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Using a PUF-based Identification Tag for Goods Tracking via Blockchain

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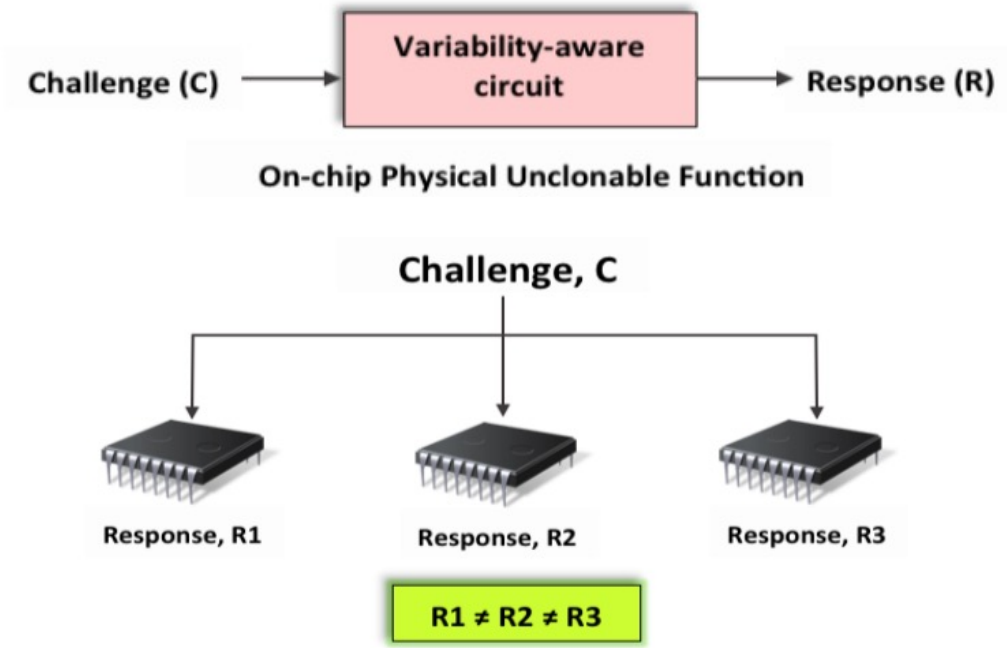
Joint Work with *F. Crupi, R. De Rose, C. Felicetti, M. Lanuzza, A. Rullo, M. Vatalaro*

SILICON PUF

(Silicon) Physically Unclonable Functions (PUFs) use the unique pattern or '**silicon fingerprint**' due to inherent deep ***sub-micron process variations*** in the production process.

They are virtually impossible to clone or predict!

- *Secure key generation and storage*
- *Device authentication*
- *Flexible key provisioning*
- ***Asset management***



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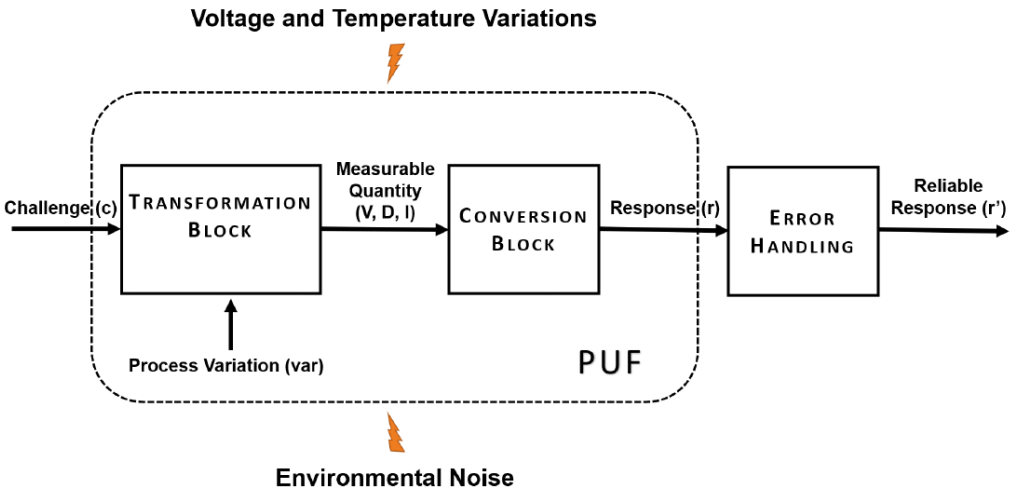
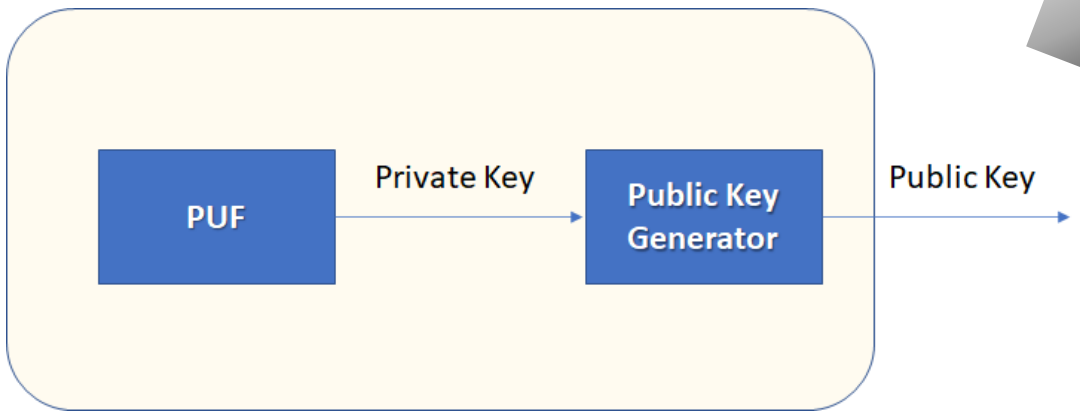
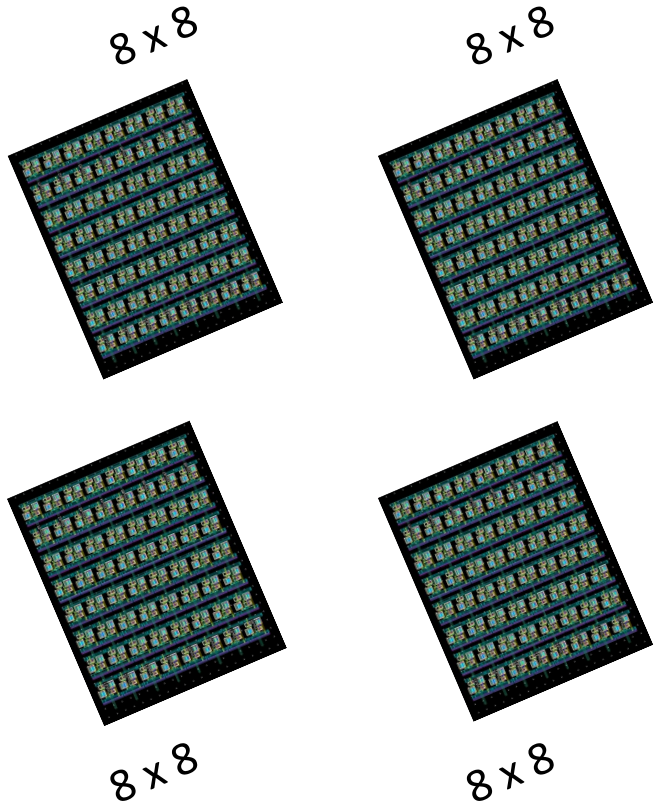
PUF ARCHITECTURE







