Workshop:

Implementing an RFID System

Moderator:

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Speakers:

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Features of RFID

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- RFID Tags can be read from a distance and from any orientation
- Tags can have read and write capabilities
- Data can be changed dynamically at any time
- RF-Tags can be read in bulk very quickly
- Does not require line of sight to be read
- RF-Tags can easily be embedded into any non-metallic products
- Works in harsh environments
- Permanent Identification for the life of the product

RFID is a highly reliable technology to identify and track items using RF communication

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Benefits of RFID

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- Reduce product handling time
- Reduce errors
- Reduce shrinkage
- Improve product visibility
- Reduce out-of stock
- Improve shipment identification
- Provide security against counterfeiting and tampering
- Optimize inventory
- More accurate and timely information
- Reduce costs

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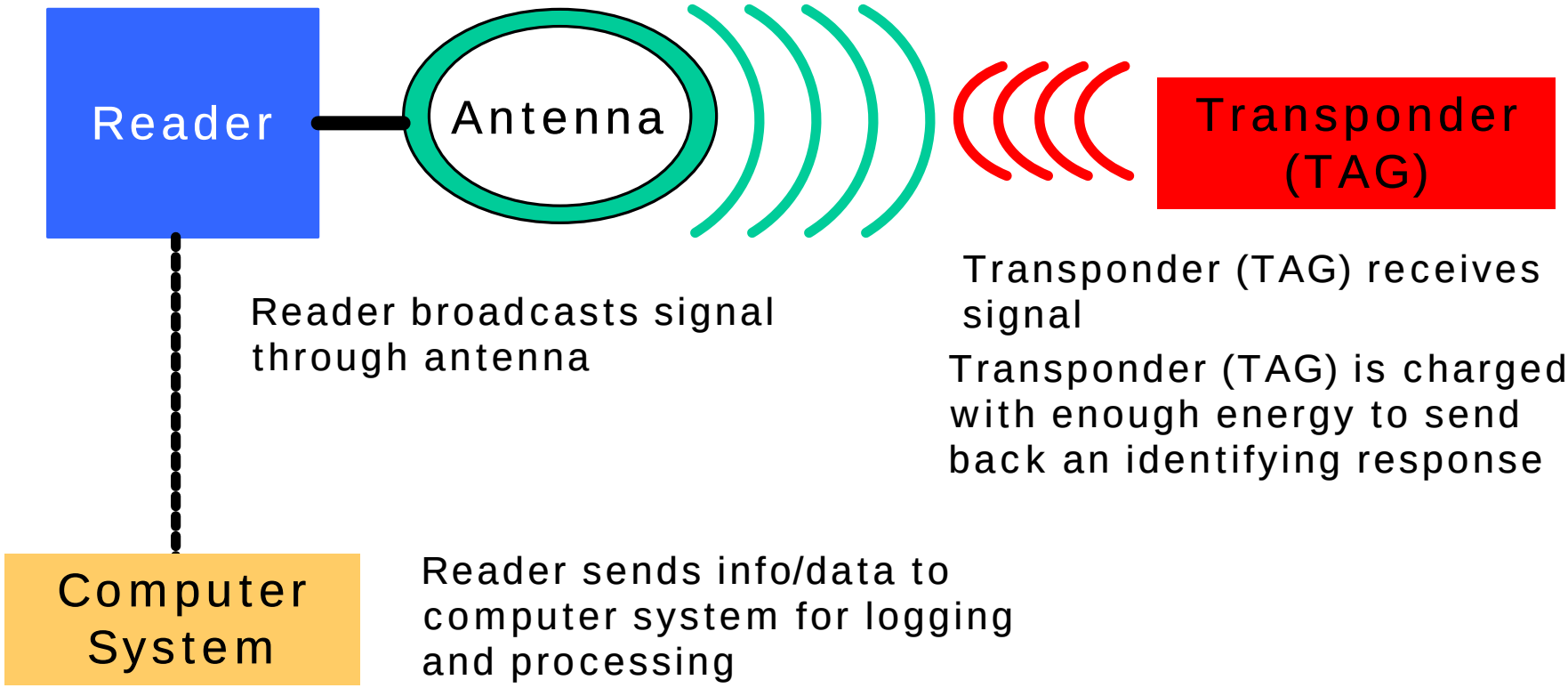
How Does RFID Work?



