

RFID/NFC TECHNOLOGY

How SMART tag™ ID Cards Work



In general, there are two types of RFID technology - Active RFID and Passive RFID.

Active RFID

Active RFID (Radio Frequency Identification) systems use cards, fobs or bracelets that have an **internal powered battery to continually broadcast their own signal**, which allows their location to be tracked at all times without the need for an RFID/NFC reader.

Passive RFID

Passive RFID, on the other hand, utilizes NFC (Near Field Communication) that **does not have an internal power source**. Passive RFID cards, fobs or bracelets require a RFID/NFC reader to temporarily activate the passive NFC card in order to read the UID contained within the card. Most NFC has a read range of approximately 5cm.

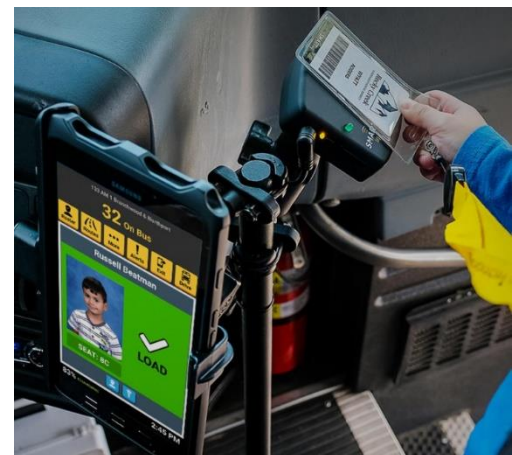
A great example of this type of RFID technology is Disney World. In 2013 Disney World converted from paper tickets to using MagicBands, which are passive RFID plastic bracelets. These bracelets are used as your Park ticket, for FastPass, PhotoPass, purchasing food at their restaurants or merchandise in the stores. They are even used as your Disney Resort key to open your hotel room door if you're staying at one of their hotels. The bracelet must be presented to a RFID/NFC reader in order to read the UID in the bracelet that is associated to a person's account.



Disney World RFID/NFC MagicBand being read for access authorization

SMART tag™ ID's are passive RFID, meaning our cards **are not powered internally**. They can only be temporarily activated when the card is placed on a powered NFC/RFID card reader for scanning, which takes about 1 second. When the card is removed from the NFC card reader the card is no longer activated or transmitting any radio frequency signal.

It's also important to note that there is also no student information stored within SMART tag™ ID's. The only data stored within the card is the UID (Unique Identifier), which is a 14-bit alpha/numeric code



SMART tag™ RFID/NFC card being read for bus rider authorization

randomly generated by our card manufacturer, HID Global Corporation, a worldwide leader in access control technology.

Our proprietary card reader reads the UID in the card and displays the student profile on the tablet screen associated with that UID. The concept of associating the UID within the SMART tag™ card with a student is very similar to how a credit card number on a credit card is associated with a bank customer. When you use your credit card the bank knows who you are because your credit card number is associated to your account. So, when a purchase is made it is applied to the correct account. In a similar way, when a student scans their card on our proprietary card reader our SMART tag™ system knows which student it is because the UID within the card is associated to the student's school ID number and displays that student's name and photo for the school bus driver to confirm.

Clarifying Misconceptions

To clarify some misconceptions of SMART tag™ ID's "tracking students", **SMART tag™ only monitors or tracks the tablet that is mounted on the school bus, not the cards assigned to students.** As students scan on or off a school bus that scan information is wirelessly sent by the tablet to the Transportation Department so they will know which students are on which school bus. Among the many features of SMART tag™, the system alerts a driver when a student is attempting to get on a wrong bus, or when they attempt to get off at a wrong stop for the student's safety and security. However, **SMART tag™ cannot track students**, it can only monitor or track the location and transactions of the tablet that is on the school bus.

Smart Phones use NFC and GPS tracking

Many smart phones today have NFC. And most all smart phones have GPS for constant tracking of the location of the phone. Cell phones operate on radio frequency technology. Radio frequency is also used in many items we use every day like wi-fi (in the home or in coffee shops, etc), automotive keyless entry remotes, and even radios in vehicles. All of the items mentioned operate with much higher power and frequency, or EMF's, than a passive RFID card does when it is temporarily activated at the time it is read by the NFC reader.

RFID in Healthcare

RFID technology offers more advanced resource and patient tracking capabilities than manual or barcode efforts. Examples of this include RFID wristbands for patient identification, processes for implantable medical devices, and RFID-enabled sterilization trays. For patient and staff tracking, Active RFID tags can be used to locate patients and verify their information. This can prevent patients from receiving the wrong medication or being sent to the wrong wing of the hospital. An RFID tag can be encoded with a patient's date of birth, allergies and other critical information to prevent mix-ups or mistakes. RFID technology can also strengthen a hospital's security system. With RFID access control, employees must wave or tap their RFID badges to gain access to certain locations. This prevents unauthorized access, lowers the risk of theft or damage, and makes staff and patients safer.

US Food & Drug Administration (FDA)

The FDA website has a number of articles on RFID technology that discuss topics ranging from using RFID for packages to human implants. One article titled **Radio Frequency Identification (RFID)** from September 2018, describes the uses of RFID in healthcare and hospitals that states:

RFID systems use radio waves at several different frequencies to transfer data. In health care and hospital settings, RFID technologies include the following applications:

- *Inventory control*
- *Equipment tracking*
- *Out-of-bed detection and fall detection*
- *Personnel tracking*
- *Ensuring that patients receive the correct medications and medical devices*
- *Preventing the distribution of counterfeit drugs and medical devices*
- *Monitoring patients*
- *Providing data for electronic medical records systems*

The FDA is not aware of any adverse events associated with RFID.

Another article posted on the FDA website written by the University of California San Francisco in 2018 titled **Clinical Impact of Smart Orthopaedic Implants** states:

Human Implantables - Microchips

The Food and Drug Administration approved a Radio Frequency chip (RFID) for implant in 2004 as a way to relay medical information quickly to doctors.

Centers for Disease Control and Prevention (CDC)

The CDC website has several articles on RFID, but most are focused on two main topics:

- The use of reverse RFID by miners to know their location for their safety
- The use of RFID on construction sites worn by workers for their safety

Conclusion

RFID technology is a widely accepted and recommended technology for many fields and applications. It has been tested and reviewed by universities, the health industry, and private organizations and has been found to be an extremely useful and beneficial technology.