= 256 bit

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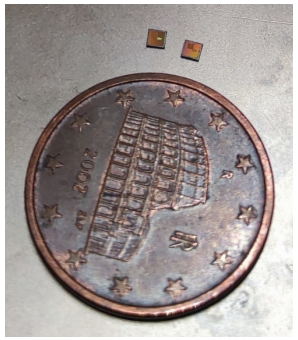
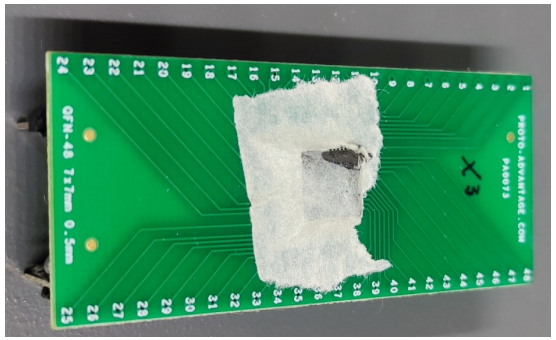
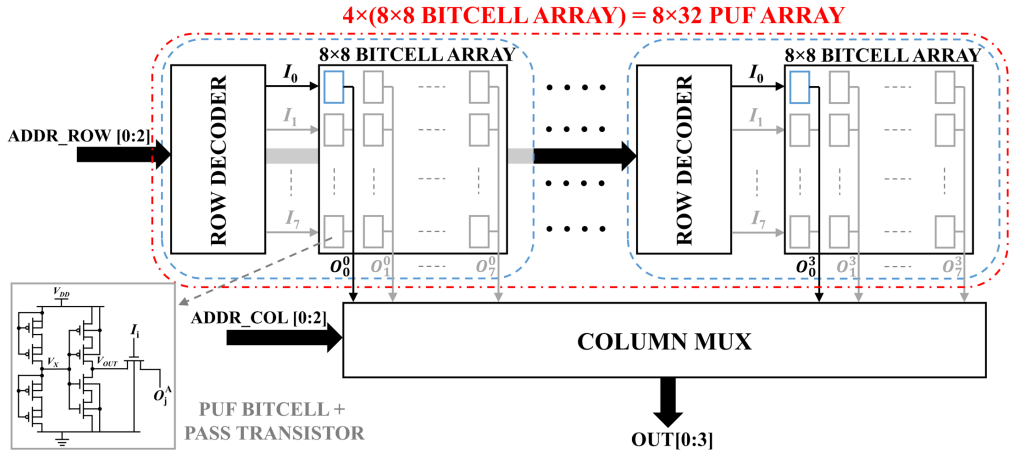
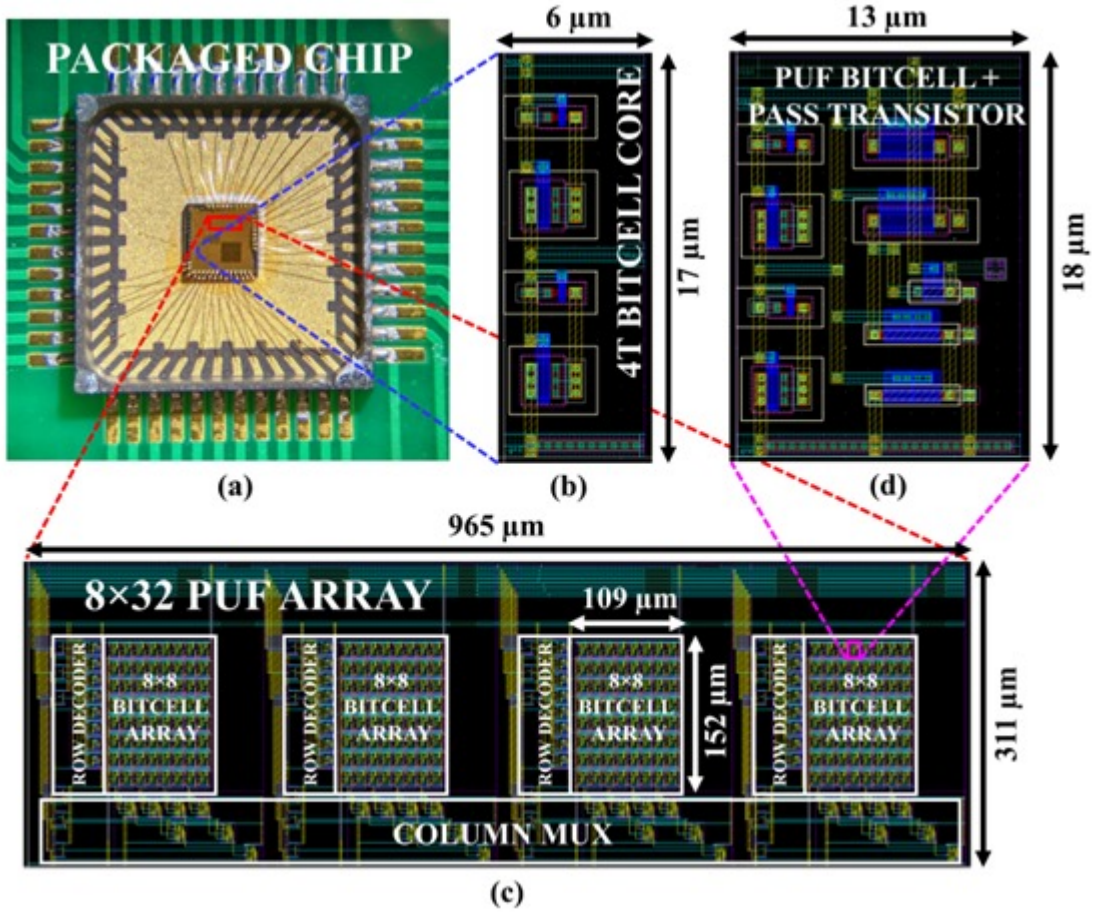
PUF DESIGN AND REALIZATION









