# Radio Frequency Identification (RFID) Network

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# Outline

- 1. Introduction

- 2. System

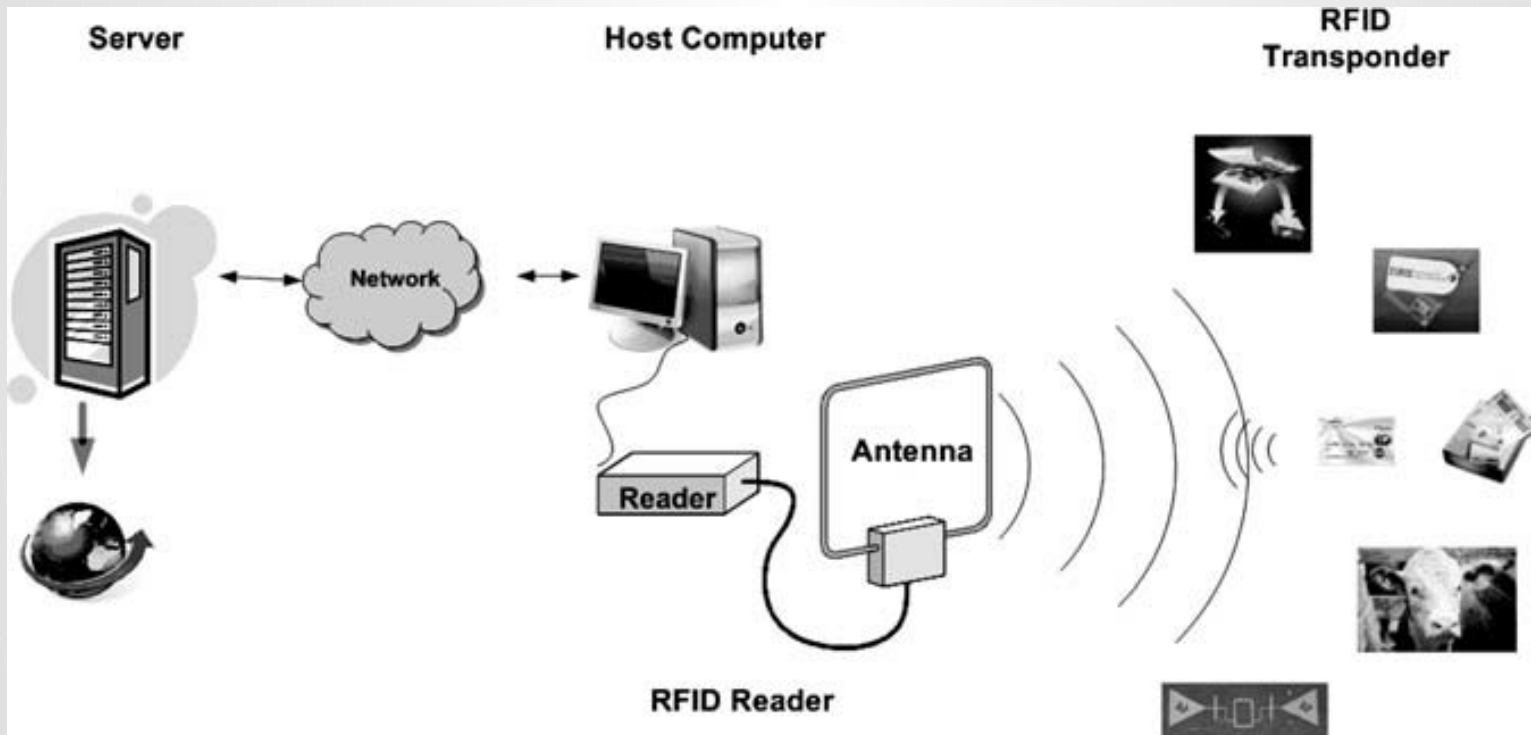- 3. Applications

- 4. Controversies

# Introduction

- What is **RFID**?

- Radio-frequency identification (RFID) is the wireless use of **el ectromagnetic fields** to transfer data, for the purposes of auto matically identifying and tracking tags attached to objects.

