

EPIC

Always Right

"From the errors of others,
a wise man corrects his own."

Publilius Syrus (85 -43 BC)

QUESTIONS?

- ✦ Please enter the questions during the presentation
- ✦ After the presentation, we'll answer all questions
- ✦ Thanks and enjoy the show

AGENDA

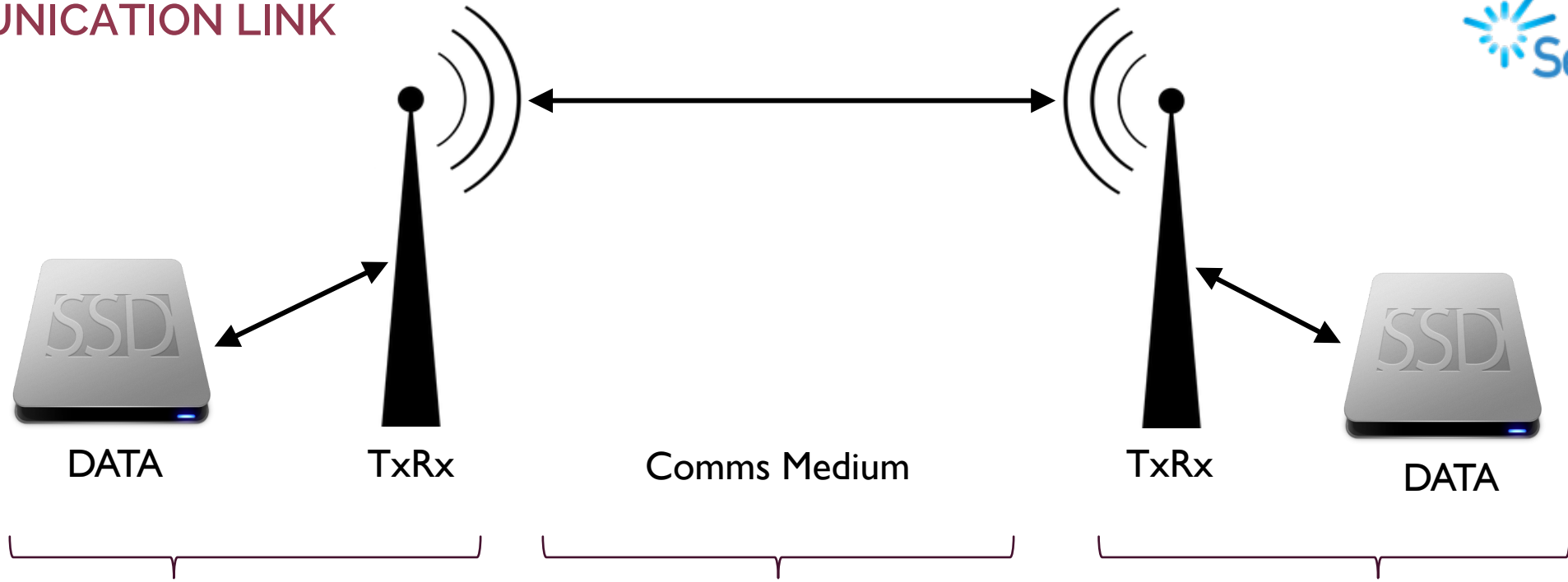


- ✦ Communications
- ✦ RFID critique
- ✦ EPIC
- ✦ Demonstrations
- ✦ Products

COMMUNICATION



COMMUNICATION LINK



❖ Processor

❖ Data farm server

❖ Earth

❖ USB Type C

❖ Fiber optics link

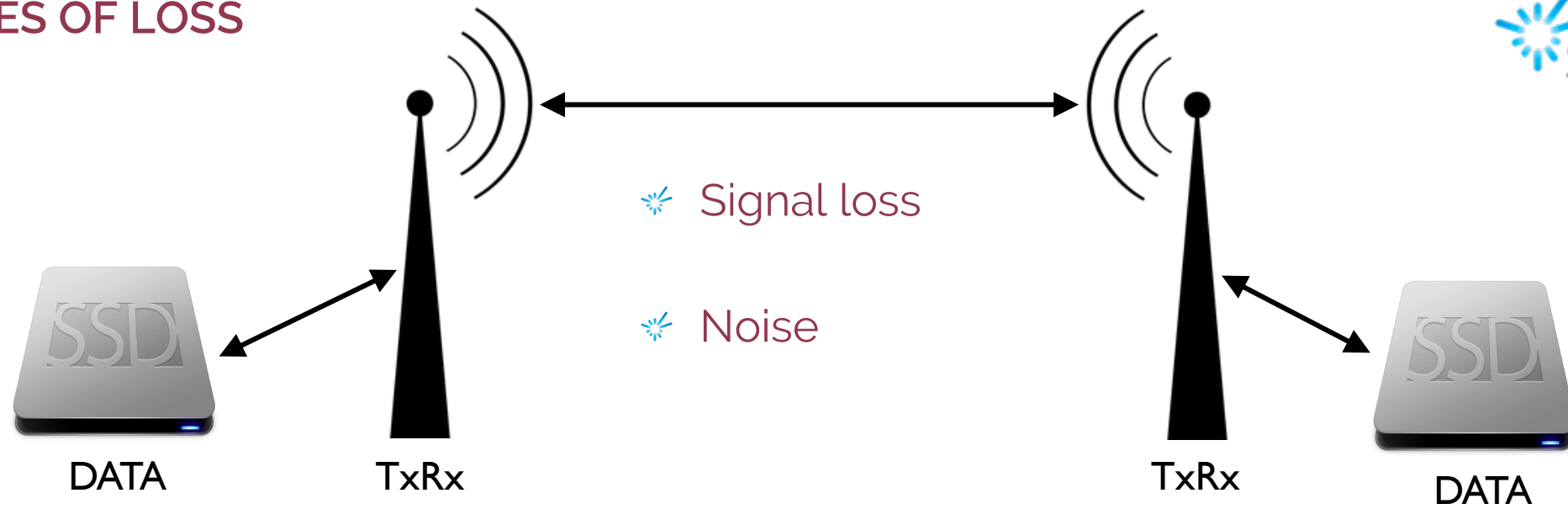
❖ RF link

❖ SSD hard drive

❖ ISP server

❖ Deep space probe

SOURCES OF LOSS



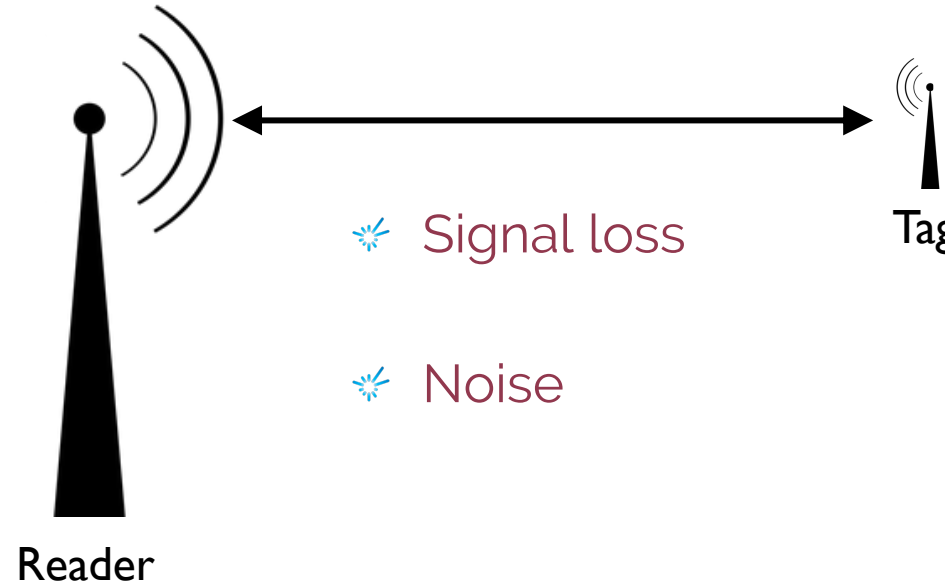
❄ Missing data

❄ Corrupt data

❄ Missing Data

❄ Corrupt data

RFID



- ❖ RFID Tag
 - Not self-powered
 - Poor error management

- ❖ No error correction
- ❖ No channel correction
- ❖ No data authentication

RFID FLAWS



- ✦ **No** tag corruption detection
→ **Corruption straight to customer**
