
BARCODING RFID AND BEYOND
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AGENDA

- Part I - Introduction
- Part II - Demonstration
- Part III - Conclusion and Questions

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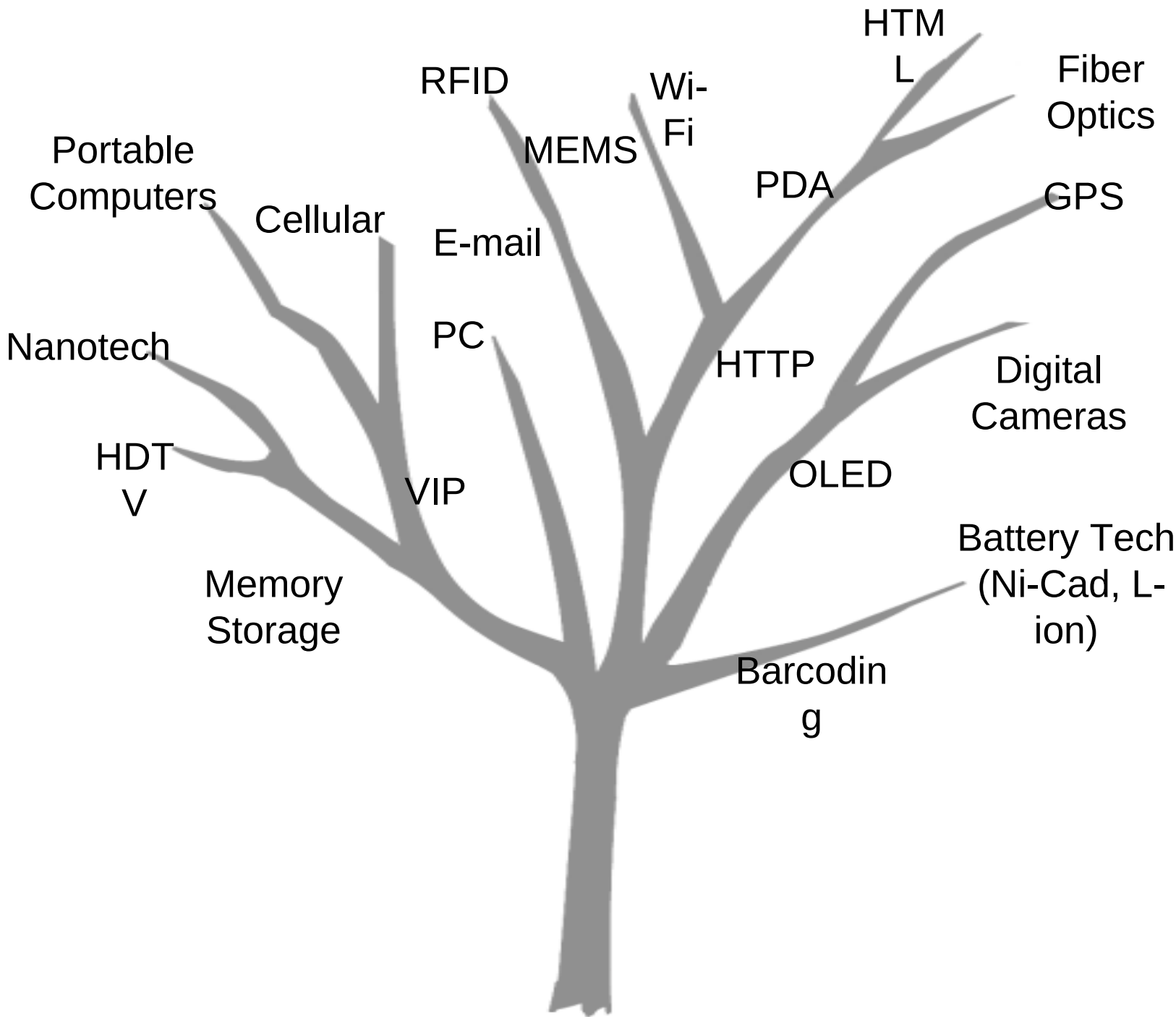
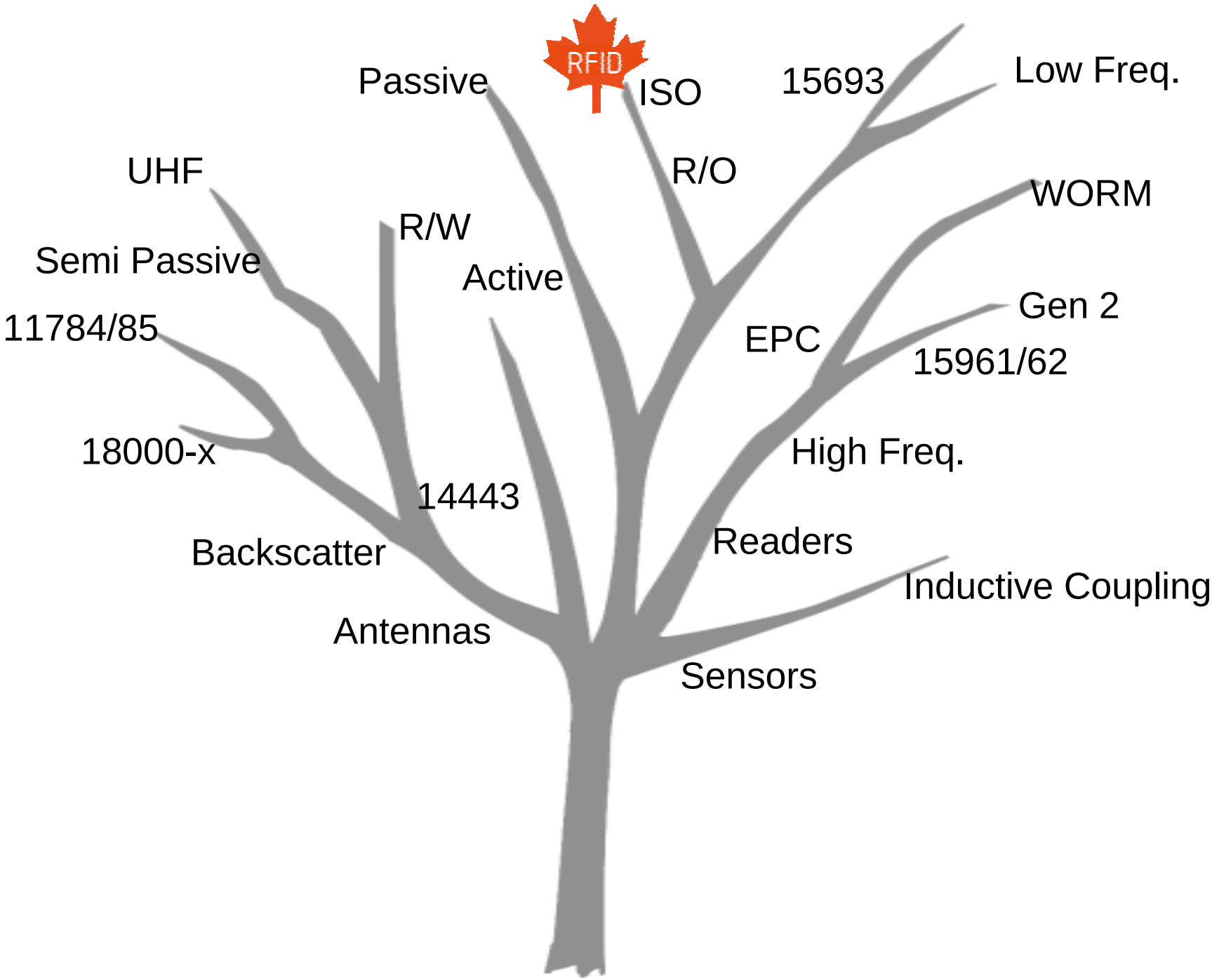
INTRODUCTION

