

# RFID Glossary

## Terminology

**AIN Allocator** - The program administered by APHIS that releases and maintains a record of AINs provided to AIN tag manufacturers.

**AIN Tag** - Official, visual animal identification devices that have an AIN printed on them.

**AIN/RF Tags** - AIN tags that also contain Radio Frequency Identification (RFID) transponders.

**AIN Tag Distributor** - A person or entity that distributes and/or takes orders for AIN tags. The distributor has an agreement with an AIN Tag Manager who must report distribution information to the National Animal Records Repository.

**AIN Tag Manager** - An entity authorized by APHIS to distribute AIN tags to a premises. The AIN Tag Manager agrees to validate the premises number of the receiving operation and report the AINs distributed to that receiving operation to the National Premises Information Repository.

**AIN Tag Manufacturer** - A company that is authorized by APHIS to receive AINs and produce AIN tags.

**Active tags** - Electronic identification tags that use batteries as a partial or complete source of power to transmit the data structure. Normally used in wildlife/endangered species research.

**Animals** - For the purposes of the NAIS, the term "animals" refers only to: Aquaculture - Clams, Crawfish, Catfish, Mussels, Oysters, Salmon, Striped Bass, Shrimp, Scallops, Tilapia, Trout; Cervids - Deer, Elk; Equine - Horses; Ovine - Sheep; Porcine - Swine; Poultry - Chickens, Ducks, Geese, Guineas, Pigeon, Pheasants, Quail, Turkeys; Bovine - Bison and Cattle, Camelid - Alpaca and Llama; Caprine - Goats

**Animal Identification Number (AIN)** - Ultimately, the Animal Identification Number will be the sole national numbering system for the official identification of individual animals in the United States. The format contains 15 digits: the first three are the country code (840 for the United States), and the following 12 digits are the animal's national number.

**Antenna** - The antenna is the part of the reader/interrogator that radiates the radio frequency energy to, and receives energy from, the transponder.

**Alphanumeric** - Data comprised of both alphabetical and numeric characters. For example the data sequence B143F6 represents an alphanumeric string. Quite often, this term includes other printable characters such as punctuation marks.

**Anti-collision (Anti-contention)** - A term describing an RFID system's capacity for avoiding conflict at the reader/interrogator for responses arising from transponders simultaneously present within the read/interrogation zone and competing for attention at the same time.

**Binary (Bin)** - A number in binary code always written in groups of four bits, each group representing one digit of the number. For example, 0011 1000 is 38.

**Bit** - An abbreviation for binary digit. A single element (0,1) in a binary number. ISO standard 11784 details the data structure or bit pattern of data placed on electronic transponders. The numeric structure is arranged on 64 bits that is divided into three primary data fields.

**Brand Inspection Entity** - State brand inspection agencies or other brand inspection organizations authorized by either by a state or the Grain Inspection, Packers and Stockyards Administration (USDA).

**Breeding stock** - Sexually intact animals of either sex (except for veal calves and females

of any species).

**Byte** - Eight bits of data.

**Biometrics** - Measurement or observation of a feature or action of an animal such as iris or retinal patterns or DNA for the purposes of uniquely identifying the animal.

**Capture field** - The region of the electromagnetic field, generated by the antenna in which transponders will operate.

**Check digit** - A digit contained within a number that provides a test to the validity of that number.

**Chip** - The electronic chip consists of an integrated circuit and a capacitor that is attached to two ends of a coil.

**Coil** - That component of the electronic chip which consists of very thin wire wound 500 to 1000 times into a loop that has a diameter of 20 to 30 mm.

**Collision** - A term used to denote an event when two or more transponders are competing for attention from the reader/interrogator at the same time. As a result, data confusion to the interrogator may cause misreading.

**Compliant Premises Registration System** - A state, tribe, or third party premises registration system that meets with NAIS data standards and communication security requirements. APHIS determines compliance or noncompliance.

**Country Code** - A 3-digit numeric code representing the name of a country in accordance with ISO 3166.

**Data** - Representations, in the form of numbers and characters for example, to which meaning may be ascribed.

**Data accumulator** - Any device (be it wired or wireless) such as a laptop or handheld computer or scale head that is capable of accepting data from the reader.

**eID** - Electronic identification, for example, by line of sight using light (bar code) or radio frequency (RF) transmission.