- ✦ **No** transmission error correction
→ **Poor RFID system performance**
- ✦ **No** error correction
→ **Single error = failure**

RFID LIMITS



- ❁ Poor reads in noisy environment
- ❁ Short tag lifetime
- ❁ No data guarantee

WHO NEEDS BETTER?



- ❖ Cold chain
- ❖ Pharma
- ❖ Hospitals
- ❖ Law enforcement
- ❖ Military
- ❖ Government
- ❖ Avionics
- ❖ Manufacturing

ARCHITECTURE

DIFFERENTIATION THAT MATTERS

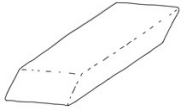


EPIC

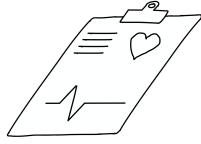
Always Right

- ✦ Error management system
- ✦ Implementation
- ✦ Standards compliant
- ✦ Backwards compatible

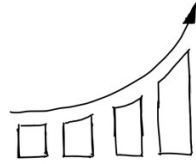
BENEFITS



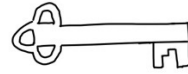
Error Correction



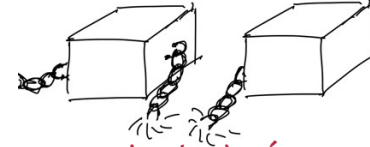
Lifetime



Performance



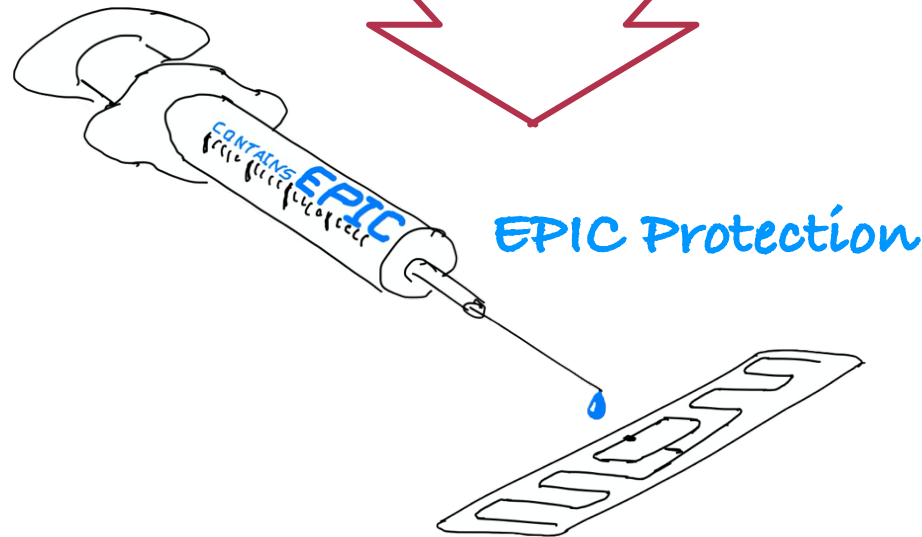
Security



Blockchain



Authentication



PERFORMANCE

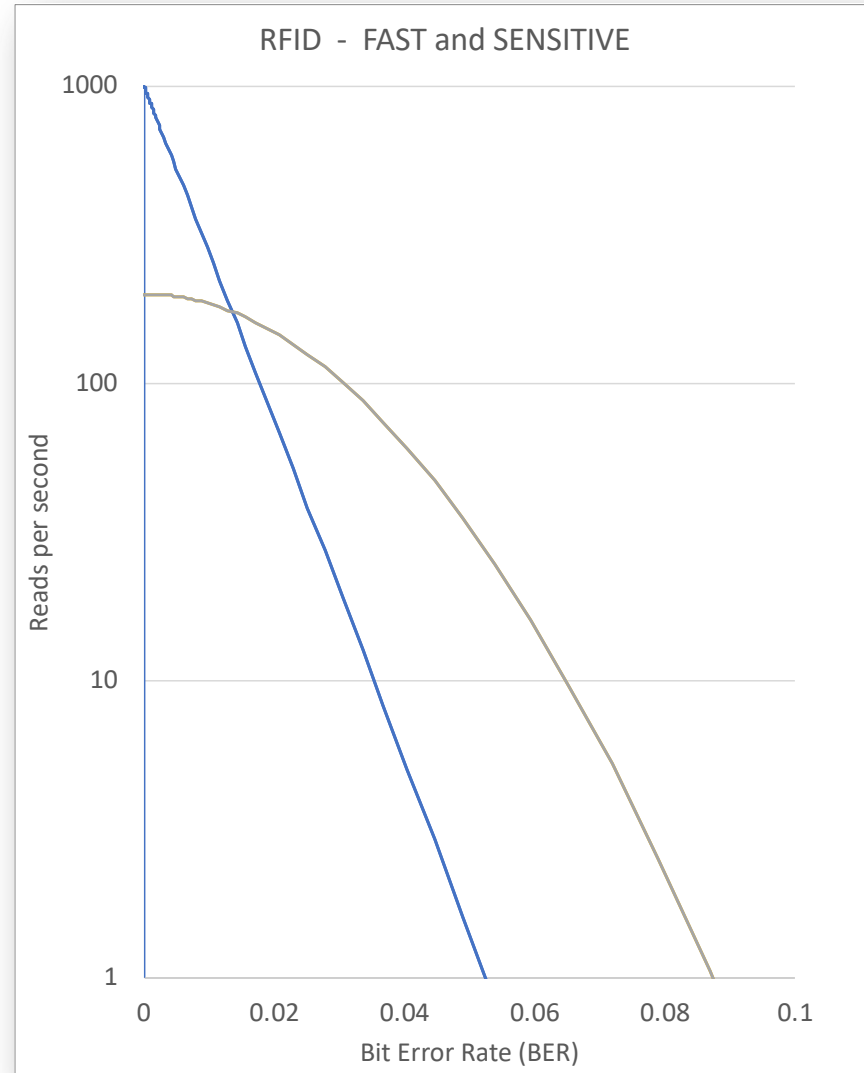
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PERFORMANCE – RFID

