Raveon Solutions

Golf Cart Tracking

Technical Brief (AN210)

Revision A0 (August 2016)

Raveon Technologies Corporation
www.raveon.com | www.ravtrack.com

Table of Contents

1 Industry Background

1.1 Market Needs

Golf course operators currently use multiple software platforms to aid in logistics. There are typical business platforms such as accounting, human resources and inventory systems and there seems to be a cutoff between this common business software and that of cart maintenance.

Golf carts have many aspects that need to be managed. The maintenance of the cart, player communications, tracking and logistics (reserving/returning carts, etc.) all need to be handled either by personnel or software. Courses all have their own systems of managing their carts and are now looking to expand their software platforms and remove the human element from as many systems as possible. Automation adds to efficiency and cost reduction.

1.2 Competitive Systems/Technologies

There are various solutions on the market for tracking golf carts. The main wireless platform in use today is cellular and the solutions providers cater their systems around this technology (and pricing model). Many of the current solutions are a SaaS (Software as a Service) model whereby the customer pays a monthly fee to maintain and operate their system. Cellular solutions are powerful but costly.

While there are many nice features to the cellular systems, the cost-reward tradeoff becomes important to analyze. The cellular systems provide many nice-to-have features such as ordering food and beverages, player communication, etc. at the cost of anywhere from $30-$50 per month per cart. This can add up quickly with an entire fleet of carts and, while possible, it may be hard for certain courses to find the immediate ROI when investing in such a system.

1.3 Raveon's Solution

Raveon has a unique position in the golf cart tracking market. With an emphasis on providing an affordable system, Raveon's solutions help solve the core issues of cart ownership without some of the extras that the cellular solutions offer.

Raveon's wireless technologies are based on private networks. Our customers buy the end nodes (for each cart) along with the central base station (typically located at the clubhouse) so they control and maintain the system with the added benefit of no monthly fees and full control/security over the system. A Raveon system provides the following benefits:

- **Fast tracking**: 1-60+ second updates
- **No monthly fees**: one-time payment for the hardware
- **General purpose inputs and outputs**: various GPIO for reading things like battery voltage and controlling features such as buzzers or alarms.
- **Long range**: Raveon's golf cart transponders are designed to reach distances of 2-15 miles depending on terrain. It is also possible to extend coverage by adding more base stations.

2 System Description

Raveon's system consists of a central base station and various end nodes on the carts. The end nodes all communicate to a base station which then relays messages to other end nodes if necessary. This star network topology can be extended with additional base stations if coverage is an issue (many hills, trees or valleys).

2.1 End Nodes

Raveon offers various radios for use with golf cart tracking systems. From modules to fully enclosed radios, medium range to long range, Raveon customizes each system to fit the particular course requirements.

2.1.1 Modules

For custom systems that require only wireless connectivity, Raveon recommends the following radio module, the RV-M50. This module can be ordered with or without GPS functionality. The RV-M50 OEM module allows you to incorporate connectivity and GPS Tracking into your system with the smallest footprint.

RV-M50

The RV-M50 is a LoRa-based based radio module.

- Low power: less than 50uA in sleep mode
- Long range: 2-15 mile range (1/2W max)
- Onboard GPS module
- Low cost
- 2 digital inputs, 1 high-current digital output, 1 analog input

2.1.2 Enclosures

"The RV-M50 module is available in two optional enclosures to create a full radio device that is easy to install into your golf carts.

Tech Series

The Tech Series enclosures house Raveon's radio modules. The RV-M22 case fits the RV-M50 radio module and has modular front panels to make it easy to change connection methods (USB, RS232, RS485, GPIO, etc.). There is even an Arduino option if the user wants to add their own custom application code to the device.

RV-V50

The RV-V50 is a plastic enclosure that includes a Li-ion battery and an onboard GPS antenna. This enclosure fits the RV-M50 radio module and includes an SMA RF antenna connector, a weatherproof power/communications connector, a power/function switch and 2 LEDs for battery and status feedback.

2.2 Base Stations

The base station is the central point for communications. In a golf cart tracking system, this would typically be located at the clubhouse or central IT location. An antenna would be located on a nearby roof with an RF cable (the shorter the better) connecting the antenna to the base station.

RV-M50

For smaller systems (<100), an M50 radio in a Tech Series RV-M22 enclosure is sufficient as the base station. This helps to reduce costs and has sufficient bandwidth for smaller systems.

RV-R40 or RV-R50

For larger systems, Raveon recommends the RV-R40 or RV-R50 base stations. These units include a base station controller which can handle multiple radios transmitting at one time. The RV-M50 can only receive one channel at a time but the RV-R40/RV-R50 can listen to up to 8 transmissions simultaneously. For systems larger than 100 radios Raveon recommends the RV-R40 gateway.

2.3 Accessories

To form a complete system, a systems integrator must consider the necessary accessory items to compliment the radios. These accessories are outlined below.

2.3.1 Antennas

Choosing the right antenna for a particular application is paramount when it comes to creating a reliable wireless system. Raveon recommends the following antennas for golf cart tracking applications.

Cart (RA-xxx-xx-xx)

For roof-top golf cart mounting in a 900MHz ISM system, The RA-xxx-xx-xx antenna is ideal. There is a threaded mount which allows an inexpensive, reliable and simple install process. The installer simply drills a hole in the roof, slips the wire through the hole, inserts the antenna into the hole and tightens down with the supplied nut. Then, the wire can be secured with wire ties or such.

Cart (RT-AN-GP2)

Each cart being tracked will also need a GPS antenna. The RT-AN-GP2 is ideal for golf cart installations as they are easily mounted with a through-hole screw mechanism.

Base station (RA-xxx-xx-xx)

The base station is typically located at the clubhouse or another high point in the system. The higher the antenna, the more reliable the coverage. The antenna is usually mounted to the roof with a coax cable that runs down to the radio. This way, the radio can be installed inside, away from the elements, and close to the server or computer used to process the tracking information. The recommended antenna for the base station is shown to the right. For added safety, a lightning arrestor should also be added in the cable path between the base station and the associated antenna.

3 Raveon Technologies

Raveon designs radios for various industries and systems. Based out of Vista California, Raveon has been designing reliable wireless radio products for over 10 years. With various off-the-shelf options, Raveon provides solutions for a number of industries but also designs custom systems for certain customers. Check out the following websites related to Raveon's products and solutions:

www.raveon.com

iot.raveon.com

www.ravtrack.com

2320 Cousteau Ct.
Vista, CA 92081

Sales: 1-760-444-5995
Fax: 1-760-444-5997