Implementation and Performance Analysis of Attribute-Based Encryption(ABE) in ICN

Project Presentation

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Introduction

ICN in a nutshell

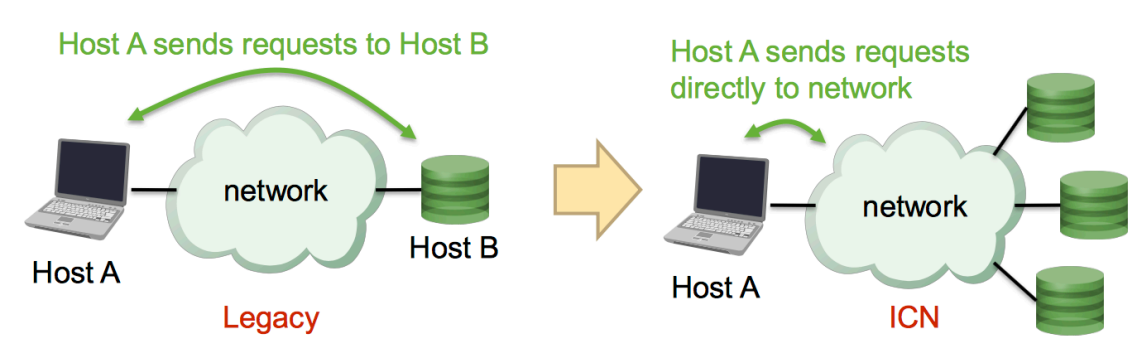


Figure 1: ICN vs traditional networks [4]

What is ICN

- In ICN, request has been done by identifying the content instead of identifying the content owner's address.
- Basic principle: name based routing
  - * User asks for an object by name
  - * Network delivers desired object from a nearby cache
- Network is aware of content
- Multiple copies of the content is cached in network

ABE as a candidate security solution

Potential Problems

- Security of data object
- Access control
- Distributed caches

ABE Solution

- No need to encrypt the data separately for each type of user
- Will be decrypted only by clients that have the correct set of attributes

Project Work

Problem Description

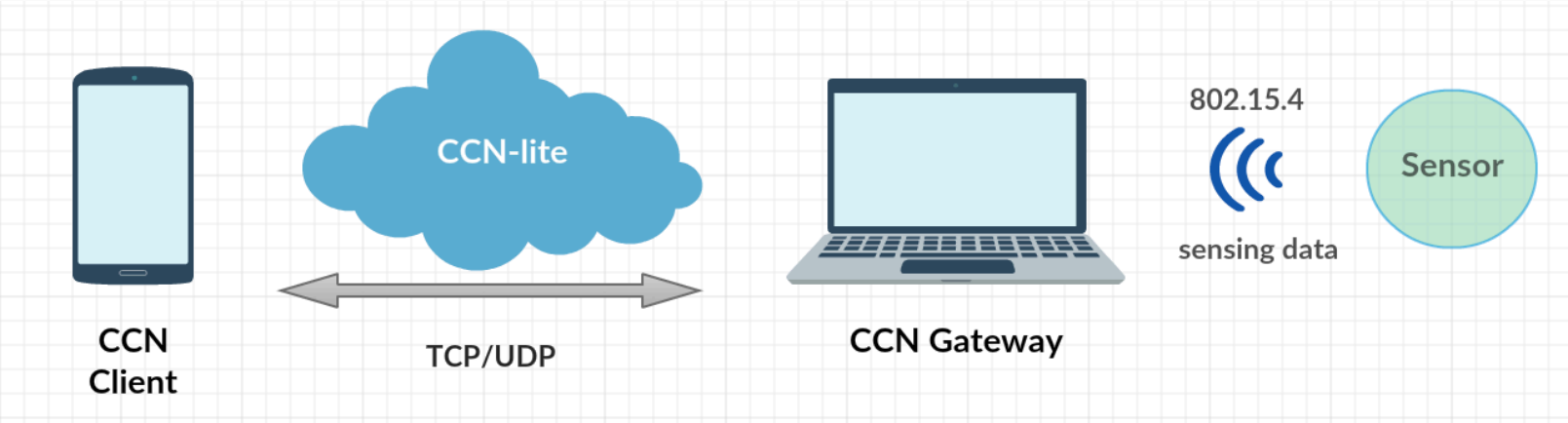


Figure 2: Block diagram for the implementation adapted from [3].