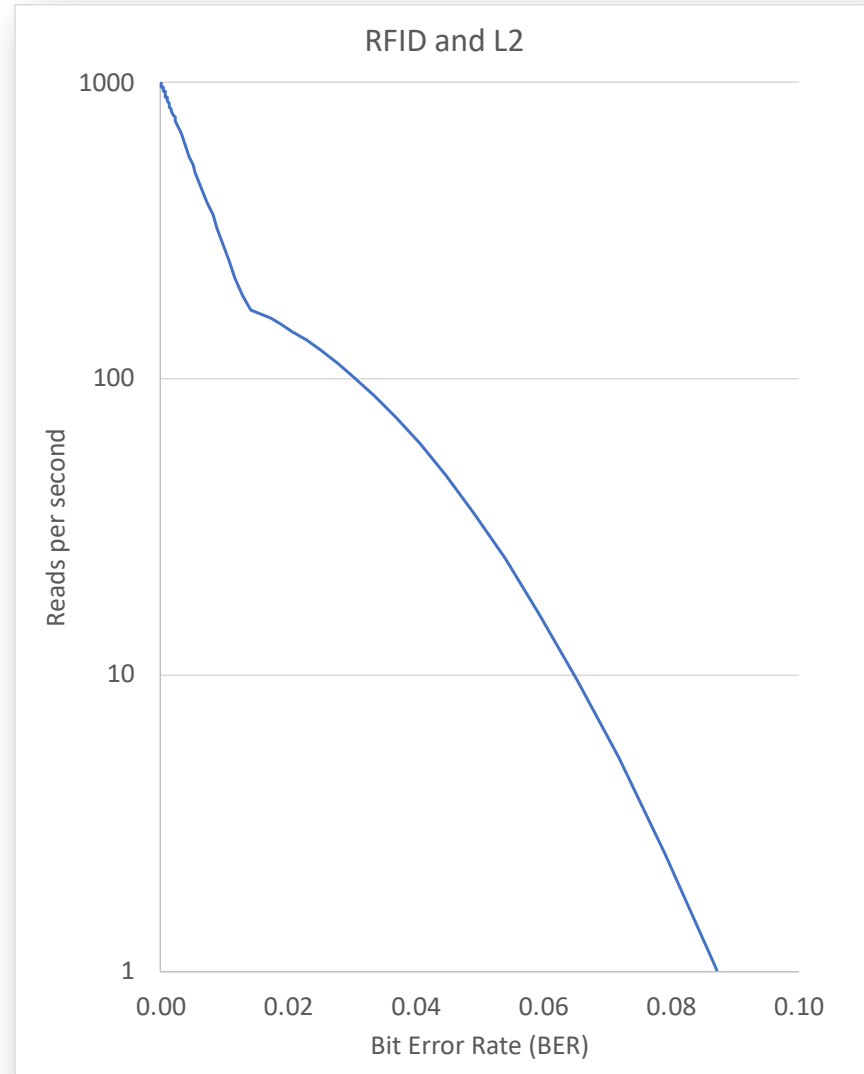
❖ Reader slows with noise

❖ No data guarantee



PERFORMANCE – LEVEL 2

- ❁ Legacy performance
 - No speed decrease
 - Sensitivity unchanged
- ❁ Data guaranteed
 - 4 bits of error correction



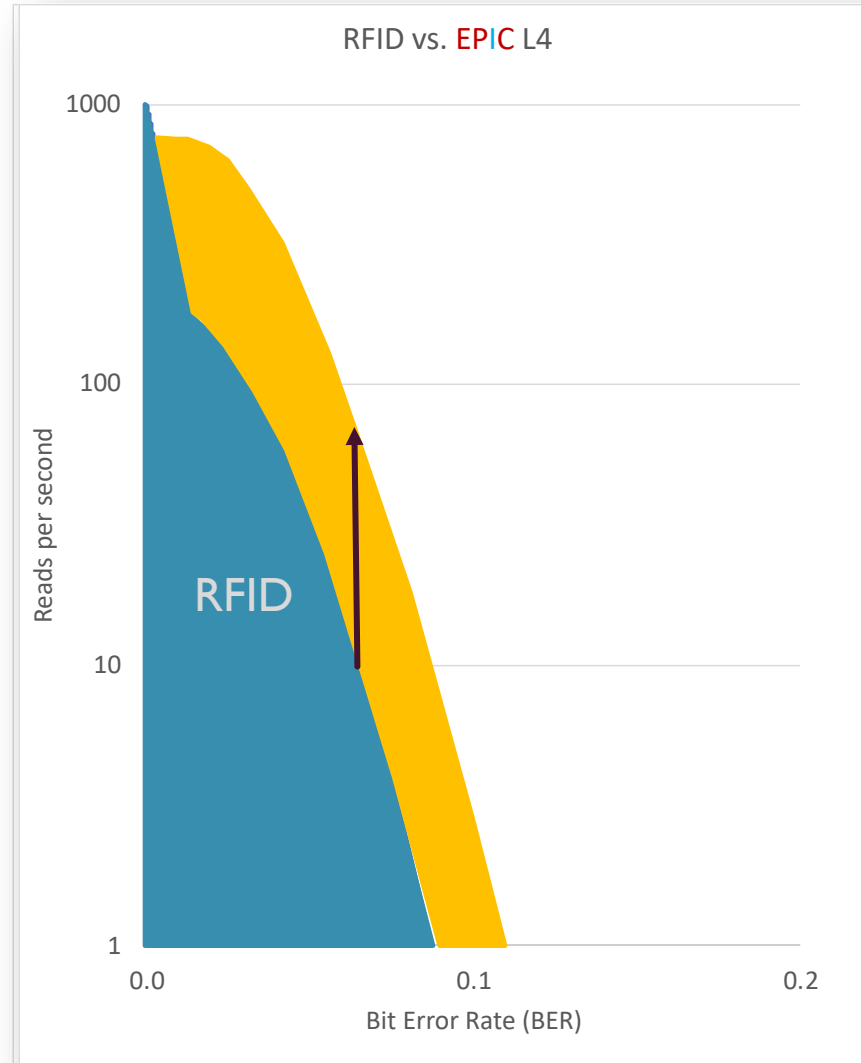
PERFORMANCE – LEVEL 4

Reader performance

33 dBm, 9 m, 400 ms frequency, 10 Seconds

| Condition | RFID | READS | |
|--------------|------|---------|----------|
| | | EPIC L4 | Increase |
| M4, DRM OFF | 318 | 327 | 3% |
| M4, DRM ON | 120 | 132 | 10% |
| FM0, DRM ON | 36 | 46 | 28% |
| FM0, DRM OFF | 29 | 39 | 34% |

