

Cuthbert offers RFID as part of integration solution for carriers and terminal operators.

Resale of RFID hardware is not a core business, so we can be unbiased with respect to selection of RFID technology for tractors, chassis, and containers. That said, our continuous review of the marketplace leads us fairly consistently to the same election.

## **Passive Choke Point RFID solutions**

Our selection criteria for RFID technology, reflecting the needs of our various clients includes the following factors:

- Reliability of tag reads
- Ease of licensing readers in the US and other countries
- Expected life of tag (or its battery, if the tag uses one)
- Sensitivity of the tag to placement
- Ease of tag installation
- Tag read range
- Special requirements for reader installation
- Initial investment in readers
- Cost per tag
- Ease of tag programming
- Ease with which tag data can be used in new and existing systems

The requirement to read tags on tractors, chassis and containers is substantially similar to the requirements of the railroads when they went through the same selection process in the late 1980s. One technology emerged, which has become the standard for cars on trucks on US toll highways.

- 915 MHz Passive tags (no battery)
- Read range 30'
- High speed reads
- One reader per traffic lane
- Choice of antenna, based on the lane configuration

RFID systems meeting these criteria have improved substantially since the railroads deployed tags on every railcar in the US. New tags respond more quickly, allowing reads at higher speeds (up to 100 MPH). New readers can sense older generations of tags, but old readers cannot sense new tags.

## **Cost Profile**

The following numbers are provided for a designer to develop order of magnitude approximations for the cost of an installation. Costs vary based on the specific needs of the terminal, and quite dramatically, based on the level of custom integration required.

- Per terminal - \$50,000
- Per lane - US\$5,000 including installation
- Per tag (one per tractor, container or chassis) US\$20-\$40

## Active Tag RTLS solutions

The passive tag solution described above and proven on 1.5 million railroad cars and 11 million vehicles in the US is only one technical approach. It requires a reader at each choke point in the terminal – typically one reader per in-gate lane and one reader per out-gate lane.

There is another approach, RTLS, Real Time Locating System. RTLS requires fewer readers. A typical terminal might have only four reader antennas, only at each corner of the facility. A larger facility might have six, one at each corner and two on the midfield perimeter. Each antenna interrogates every tag on the premises. The reader measures the time from its question of the tag to the tag's answer. From this, the reader knows the distance to the tag. With two antennas operational, a tag can be located to one of two locations on the terminal. With three readers, a tag can be located in position and altitude on the terminal. Because the antennas are so far from the tags, the tags must respond with a healthy signal, requiring a battery.

Active tag solutions have a significant cost disadvantage associated with the battery powered tag. The initial investment in the tag is higher, and the cost to replace batteries is significant. The advantage is an RTLS provides a periodic inventory, rather than the perceptual inventory offered by a choke point solution. In the world of containers, a periodic inventory that can be conducted at will, is superior solution to a perpetual inventory, in which errors perpetuate themselves.

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