Two main phases:

1. ABE encryption on sensor devices
2. Transport of sensor data over an ICN network

Discussions

Outcomes

- No need to establish a secure end-to-end connection such as TLS
- Enables delay tolerant networking derived from store-and-forward mechanism [3].

Limitations

- Feasibility of ABE on resource constrained devices
  - Memory
  - Energy consumption
  - Processing load

Implementation Details

Simulation Environment

- CCN-lite for ICN environment [2]
- Cpabe Toolkit for ABE implementation [1]

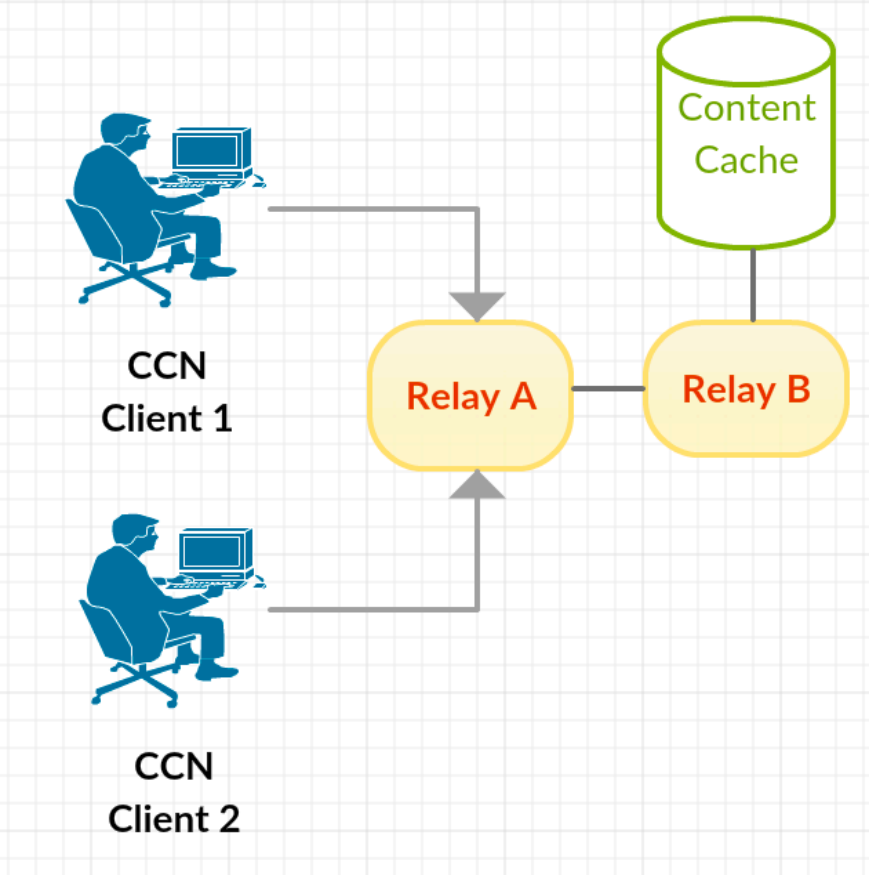


Figure 3: Users with attributes

Experimental Results