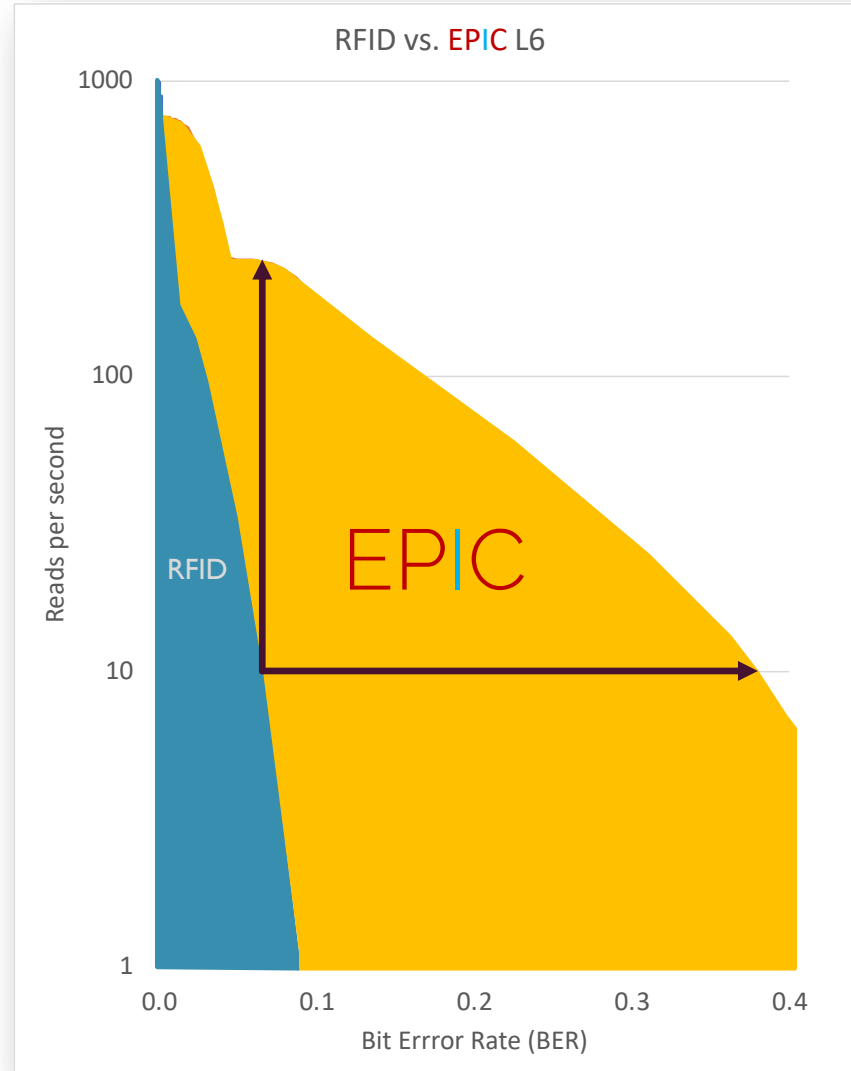
Data guaranteed



PERFORMANCE – LEVEL 6

- ✦ *Adaptive algorithms*
- ✦ Correct >30% BER

- ✦ In development



BATTLE NOISE

- ❄️ Tags at edge of read range
 - 9 meters away
- ❄️ Massive jamming noise
 - 33 dBm of power
 - 9 dBic antenna
 - 2 meters to sensing antenna

❄️ Tag reads → GONE!

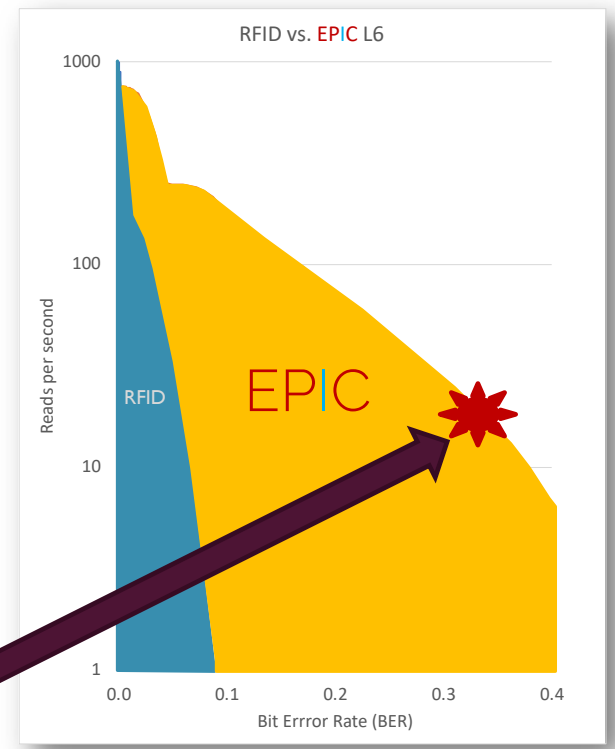
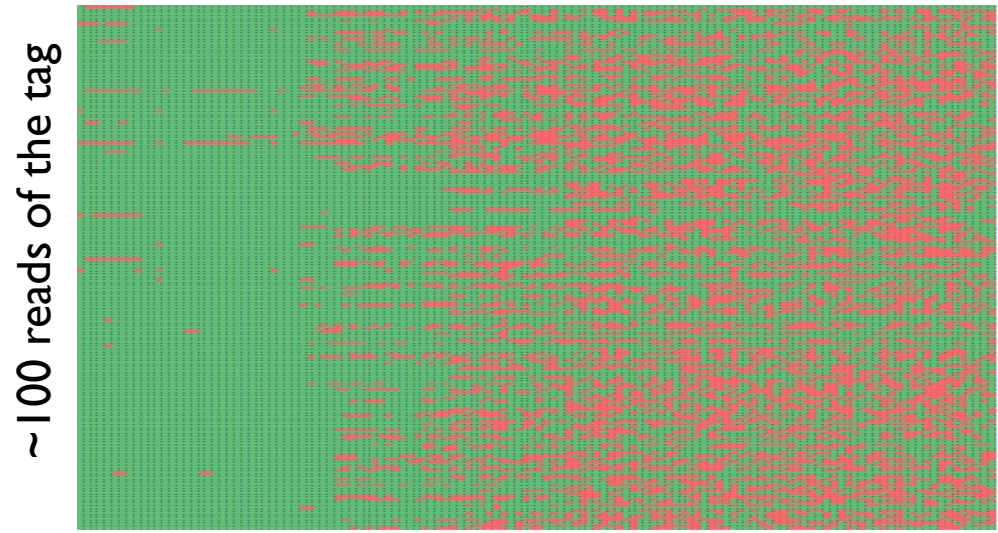
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| READER @33 dBm, 8.5 dBic antenna, 2m to antenna | | | |
|---|------|---------|---------|
| | RFID | EPIC L4 | EPIC L6 |
| M4, DRM ON | 0 | YES | YES |
| M4, DRM OFF | 0 | 0 | YES |

NO OTHER READER

✦ >30% errors solved

Bits 1-128



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PERFORMANCE SUMMARY



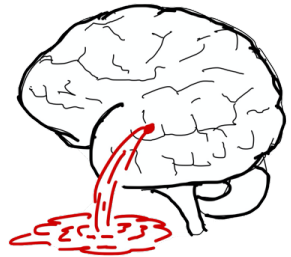
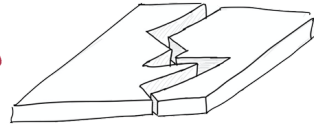
| | EPC Protect | User Memory Protect | Legacy Reader | Transmission Correction | Adaptive Transmission |
|----------------|-------------|---------------------|---------------|-------------------------|-----------------------|
| Legacy RFID | NO | NO | YES | NO | NO |
| EPIC L2 | YES | YES | YES | NO | NO |
| EPIC L4 | YES | YES | SensThys Only | YES | NO |
| EPIC L6 | YES | YES | SensThys Only | YES | YES |