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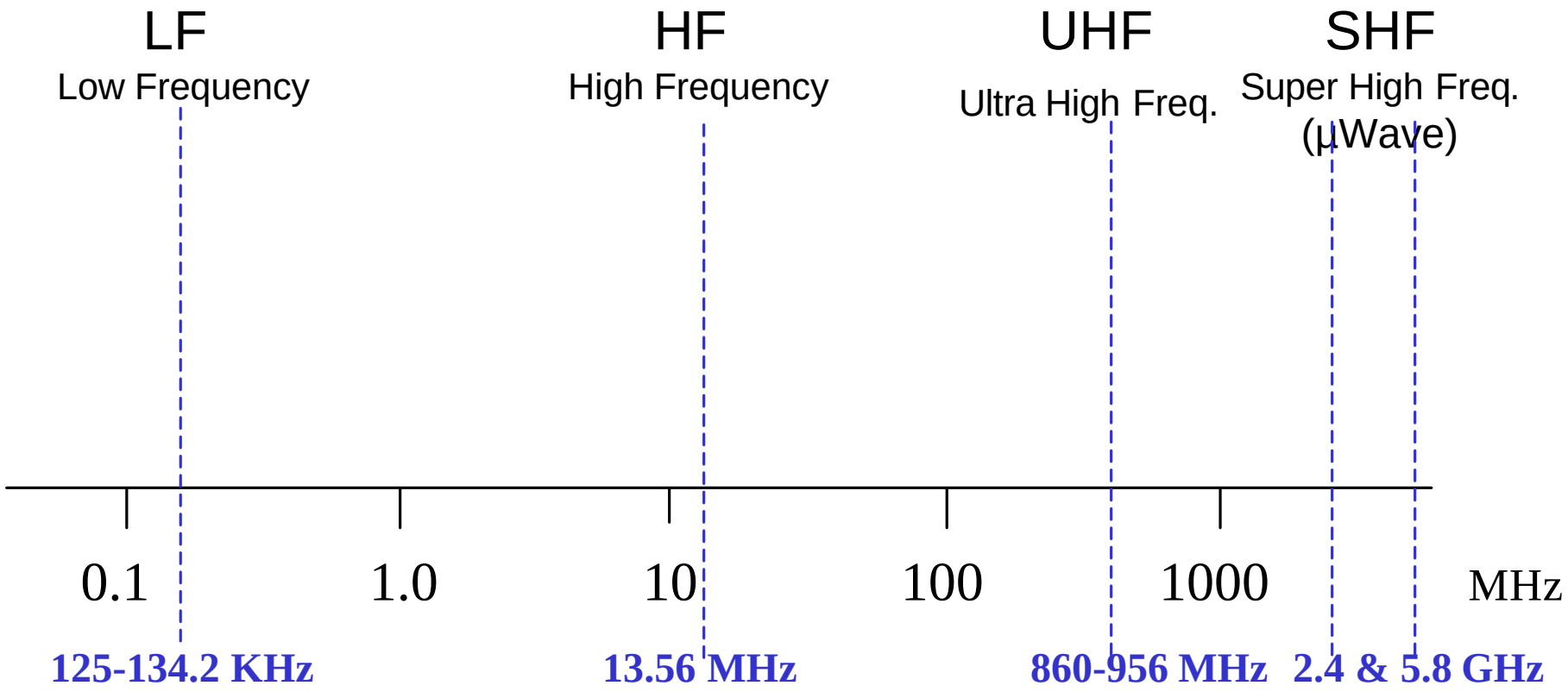
RFID Frequency Ranges



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LF (125 - 134.2KHz) Characteristics

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- Penetrates most materials well
- Could be affected by electrical noise
- Relatively low data transfer rate (200msec for read command)
- Relatively high cost (Transponders: $2.00 - $17.00 CDN)
- Tags can easily be embedded in any non-metallic product (labels, plastic, etc)
- Non-simultaneous reads (reads one tag at a time)
- Read range variable: 1” – 72”
- Frequency is usable worldwide (no restrictions)
- Common Applications:
    - Animal Identification (ISO 11784 & 11785 Standards)
    - Access Control
    - Automotive Security (Ford, Chrysler, Honda etc.)
    - Wireless Commerce (Esso, Mobil, McDonalds)

