RFID in IoT Systems

Components, Applications, and Integration

Dr. Öğr. Üyesi Yıldıran YILMAZ

Recep Tayyip Erdoğan University

April 28, 2025

RFID Components

Core Elements

- **Tags**: Passive (no battery) / Active (battery-powered)
- **Reader**: Transceivers with antennas
- **Backend**: Database/software for ID processing

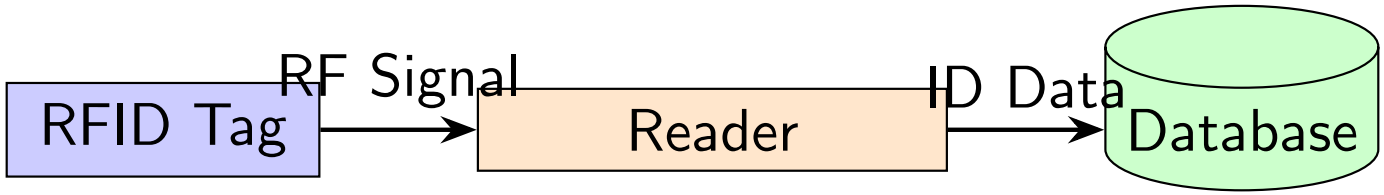
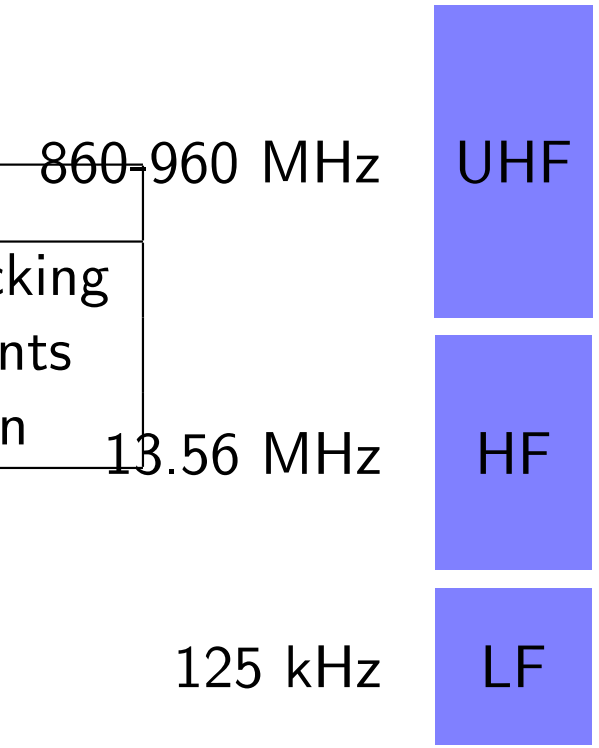


Figure: RFID system architecture

RFID Frequency Bands

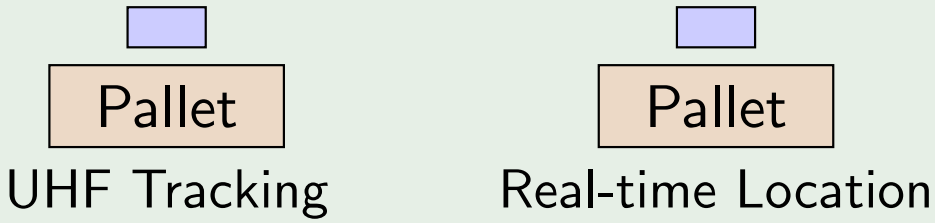
Band	Use Case
LF (125 kHz)	Animal Tracking
HF (13.56 MHz)	NFC Payments
UHF (860-960 MHz)	Supply Chain