**eTag** - An animal identification device containing an electronic chip. Also referred to as a transponder.

**Frequency** - The number of cycles a periodic signal executes in unit time. Usually expressed in Hertz (cycles/second) or appropriate weighted units such as kilohertz (kHz), Megahertz (MHz) and Gigahertz (GHz).

**Full duplex (FDX)** - A design principle whereby the return signal initiates as soon as the beginning of the interrogation signal is received and the smoothing capacitor in the transponder has been charged. The return signal is received repetitively and without interruption for as long as a continuous interrogation signal is maintained. An FDX transponder does not have to store energy to be able to return its entire data content.

**Group/Lot Identification Number (GIN)** - The number used to identify a unit of animals of the same species that is managed together throughout the pre-harvest production chain. The GIN consists of a 7-character Premises Identification Number and a 6-digit representation of the date that the group or lot of animals was assembled (MMDDYY).

**Half duplex (HDX)** - A design principle whereby the transponder initiates the return signal to the reader/scanner/interrogator only after the end of the interrogation signal has been received - and only after the storage capacitor has been fully charged in the transponder. The return signal is then only sent once, since the transponder has emptied its storage capacitor after it has sent its entire data content.

**Herd of origin** - Herd of birth.

**Identification methods** - A means of identifying an animal, including eartags, biometrics, brands and brand inspection records, breed registry certificates, etc.

**Individual animal identification** - A means of identification that differentiates one animal from another. Official individual-animal- identification uses APHIS-approved methodology.

**Inductive coupling** - Systems, which use the inducing of a current into a coil as a means of transferring data or power, are said to use inductive coupling.

**Information** - Something that is meaningful. For example, data may be regarded as information once its meaning is revealed.

**Interface** - An electrical or physical standard for the interconnection of devices. Some common interfaces include RS232, RS422 or RS485.

**Interference** - Unwanted electrical signals found in the operating environment of RFID equipment that interfere with the transponder's or reader's normal operation. Obviously, the effect of interference can be seen in reduced system performance.

**Interrogator** - A fixed or mobile data capture and identification device using a radio frequency electromagnetic field to stimulate and create a coordinated data response from a transponder. Often used as an alternative term to reader, transceiver or scanner.

**Interstate movement** - Movement that crosses state lines, regardless of ownership, at either shipping or receiving premises.

**Intrastate movement** - Movement within a state that does not meet criteria for being interstate commerce.

**ISO** - International Organization for Standardization ([www.iso.ch](http://www.iso.ch)).

**ISO-11784** - This international standard represents the definition of the data numeric architecture of the 64 bit (character) code for electronic animal identification.

**ISO-11785** - This international standard describes the accepted protocol for transmission between the reader/scanner/interrogator and the transponder (tag). The standard consists of two transmission protocols, half – duplex (HDX) and full – duplex (FDX).

**ISO Transponder** - An ISO Transponder is a Radio Frequency Identification Device (RFID) that transmits its transponder code according to ISO 11784/11785 when activated by a transceiver. The International Committee on Animal Recording (ICAR) must verify that a transponder is ISO 11784/11785 compliant and also assigns a manufacturer's code to the manufacturer. The manufacturer's code is a 3-digit number that ICAR assigns to a company when their evaluated transponders are deemed ISO 11784/11785 compliant.

**ISO Transceiver (Reader)** - A device that receives and reads radio signals from both ISO FDX-B and ISO HDX transponders as defined in ISO 11784/11785.

**Manufacturer/Country Code** - Three-digit code defined by ISO 11784 standard. If country codes are used, ISO 3166 standard is used (USA country code = 840).

**Memory modules** - Refers to the means of storing data content within the transponder. A variety of random access (RAM), read-only (ROM), write once-read many (WORM) and read/write (RW) memory devices may be noted.

**National Premises System** - The National Premises System contains the Premises Number Allocator, the Premises Registration Systems, and the National Premises Information Repository.

**Noise disturbance** - A cause normally attributed to low data capture around heavily industrialized areas such as packing plant facilities and feedlot processing areas where extraneous electromagnetic interference (EMI) from inflorescence lights and other devices emitting conflicting signals from other competing devices.

**Noise immunity** - An indication of the robustness of a system to operate in the presence of noise disturbance.

**Nonproducer Participant** - A person or entity who engages in NAIS activity in a designated role(s) where that role(s) is not associated with a specific premises. Typical roles include USAIN Manager, AIN Distributor, Animal Health Official, Brand Inspection Entity, Diagnostic Laboratory, etc. Nonproducer Participants may provide data to the national identification database.

