SensThys

EPIC

Always Right

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

Publilius Syrus (85 -43 BC)

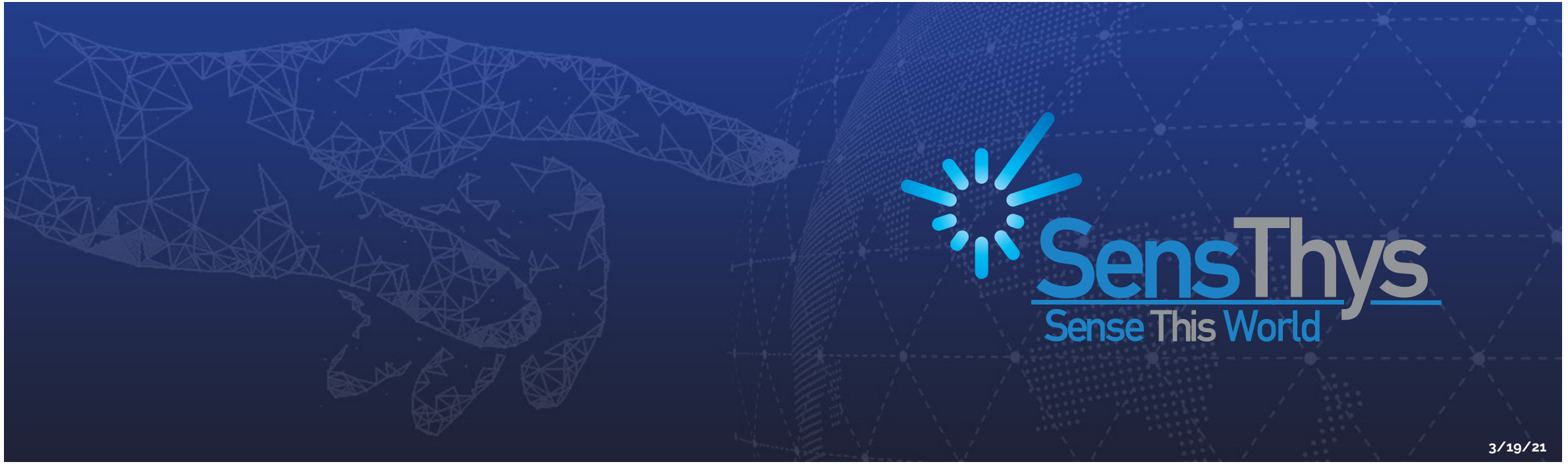
QUESTIONS?

