

Container Tracking and Monitoring: RFID vs. Satellite -- An Honest Evaluation

Bert Moore
Director, Communications and Media Relations
AIM Global

Satellite communications that go beyond mere GPS information can provide information not only about the location of a container but also about its environmental conditions, whether it has been tampered with, and other useful data. What's more, this can be achieved with in-transit containers virtually anywhere in the world. For some applications, such as tracking of munitions, hazardous materials, pharmaceuticals and other sensitive goods, having access to that kind of information in real time can enable the cargo's owner to take immediate corrective action (if any is possible).

For the majority of supply chain applications, however, access to this type of data at the point of receipt is perfectly adequate.

The issue isn't whether satellite communications between a container and a head office can offer benefits in certain applications, the issue is whether there are benefits offered by RFID that can serve a significant part of the supply chain.

Container tracking can be accomplished in a number of ways -- most notably today by associating the container with the carrier whether a cargo vessel, tractor/trailer or rail car. In many cases, it's possible for shippers or consignees to access carrier information about the location of the transport to track the container.

The key to many of the potential benefits of container tracking and monitoring is sensor technology. Sensors that monitor temperature, humidity, shock, vibration, etc. provide cargo owners with important information about the condition of their goods -- whether in real time or as a histogram.

Both GPS and RFID systems can be equipped with sensors to collect and report conditions within the container. In addition, there is a growing number of disposable sensor-enabled RFID tags that can monitor specific shipping containers, pallets or areas of the container.

At this point, it is often noted that a significant advantage to GPS is that it can be used anywhere in the world. However, both 433 MHz and UHF systems are legal in the vast majority of countries in the world and more are adopting internationally-based RFID standard spectra. China, for example, has just authorized a portion of the UHF band compatible with Gen2 UHF tags.

Infrastructure: GPS infrastructure is obviously already in place. RFID does require fixed location antennas. These can be implanted in the ground, on cranes and tugs in ports, or at entry and exit points of freight yards. Readers on cranes and tugs can also provide absolute linking between container movement and the equipment or operator. RFID tags can offer more precision at close range than GPS.

Timeliness and Features: it is true that RFID typically works by having goods and containers move past a reader and that RFID data logging and e-seals offer historical data. Satellite can transmit the occurrence of unwanted events in a far timelier manner. In some instances, this can trigger urgent, necessary responses. In other instances, however, having this data go from the container to a head office isn't a particularly efficient or even necessary scheme. Sometimes, having the container communicate directly with, say, the driver of a truck, is more efficient. If a refrigeration unit on a trailer fails, the driver, not the main office in some other state, is going to have to take corrective action.

Costs: RFID readers -- hand-held or fixed location -- will be necessary. Satellite linking doesn't require the same hardware infrastructure as RFID systems but it does require subscription to a service -- an ongoing, rather than a one-time cost.

The more significant problem with the cost analysis is a lack of understanding of the business case. Container owners, not shippers or consignees, must foot the bill for equipping containers with either fixed RFID tags or satellite equipment. Port and yard operators pay for installation of RFID reading equipment. The benefit for both these parties could be the more efficient transport of containers through the system -- freeing assets (containers) for reuse and reducing required storage space.

While some shippers and consignees could see some benefit from having real time data from containers, the majority would not. Most would not see any real benefits and would be reluctant to pay much, if any, additional fee. Thus, container owners would have little incentive to satellite enable their containers.

Further, many container owners don't foresee widespread utilization of either system until there is a government mandate for their use or there are provisions for expedited handling of containers that provide sensor data to ensure their integrity.

In all likelihood, some combination of GPS, RFID and sensors will eventually provide comprehensive, real-time monitoring and tracking of containers and shipments as costs come down, features are added, and governments take action.

In the short term, however, companies must evaluate the value of having real-time or historical data on the location and condition of shipments and, consequently, whether they should consider fixed RFID tags or GPS or disposable sensor-enable RFID tags and/or e-seals.

For more information on RFID, visit www.rfid.org.