**Official identification devices and methods** - Means of officially (approved by the APHIS Administrator) identifying an animal, or group of animals, including, but not limited to: official tags, tattoos, and registered brands when accompanied by a certificate of inspection from a recognized brand inspection authority.

**Officially identified** - The moment when an official identification number is applied to an animal by means of an identification method or device approved by the APHIS Administrator for purposes related to official disease control programs or animal movements in interstate or international commerce.

**Official Animal Identification Number Systems** - Currently, there are three official numbering systems; the three National Uniform Ear Tagging System, AIN, and the premisesbased system that combines an official PIN with a producer's livestock production numbering system.

**Orientation** - The alignment of a transponder with respect to the reader antenna.

**OTP** - One Time Programmable-Specific chip design where the device manufacturer programs the contents of the electronic chip. This design is normally done to correlate the eID number with the visual identification number.

**Passive tags** - In order to transmit tag data content, the reader/scanner/interrogator must "excite" the transponder at a specific radio frequency. RFID tags that rely upon the energy generated from the magnetic field induced by the reader/scanner/interrogator in order to transmit tag data content.

**Premises** - A physical location that represents a unique and describable geographic entity where activity affecting the health and/or traceability of animals may occur. The State Animal Health Official or Area Veterinarian in Charge (and when appropriate, in conjunction with the affected producer) determines what is a premises.

**Premises Identification Number (PIN)** - An official, 7-character identification code assigned to a premises; the final PIN digit is a check digit.

**Premises Identification of Individual Animals** - The method of identification in which an official identification device (bearing the last PIN and thus, associating the animal to its last location) is attached to the animal prior to movement.

**Premises Number Allocator** - The APHIS computer program that assigns PINs to a specific location through interfaces with Standardized or Compliant Premises Registration Systems.

**Process verification** - The ability to verify whether an animal has received a specific product (such as a vaccine) or procedure (defined set period of weaning) as claimed by the seller.

**Range** - The distance at which consistent, successful reading and/or writing can be accomplished between the transponder and the reader/interrogator.

**Read distance** - Refers to the distance between the transponder and the reader antenna. The distance will be affected by the power available to the reader, the power available

within the tag to respond and electromagnetic interference (emi).

**RFID** - Any electronic identification system comprised of a reader/scanner/interrogator and a transponder that can read or write data content using a specified radio frequency.

**Reader (interrogator)** – The device in an radio frequency system which contains the digital electronics that triggers the transponder to respond, and extracts and validates the information from the transponder's response. See also interrogator, scanner or transceiver.

**Read only (R/O)** – Specific chip design whereby the chip has information written into it during its manufacture. This information can only be read from the tag and can never be changed.

**Read/write (R/W)** - Specific chip design whereby data can be freely read or written to a transponder using a suitable programming reader.

**RS232** - A common physical interface standard for the interconnection of devices. The standard allows for a single device to be connected at baud rates up to 9600 bps, at distances up to 15 meters.

**RS422** - An interface standard similar to RS232 except differential voltages across twisted pair cables are used. This standard is more noise immune than RS232 and is often used to connect single or multiple devices to a data accumulator at distances up to 3,000 meters.

**Source verification** - The ability to verify the source of animal as claimed by the owner or seller.

**Standardized Premises Registration System** - The Premises Registration System that APHIS makes available to all states and tribes.

**Terminal feedlot (Designated feedlot)** - A livestock feeding operation where all animals, upon exit of the operation, move directly to a slaughter plant.

**Transceiver** - The reader/scanner/interrogator device that is used to interrogate/read a transponder.

**Transponder** - A reference to a radio frequency identification (RFID) tag that combines the technical terminology of transmitter (trans) and responder (ponder). The transponder becomes activated when placed inside a magnetic field generated by an antenna. The induced current in the coil in turn charges the capacitor located inside the chip. Depending upon the transfer protocol, the chip transmits its identification code (and attached information if R/W).

**Transponder code** - The code programmed into a transponder as defined in ISO 11784 and ISO 11785.

**Wedge** - Software that converts data from a scanner or interrogator into a format that a computer application can use, typically by making scanned data appear as though it were keypunched in.

**Write once read many (WORM)** - Specific chip design whereby a transponder can be part or totally programmed initially by the user and only read thereafter.

Sources: Dr. Dale Blasi, Kansas State University; USDA National Animal Identification Draft Program Standards, Appendix A.