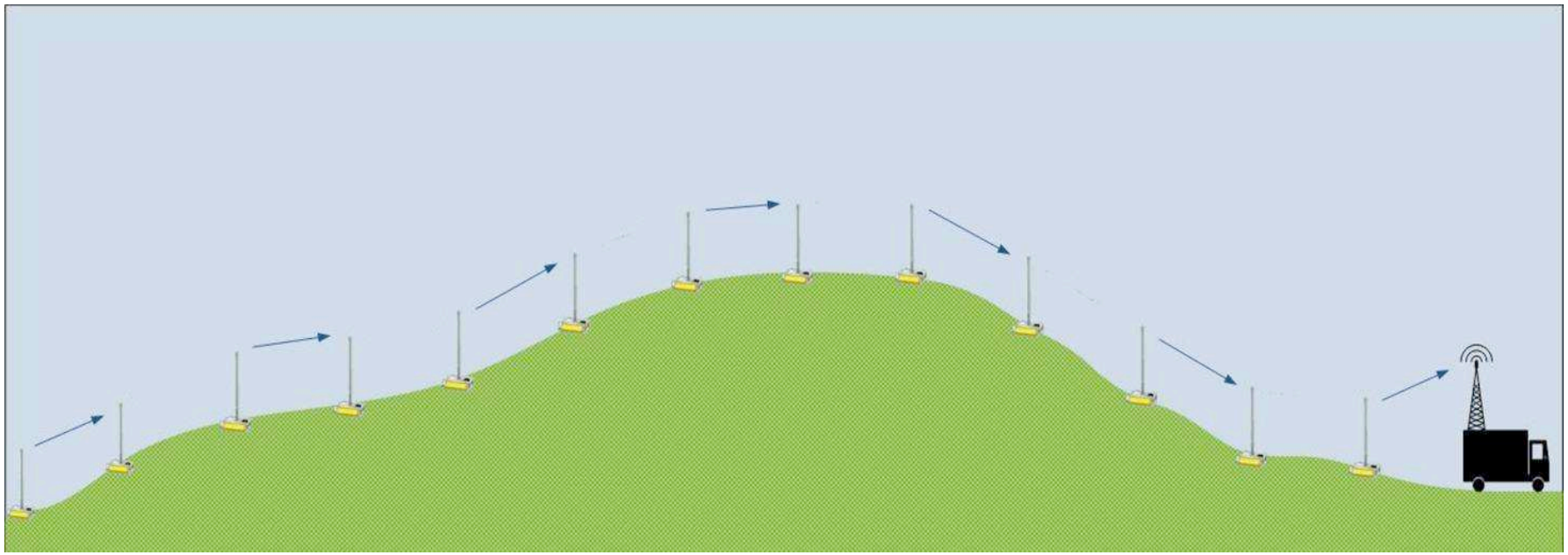

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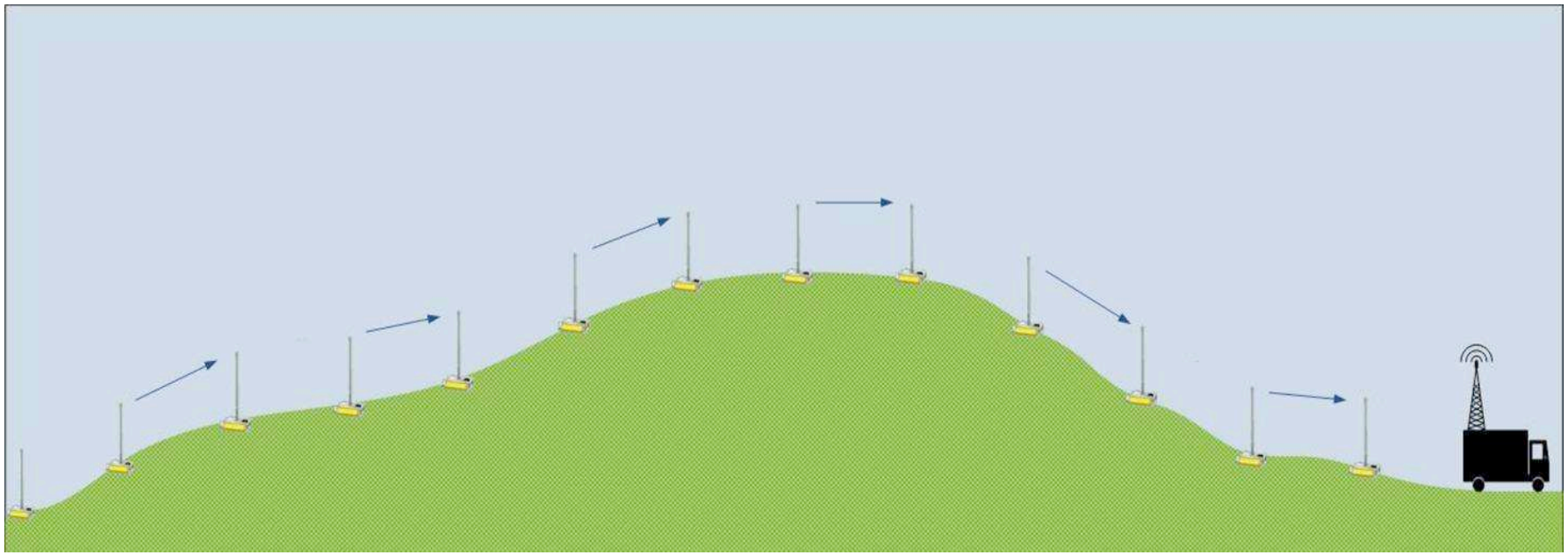