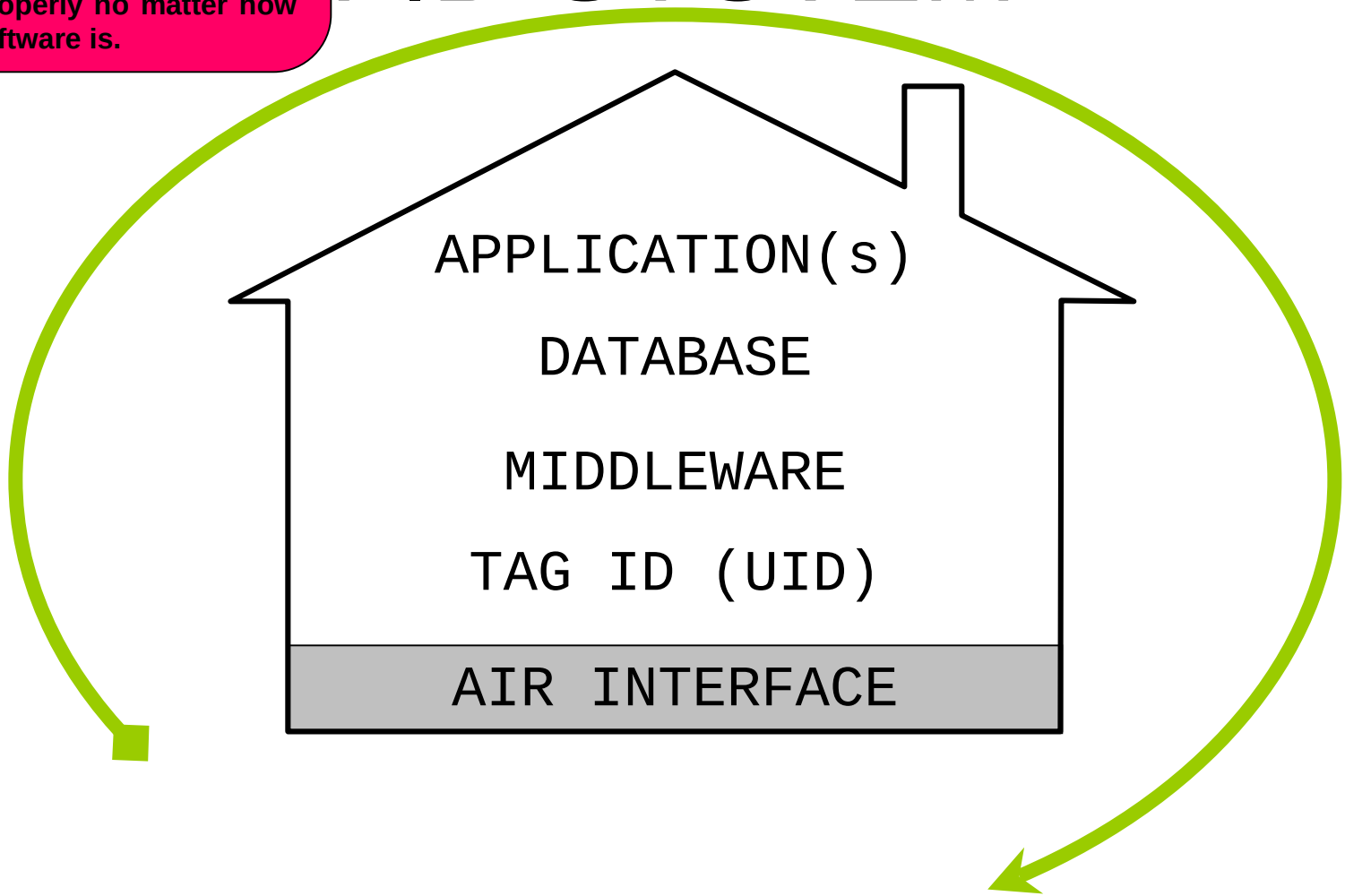

HTML
Fiber Optics
RFID
Wi-Fi
MEMS
Portable Computers
PDA
GPS
Cellular
E-mail
PC
Nanotech
HTTP
Digital Cameras
HDTV
VIP
OLED
Battery Tech (Ni-Cad, L-ion)
Memory Storage
Barcoding


RFID
Passive
ISO
15693
Low Freq.
UHF
R/O
WORM
R/W
Semi Passive
Active
Gen 2
11784/85
EPC
15961/62
18000-x
High Freq.
14443
Backscatter
Readers
Inductive Coupling
Antennas
Sensors

Note…

The first point of success or failure in an RFID system is the tag to reader communication.
If the reader cannot communicate with the tag, the RFID system will not work properly no matter how great the software is.

FID SYSTEM



Active vs Passive

Active Technology:

Battery powered
Long reading distance (100m +)
Shorter life time (approx. 5yrs)
Large devices
Sensitive to high/low temperatures

Higher Cost

Passive Technology:

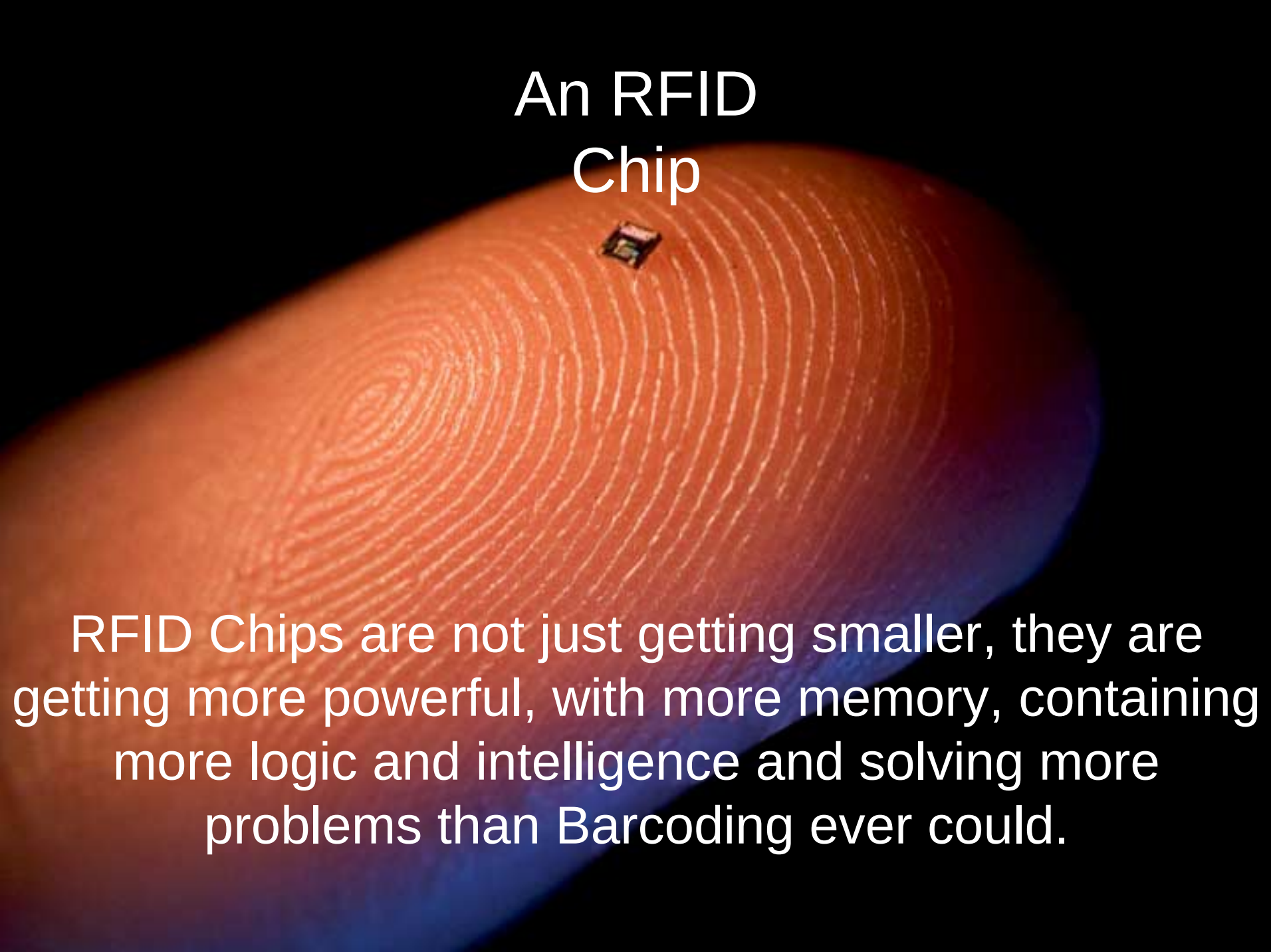
No Internal Power
Shorter reading distance (1 - 5m)
Lasts forever
Small devices
Easily inserted or embedded
Withstands harsh conditions

Inexpensive

Note…

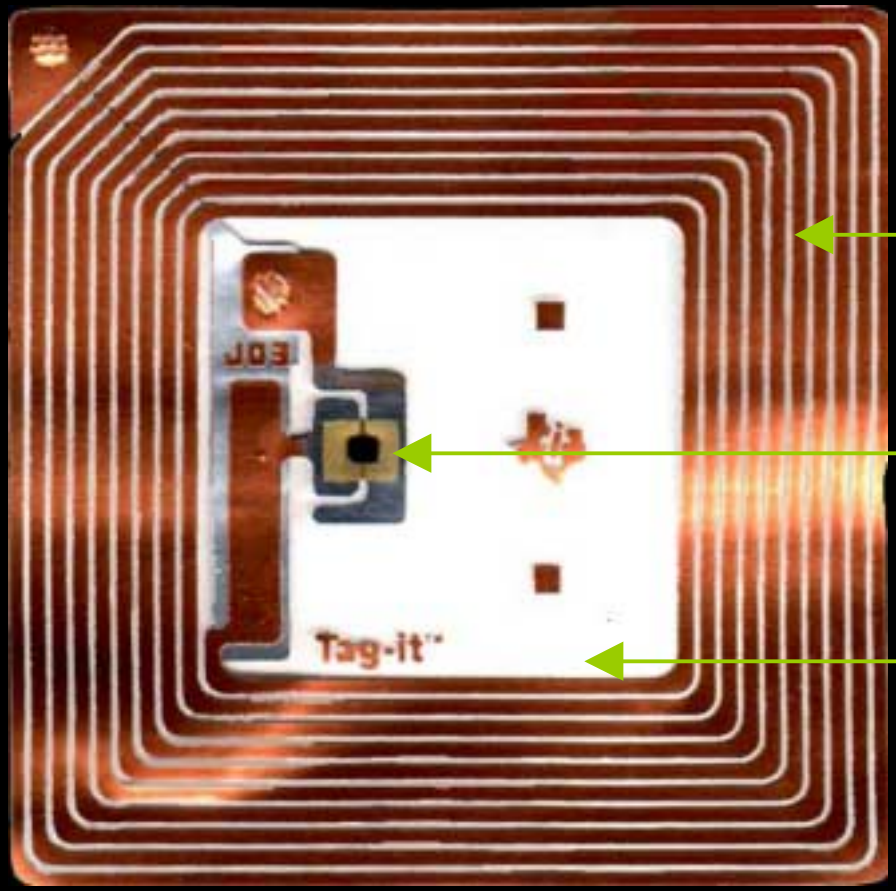
Semi-Passive or Battery Assisted Tags
Increase performance
Sensor Interface