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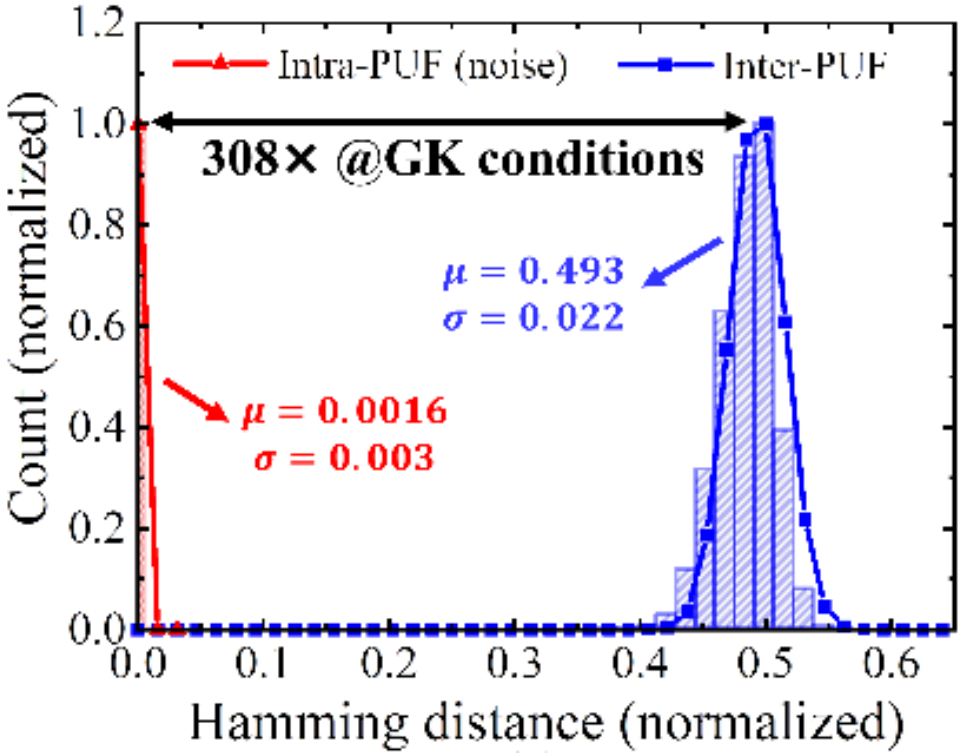
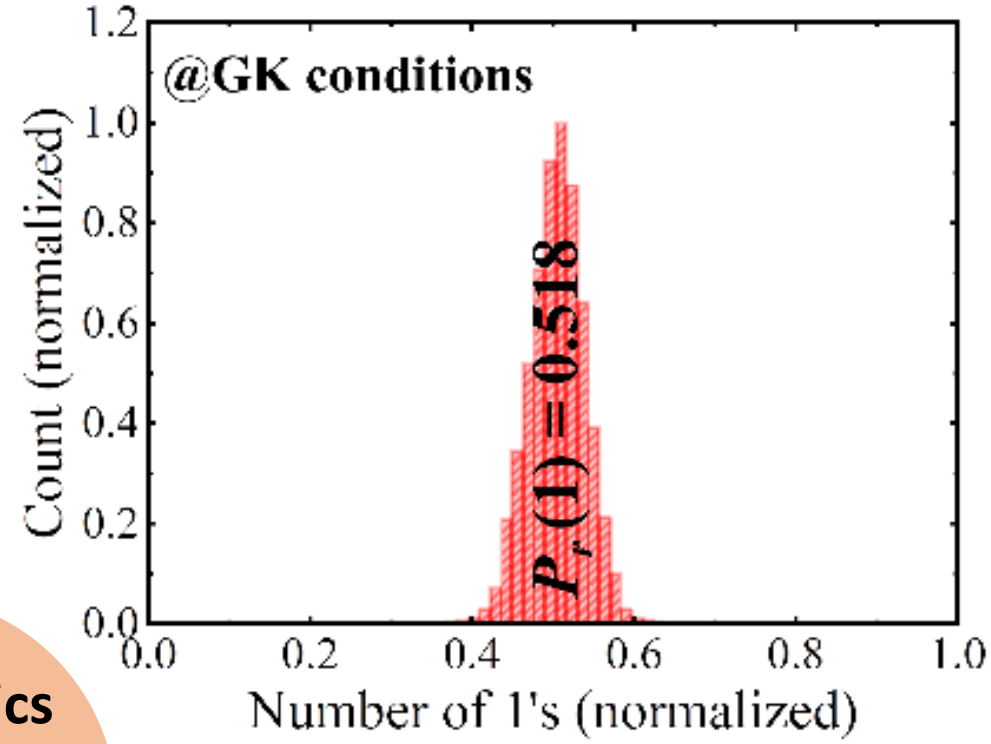
TEST RESULTS





