

1940s 1950s 1960s 1970s 1980s 1990s 2000s

Radar refined and used major World War II effort

Early explorations of RFID technology

Development of the theory of RFID. Start of applications field trials

Explosion of RFID development. Tests of RFID accelerate. Early adopter implementations of RFID.

Commercial applications of RFID enter mainstream.

Emergence of standards. RFID widely deployed. RFID becomes a part of everyday life.



1948 Harry Stockman invents RFID with the publication of his paper "Communication by Means of Reflected Power."



1952 F.L. Vernon's "Application of the microwave homodyne"



1950s D.B. Harris patents "Radio transmission systems with modulatable passive responder"



1963-1964 R.F. Harrington advances theory with "Field measurements using active scatterers" and "Theory of loaded scatterers"



1959 Friend or Foe (IFF) long-range transponder system reaches breadboard demonstration stage



1973 Transponder system and apparatus



1977 Electronic license plate for motor vehicles



1978 Identification system using coded passive transponders

Passive encoding microwave transponder

Identification system using coded passive transponders

Electronic detection and identification system

Passive transponder apparatus for use in an interrogator-responder system



1980 Electronic identification system



1982 Electronic identification system

Apparatus and method for an electronic identification, actuation and recording system



1984 Radar apparatus for detecting and/or classifying an agitated reflective target

Batteryless, portable, frequency divider useful as a transponder of electromagnetic radiation

Electronic identification system with power input-output interlock and increased capabilities

Animal feeding and monitoring system



1985 Electronic proximity identification system

Electronic tag identification system

Remote passive identification system

Implant telemetry system

## Science Publications and Patents

Over 350 direct-reference patents



## Relevant Military and Government



1966 Commercialization of EAS, 1-bit Electronic Article Surveillance technology: Checkpoint, Sersormatic



1976-1977 LASL spinoffs Indentronix and Amtech



1975-1978 Large companies, e.g. Raytheon, RCA, and Fairchild, develop electronic identification systems



1982 Mikron founded (later purchased by Philips)



1979 First implantible RFID tags.



1982 molded-neck collar EID



1986 Glass-encased injectible EID.

## Commercial Applications

Vast number of companies enter RFID marketplace



1991 TI establishes TIRIS, the first multinational semiconductor company to develop and market RFID



1993 ISO EID standard developed



1996 City of L.A. adopts pet tagging



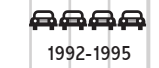
1991 AAR adopts RFID standard.



1994 All USA railcars equipped with RFID.



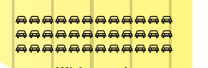
First RFID toll collection system implemented in Norway



1992-1995 Multi-protocol traffic control and toll collection systems implemented in Texas, Oklahoma, and Georgia.

Modern successful commercial applications include:

- Supply Chain Management
- Transportation/Distribution
- Industrial
- Security and Access Control
- Animal Identification
- Automated Library Systems
- Checkpoint Systems
- Toll Road Control
- Healthcare
- Digital Card Mail
- Toys



Wide-scale electronic toll collection in US

### Prior to the 1940s

1600-1700 Scientific observations of electricity, magnetism, and optics are conducted and recorded.

1752 Benjamin Franklin pioneers electrical discoveries and experiments.

1846 Michael Faraday correctly classifies light and radio waves as electromagnetism.

1864 James Clerk Maxwell discovers that electromagnetic waves are transverse and travel at the speed of light.

1887 Heinrich Rudolf Hertz is credited as the first to transmit and receive radio waves.

1896 Guglielmo Marconi transmits radiotelegraphy across the Atlantic.

1906 Ernst Alexanderson demonstrates continuous wave radio communication.

1922 The birth of radar systems.

# RFID timeline

Radio Frequency Identification

Few other technologies have developed into a highly-diversified worldwide industry as quickly.

Much of the contained information is from Jerry Landt and Barbara Catlin's "Shrouds of Time--The history of RFID".