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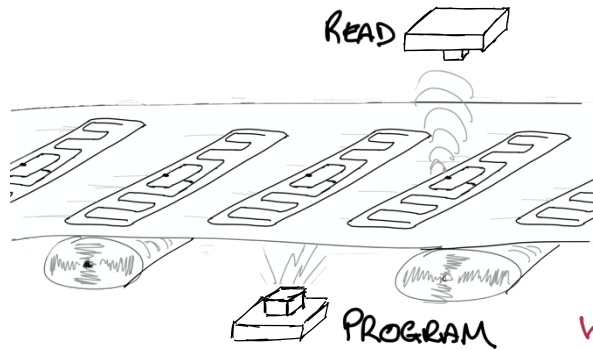


CORRUPTION

Damaged RFID tag chip



Memory Leaks

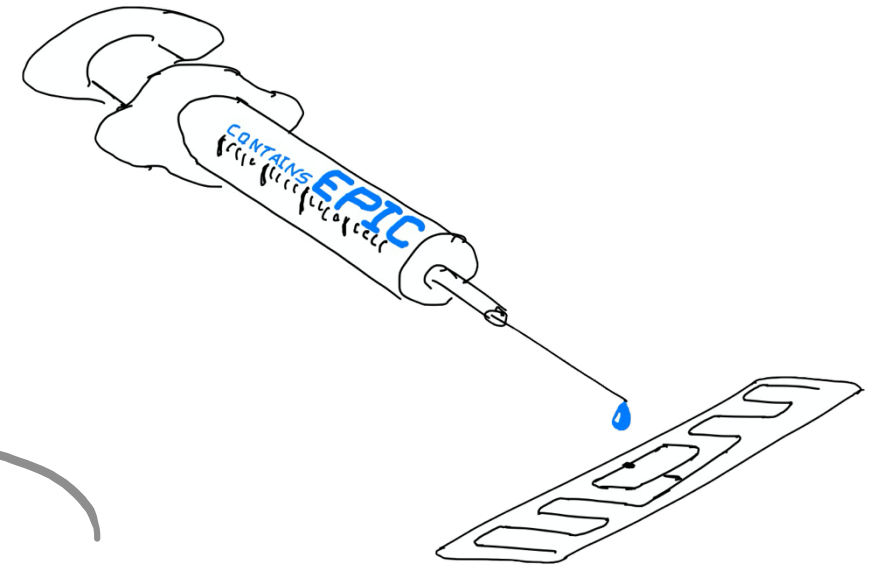


PROGRAM

Weakly written Tags



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DO CUSTOMERS CARE?

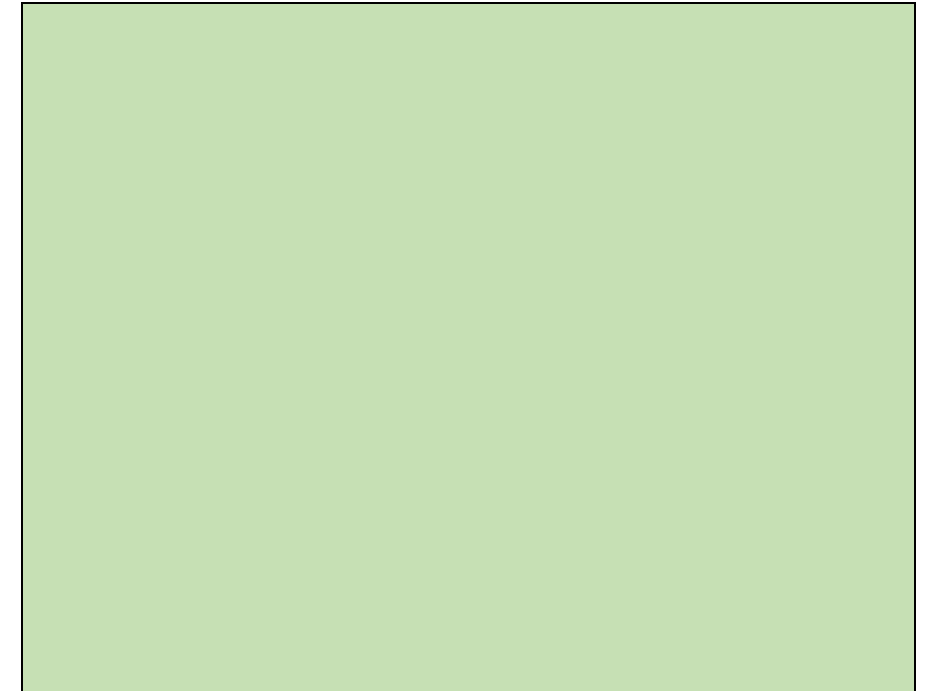
❄ Simulated Tag Population

- Green = GOOD
- Red = 1 or multiple fails
- 8000 tag model

❄ Conservative

- 96b tag
- Constant fail rate
- 100% in-coming test → no-fail period
- Undercounts fails at high fail count

Deployed Months
3

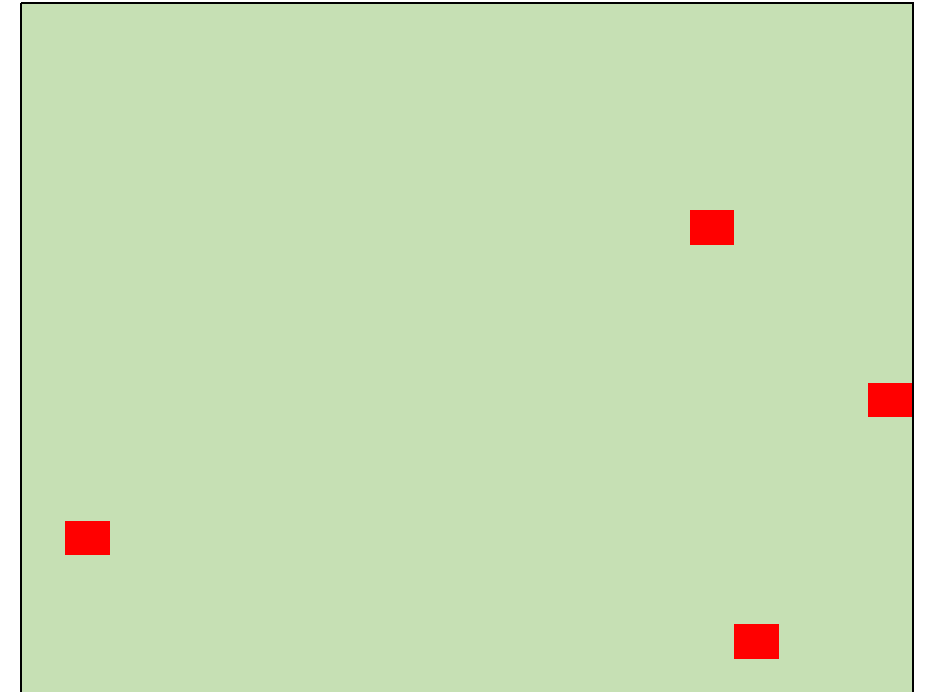


❄ No early failures

A YEAR IN . . .