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

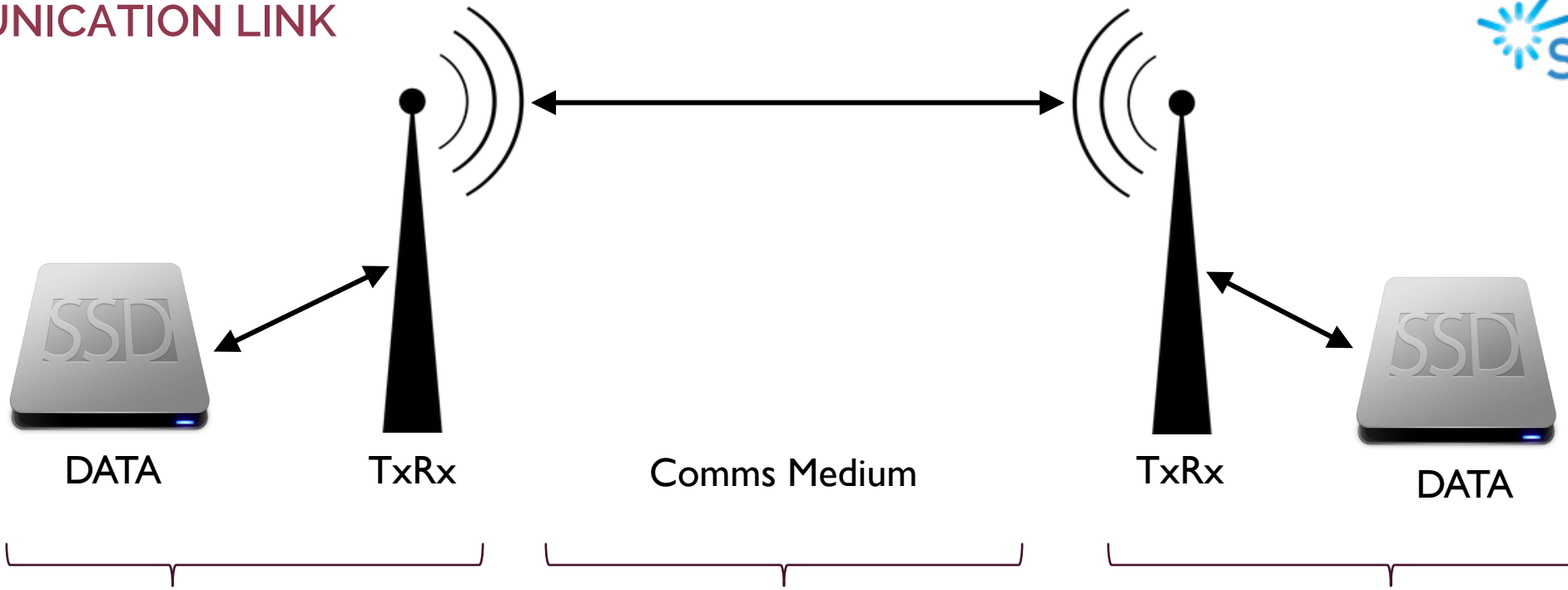
AGENDA

- Communications
- RFID critique
- EPIC
- Demonstrations
- Products

COMMUNICATION



COMMUNICATION LINK

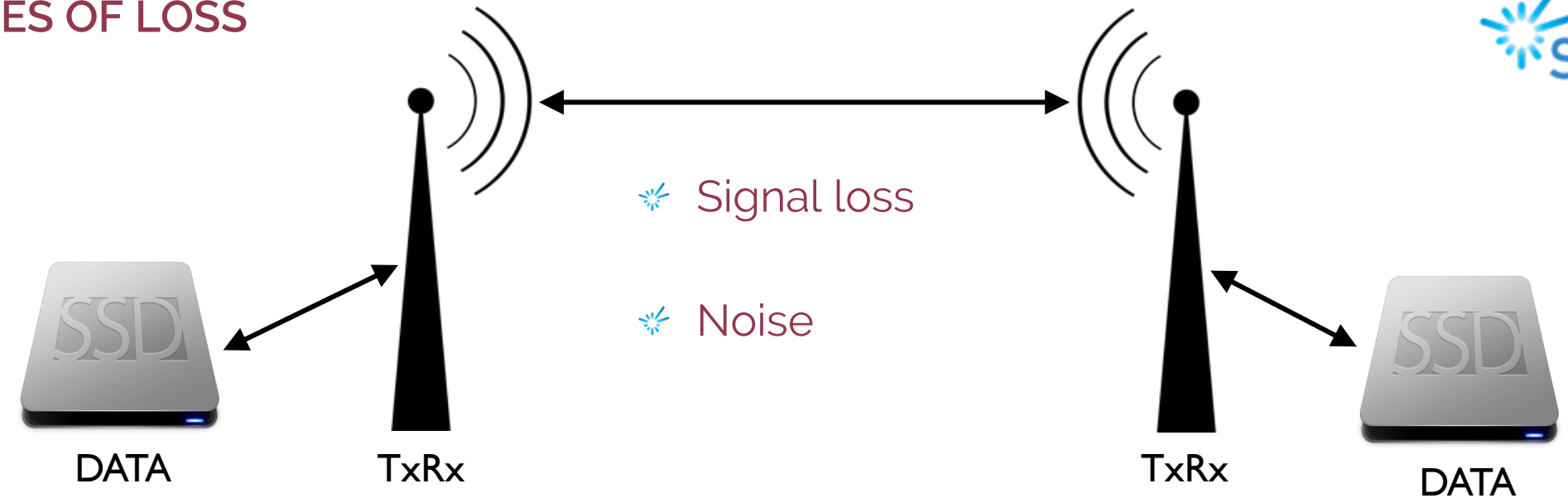


- Processor
- Data farm server
- Earth

- USB Type C
- Fiber optics link
- RF link

- SSD hard drive
- ISP server
- Deep space probe

SOURCES OF LOSS

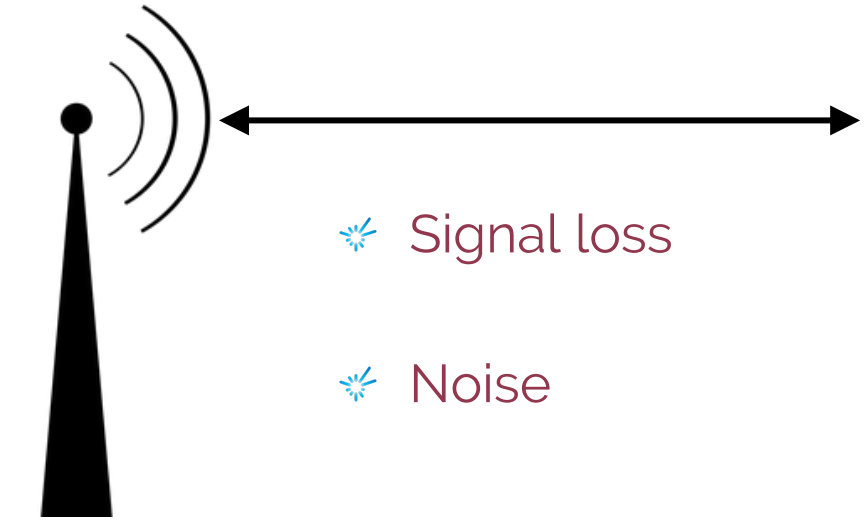


- Signal loss
- Noise

- Missing data
- Corrupt data

- Missing Data
- Corrupt data

RFID



- Signal loss
- Noise
- 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

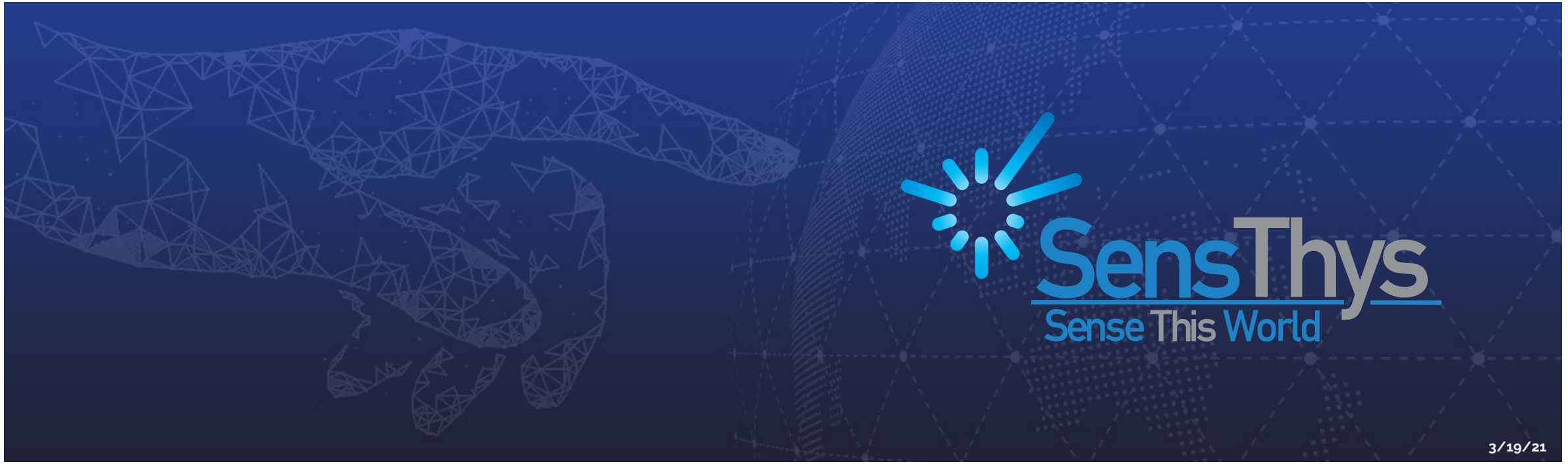
- Poor reads in noisy environment
- Short tag lifetime
- No data guarantee

WHO NEEDS BETTER?

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

ARCHITECTURE

DIFFERENTIATION THAT MATTERS



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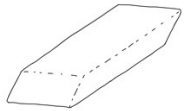
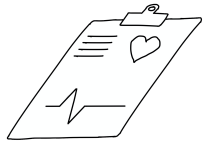
- Error management system
- Implementation
- Standards compliant
- Backwards compatible