An RFID Chip



RFID Chips are not just getting smaller, they are getting more powerful, with more memory, containing more logic and intelligence and solving more problems than Barcoding ever could.

Transponder (TRANSmitter-resPONDER) or TAG



Antenna

Chip

Support

Note…

Chipless RFID

Tags that do not contain a chip are called Chipless tags

How RFID Works

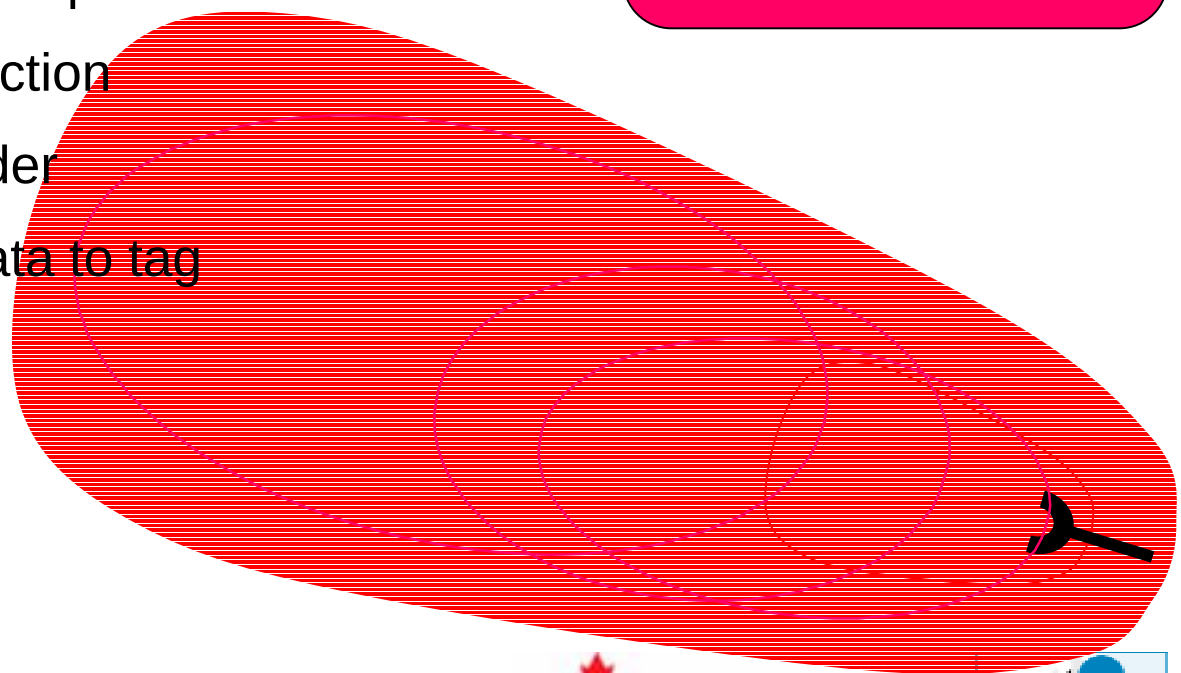
- Tag(s) enters RF field
- RF signal from the reader powers tag
- Tag transmits ID (plus data)
- Reader captures data
- Reader sends data to computer
- Computer determines action
- Computer instructs reader
- Reader may transmit data to tag

Note…

Active Tags
Do not require
power from the reader
to be activated

Note…

Passive Tags
Require 10 X more power to charge the capacitor that powers the tag than is required to communicate



