

# Application Note: Using GPS to Track a Fleet of Vehicles

## Objective

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A seismic data acquisition company in the oil and gas exploration field wished to track approximately 20 vehicles by distributing GPS data as the vehicles traveled on remote arctic tundra.

## Equipment

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25 NovaRoam 900 Wireless Routers are involved in this application. Each NovaRoam 900 has a GPS receiver connected directly to it via the NovaRoam's onboard RS-232 serial interface.



**Figure 1: Seismic data acquisition vehicle**



**Figure 2: Seismic data acquisition vehicle in action**



**Figure 3: An example of the terrain and climate**



## Configuration

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Each vehicle has been equipped with a NovaRoam 900 Wireless Router and a GPS receiver. The GPS receiver is connected directly to the NovaRoam via the onboard RS-232 serial interface. Each NovaRoam is configured to send all serial data to the “base station” NovaRoam. The data is routed to the base station by using NovaRoam’s unique ad hoc routing capabilities, allowing the network to automatically reconfigure itself as the topology changes.

Once reaching the base station, the GPS data is collected and displayed by a software package developed by Integrated GPS Technologies, Inc. (IGTI). This software polls multiple GPS receivers at a preset interval and displays the data of all vehicles on a single map. Once the positioning data reaches the base station, it can be sent via the Internet to the seismic data acquisition company’s main office.

By nature, GPS receivers maintain a synchronized time with each other. This can be problematic when using several GPS receivers in conjunction with wireless equipment. If a large number of radios transmit data simultaneously, collisions can occur. Due to the synchronized nature of GPS data, this scenario is likely. To compensate for this, the NovaRoams were configured in such a way that the serial data transmission is delayed a different amount of time for each vehicle. Vehicle 1 transmits GPS data 20 ms after receiving it. Vehicle 2 delays the data transmission by 40 ms. Vehicle 3 delays its data transmission by 60 ms. Each vehicle thereafter is set to delay data transmission by an additional 20 ms. This approach greatly reduces the likelihood of collisions, allowing a larger number of vehicles to be tracked simultaneously.



## Conclusion

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NovaRoams have been running for months in monster seismic data acquisition vehicles that traverse rough terrain and endure temperatures lower than -40 degrees Fahrenheit in Alaska.

The project's team leader had this to say about NovaRoam's performance: "I have been very impressed with how robust the NovaRoam 900's have been. They were turned on in early January and have endured months of pounding on some extremely rough and frozen terrain."