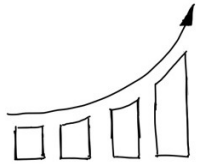
BENEFITS



Error Correction

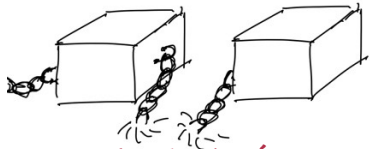


Lifetime



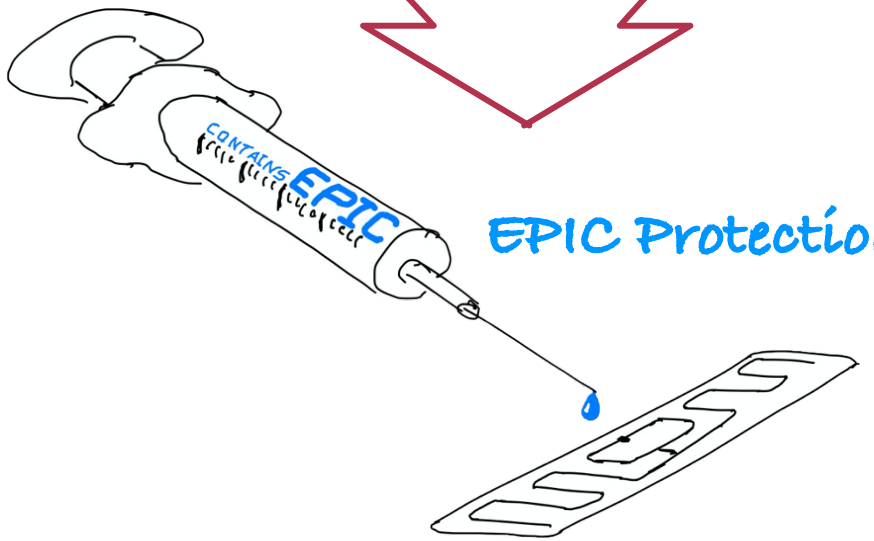
Performance

Security



Blockchain

Authentication



EPIC Protection

PERFORMANCE

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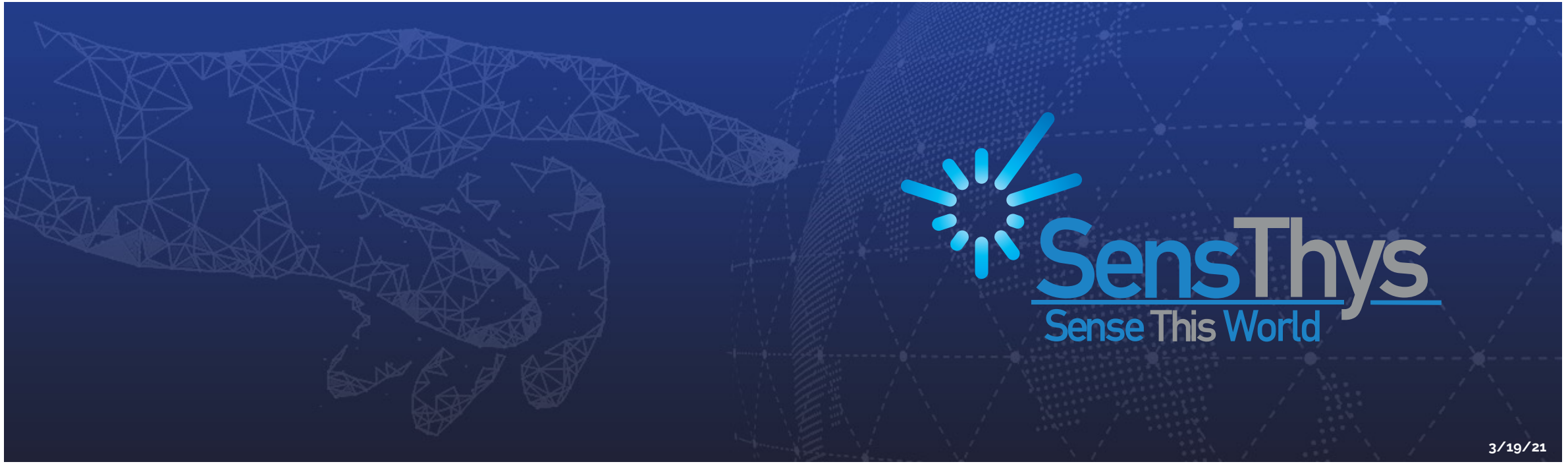
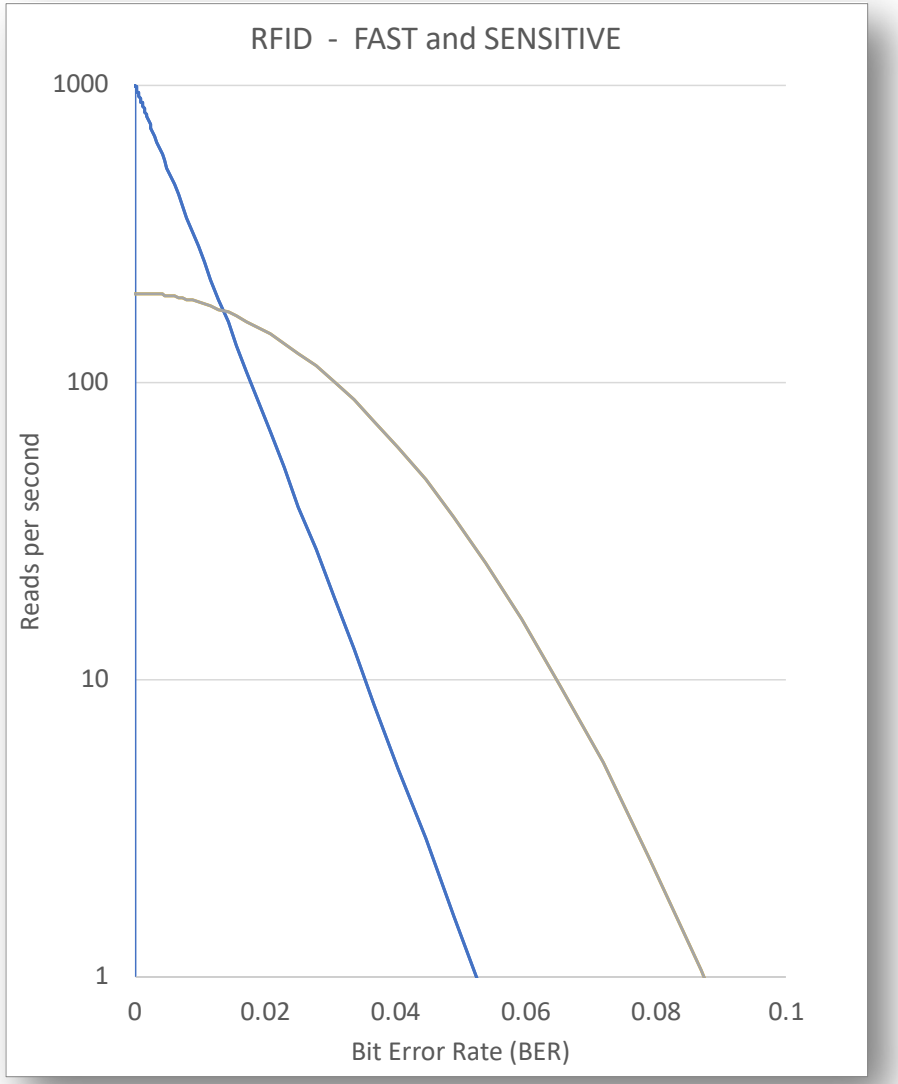