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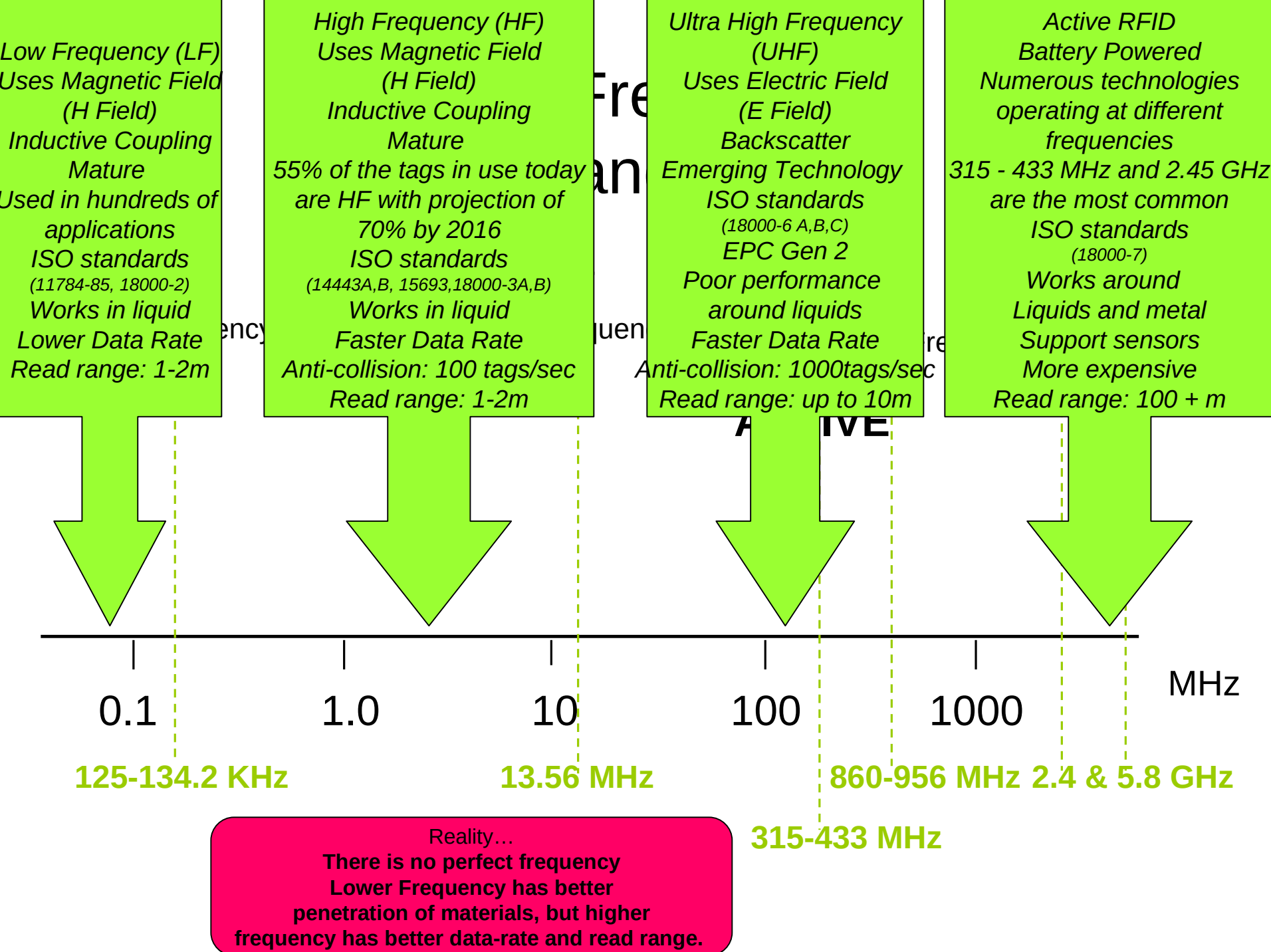

Low Frequency (LF)
Uses Magnetic Field
(H Field)
Inductive Coupling
Mature
Used in hundreds of
applications
ISO standards
(11784-85, 18000-2)
Works in liquid
Lower Data Rate
Read range: 1-2m
High Frequency (HF)
Uses Magnetic Field
(H Field)
Inductive Coupling
Mature
55% of the tags in use today
are HF with projection of
70% by 2016
ISO standards
(14443A,B, 15693,18000-3A,B)
Works in liquid
Faster Data Rate
Anti-collision: 100 tags/sec
Read range: 1-2m
Ultra High Frequency
(UHF)
Uses Electric Field
(E Field)
Backscatter
Emerging Technology
ISO standards
(18000-6 A,B,C)
EPC Gen 2
Poor performance
around liquids
Faster Data Rate
Anti-collision: 1000tags/sec
Read range: up to 10m
Active RFID
Battery Powered
Numerous technologies
operating at different
frequencies
315 - 433 MHz and 2.45 GHz
are the most common
ISO standards
(18000-7)
Works around
Liquids and metal
Support sensors
More expensive
Read range: 100 + m
0.1
1.0
10
100
1000
MHz
125-134.2 KHz
13.56 MHz
860-956 MHz
2.4 & 5.8 GHz
315-433 MHz
Reality…
There is no perfect frequency
Lower Frequency has better
penetration of materials, but higher
frequency has better data-rate and read range.

