Overview of RFID Components

Tags

Tags are the heart of an RFID system, because they store the information that describes the object being tracked. Specific object information is stored in the memory of tags and is accessed via the radio signal of RFID readers.

Data is transferred between a tag and a reader via low-power radio waves, which are tuned to the same frequency. To obtain information from a tag, a transceiver must send a signal to the RFID tag, causing the tag to transmit its information to the transceiver. The transceiver then reads the signal, converts it to a digital format, and transmits it to a designated application such as an inventory management system.

Tags may be active or passive and read-only, write-once, or read-write. Below is a description of each:

- Active tags have a battery, which runs the microchip's circuitry and enables the tags to send a stronger signal to the reader, and have a read range of approximately 100 feet.
- Passive tags have no battery. Instead, they draw power from a reader, which sends electromagnetic waves that induce a current in the tag's antenna and powers the microchip's circuits. The chip then modulates the waves the tag sends back to the reader. Passive tags have a read range of approximately 30 feet.
- Read-only tags contain data, such as a serialized tracking numbers, which are pre-written onto them by the tag manufacturer or distributor. Read-only tags are generally the least expensive, because they cannot have any additional information included as they move throughout the supply chain. Any updates to that information have to be maintained in the application software that tracks the stock unit's movement and activity.
- Write-once tags enable a user to write data to the tag one time during production or distribution. This information can be a serial number or other data, such as a lot or batch number.
- Full read-write tags allow new data to be written to the tag as needed and written over the original data.

Readers and Antennas

RFID readers are devices that convert radio waves from RFID tags into a form that can be passed to middleware software. An RFID tag reader uses antennas to communicate with the RFID chip. Reader requirements vary depending on the type of task and application, and almost all applications will require multiple forms of readers to make a successful system.

There are a variety of different reading systems and technologies. These include:

1. Handheld readers that act like a handheld bar code scanner.
2. RFID readers embedded into mobile data collection devices.

3. Fixed readers, which are mounted to read tags automatically as items pass by or near them.

Middleware

Both middleware and software applications are required in an RFID environment. A major issue for companies seeking to implement an RFID solution is the lack of sufficient middleware to link RFID systems and enterprise applications. Middleware software or applications are needed to manage the flow of data from readers and send the data to back-end management systems. RFID middleware assist with the following:

1. Retrieving data from readers.
2. Filtering data feeds to application software.
3. Generating inventory movement notifications.
4. Monitoring tag and reader network performance.
5. Capturing history.
6. Analyzing tag-read events for application tuning and optimization.

Source: *What Every Internal Auditor Should Know About RFID,* Knowledgeleader, June 2006.