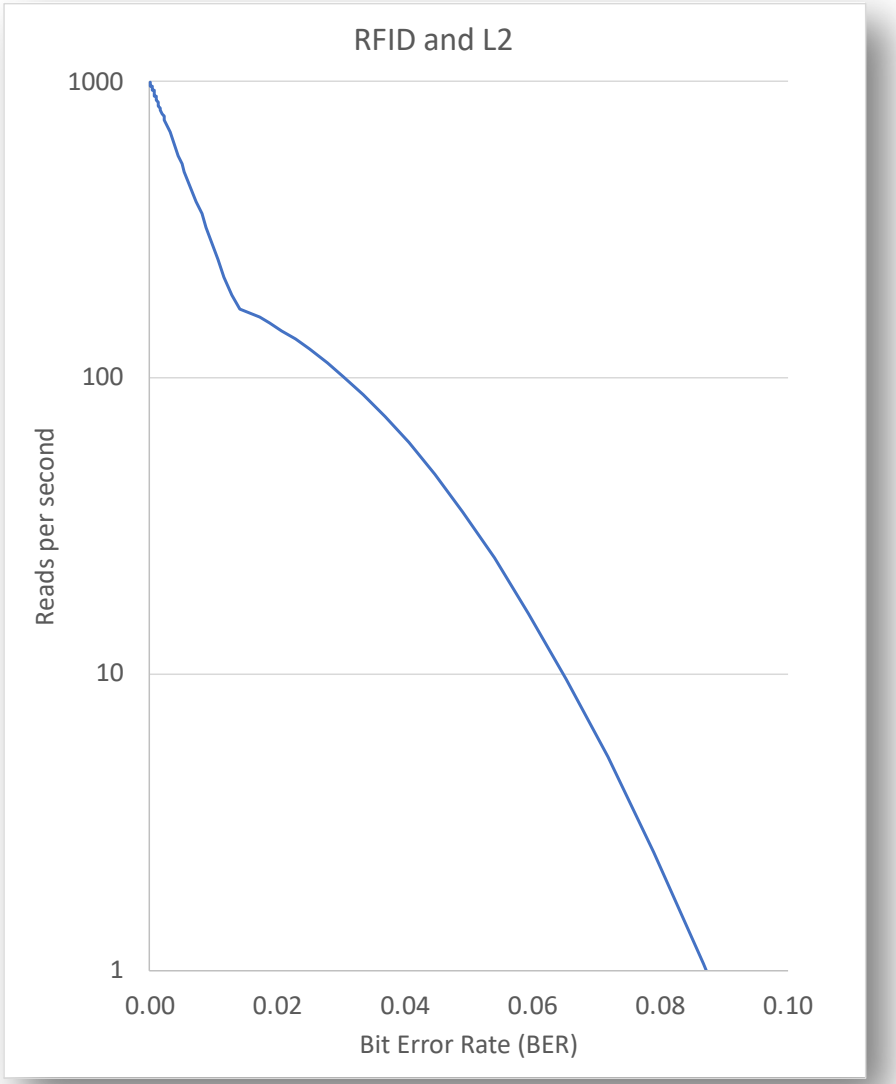
PERFORMANCE – RFID

- Reader slows with noise
- No data guarantee



PERFORMANCE – LEVEL 2

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

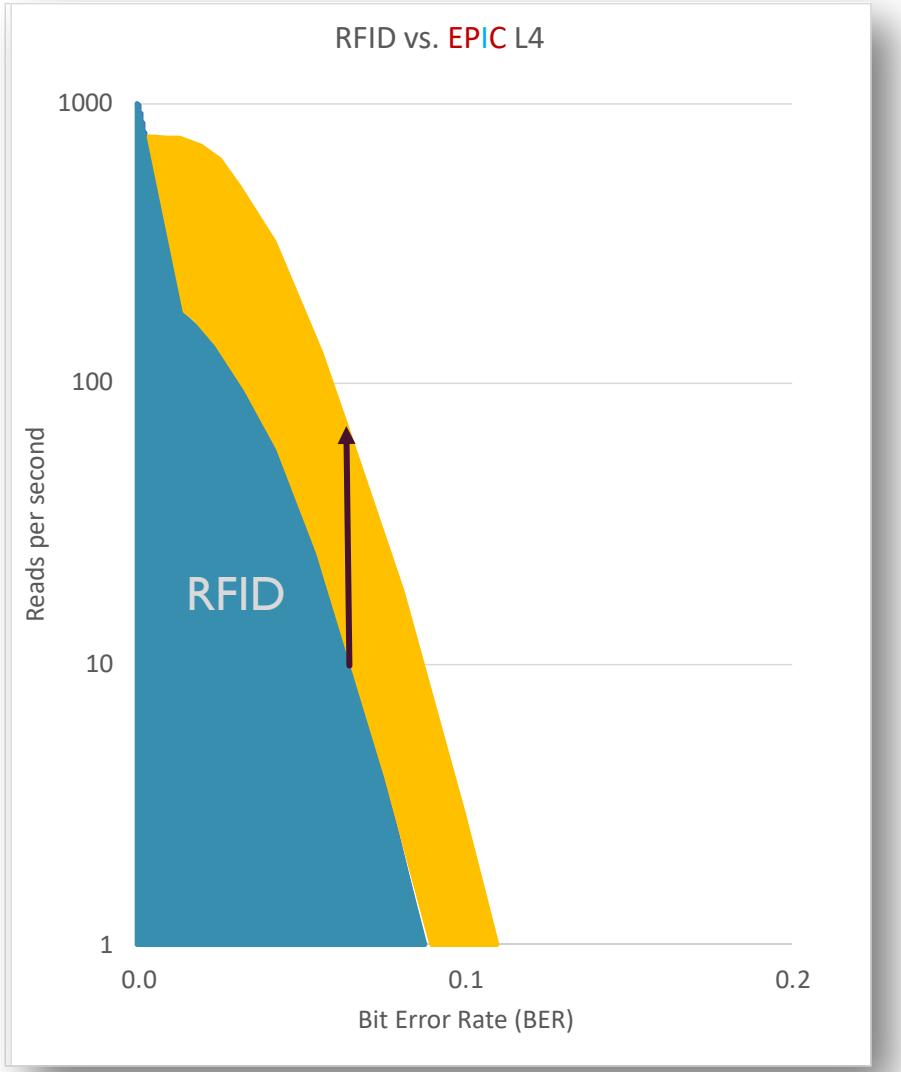


PERFORMANCE – LEVEL 4

- Reader performance

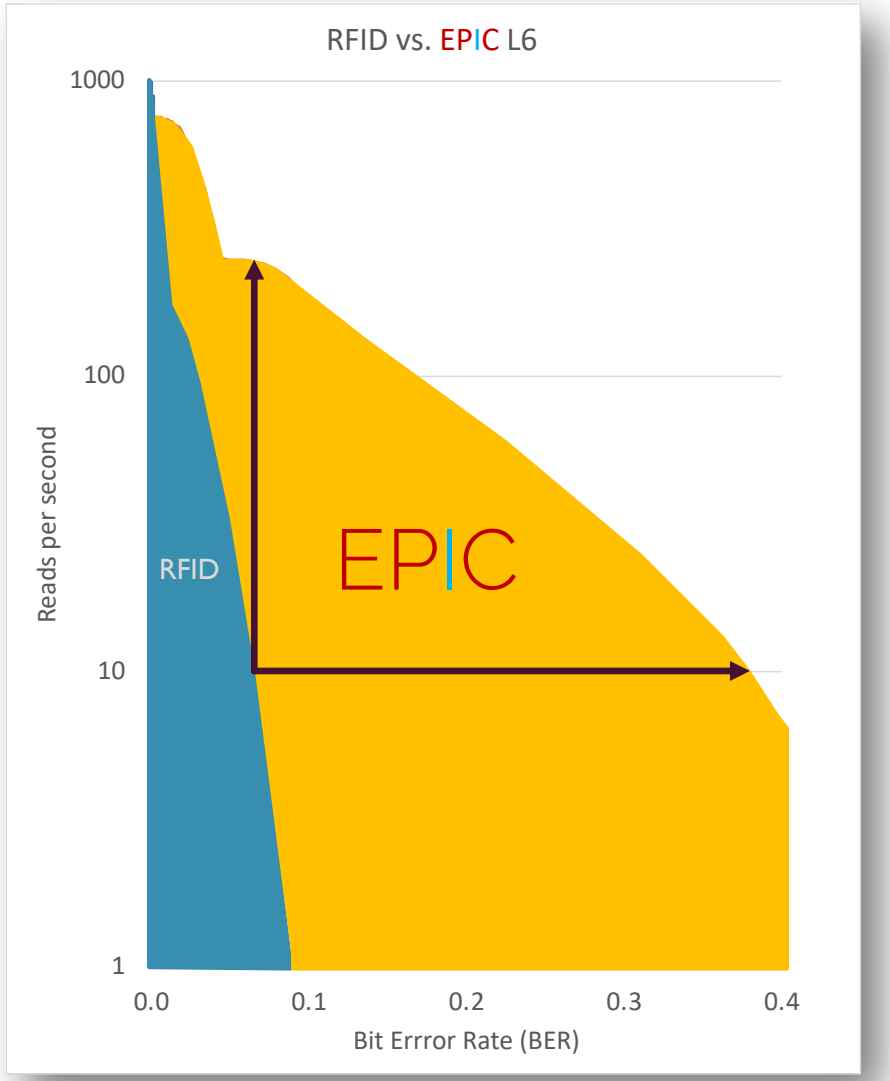
33 dBm, 9 m, 400 ms frequency, 10 Seconds		READS	
Condition	**RFID**	**EPIC L4**	**Increase**
M4, DRM OFF	318	327	3%
M4, DRM ON	120	132	10%
FM0, DRM ON	36	46	28%
FM0, DRM OFF	29	39	34%

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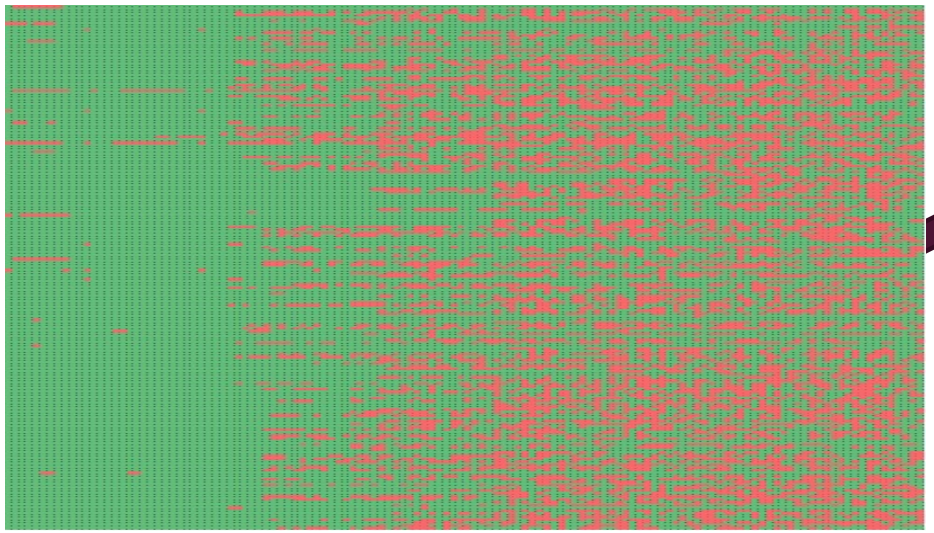
READER @33 dBm, 8.5 dBic antenna, 2m to antenna	RFID	EPIC L4	EPIC L6
M4, DRM ON	0	YES	YES
M4, DRM OFF	0	0	YES

