

# New System's Tags Talk First, and Fast

A new passive UHF RFID system from iPico uses "tag talks first" technology, making it suitable for applications where items move at high speeds.

By Jonathan Collins

Dec. 15, 2005—South African RFID company [iPico Holdings](#) has developed a new passive UHF RFID system geared toward applications where tag data needs to be quickly read.

The system employs a transmission method called "tag talks only" (TTO), as opposed to "reader talks first" (RTF) and "tag talks first" (TTF) methods. Utilized by RFID systems based on the [EPCglobal](#) or [ISO 18000-6](#) standards, RTF has interrogators (readers) initiating communication between a tag and reader in a set of sequences. The interrogator sends energy to the tags, but the tags sit idle until the reader requests them to respond. The reader can identify a specific tag and request data from it by using a complex sequence of commands to select a particular subset of tags, singulating one tag from this subset using an anticollision algorithm, and reading the required data it contains.

With TTF, the tag initiates communication with the reader by transmitting its ID as soon as it enters the interrogator's RF beam. The reader then responds with a command. By contrast, with TTO, the reader sends no commands to the tag. Instead, the tag just sends its ID code and any required additional data at random intervals whenever it receives an RF signal from the reader.

"Communicating with a read-write tag in UHF has to be quick because the reader's RF field is not solid," says Luther Erasmus, CEO of iPico. "Moving tags pass in and out of the reader field, and two-way communication gets interrupted, even if initiation takes just a second. If there is a read-write action taking place and the RF field gets interrupted, then the process has to start over again."

Using iPico's own iP-X anticollision protocol, the company claims, the TTO system is able to interrogate 200 tags simultaneously in the same read RF beam. Erasmus says his company developed its new TTO system to meet the requirements of several applications where tags have to be read either while moving at high speeds (e.g., 100 miles per hour) or in an environment with a high density of other tags.

One of these applications is electronic vehicle licensing, an RFID application the company is marketing to countries in Latin America, the Middle East and Asia. In the summer of 2004, iPico announced the commercial availability of its Electronic Number Plate (ENP) RFID technology, which also uses TTO technology (see [Passive Tags Track Cars](#)). The new TTO system is a redesign of an earlier system designed primarily for electronic license plate applications. Both the ENP and TTO systems use read-write tags with 1 kilobit of memory (a unique 64-bit ID number and 14 64-bit pages of user memory), which can be one-time programmable (OTP), "write once, read many" (WORM) or multiple read-write, as selected by the user. According to iPico, the newer version improves on the system's performance and extends its usefulness to applications such as container security and baggage tracking.

"RTF is not sufficient for baggage tracking. It can be done, but with what amount of infrastructure and what

level of accuracy?" Erasmus asks. "Using TTO, airport gate numbers and other data can be obtained at speed from the tags without any reader commands, resulting in low levels of reader interference."

The company maintains that because its TTO tags can hold more data than just an ID number, they can also store EPC data. EPC readers, however, would first have to be enabled to use TTO, a communication method that currently lies outside the EPC Gen 2 specification.

Other applications will build on the security aspects of the new iPico offering. The company has added its own security—an on-chip sensor able to detect the status of an external switch or link to the tag so additional data can be written and linked to each tag's unique 64-bit ID number. This makes the system applicable for use in securing shipping containers, as well as providing a way to tag and verify the authenticity of high-value items stored together in high density, such as optical discs. The additional memory and security encryption available on the tags can be used to store additional data to help combat fraud.

When a TTO tag is charged up by a reader beam, it can transmit its 64-bit ID in less than 1 millisecond. When using the read-write functionality, the system requires a read command approximately 5 milliseconds in length, followed by a tag response. A tag using TTO would take 1 millisecond to transmit its ID, along with one 64-bit page of data, says iPico.

The company also states that iP-X TTO tags and readers require as little as 100 kHz of bandwidth and will work optimally using 1.2 MHz bandwidth, whereas EPCglobal- and ISO-based systems require several MHz bandwidth for read-write capabilities. In European and Asian countries, no more than 2 to 3 MHz are available. That makes the option particularly useful in Europe and Asia, Erasmus explains, where UHF spectrum assigned to RFID is far less than in the United States.

iPico's TTO system uses reader chips from [EM Microelectronic](#) and works with the latter's EM4244 read-write passive chips. EM Microelectronic has its own TTO offering, but iPico says only its system offers tamper detection as well. This comprises a passive sensor switch, and can be a tamper wire or another threshold pulse, such as a change in temperature or air pressure.

The company reports that tags and readers based on TTO technology will be commercially available in the first quarter of 2006, and that pricing will be the same as for its other UHF offerings.

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