- ✦ Failures becomes obvious
- ✦ This picture is only **0.5%** fail
- ✦ This is awful for
 - Anyone not selling socks

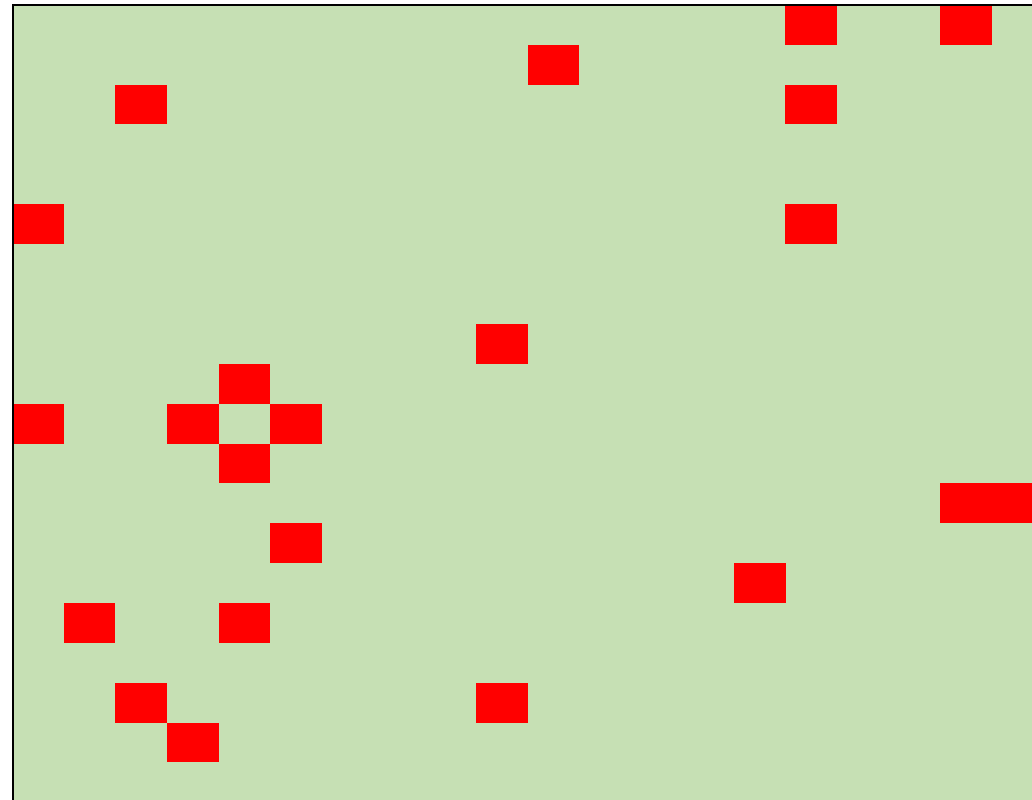
Deployed Months
12



FIVE YEARS IN



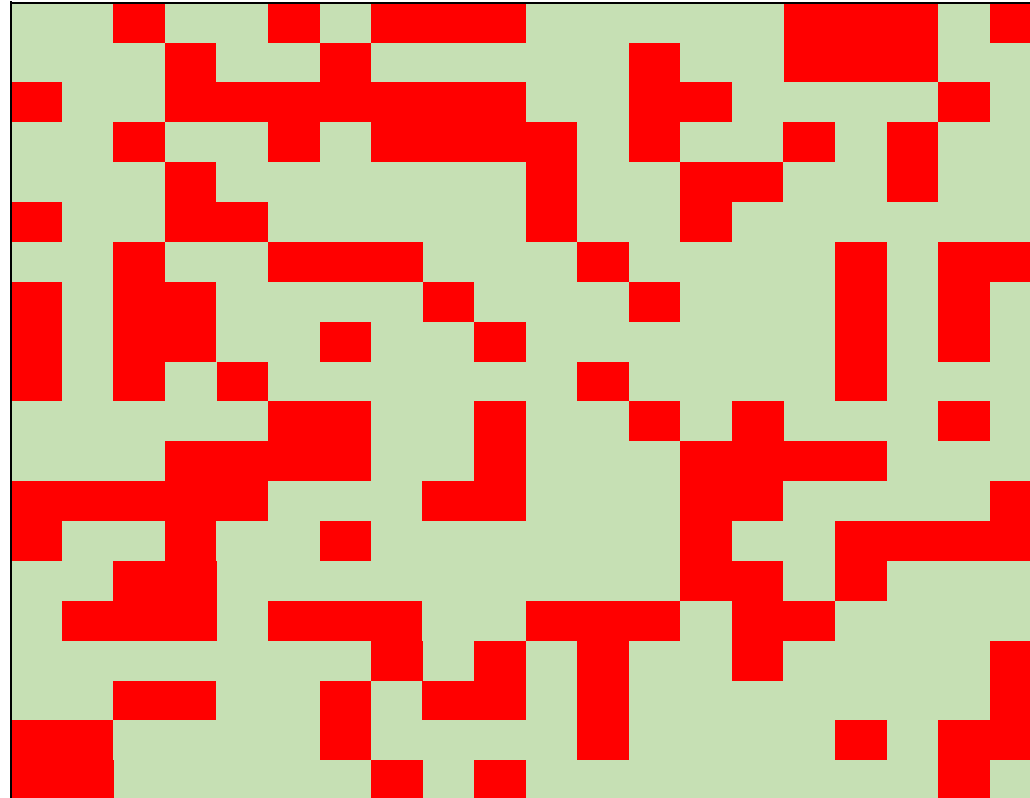
Deployed Months
60



EXTENDED TAG LIFE . . .