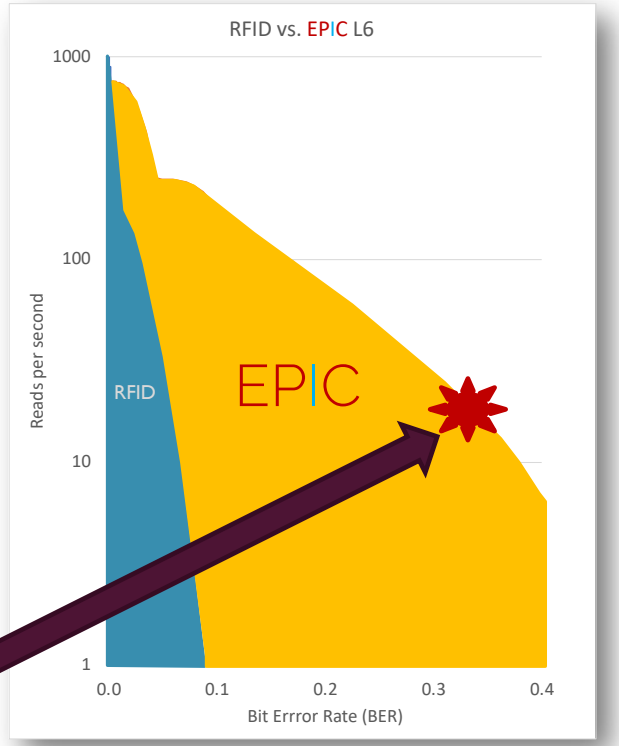
NO OTHER READER

- >30% errors solved

Bits 1-128

~100 reads of the tag





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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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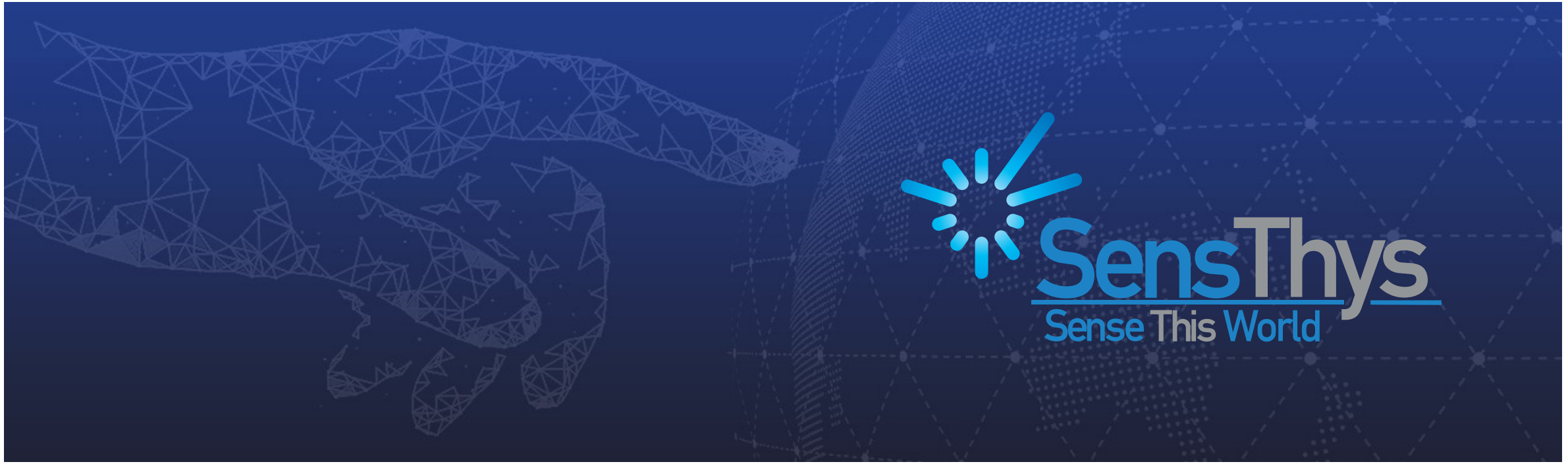
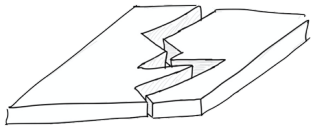
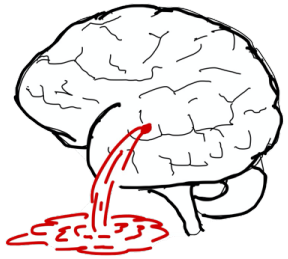


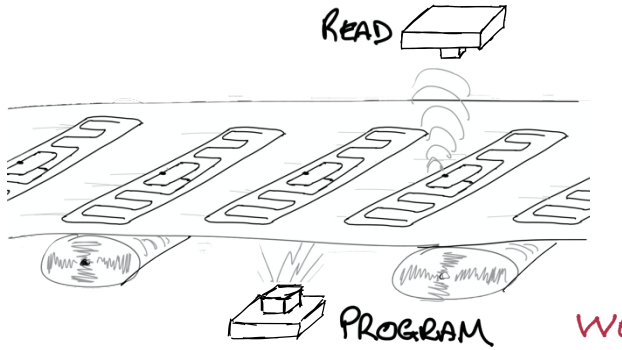
CORRUPTION

Damaged RFID tag chip





Memory Leaks



Weakly Written Tags

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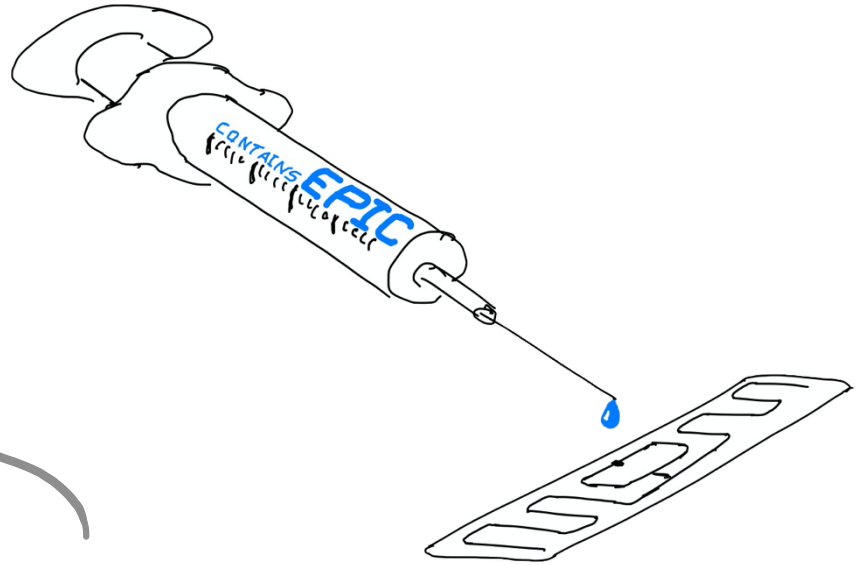
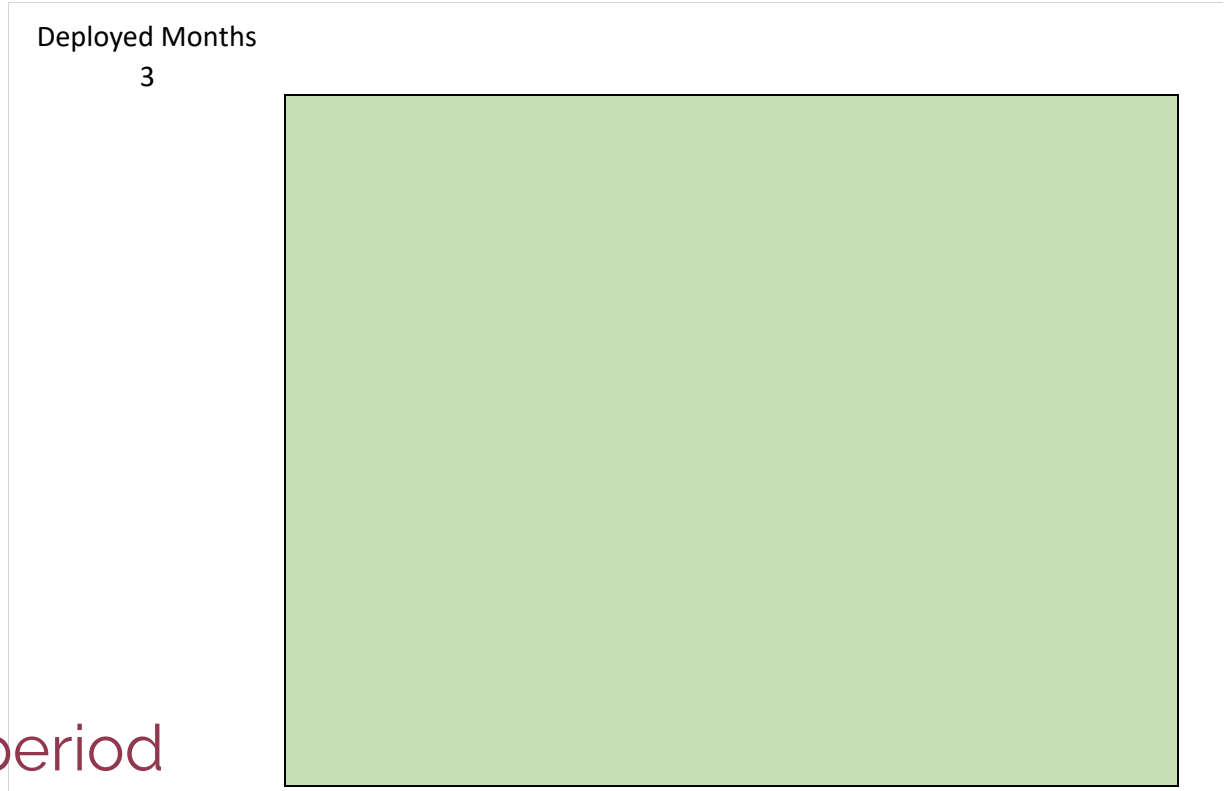


DO CUSTOMERS CARE?