DEMONSTRATION

Little Physics !

Note…

Impedance Matching is important
Matching antenna and cabling especially with HF and UHF for impedance matching,

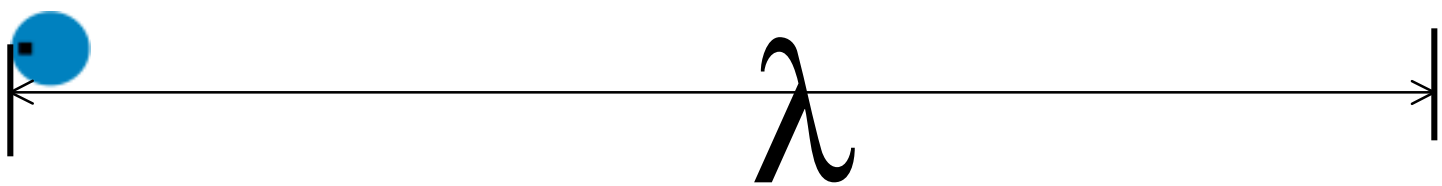
we need to know

λ

Note…

All Electromagnetic Fields are affected by metal.

By tuning the tag you can use metal to its advantage.



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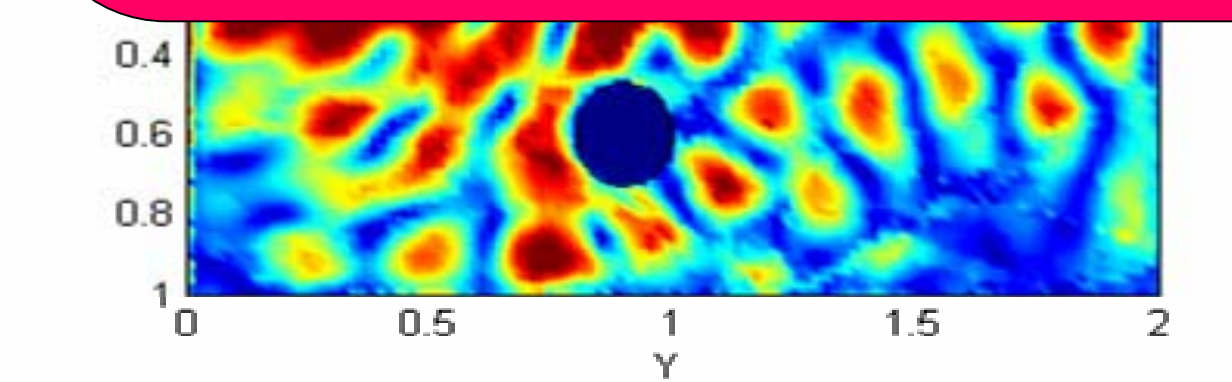
NEAR ELECTRIC FIELD AFFECT AT

Note…

Read Range is a function of tag and reader antenna design. Noise rejection is a system design problem.



Environmental Factors

EMI - Electromagnetic Interference

-Ambient and Intrinsic Noise

Surrounding Material and Elements

-Metal, Liquid, Elements such as Rain, Fog and UV

-Absorption, Reflection, Refraction, Diffraction

Mechanical

-Shock, Vibration, Bending

Safety

-Human safety, Hazardous Environments

Temperature

PASSIVE LOW FREQUENCY (LF) APPLICATIONS

- Animal Identification
- Access Control
- Car Access and Security (Immobilizer)
- Parking Access
- Payment
- Manufacturing
- Asset Tracking



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PASSIVE HIGH FREQUENCY (HF) APPLICATIONS

- Access Control and Security
- Electronic Payment
- Ticketing
- Item identification
- Document & File Tracking and Libraries
- Manufacturing
- Personal identification





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PASSIVE ULTRA HIGH FREQUENCY (UHF) APPLICATIONS

- Luggage Tracking
- Asset Tracking
- Supply Chain

Note…

EPC Gen 2 or ISO 18000-6C

Three types of configurations:

- **Single Reader Mode**
- **Multi Reader Mode (< 10)**
- **Dense Mode (>10)**

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ACTIVE RFID APPLICATIONS

- Vehicle Tracking
- Container Tracking
- Asset Chain
- Highway Access
- Real time Locating System (RTLS)

Note…

For Asset Tracking

Not one RFID technology is the solution for all Asset Tracking Applications

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CONCLUSION

CONCLUSION

- RFID IS a highly capable technology when implemented carefully
- RFID IS an enabling technology
- RFID IS a technology that challenges current business practices
- RFID IS proven and able to deliver a measurable ROI in most cases