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HF (13.56MHz) Characteristics

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- Penetrates most materials well
- Less effective frequency in the presence of metal and water
- Not susceptible to electrical noise
- Higher data transfer rate (20m sec for read command)
- Low cost, flexible inlays: $0.50 - $0.90 CDN
- Tags can easily be embedded in any non-metallic product (labels, plastic, etc)
- Simultaneous reads, 50 transponders per second
- Read Range variable: 1” – 30”
- Optimal reading depends on tag and antenna orientation
- Ultra-thin inlays and smart labels (0.13”)
- Larger memory (2048 bits; 256 ASCII characters)
- Frequency is usable worldwide (no restrictions)
- Global Standard: ISO 15693, 14443
- Common Applications: Access Control
    - Wireless Commerce (Shell)
    - Ticketing
    - Marketing and Loyalty programs

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UHF (860 - 956MHz) Characteristics

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- Does NOT penetrate most materials well
- Not an effective frequency in the presence of metal and water
- Not susceptible to electrical noise
- Higher data transfer rate (2m sec for read command)
- Directional communication
- 915MHz not available globally; different frequencies for North America, Europe and Asia
- Global Standards: ISO 18000-6 standard not yet approved
- Low cost, flexible inlays: $0.50 - $0.90 CDN
- Tags can easily be embedded in any non-metallic product (labels, plastic, etc.)
- Simultaneous reads, 1000 + transponders per second
- Read Range variable: up to 20 ft.
- Common Applications:
    - Distribution and Logistics
    - Baggage Tracking

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Factors Affecting Operating Range

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- Transponder/Tag Orientation
- Overlapping of Tags - Transponders touching
- Amount and Direction of Data Transfer (R/O or R/W)
- Transmitting Power (power of the reader) and the reader
- Size and Shape of the Antennas (transponder and reader)
- Readers/Antennas near each other
- Environment (ambient noise, intrinsic noise, cabling, surrounding metal, DC Motors etc.)
- Metal
- Transponder (chip specifications)
- Frequency which may be limited by regulations (FCC in North America) and standards (ISO)

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Factors Affecting Communication Time

- Reader Reading and Writing Rate
- Tag Response Time
- Data Capacity
- Velocity of the Tag
- Operating Range
- Number of Tags

Successful Implementation

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- For an RFID project to succeed, it is necessary to approach the business problem and potential RFID solution using a systems approach

- RFID systems should be conceived, designed, and implemented using a systematic development process in which end-users and specialists design RFID systems based on an analysis of the business requirements of the organization

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Why?

- 75 - 80 % of all I.T. projects experience problems or fail
- 45 - 50% exceed their budget
- 25 - 30% are cancelled

System Survey

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- Business:
  - Why are you implementing RFID?
  - Are you being mandated or are you looking at improving your internal operation?
  - Is there a requirement or preference for standards?

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System Survey

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- Tags:
  - Do you require disposable tags or can you use reusable tags?
  - Type of tag required (Read only, R/W, WORM)?
  - Maximum amount of data to be stored in the tag (data capacity)?
  - What is the data format?

- Reader:
  - What is the required read zone (width, height, and depth)?
  - How may tags will the reader read or write to at one time?
  - What are the possible location(s) for the tag?

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System Survey

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- Reader (cont.):
  - Orientation of the tag?
  - Distance between tags?
  - At what speed and direction will the tags be travelling?
  - What error control and correction will be required?
  - Do you require any data security?
  - What will the required distance be between different reader antennas?
  - What is the distance between antenna location and the reader?
  - Is portability a requirement?
  - Data interface and protocol – reader/interrogator (batch, on line, wireless, Ethernet, etc.)?

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System Survey

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- Environment:
  - Environment: Metal, Tags and reader antenna proximity to metal?
  - Temperature, humidity, and exposure to chemicals, UV and X-rays, mechanical stress?

- Systems:
  - How and where will the tags be applied?
  - What do you do when a tag is read?
  - What do you do if a tag is not read?

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Conclusion

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Successful Implementation requires Team Work and a good Understanding RFID

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RADIO FREQUENCY IDENTIFICATION
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Two Day Conference ◆ April 19-20, 2005
◆ Le Parc, Markham Ontario

Questions?