Key Metrics

- Reliability
- Uniqueness
- Randomness

PASSED

NIST TEST:

"A Statistical Test Suite for Random and Pseudorandom Number Generators for Cryptographic Applications"

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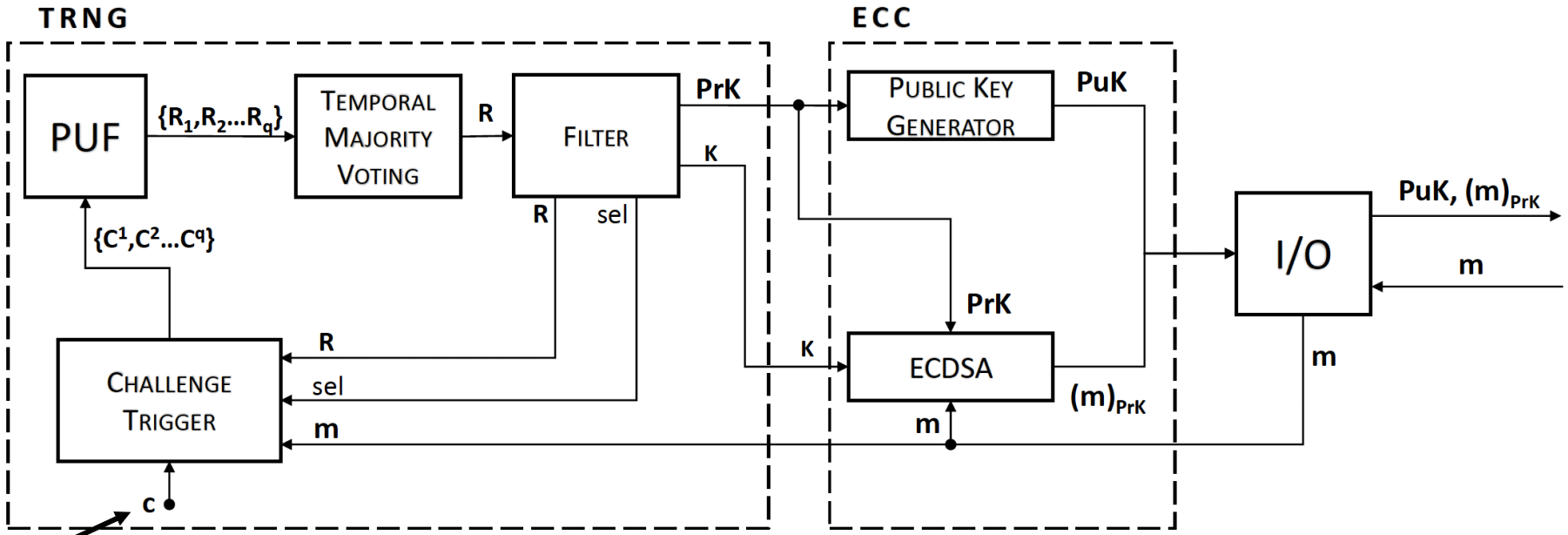
DEVICE ARCHITECTURE



Built-In Challenge

TRNG

DIGITAL FINGERPRINT

ECC

PUBLIC KEY

SIGNATURE

I/O

INTERFACE

(*) **Felicetti, C.**, Lanuzza, M., Rullo, A., Sacca', D., Crupi, F., «Exploiting Silicon Fingerprint for Device Authentication Using CMOS-PUF and ECC». The 5th IEEE International Conference on Smart Internet of Things. IEEE SmartIoT 2021 - August 13-15, 2021, Jeju Island, South Korea.

