Remote Property and Ranch Monitoring

Rural landowners with large properties - farms, ranches, hunting leases, vacation cabins - face a common problem: no cellular service beyond the main building, meaning no communication across the property and no remote monitoring of gates, water tanks, or equipment.

The Coverage Gap Problem

Cellular coverage at rural properties is often marginal at best at the main buildings and nonexistent across the property. A 2,000-acre ranch might have cell service at the house but zero coverage at the back pasture 3 miles away. This gap makes remote monitoring and intra-property communication impossible with conventional technology.

LoRa mesh solves this gap at low cost. A solar-powered **repeater** on a stock tank or fence post relays packets in real time between sensors at the back of the property and a **gateway** at the house. (A repeater only forwards live traffic; the gateway is the node that collects, logs, and displays the data, connecting to the internet if available or running standalone.) Reliable relaying depends on line of sight between nodes, so terrain and vegetation can require additional or better-sited repeaters.

Common Ranch and Farm Applications

Water Tank Level Monitoring

Stock water tanks and irrigation reservoirs can be monitored with ultrasonic level sensors on Meshtastic/MeshCore sensor nodes. When a tank runs low, an alert can propagate through the mesh to the operator's phone - before cattle run out of water. Because mesh delivery is best-effort and depends on connectivity at the moment of sending, do not rely on a single low-level alert getting through: configure nodes to report tank level periodically as well as on threshold crossings,

so a missed alert is caught at the next routine reading.

Gate Status

Magnetic reed switch or Hall effect sensors on gates report open/closed status. Know when the back gate was opened at 2am without driving 2 miles to check.

Equipment and Vehicle Tracking

GPS-equipped nodes attached to tractors, ATVs, or trailers provide position updates at the node's reporting interval. If equipment is moved without authorization, the operator gets an alert. The Meshtastic app shows all tracked assets on a map.

Frost and Weather Alerts

Temperature/humidity sensors in orchards or greenhouses send alerts when frost risk is detected, allowing operators to activate irrigation or heating systems before damage occurs.

Cabin Arrival Detection

Motion or door sensors at remote cabins alert owners when unexpected visitors arrive - useful for hunting leases with multiple lessees or vacation properties managed remotely.

System Architecture for a 2,000-Acre Property

1. **Gateway node at house** - Connected to internet (if available) or used standalone. This node collects all sensor data and provides the map interface on the owner's phone.
2. **1-2 repeaters at property midpoints** - Solar-powered on fence posts or stock tanks, providing mesh coverage from house to back of property (line of sight permitting).
3. **Sensor nodes at monitoring points** - Low-power nRF52840 boards with appropriate sensors. Runtime depends heavily on power design, battery capacity, and reporting interval. A non-GPS nRF52840 sensor node with deep-sleep firmware, efficient sensor power-gating, a sizable battery (e.g., a large 18650 pack), and an infrequent reporting interval can run many months between changes - this is why such sensor nodes last months while a GPS-tracking T-Beam (see the precision-agriculture page) lasts only days. Verify your own runtime against a measured benchmark for your specific board, battery,

and sleep configuration.

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