- **Advantage** over other identification system especially barcode

- No line of sight required for the communication

- Read and Write capability of the transponder memory

- Battery-less, supply voltage derived from the RF field

- Large operating and communication range

- High communication speed, data capacity

# Introduction

| Band | Regulations | Range | Data speed | Remarks | Approximate tag cost in volume (2006) US $ |
|---|---|---|---|---|---|
| 120 – 150 kHz (LF) | Unregulated | 10 cm | Low | Animal identification, factory data collection | $1 |
| 13.56 MHz (HF) | ISM band worldwide | 10 cm – 1 m | Low to moderate | Smart cards (MIFARE, ISO/IEC 14443) | $0.50 |
| 433 MHz (UHF) | Short Range Devices | 1 – 100 m | Moderate | Defence applications, with active tags | $5 |
| 865–868 MHz (Europe) 902–928 MHz (North America) UHF | ISM band | 1 – 12 m | Moderate to high | EAN, various standards | $0.15 (passive tags) |
| 2450–5800 MHz (microwave) | ISM band | 1 – 2 m | High | 802.11 WLAN, Bluetooth standards | $25 (active tags) |
| 3.1 – 10 GHz (microwave) | Ultra wide band | to 200 m | High | requires semi-active or active tags | $5 projected |

# System

- RFID system consists of a **Reader** and a **Transponder**



RF system

# System

- (Passive) transponder consists of some basic functional modules as shown below
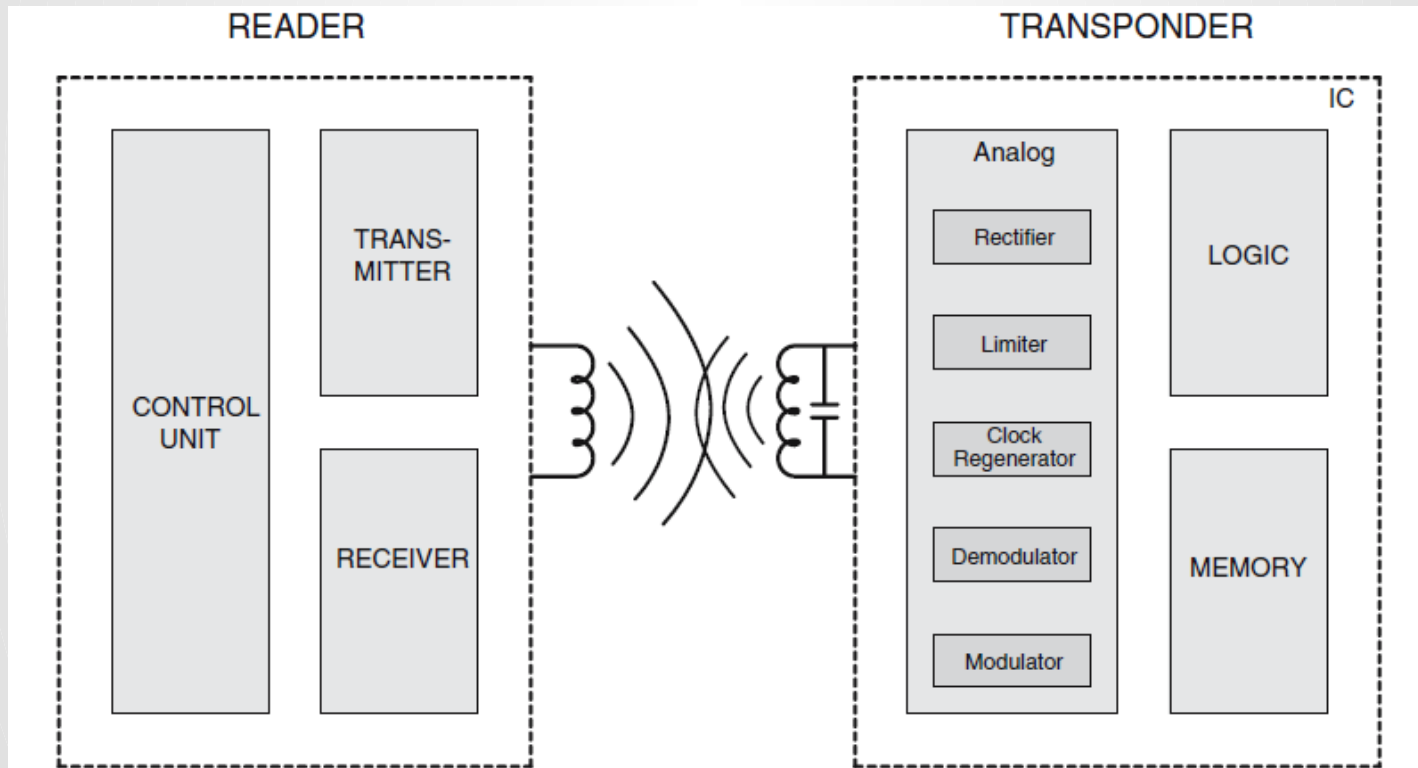
# Applications

