Lat-Lon Presentation for: MARTS

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October 18, 2010



Lat-Lon Overview

- Founded 1999, based in Denver
- Maker of Wireless Monitoring
 Devices
 - Solar Tracking Unit (STU)
 - Locomotive Monitoring Unit (LMU)
 - Family of Sensors
- 170 active customers, 4300 digital units sold
 - Digital unit sales began in mid-2006
- Primary market is freight rail



One week of data activity (all customers)



Some of Lat-Lon's Customers



Solar Tracking Unit

- Cellular communications (Kore Wireless)
- Camera sensor
- 3-axis accelerometer
- Wireless sensors
- Solar powered
- Hybrid battery/super-cap
- 3 Patents (one pending)
- Magnetic or screw mounting
- Two-way communications
 - Can send settings and/or new firmware
- UL-913 certified
 - Intrinsically safe
 - Available for combustible shipment monitoring
 - Propane, Ethanol, LNG etc.









Back Office / Website

• Designed for variety of customers

- Customers can build their own:
 - Reports
 - Groups of units
 - Alerts
 - Geofences, geopoints, trip-wires databases
 - Sub-user accounts
 - Preferences (time zone, units etc.)
- Designed for variety of applications
 - Sensor reassignment
 - "RF_digiital_1" becomes "Hatch Open"
- XML data access for 3rd parties
- Small screen version for smartphones / iPad
- Various specialty reports
 - Productivity
 - Aging history by location
 - Start/stop summary
 - Fuel usage summary



ap: ---- Best Fit --- 🔽 🜀 🔹 Moving 📕 Moving, Speed 0 🗢 Stopped 🛆 Alarm 🔶 RF Triggered 💭 Timed



Solar Tracking Unit (STU)

Four Models

- **STU Tracking unit** For companies that want near-real-time visibility to their mobile assets including location, speed, direction, etc.
- STU / I Tracking with impact monitoring For companies that want to monitor their shipments for damaging impacts



STU / RF / C – Tracking with camera (picture taking ability)
 For companies that also want to monitor their assets or shipments for security reasons





STU Features

- Worldwide GSM/GPRS communication
- Easy magnet or screw mount
- Hybrid super-caps and rechargeable battery can potentially run forever
- No batteries to replace—ever!
- Patented battery isolation circuit protect batteries from abusive discharge currents
- Creates a timed message every 2 hours (over the air programmable)
- Creates move-timed messages up to once every 10 minutes (over the air programmable)
- Alarm messages (ex: impact alarm or door open alarm) are sent out immediately
- For immediate temperature alarms, wired sensors are available:
 - 2 temperatures and/or 2 digitals per STU



Lat-Lon = No Limits

- No limit to number of messages (location updates)
 - Fixed cost data plan using GSM/GPRS cellular data
 - Sending data is nearly free—40 location reports per penny
 - Near real time data, so you know where your unit is NOW
- No limit from power
 - With solar power, every day brings a fresh set of "batteries"
 - Enough power for 100's of location messages per day
 - Patented power system works forever
 - STU fully functional with no battery at all
 - Battery used to bridge periods of poor lighting





Solar Smart Power in Action

Map shows plentiful power during this test trip in good sunlight for near-real-time tracking data





STU / I

- Internal impact
 detection monitoring
- Internal 3 axis
 accelerometer
- More power for lower impact threshold reporting
- Filtering for high and low speed impacts
- Unit reports change in velocity





STU / RF

- 10 Wireless sensors can be assigned to each STU
- Each wireless sensor can monitor:
 - Temperature
 - Continuity switch
 - can be used for open/closed door or hatch
 - Accelerometers
 - can be used for tilt, loaded /empty, hand brake on / released (Patent pending)



The picture shows you how small the RF Wireless Sensors are in comparison to a smart phone



Wireless Sensors Specs.

- Tilt in two axis (orientation, patent pending)
- Temperature (-40 to +180F)
- Magnetic reed switch on end
- Battery voltage reporting
 - Predict remaining life of sensor
- 5-10 year life
 - Depending on sensors and reporting frequency
- Can trigger STU to create message or not
- Flexible sampling intervals
- Transmits when sensor readings change
- Smart digitals to turn tilt analog values into digitals
 - Report loaded/empty or brake on/off as digital
- Status LED blinks as data is sent (confirm operation)
- 433 MHz TX frequency
- Patent pending





STU / RF/ Camera Unit

- Camera can be activated by:
 - RF sensor(s) Impact detection threshold Paging unit from Lat-Lon website
- The STU can illuminate a night shot up to about 20 feet away (infrared light cannot be seen by humans)
- Different photo resolutions and different mounting options are available





STU Wireless Sensor Apps

- Hatch—three methods to detect state
 - Tilt sensing on lid (photo at right)
 - Tilt sensing with ball-switch
 - Gives longer battery life
 - Magnetic proximity
 - RF sender need not be on lid
 - Magnet needed to be near RF sender, then move away when hatch opens
 - Also gives longer battery life
- Load/Empty (photo at right)
 - Wireless tilt sensor on ramp between bolster and side-frame
 - Measures spring compression
- Handbrake sensing (photos next page)
 - Wireless tilt sensor on bell-crank
 - Or, tilt sensor on hinged plate with cable tie to chain







Wireless Brake Sensing

- Sheave equipped car needs chain-to-ramp tilt installation
 - Cable between chain link and ramp



 Bell crank detects brake via tilt angle using accelerometer sensor in RF sender





STU – RF Sensor Config.

Lat-Lon Wireless Senso Serial #: 00005

- Each STU can host up to 10 RF sensors
- STU contains database of sensor serial numbers and what it should do when a message is received
 - RF sensor message can trigger a STU message
 - RF sensor message can trigger a STU picture to be taken
 - RF sensor message can just update their data fields and not trigger a picture (for inclusion in next STU triggered message)
- All these settings and the RF sensors that are assigned to a STU can be updated over the air via the Lat-Lon website
 - New sensors can be added
 - Sensors can be changed out or removed
- STU can be configured to listen for RF sensors or not (to save power)





Website Reporting

- **Query Engine** •
 - Customer built data mining tools (custom reports)
 - Fleet and history reports
- Street level, aerial and birds eye maps •
 - Integrated map/report
 - Puts data into context
- Customer specific geo-referencing •
 - 0.01 Mi North of Roundhouse
 - Unlimited amounts of backend geofences and geopoints can be created by customer
- Dispatch and alert pages •
 - Auto updates
- Save to Excel or CSV format •
- Graph or chart creation directly from website •

Save To E

- Web services (XML) available •
- Any message can be sent to a cell phone • via text messaging or an email

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Two-Way Communications

- Administrator can change parameters of a unit over the air
 - Move Timed call-in times
 - Timed call-in times
 - Temperature alarm thresholds
 - Digital alarm enable/disable
 - Impact sensor thresholds
- Unit firmware can be updated
 - Upgrades without removal
 - Performance improvements after deployment

Manage Users	<u>Manage Units</u> <u>Manage Reports</u> <u>Manage Maps</u>							
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STU Summary

- The STU is the most advanced tracking system developed to date
 - It has moving / not moving intelligence
 - It can run forever
 - It has multiple monitoring capabilities
 - Website has the tools to get your logistics answers
 - It has a low lifetime cost of ownership
- Let Lat-Lon help you solve business problems and reduce cost with the STU.
- Call 877-300-6566