Deployed Months
600



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DEMONSTRATIONS

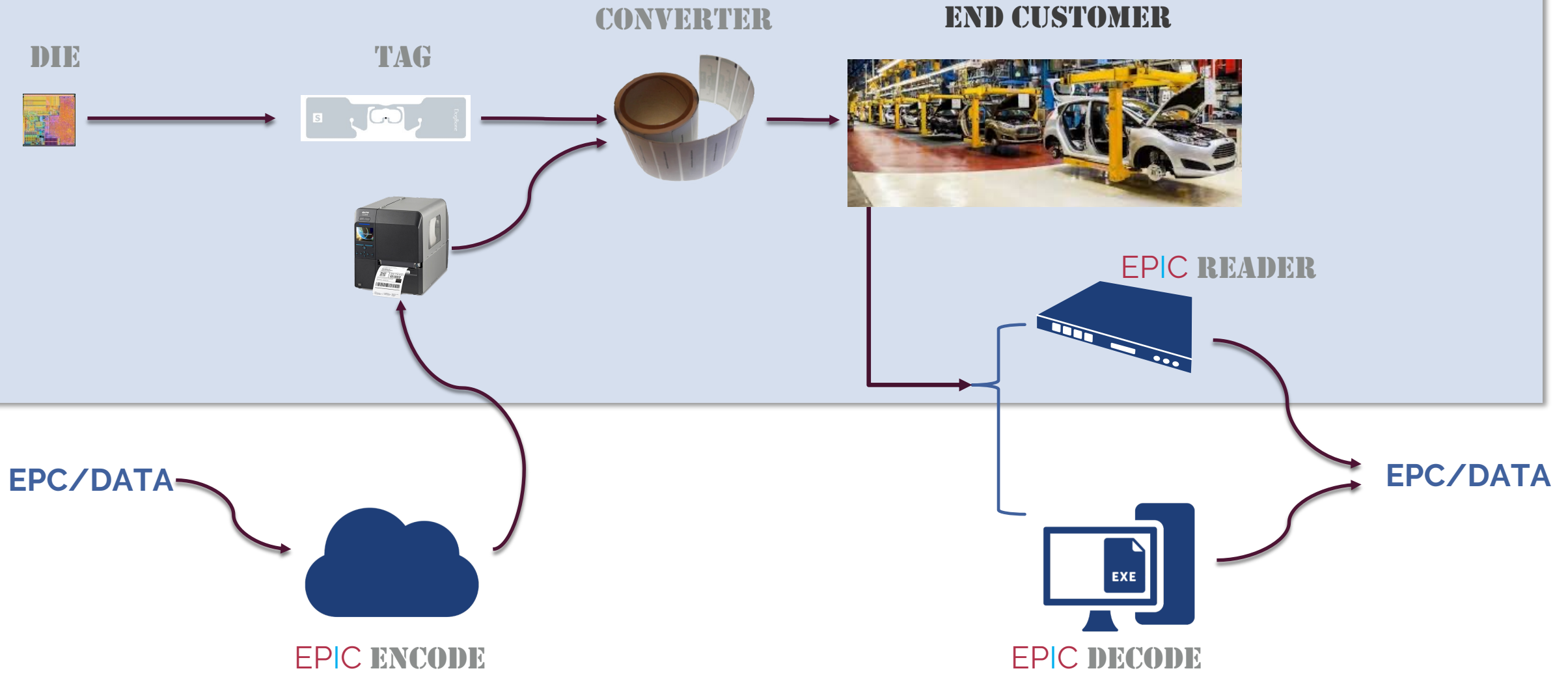


PRODUCTS

EASY TO DEPLOY



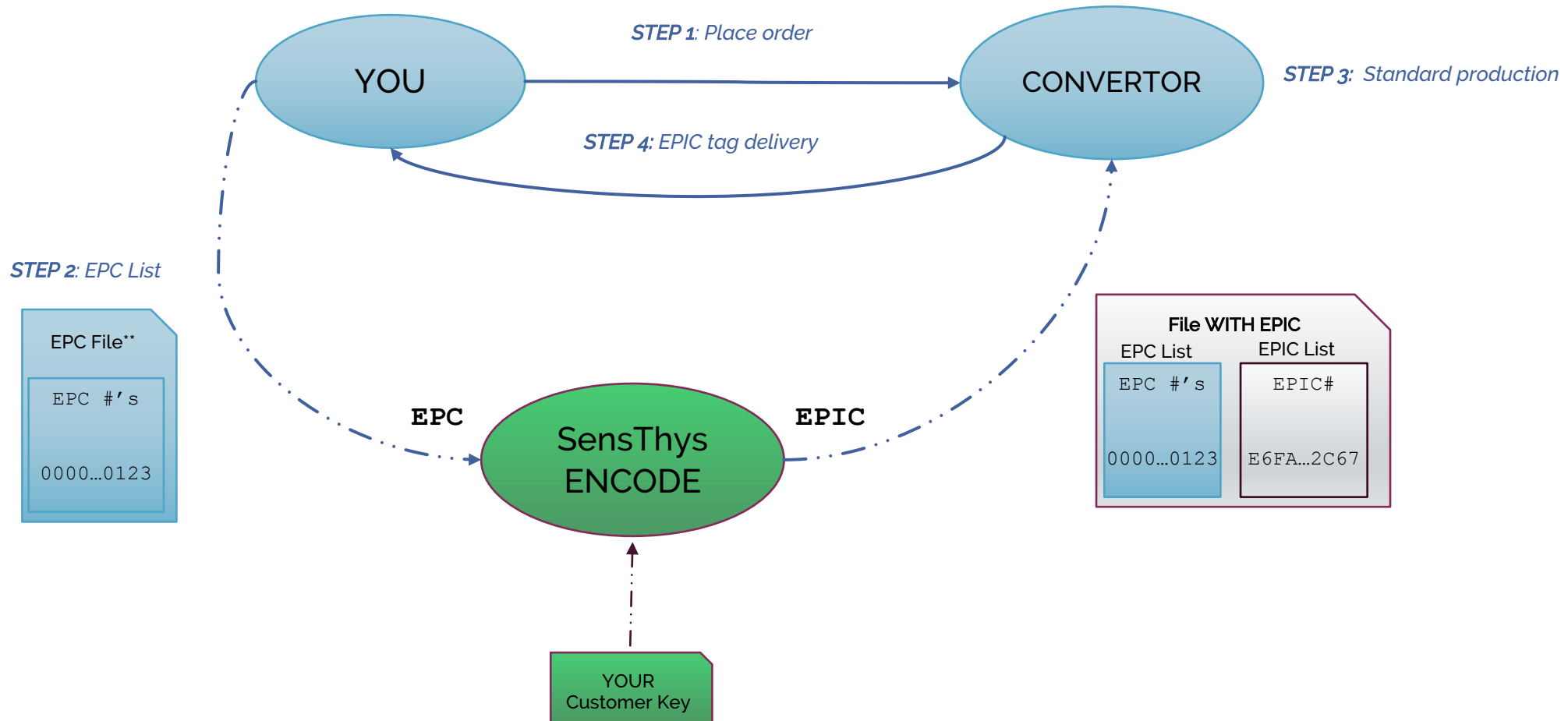
ZERO CHANGES to Infrastructure or Processes