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

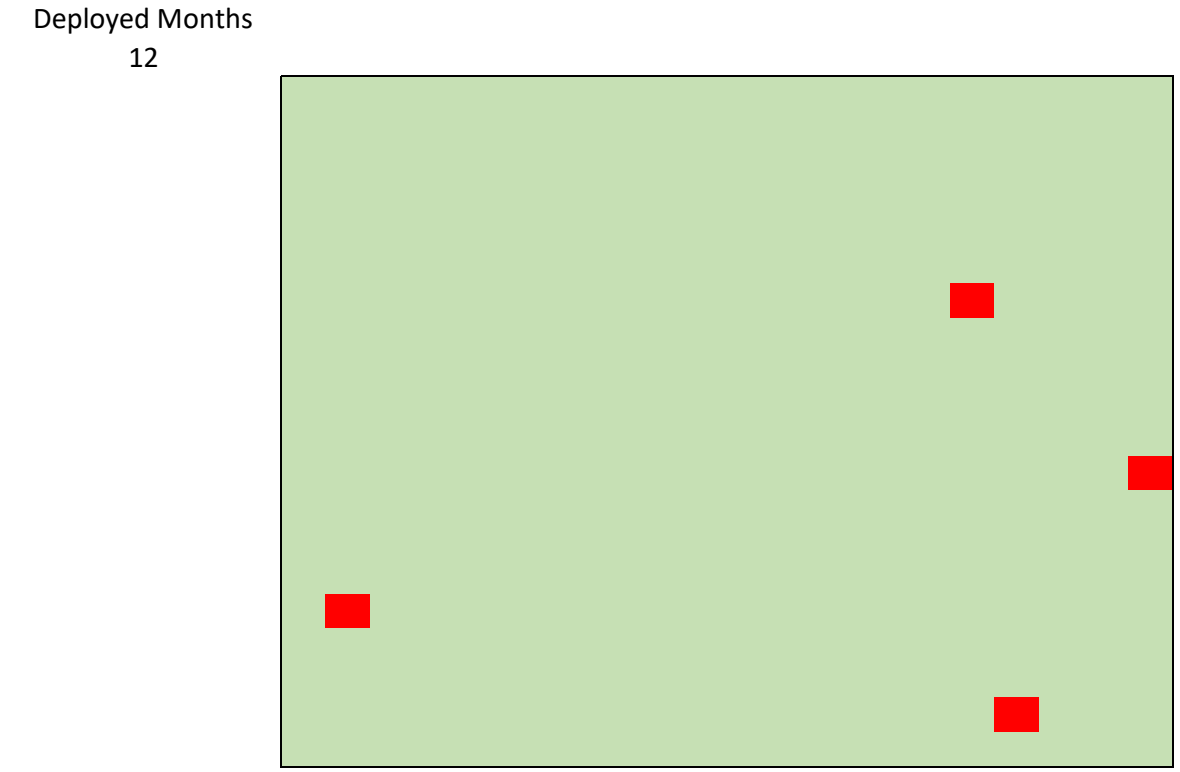
- Conservative
  - 96b tag
  - Constant fail rate
  - 100% in-coming test → no-fail period
  - Undercounts fails at high fail count



- No early failures

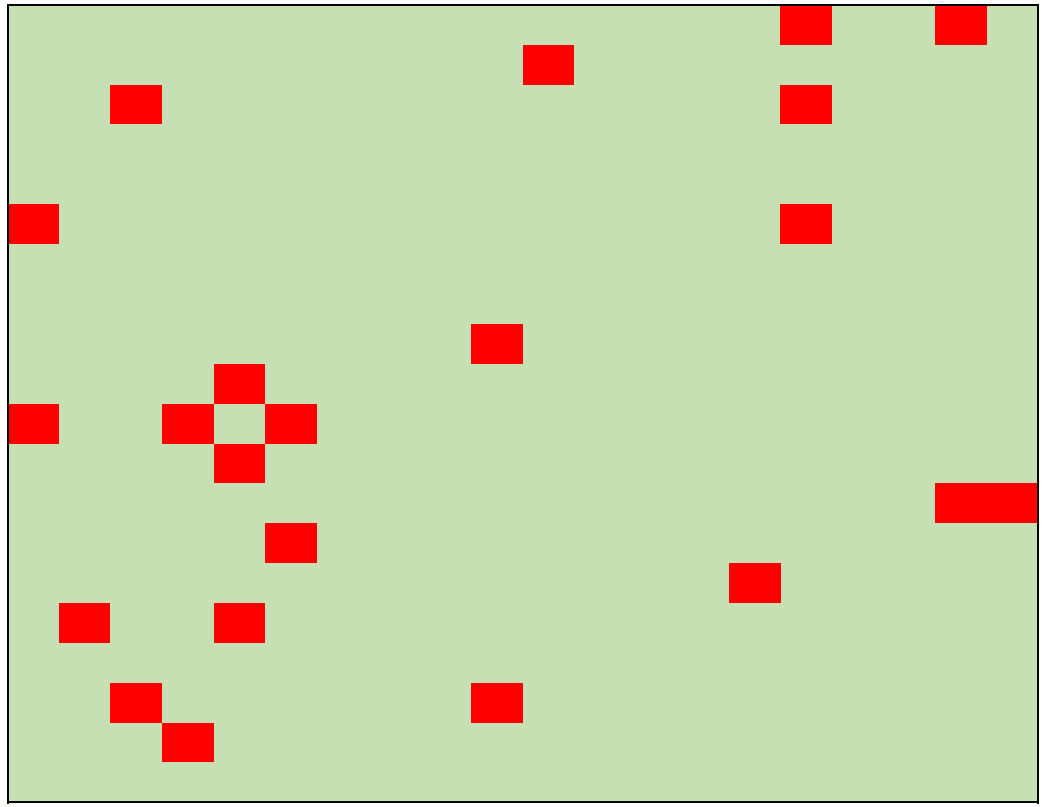
A YEAR IN . . .

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



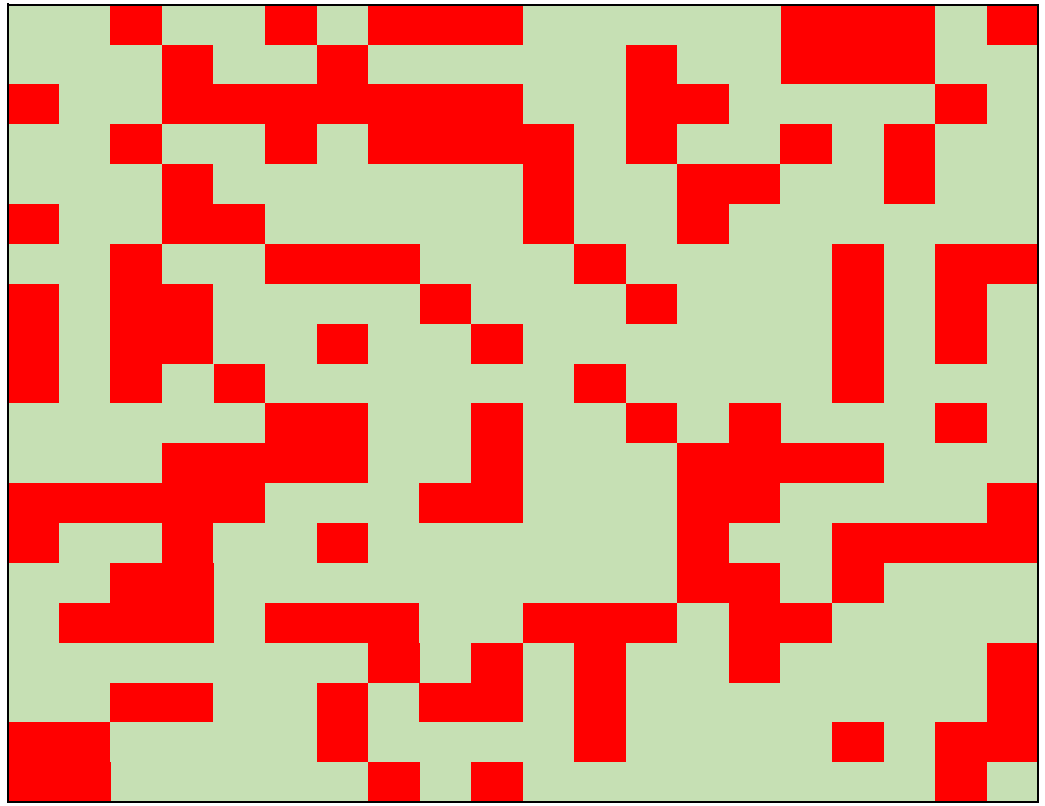
FIVE YEARS IN . . . . . .