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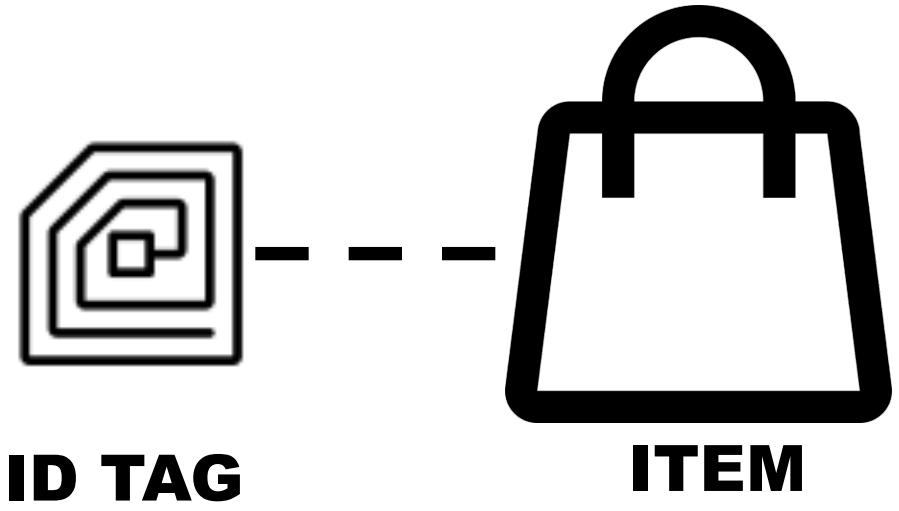
USING ID TAG FOR TRACKING PHYSICAL OBJECTS VIA BLOCKCHAIN

Pairing ID Tag and Physical Object (Item)



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BLOCKCHAIN APPLICATION SCENARIOS

THREE PHASES IN PAIRING ID TAG AND ITEM

- Enrolment
- Verification
- Consumption

TWO TYPES OF PAIRING

- Uncoupled
- Coupled

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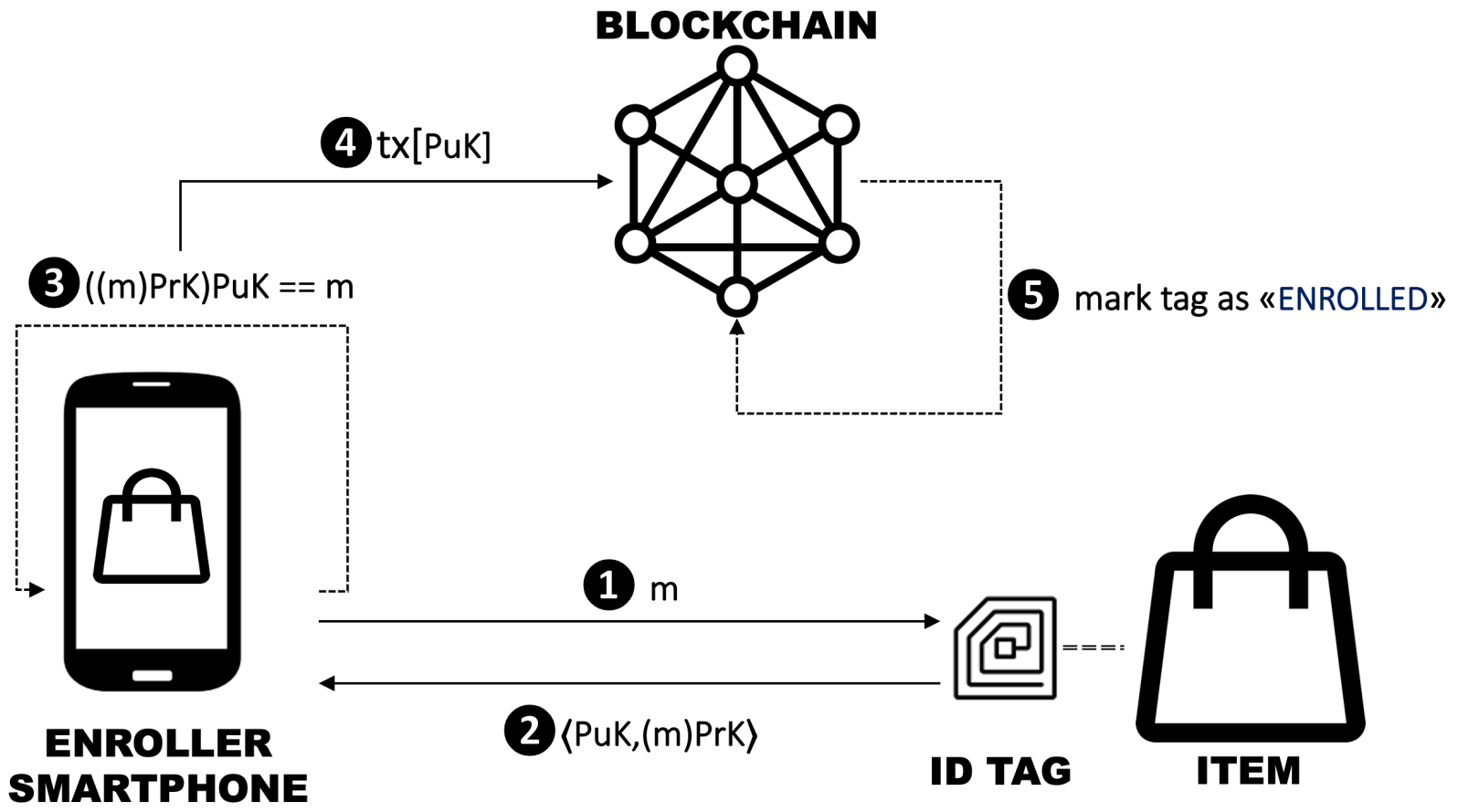
ENROLMENT PHASE