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Successful Implementation requires a good understanding of RFID and Team Work

R. MOROZ LTD. - RFID CANADA

- 18+ years in the Auto ID industry (Bar Coding and RFID)
- 9+ years experience in RFID
- Full Solutions and Services Provider of Passive LF, HF and UHF and Active RFID
- RFID experience - implemented over 100 systems
- Fully trained sales, support and service staff
- Engineering department that can provide custom solutions
- Full training and testing facility
- Provide the most complete RFID product line in Canada

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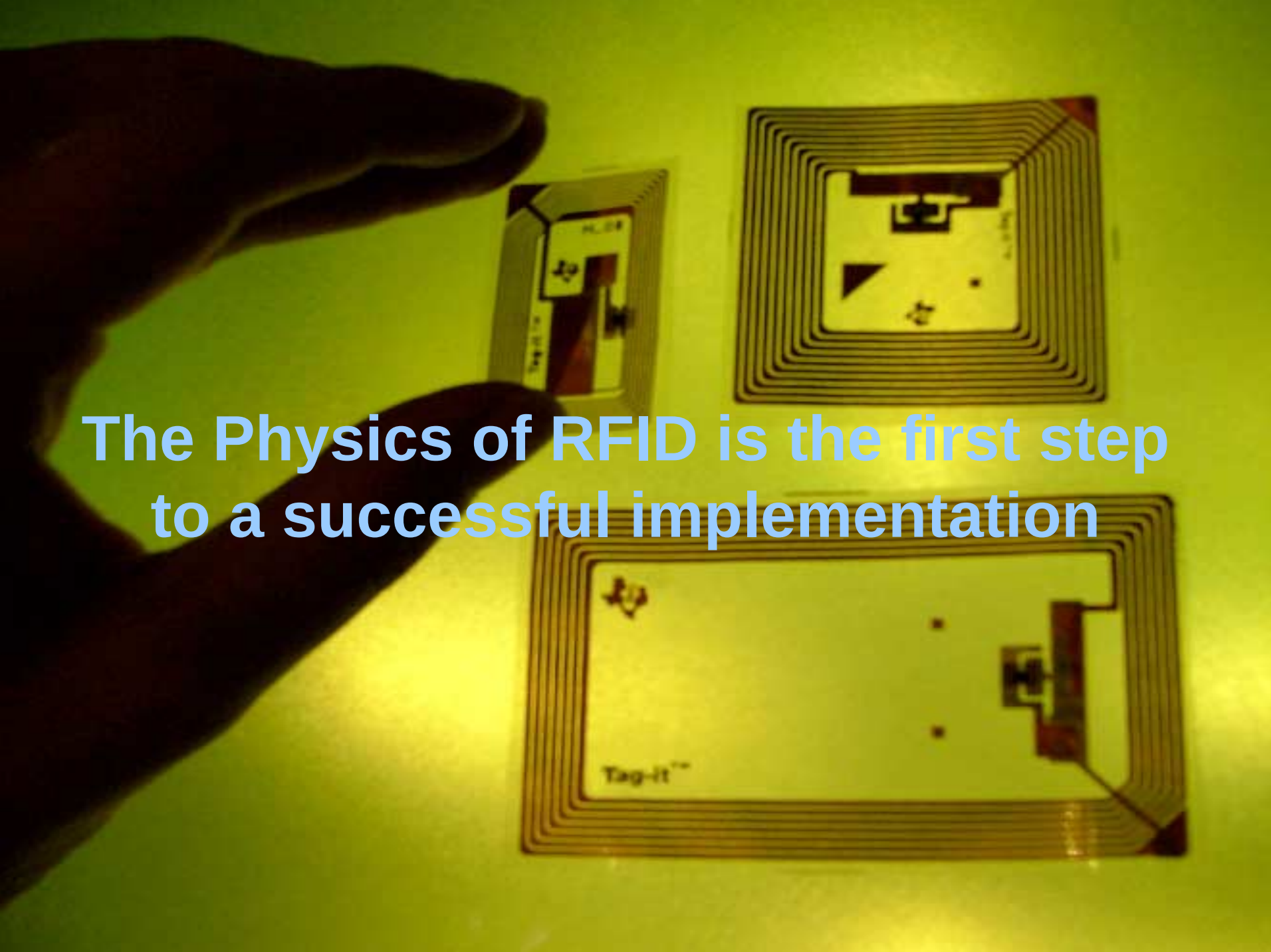
Tag-it™


The Physics of RFID is the first step
to a successful implementation
Tag-it™

QUESTIONS?