Chapter 1. Introduction to RFID

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Automatic identification techniques

- Automatic identification uses technology to track and manage items with minimal human intervention
- There are two primary automatic identification techniques:
  - Barcode : a strip of bars and gaps that represent numbers
  - RFID : a system that involves electronic tags containing identification numbers or other data encoded onto an IC

Uses of RFID

- Security and authentication
  - Identifies badges, key chains, and other items that provide access control for any secure area
- Track and trace
  - Monitors the exact location of objects
- Industrial automation
  - Helps in automating various steps
- Environment sensing and monitoring
  - Monitors various environmental conditions

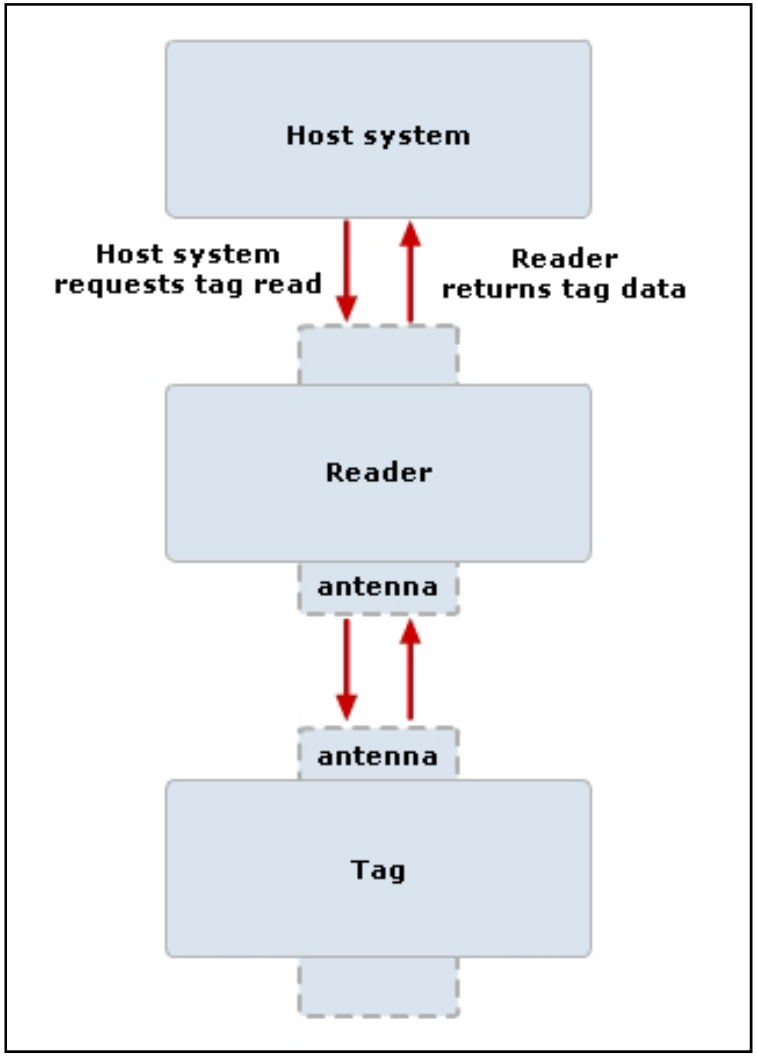
Benefits of RFID

- Stores between 128 bytes to 8 kilobytes of data
- Does not require a line of sight or contact
- Provides security
- Operates in harsh environments
- Reads multiple tags at the same time
- Offers read/write functionality

RFID components

- The hardware
  - Are responsible for identifying and capturing data
- The software
  - Are responsible for managing the data transmitted between the tag and the reader and between the reader and the host system

RFID hardware components



RFID hardware components (cont'd)

- RFID tag : a device that is attached to or embedded in an item that you need to track, has memory where the data is stored
  - Integrated circuit(IC)
  - Tag antenna
- RFID reader : a device that activates the tag and retrieves the information stored in its IC
- RFID host system : a system that manages the flow of data between the RFID readers and tags.

RFID software components

- Depending on the system requirements
- Executed in the tag, the reader, and the host system
- System software : a collection of functions that facilitates interaction between a tag and a reader
  - Read/write
  - Anit-collision
  - Error detection/correction
  - Encryption, authorization, and authentication
- Middleware : acts as a bridge between the RFID hardware components and the host application software
- Host application : receives processed and normalized data-sent from the tag-through the reader and the RFID middleware software

Unit summary

- Common automatic identification techniques include **barcodes** and **radio frequency identification(RFID).**
- RFID offers distinct advantages over barcodes, including greater data capacity, no need for contact or line of sight, ability to read multiple tags simultaneously, and more.
- RFID systems are composed of hardware including **tags, readers, antennas**, and a **host system** and software including **RFID system software**, middleware, and **a host application**.

Review questions

- For which of the following scenarios would RFID be well-suited but for which barcodes would be unsuitable? (Choose all that apply.)
  - A. Single item point of sale transaction at a supermarket.
  - B. Reading a pallet full of item cases without human intervention.
  - C. Changing the expiration date of a food item as it is frozen.
  - D. Tracking luggage as it is directed through an airport terminal.
- If RFID technology has been around for over 50 years, then what is causing its rapidly increasing adoption now?
- What are some important business advantages of using RFID over barcodes?