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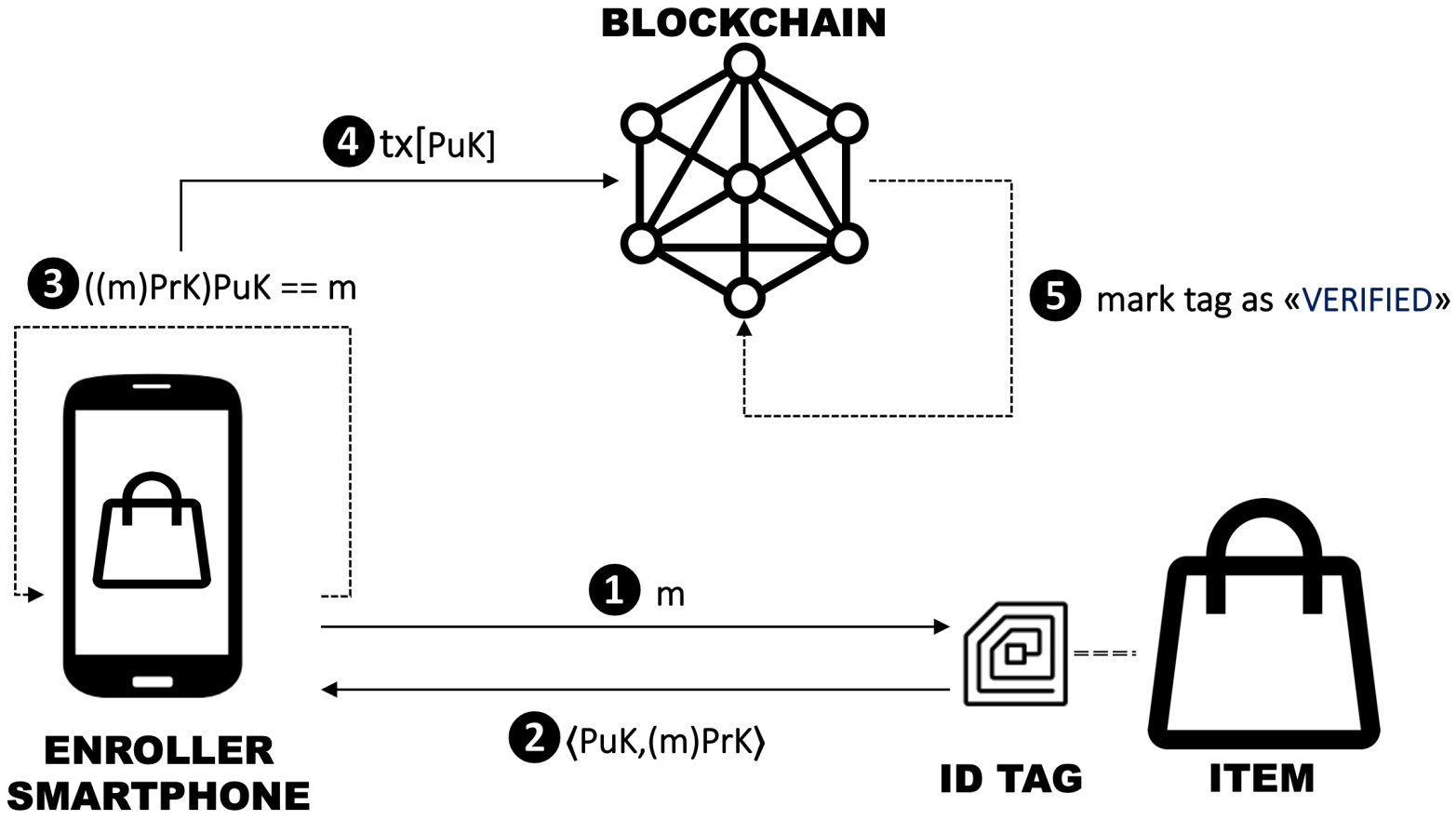
VERIFICATION PHASE