ENCODING YOUR NEW TAGS

Minimal Impact To Existing Business Practices

BLUE = No changes



PRODUCTION PRODUCTS



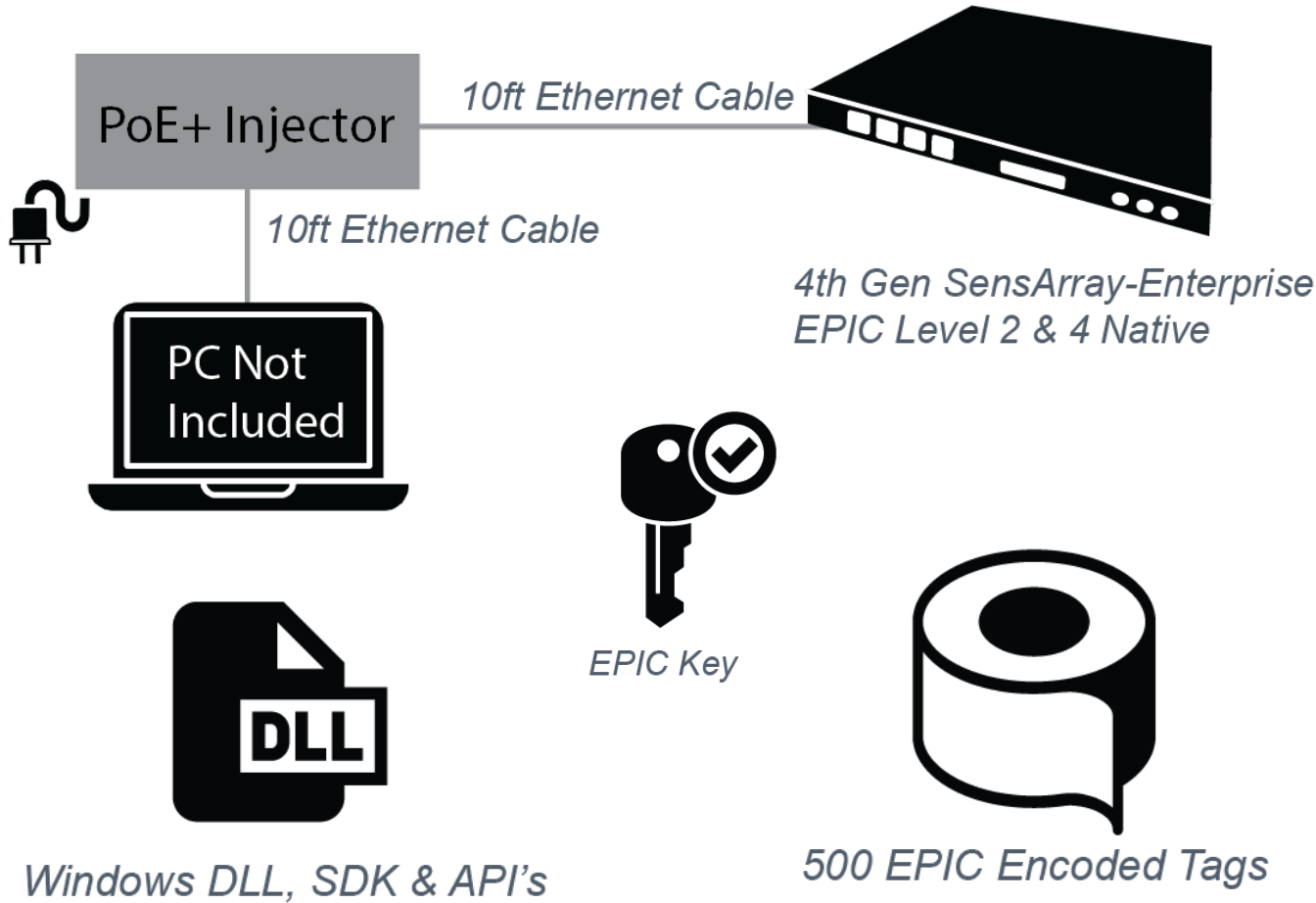
Core Offering

- ✦ SensThys Provides:
 - Fixed EPIC L4 readers
 - Handheld EPIC L2 readers
 - DLL for legacy installs
 - Customer Key

Tag Sourcing

- ✦ Buy tags from converter
 - SensThys encodes EPC → EPIC
 - Normal business with converter
- ✦ SensThys supplies tags
 - You provide EPC list
 - SensThys supplies tags

EVAL KIT



Optional Handheld

*CS-108 Handheld
EPIC Level 2 Native*



✦ **Guaranteed data**

✦ **Performance Gain**

✦ **Advanced features**

→ **Authentication**

→ **Privacy**

→ **Blockchain**

→ **Encryption**

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NEXT STEPS

✉ Neil.Mitchell@SensThys.com

☎ Neil @ 408.656.9500

✉ Darryn.Prince@SensThys.com

☎ Darryn @ 760.710.9153



SensArray® Enterprise
4th Generation with EPIC

The 4th generation SensArray® RFID reader that also contains an integrated power switch with integrated power distribution system. These are consolidated form-factor. The SensArray® maximum of +3300m via the rate DC power input is required.

This is an EPIC native reader

- Offers absolute data validity
- Provides constant tag health
- Massively increases read distance
- Requires no read quality trade-offs
- While being compatible with industry standards

Unlike other readers, the SensArray® readers massive power input is required.

The reader is supplied as a standard VESA mount. Variants include:

- Class 8 PoE+

EPIC™ Intelligence Within

SensThys EPIC™ technology

- Offers absolute data validity
- Provides constant tag health and lifetime monitoring
- Massively increases read distance
- Requires no trade-offs
- While being compatible with industry standards

EPIC can be applied to most changing your current business layer of patented encoding algorithm to protect that data from transmission errors. Unlike your data from multiple bit errors from memory corruption or permanent by semiconductor sufficient power or time, physical such as gamma ray and transmemory cells that are like a lightning bolt sometimes due to the reason and unpredictability.

Real-World Examples

The kits are:

- **EPICKit-E**: For customers who desire to evaluate EPIC with fixed readers. This kit offers the EPIC native 4th generation version of the SensArray-Enterprise to evaluate Level 2 and Level 4 EPIC capabilities.
- **EPICKit-EH**: For customers who wish to explore both fixed and handheld solutions, this kit includes both the 4th-generation SensArray-Enterprise (Level 2 and 4) and the CS-108 handheld (Level 2)

Benefit?

Absolutely guarantee data from your RFID system

Excellent enterprise connectivity for wide variety of sensors and peripherals

Highest Reader Performance

Reduced operational and capital costs

Building and Community-friendly form factor

Benefit?

Inventory misidentification

Premises

Error Correction

Health

PC Not Included

500 EPIC Encoded Tags

EPIC Key

EPICKit-E

4th Gen SensArray-Enterprise EPIC Level 2 & 4 Native

The EPICKit-E includes the 4th generation SensArray-Enterprise which is a novel RAIN RFID reader that also contains an 8.5dBc antenna, network switch and power distribution system. The 4th generation adds native EPIC decoding for either EPIC Level 2 or EPIC level 4 tag interrogation. This combination provides the capability to test both the memory and transmission resilience provided by EPIC.

The kit contains everything you need to evaluate the EPIC technology. Just plug an ethernet cable that carries power and data into the reader and one into your network or PC, download the software from our website, and go!

Contents

| Contents | Number |
|---|--------|
| SensArray-Enterprise (4th Gen) - EPIC L2 & L4 | 1 |
| Class-4 PoE Injector | 1 |
| Ethernet Cat6 Cabling (10ft) | 2 |
| Windows EPIC Decoder DLL | 1 |
| EPIC Encoded Roll of Tags (500 tags/roll) | 1 |
| EPIC Evaluation Key | 1 |

Real-World Examples

Inventory misidentification

Premises

Error Correction

Health

PC Not Included

500 EPIC Encoded Tags

EPIC Key

Benefit?

Absolutely guarantee data from your RFID system

Excellent enterprise connectivity for wide variety of sensors and peripherals

Highest Reader Performance

Reduced operational and capital costs

Building and Community-friendly form factor

Benefit?

Inventory misidentification

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Error Correction

Health

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