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Scalable System Architecture – 1000's of channels

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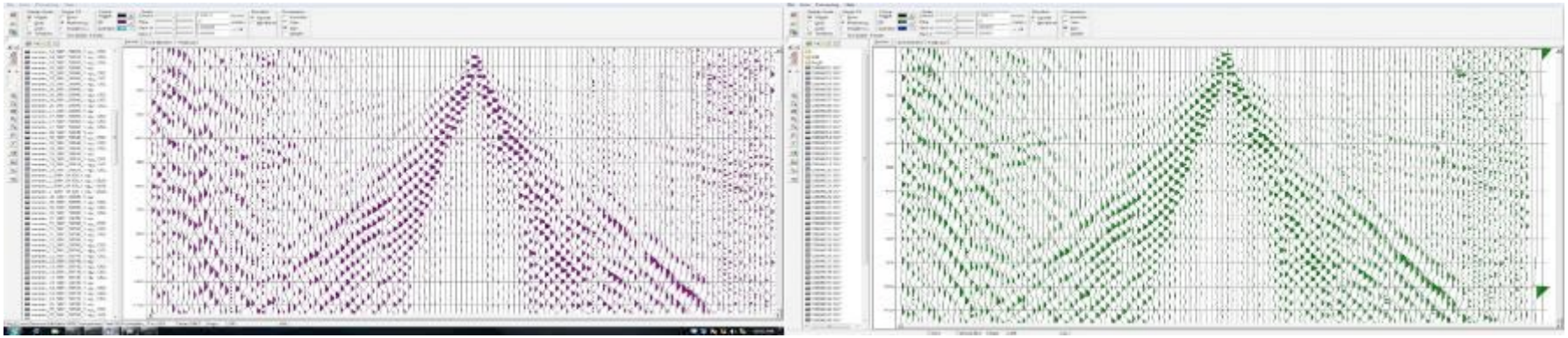
Virtually identical results

RT 1000 vs. Competitor



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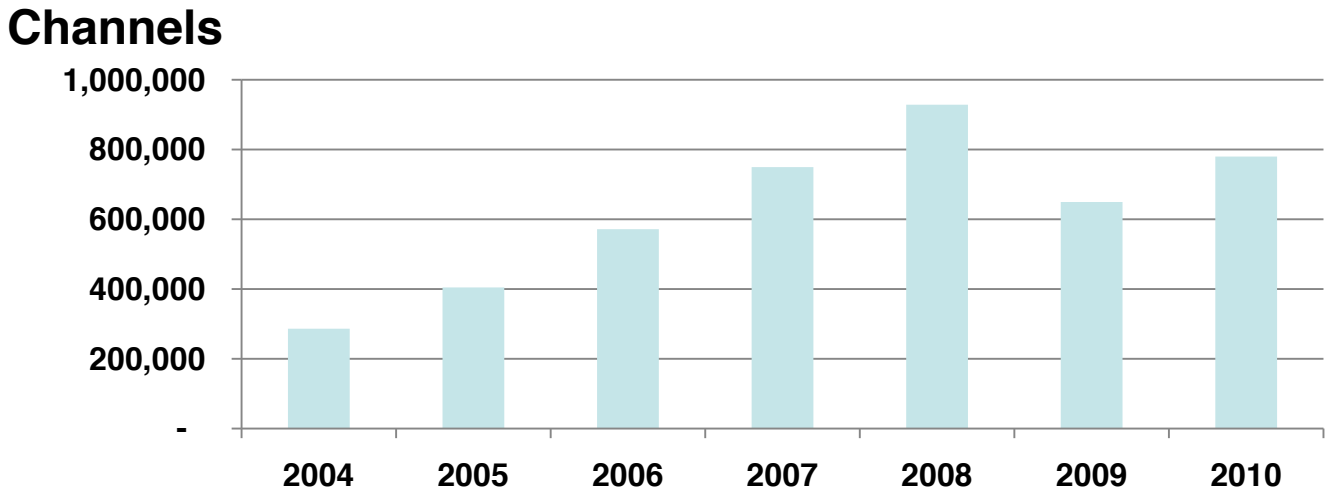
Land Recording System Sales