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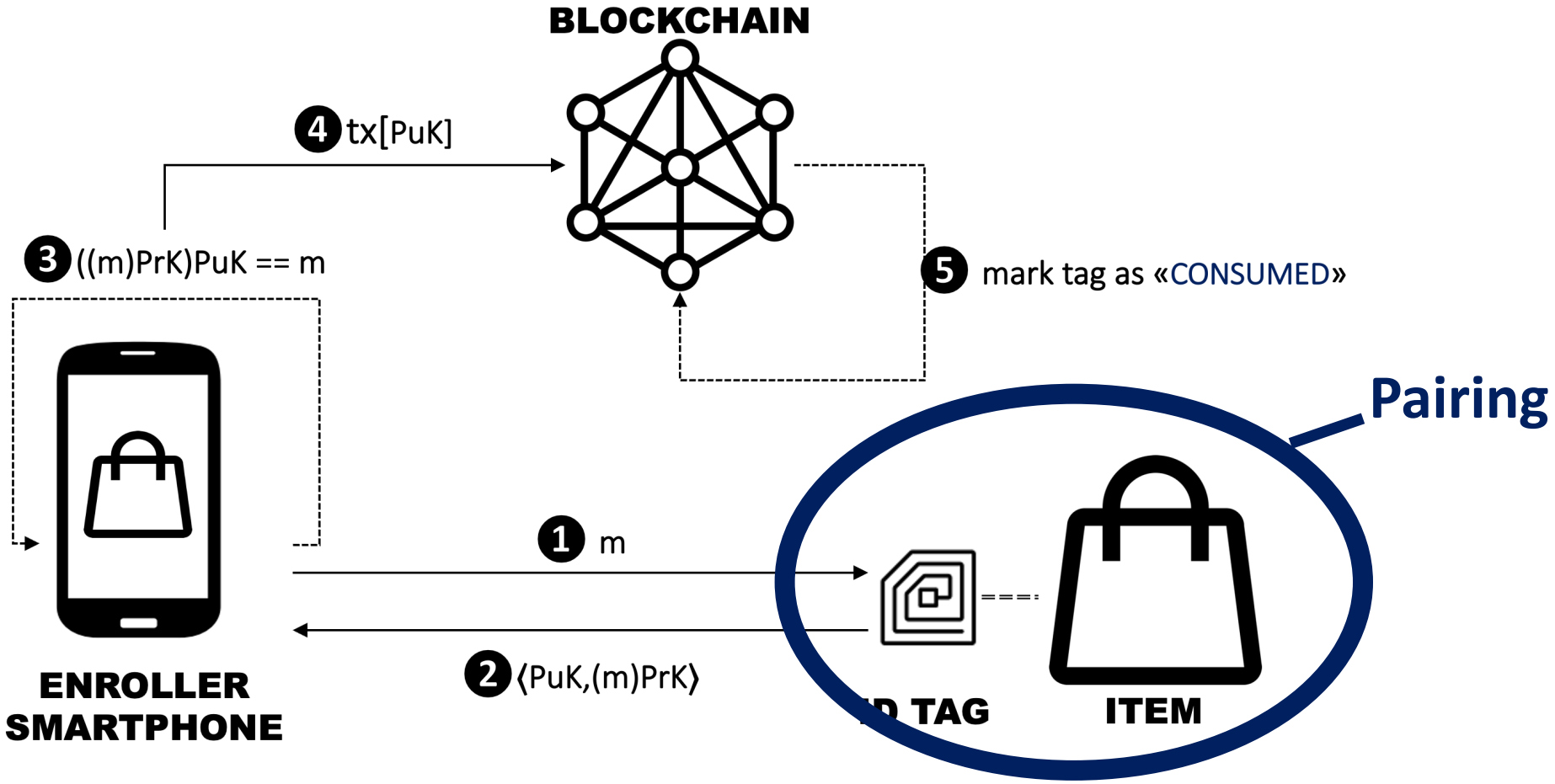
CONSUMPTION PHASE



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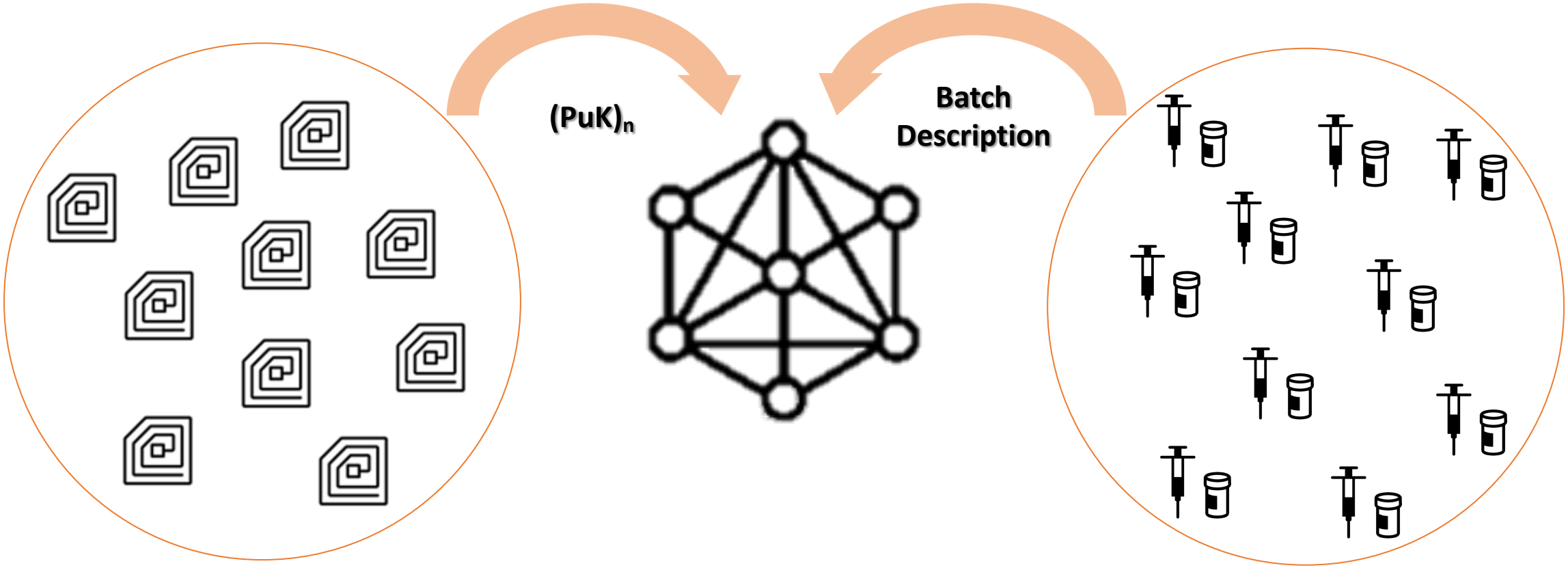
UNCOUPLED BATCH

