

## RTK Networks: Cellular Modem Communication Technology

### Introduction

With advancements in GPS positioning technology, obtaining RTK quality corrections is becoming easier and more affordable. A personal base station, consisting of an antenna, receiver, radio transmitter, mounting structure, and a power source, used to be the only option for any RTK operations. With a personal base station, radio range is often limited to 1 or 2 miles, however, farmers that manage plots scattered over many miles typically re-locate their base station to accommodate fields spread over several miles. Now, cellular modems are capable of replacing bulky personal base stations by streaming CORS or Real-Time Network (RTKN) correction data via the internet to the rover unit. In order to capitalize on this technology, producers must understand basic concepts behind cellular modem communication and how to make beneficial purchases for his/her operation. For comprehensive definitions of terms and acronyms used in this document see *GPS/GNSS Related Terminology* at [www.AlabamaPrecisionAgOnline.com](http://www.AlabamaPrecisionAgOnline.com).

### INSIDE THIS PUBLICATION

- Cellular data options for use with guidance systems and other GPS-based technologies
- Components required to access RTK correction data via the internet
- Purchase considerations for cellular modems for use with guidance systems

### Cellular Data Options

In order to utilize CORS or RTKN based corrections for agriculture operations via the internet, a producer must have at least three components:

- 1) Data plan subscription from a cellular service provider
- 2) Cellular modem, either integrated within a guidance device or as a stand-alone component (Figure 1)
- 3) Compatible RTK guidance device



Figure 1. Example cellular modem (left) and optional cellular signal booster (right).

Matching a cellular service provider to a particular modem and subsequent guidance system is imperative as some service provider/manufacture combinations are not compatible. In addition to having a cellular modem that is compatible with a guidance system, a producer should ensure the cellular modem is compatible with the desired cellular service provider. For example, Verizon Wireless™, Alltel™, and Sprint PCS™ use a cellular format known as CDMA. However, the Trimble™ Ag 3000 modem only functions with the GSM/GPRS cellular format. Therefore, to use this modem for real-time correction data with a Trimble guidance device, a producer would require a data plan subscription from T-Mobile™ or AT&T Mobility™, as these providers support the GSM/GPRS cellular format.

On the other hand, some ag receivers, e.g. Topcon™ & Trimble™, can use third-party modems for CORS or RTKN functionality. Such modems include, but are not limited to, the Intuicom RTK Bridge™ and Sierra Wireless Airlink™. Both of these modems are pre-configured by the manufacturers to communicate with either GSM/GPRS or CDMA formats, but not both at the same time. Prior to ordering either of these devices, the producer must

specify which cellular service provider he/she is planning to use. A guidance-system salesperson may ask for that information as well, in order to assign the optimum equipment combination and to simplify the technical-support process for the producer.

The two main data transfer protocols (GSM/GPRS and CDMA) and their compatibility with a few different modems and guidance systems, are illustrated in Table 1. Over the years, these data options have been enhanced and upgraded to increase data transfer capacity, thus revisions of these formats may be referred to in different manners. Today, CDMA may be referred to as or associated with W-CDMA, EV-DO, and EV-DV, while GSM/GPRS may be associated with EDGE or EGPRS.

## Purchase Considerations

When making an investment in this technology, it is imperative to carefully plan before making a purchase.

- Determine cellular **data coverage** in the area of operation. A data coverage map can be accessed by clicking a cellular carrier in the table below.
- Select the cellular carrier with the best data reception in your area; voice reception does not necessarily reflect data reception for cellular devices.
- An optional cellular signal booster (Figure 1) and a high gain antenna can enhance data reception in low signal areas.
- If you wish to purchase a modem for existing equipment, contact your local guidance system dealer for compatibility information.
- Ensure the dealer/manufacturer offers technical support and firmware updates for the device.

**Table 1. Cellular data options and corresponding information for Alabama** ([click a cellular carrier for data coverage map](#))

| Cellular Format | Cellular Carrier  | Cellular Modem                       | Example Guidance Receiver                                     |
|-----------------|---|--------------------------------------|---|
| GSM / GPRS      | <a href="#">AT&amp;T Mobility™</a> ,<br><a href="#">T-Mobile™</a>                               | Integrated RTK Module (Topcon)       | AGI-3 Receiver (Topcon)                                       |
|                 |   | Ag 3000 (Trimble™)                   | AgGPS 442 GNSS (Trimble™)                                     |
|                 |   | integrated BlueTree Wireless†        | Slingshot™ used with Phoenix 300<br>(Raven Industries)        |
|                 |   | RTK Bridge™ (Intuicom®)              | <i>Some receivers compatible with a<br/>third-party modem</i> |
|                 |   | Airlink™ (Sierra Wireless™)          |   |
| CDMA            | <a href="#">Sprint PCS™</a> ,<br><a href="#">Verizon Wireless™</a> ,<br><a href="#">Alltel™</a> | integrated Kyocera M200              | mojoRTK<br>(Leica Geosystems)*                                |
|                 |   | Integrated Multi-Tech Systems, Inc.® | Paradyme™ (Ag Leader®)*                                       |
|                 |   | integrated BlueTree Wireless†        | Slingshot™ used with Phoenix 300<br>(Raven Industries)        |
|                 |   | RTK Bridge™ (Intuicom®)              | <i>Some receivers compatible with a<br/>third-party modem</i> |
|                 |   | Airlink™ (Sierra Wireless™)          |   |

\* Leica Geosystems and Ag Leader® manage their respective cellular data service, relinquishing customer responsibility for setup.

† Raven currently supports AT&T Mobility™, Verizon Wireless™ and Alltel™.

## Disclaimer

The mention of trade names and commercial products is for informational purposes and does not necessarily imply endorsement by the Alabama Cooperative Extension System.

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