- 2010 saw ~7-10% of channels sold as cable free
- We expect cable free systems to capture 50% in 3-5 years
- We expect 2012 market to surpass 2008 in total market

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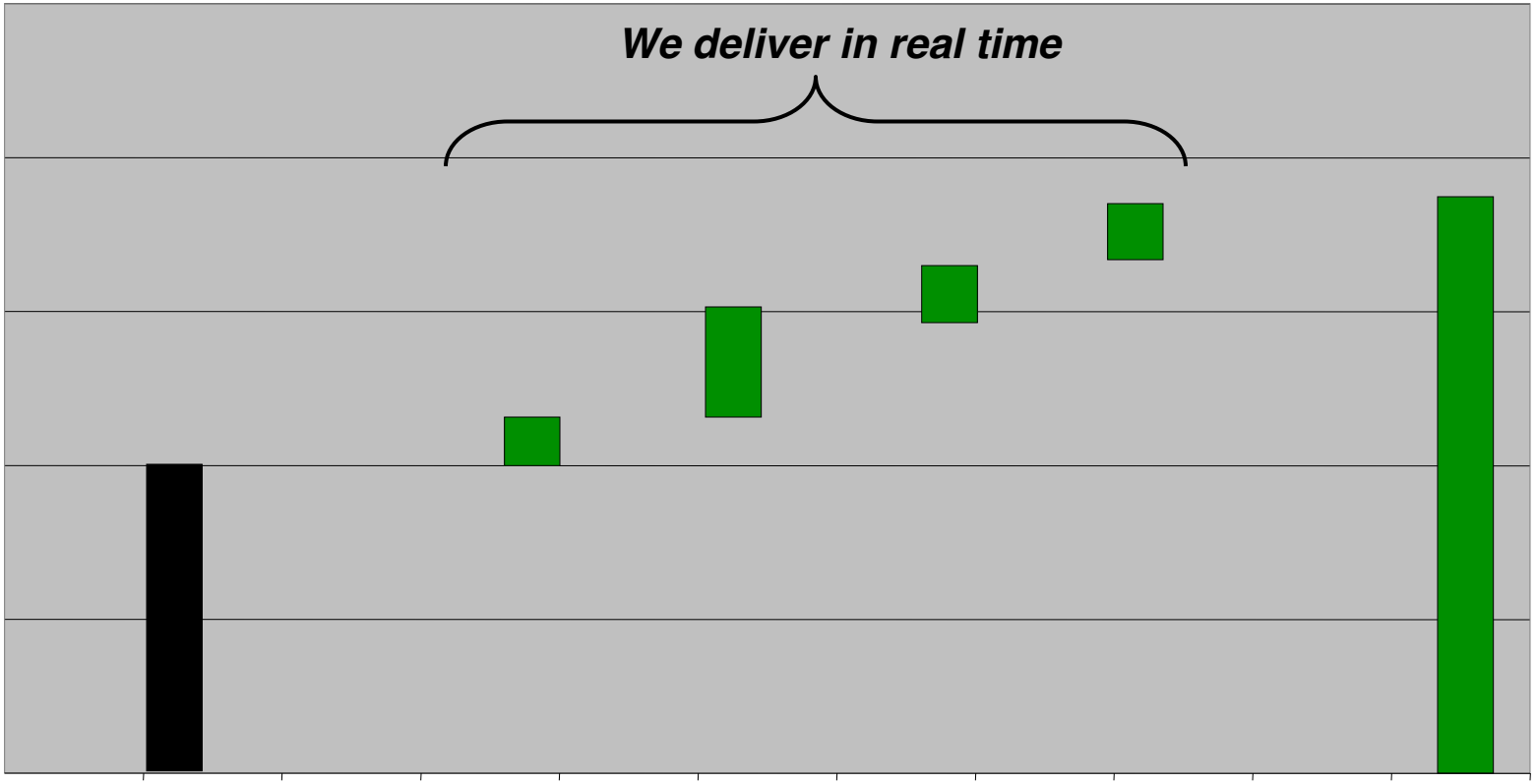
Value Proposition: Real Time Matters



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Funding by:

energy ventures

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More information

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