Deployed Months
60



EXTENDED TAG LIFE . . .

Deployed Months
600



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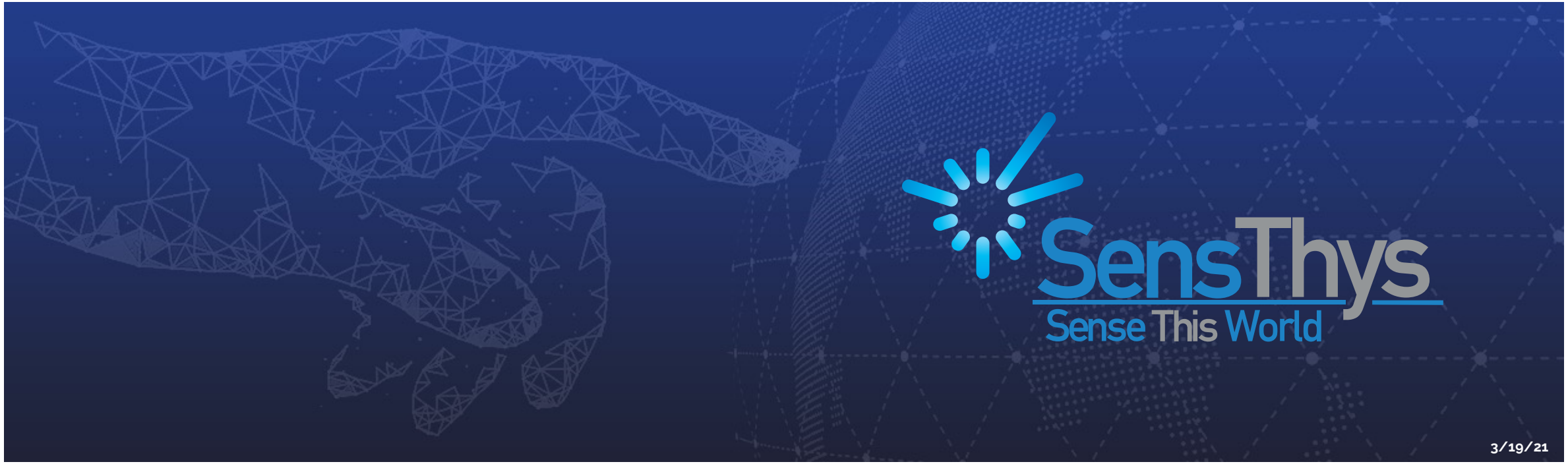
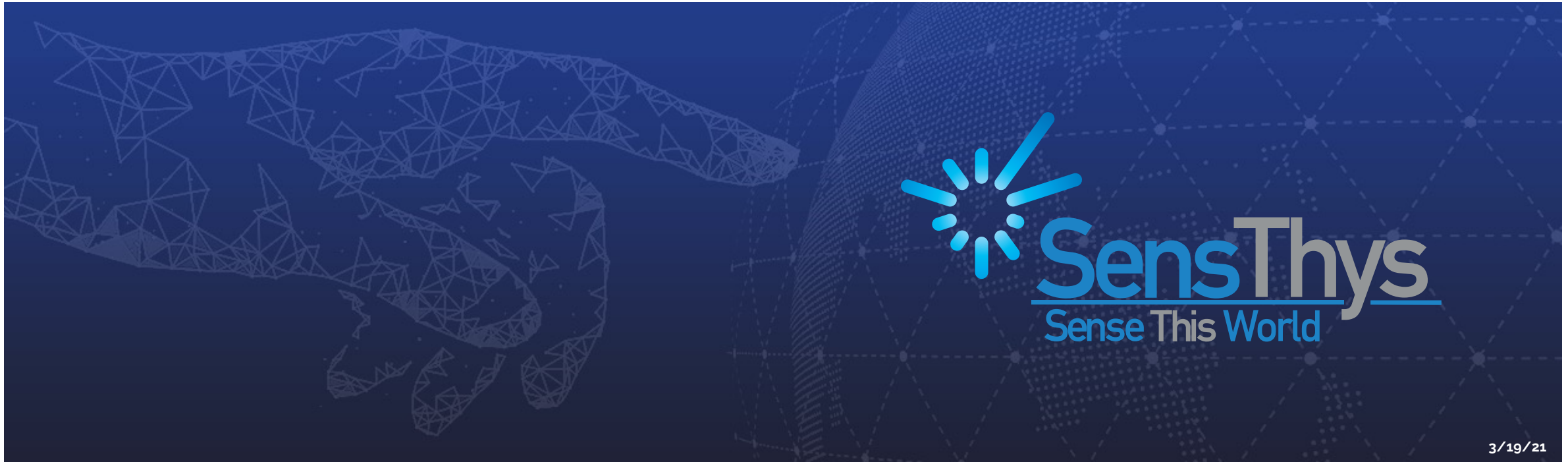
DEMONSTRATIONS