Batch of n products is associated with n tags
without direct coupling between products and tags



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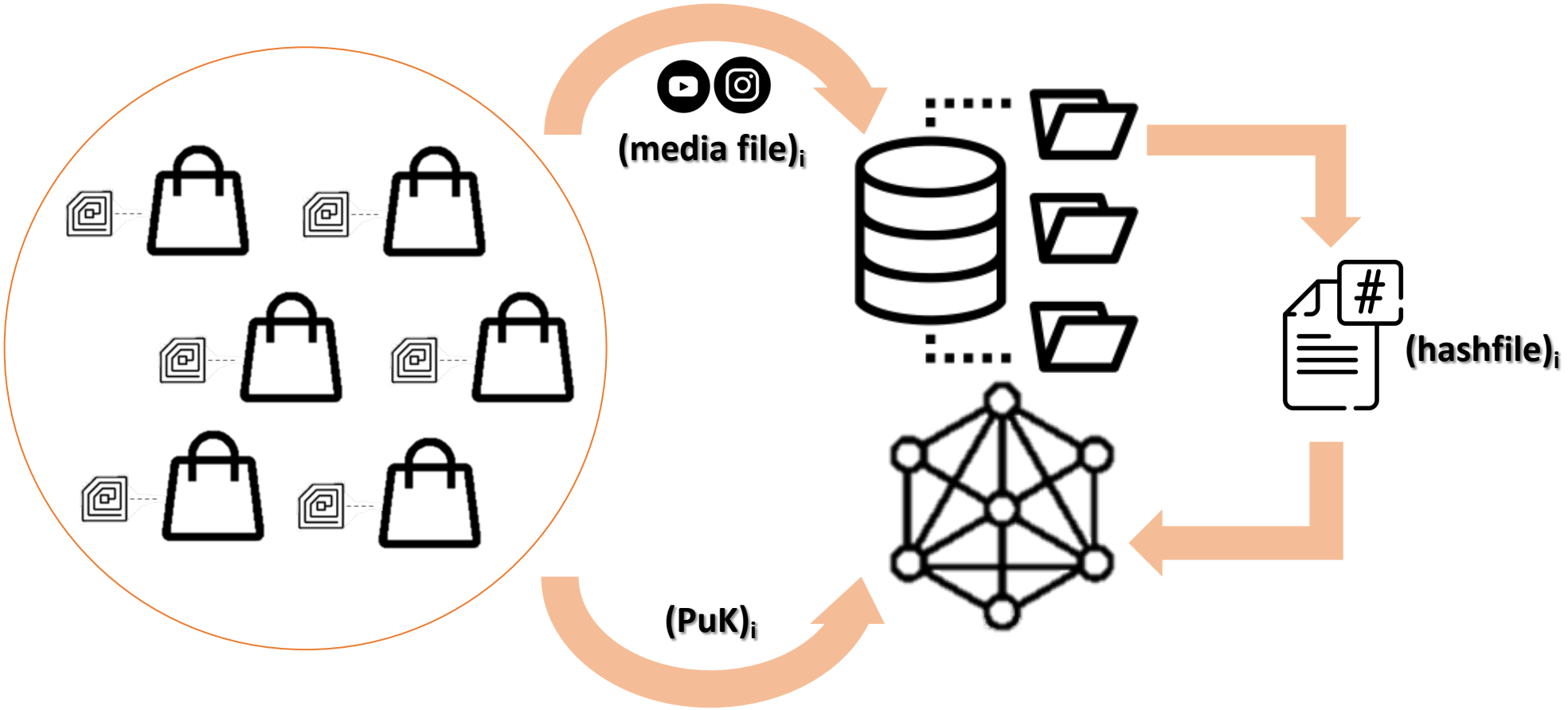
COUPLED BATCH

Each Item of the batch is associated with a tag



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A Related Issue to ID Tag & Physical Object

Pairing ID Tag and Digital Object