- E-passport

- Personal data and biometric data that include a (low-resolution) photograph, textual descriptions of the characteristics of the holder, and provision for fingerprints and iris scans.
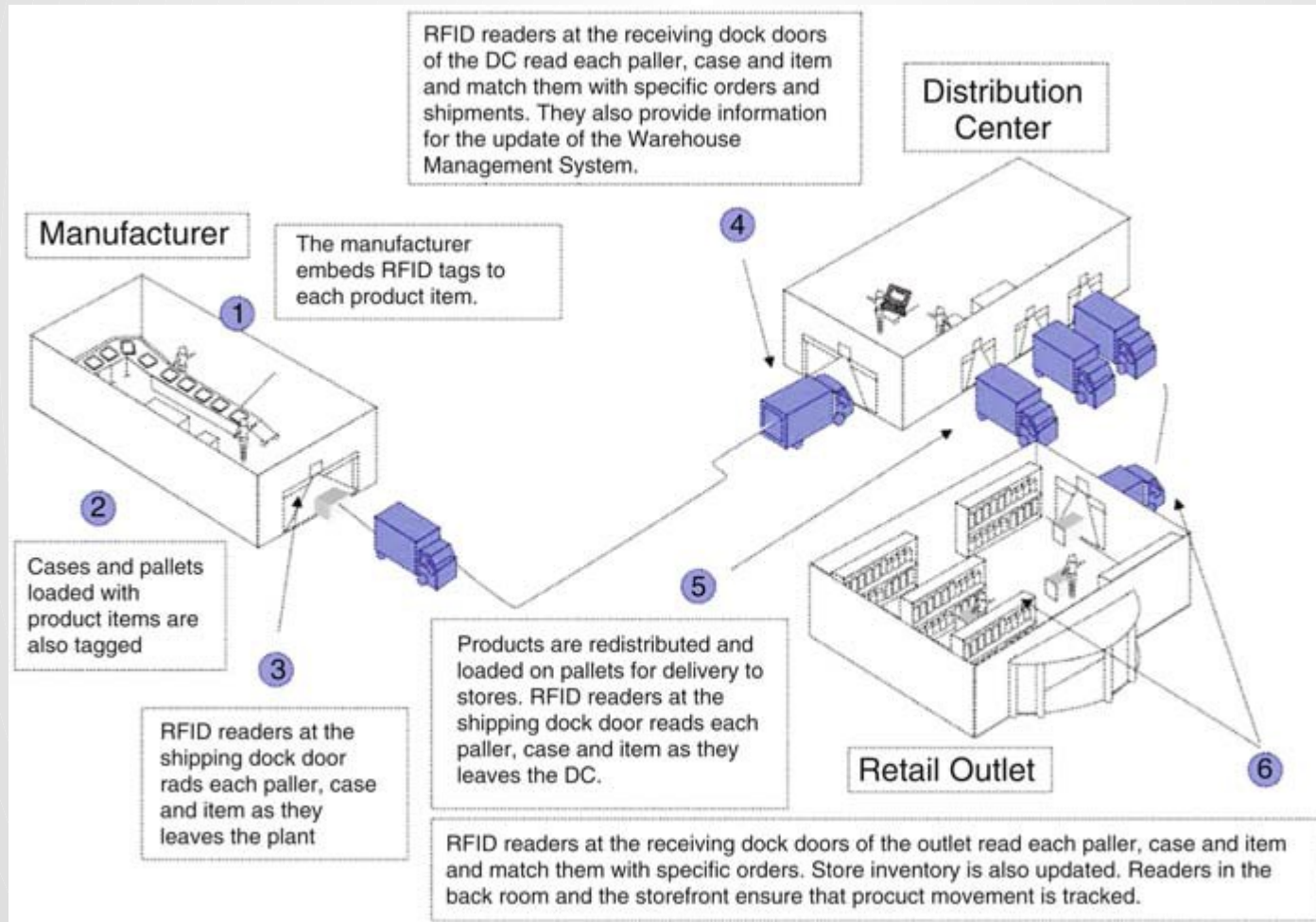
# Applications

- Ticketing

- Tags are embedded in credit-card-sized reusable tickets that store either a seasonal pass or credit that can be used against travel.

# Applications

- Supply Chain Management

# Problems

- With low-cost, passive tags, readers today have to be in close proximity to the tag


- Many Customer Relations Management (CRM) systems today store more data than organisations can use, which causes data flooding


- The frequencies used for RFID in one country are not incompatible with others

# Controversies

- Privacy & Security


- location privacy

- customer information

- corporate espionage

- insecure operating environments

- denial of service

- spoofing

- technical attacks

- compromise of supporting systems