PRODUCTS

EASY TO DEPLOY



ZERO CHANGES to Infrastructure or Processes

SensThys
Sense This World

DIE

TAG

CONVERTER

END CUSTOMER

EPIC READER

EPC/DATA

EPIC ENCODE

EXE

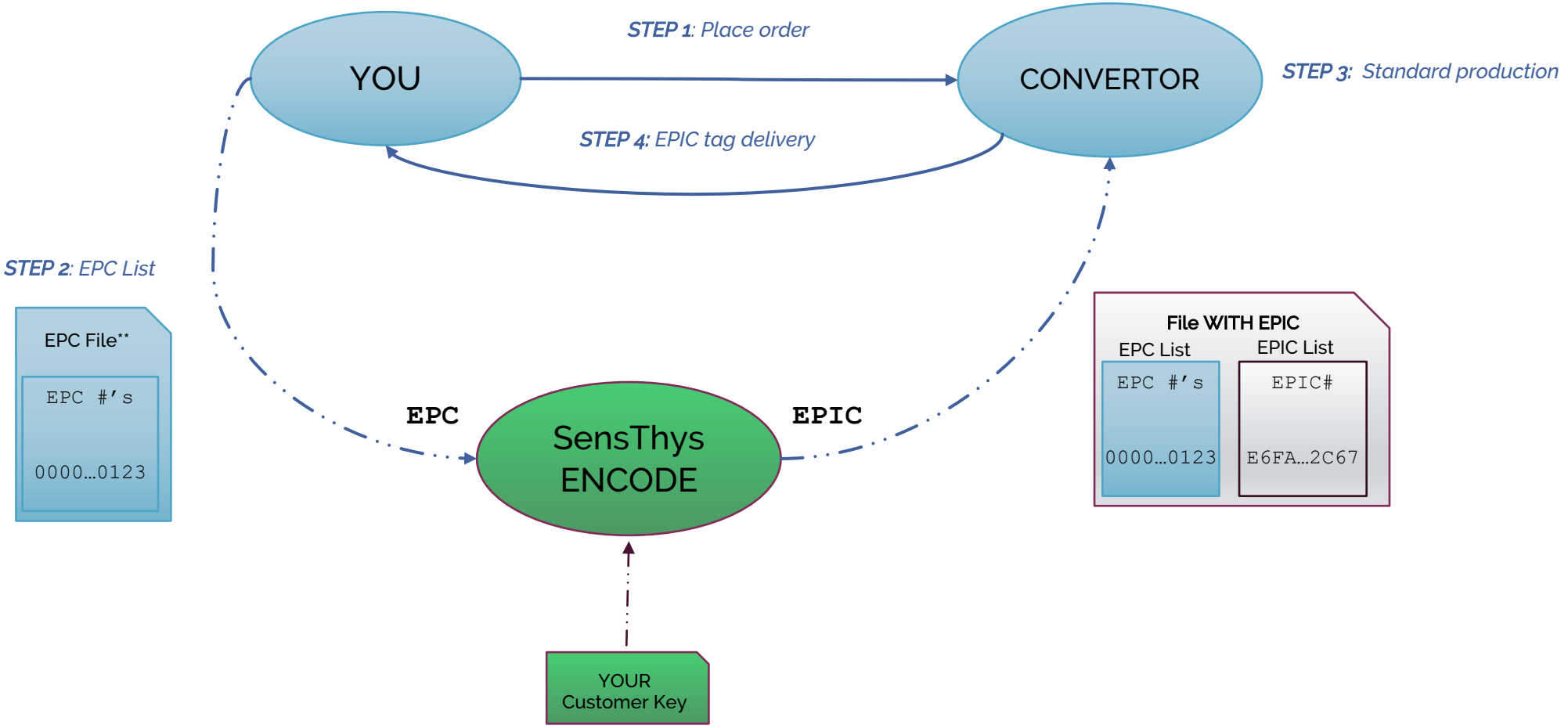
EPIC DECODE

EPC/DATA

ENCODING YOUR NEW TAGS

Minimal Impact To Existing Business Practices

BLUE = No changes



PRODUCTION PRODUCTS

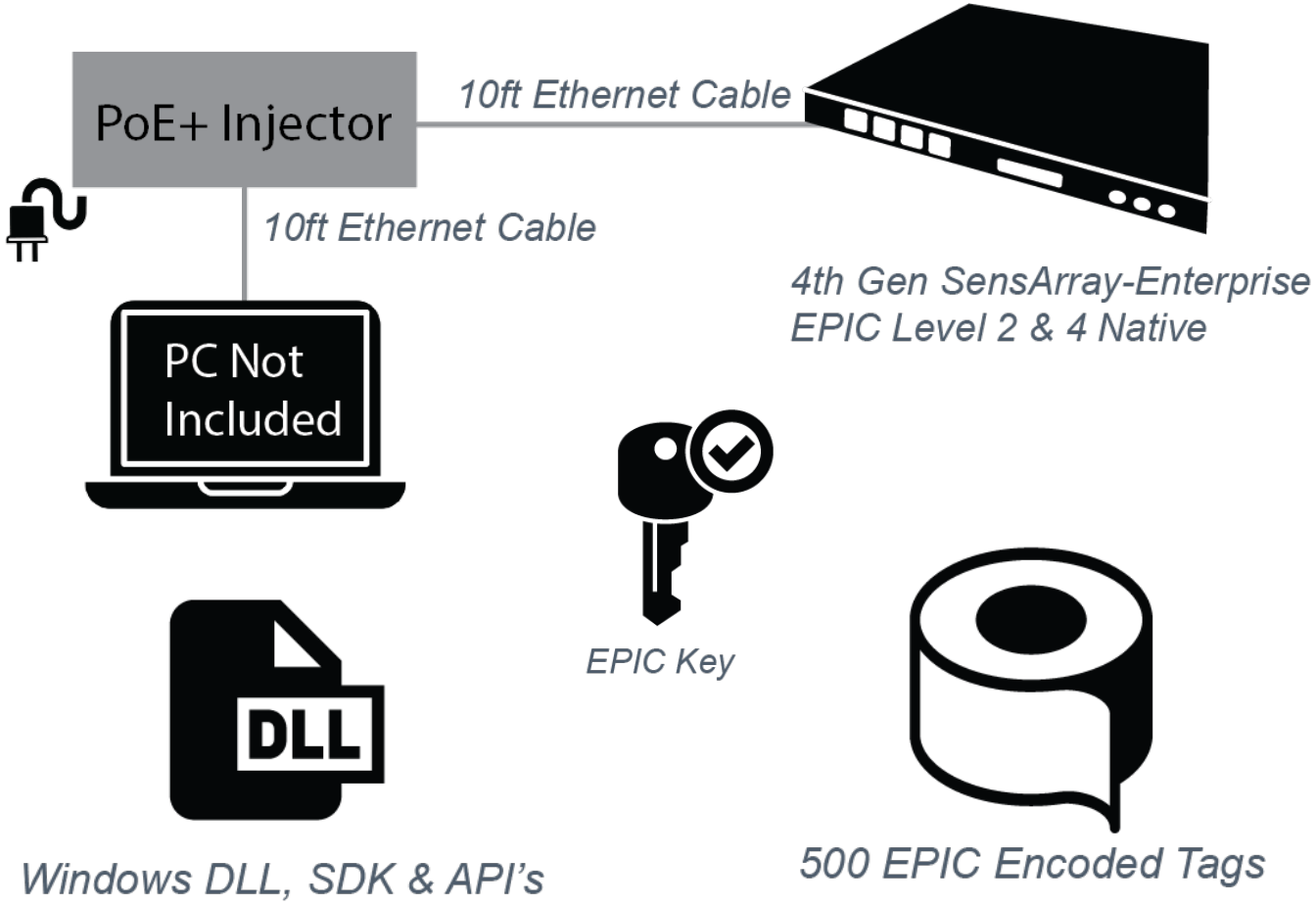
Core Offering

- 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

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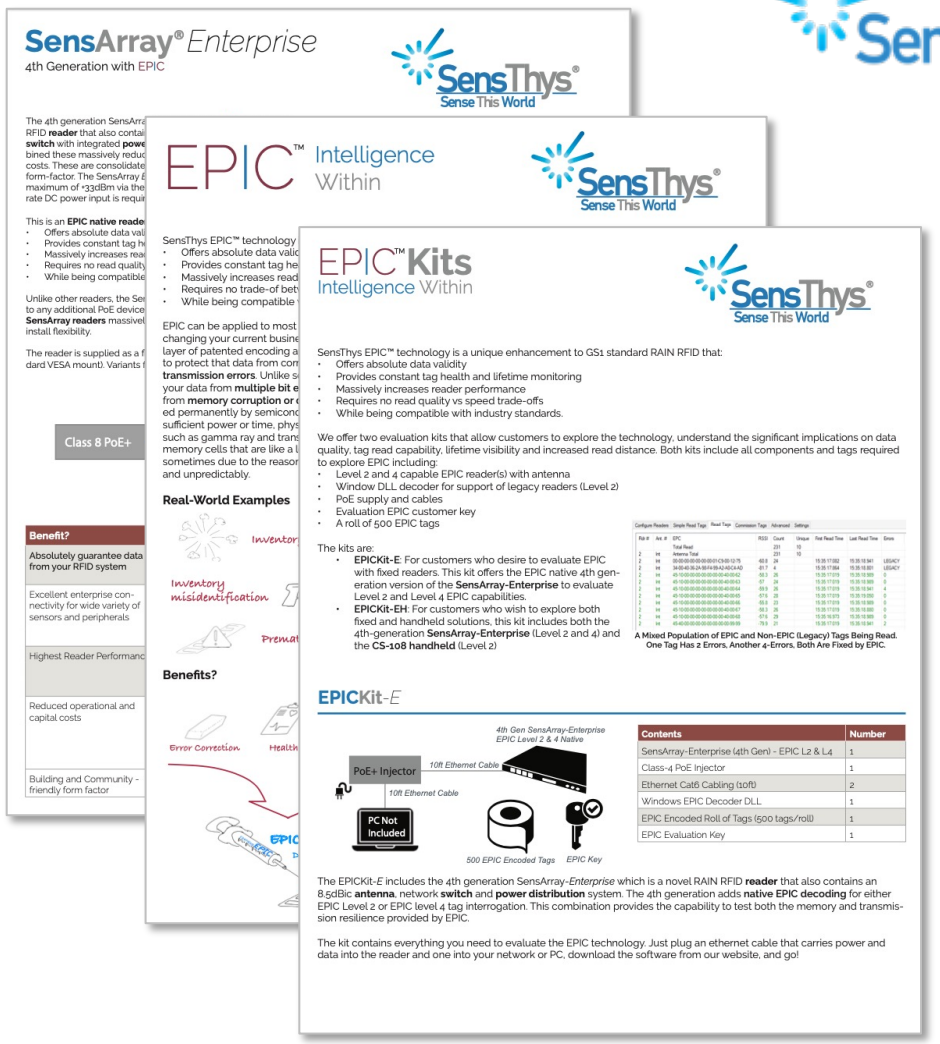
Darryn.Prince@SensThys.com

Darryn @ 760.710.9153