Table: Frequency bands and applications

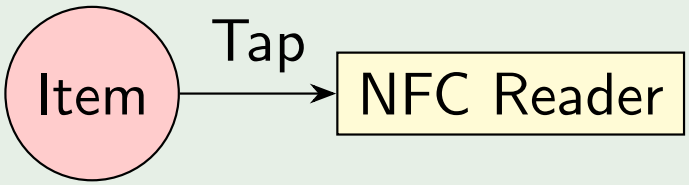


Key IoT Use Cases

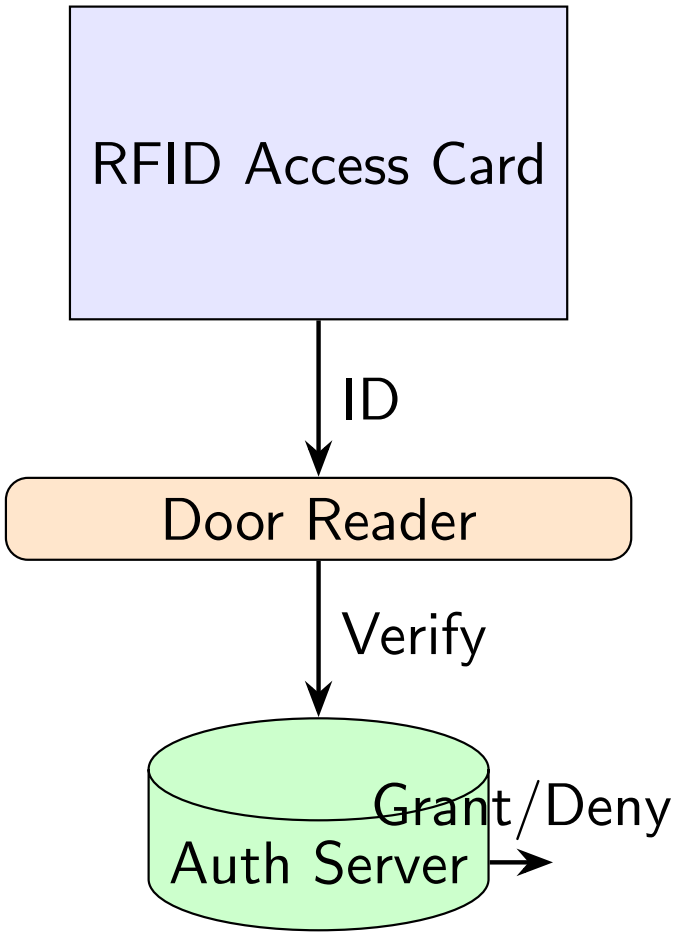
Supply Chain



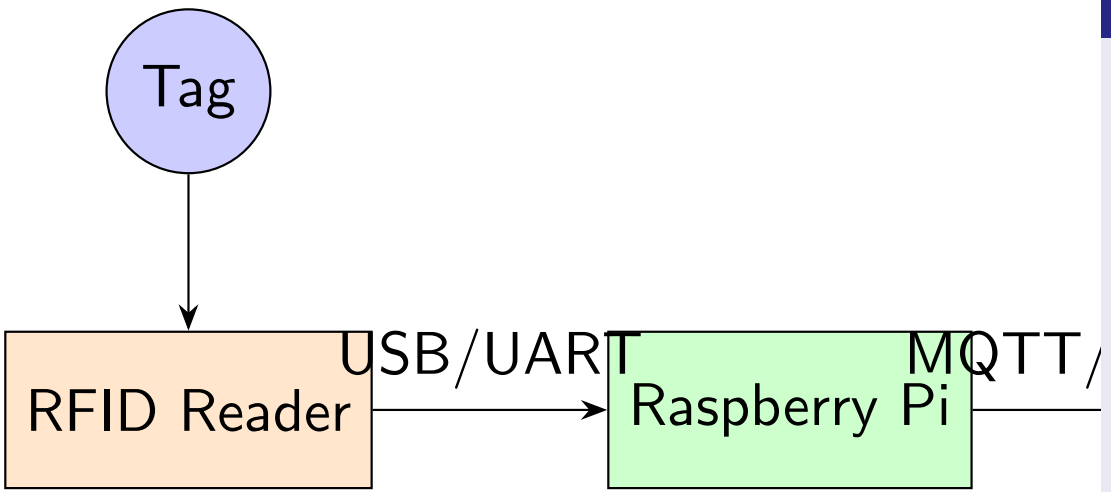
Smart Retail



Authentication



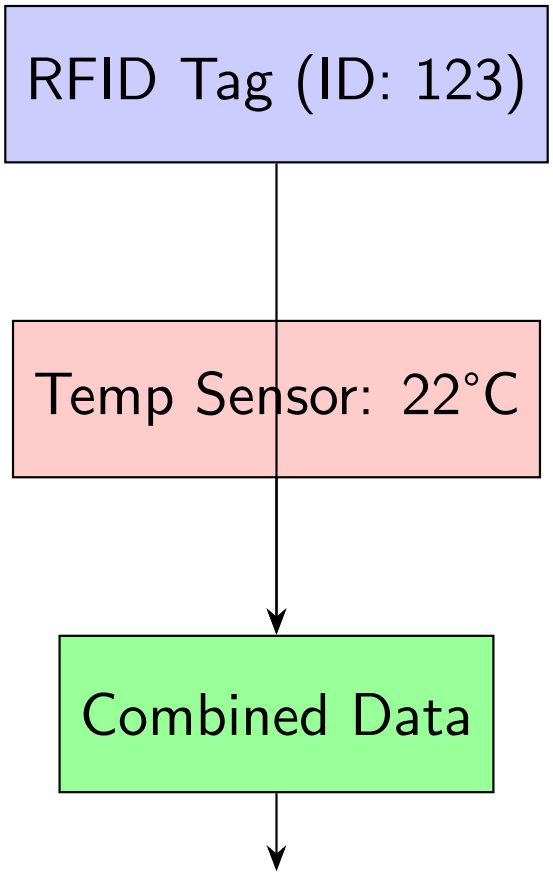
IoT Gateway Integration



Key Components

- RFID module (e.g., RC522)
- IoT gateway (RPi/ESP32)
- Cloud platform (AWS/Azure)

Data Fusion Example



Perishable Goods Monitoring

Key Takeaways

- RFID = Tags + Reader + Database (LF/HF/UHF)
- IoT apps: Supply chain, retail, authentication
- Integrate via gateways (e.g., RPi + RFID module)
- Combine with sensors for enriched data