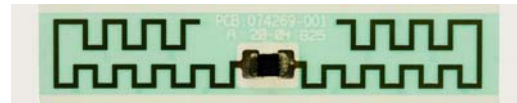


RFID for Animal Care Systems – Passive or Active

by Bob Scher, CEO, Dynasys

Radio Frequency Identification transponders basically contain a radio transceiver circuit along with some sort of an appropriate antenna. The transponder can take the form of a tag, label, ID card, wrist band bracelet, key fob or any other type of package encapsulation appropriate for their intended application.

In its simplest form the RFID tag contains a silicon chip and a tuned conductor which acts as its antenna. The onboard chip may function as both a radio receiver and a radio transmitter as well as storing information such as its unique ID number and other associated data.



Passive RFID

In the case of the PASSIVE RFID device the tag does not contain its own power source. The tag derives all of its power from induced energy captured by its antenna. The associated RFID Reader interrogates the tag by providing energy to the air-interface. The tag's antenna captures a small portion of the Reader's energy and uses it to power its receiver and detector circuits and then interprets the received data.

Once the data is received by the tag it then responds back to the Reader with an acknowledgement and its own data message. The passive tag may just reflect back the energy it has received from the Reader. In this case it is referred to as “backscatter”.

Dynasys RFID Animal Care Systems utilize this type of PASSIVE RFID technology in the tags we install on the metal cage card holders. The RFID Reader interrogates the space with a 900 MHz UHF energy field modulated in accordance with the EPCglobal Generation 2 communication protocols.



Due to the high density of stored cages in the laboratory, hundreds of tags may respond to the Reader simultaneously. An anti-collision detection algorithm allows all the tags within the range to be successfully detected without interference from one another.

When using your cell phone you may have experienced an occasional “dead” spot in a room and when you moved over a few yards the reception got much better. This exemplifies the “Can-you-hear-me-now?” phenomenon. Radio energy operating at short wavelengths typical of UHF (12 inches) experience cancellation of signals due to reflections of the waves off of walls and equipment present in the vicinity.

Dynasys RFID Animal Care Systems utilizes a mobile reader cart incorporating four patch antennas multiplexed into a single Reader. The multiple antenna array as well as the dynamic motion of the cart assures that all of the tags in the space are detected thus overcoming any “dead” spots. The result is a highly reliable, very robust, solution to obtaining a census rapidly and virtually error free.



Dynasys passive RFID cage tags are designed to operate at autoclave sterilization temperature and be detected when directly mounted to metal cage card holders.

Active RFID

In the case of the ACTIVE RFID device the tag contains a battery power source. The ACTIVE tag may derive some or all of its power from its internal battery. The associated READER is just a radio receiver and listens for the tag’s transmission. The tag itself contains a battery, transmitter circuitry and a data processor which controls the communication protocols.

The ACTIVE tag remains in a sleep state most of the time conserving its precious battery. Periodically or randomly the tag “wakes up” and BEACONS its ID number along with any other associated data. After the beaconing has completed its cycle the tag goes back into its sleep state, again conserving its battery.



The Reader is enabled all of the time and monitors the channel for received activity from any of the tags in its vicinity. When the Reader detects a tag’s transmission it can detect the data and determine a Received Strength Signal Indication (RSSI) which may be indicative of relative range information.

Since the tag has its own power source it can transmit energy hundreds of feet. Tags can reliably be detected at much greater distances than when utilizing passive devices. Although the ACTIVE RFID technology features the advantage of long range it does have its limitations. The tag’s internal battery has a finite lifetime and dependent on the frequency of the beacon interval batteries typically can last 2 to 5 years.

ACTIVE tags have limited anti-collision capability and are not suited for high density applications such as hundreds of mouse cages in a single room. Also, because of the battery circuitry required these ACTIVE tags have a limited temperature range and will not survive autoclave sterilization.

ACTIVE tags are typically more expensive than PASSIVE tags since their internal circuitry is more complex.

ACTIVE tags are ideal to track the location of physical assets such as cage racks, medical equipment and personnel. By monitoring the RSSI value you can locate and make positive identification of assets quickly.

There are many varieties of RFID technology available. It is essential to choose the proper RFID technology for each specific Automatic Data Collection application.

Dynasys engineers have been developing solutions with RFID technology for the past 10 years. We are proud to have been chosen by Texas Instruments to be their technical support center for their TI-RFID products in the United States. Give us the chance to solve your data collection problems using the latest RFID devices available, be it with PASSIVE or ACTIVE technology. We will help you make the right choices.