Experimental Results-I

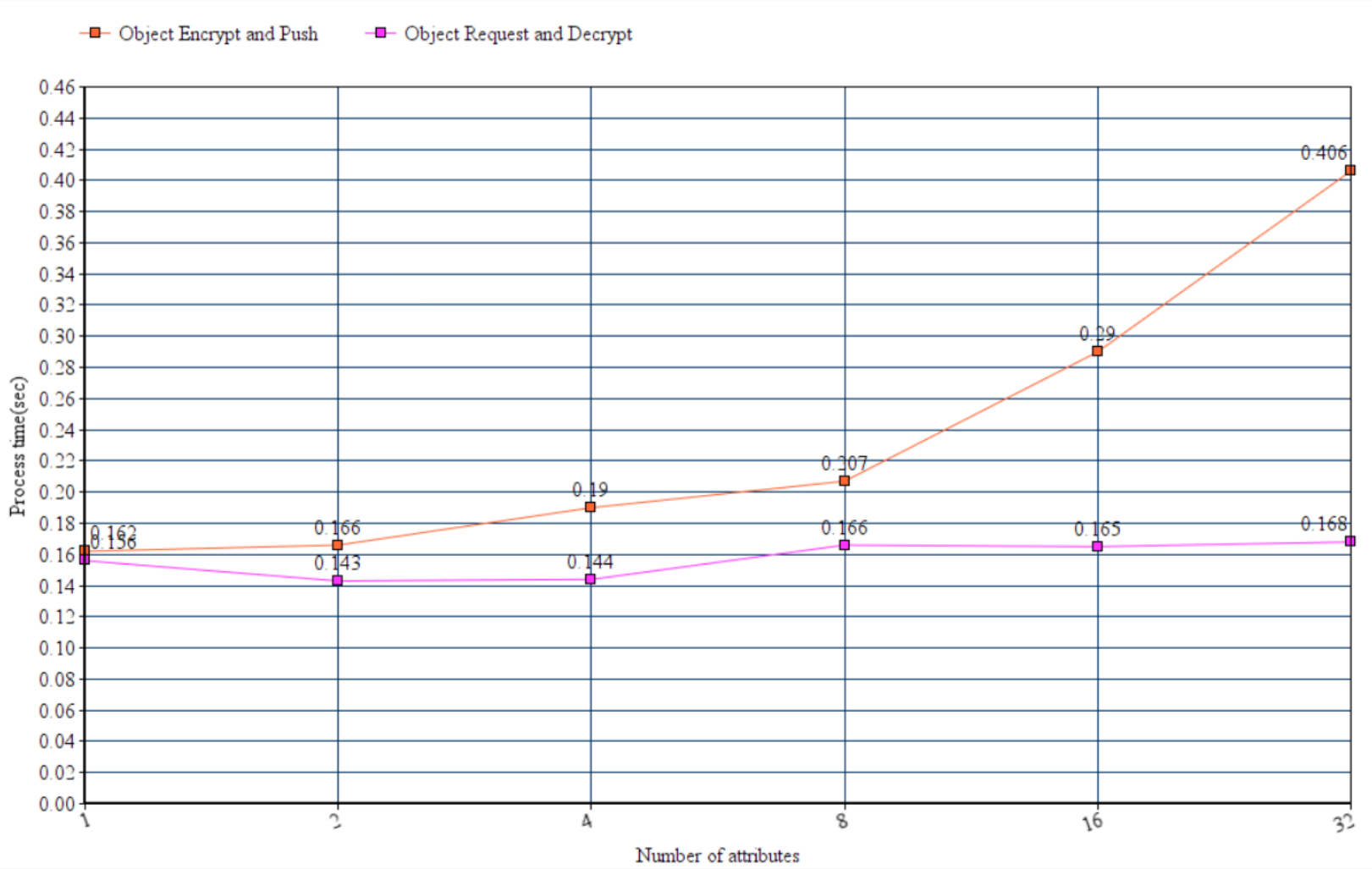


Figure 4: Processing time with various number of attributes

Experimental Results-II

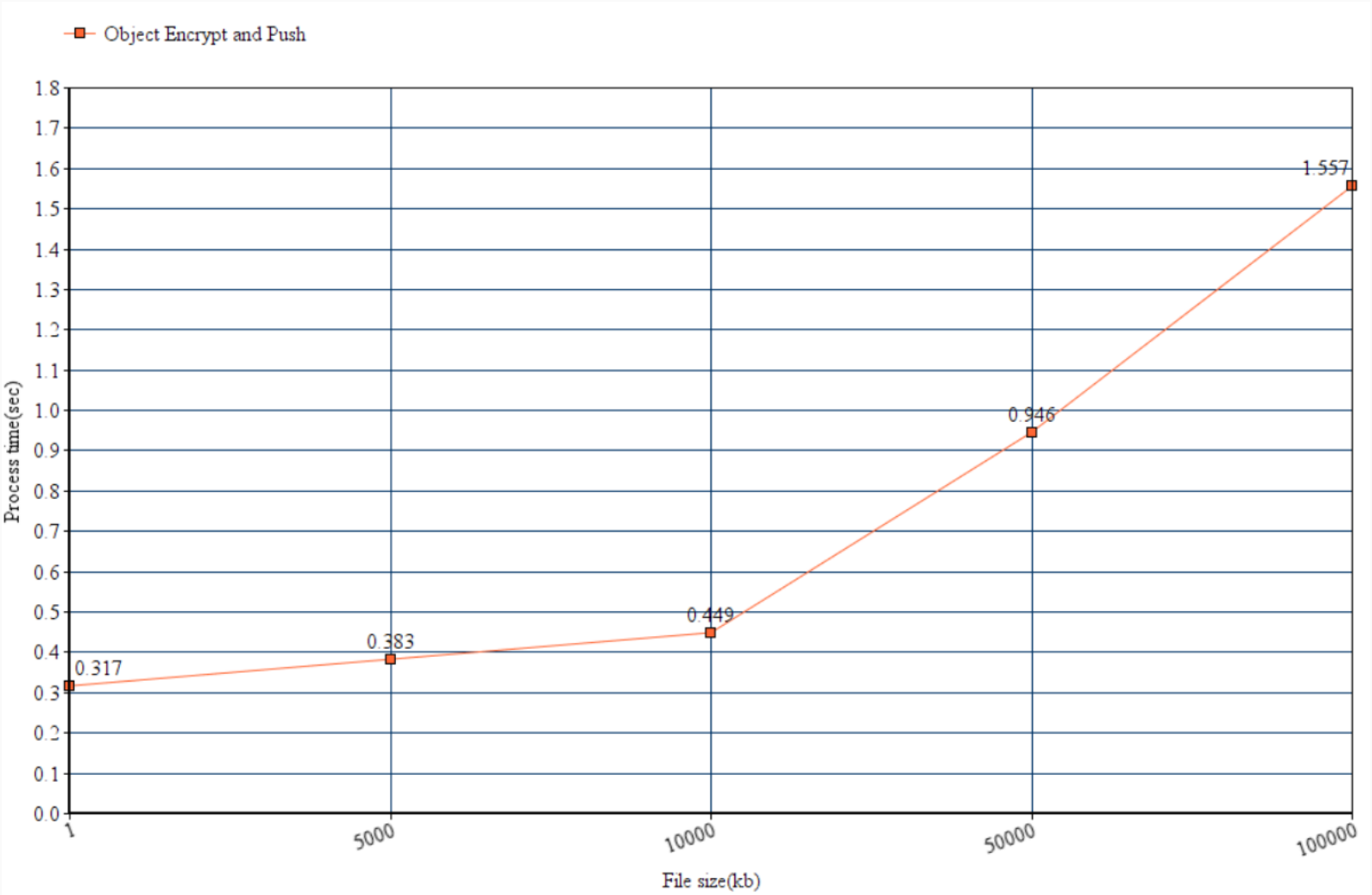


Figure 5: Processing time with various file sizes

Case Study for Demonstration

Case Study for Demonstration

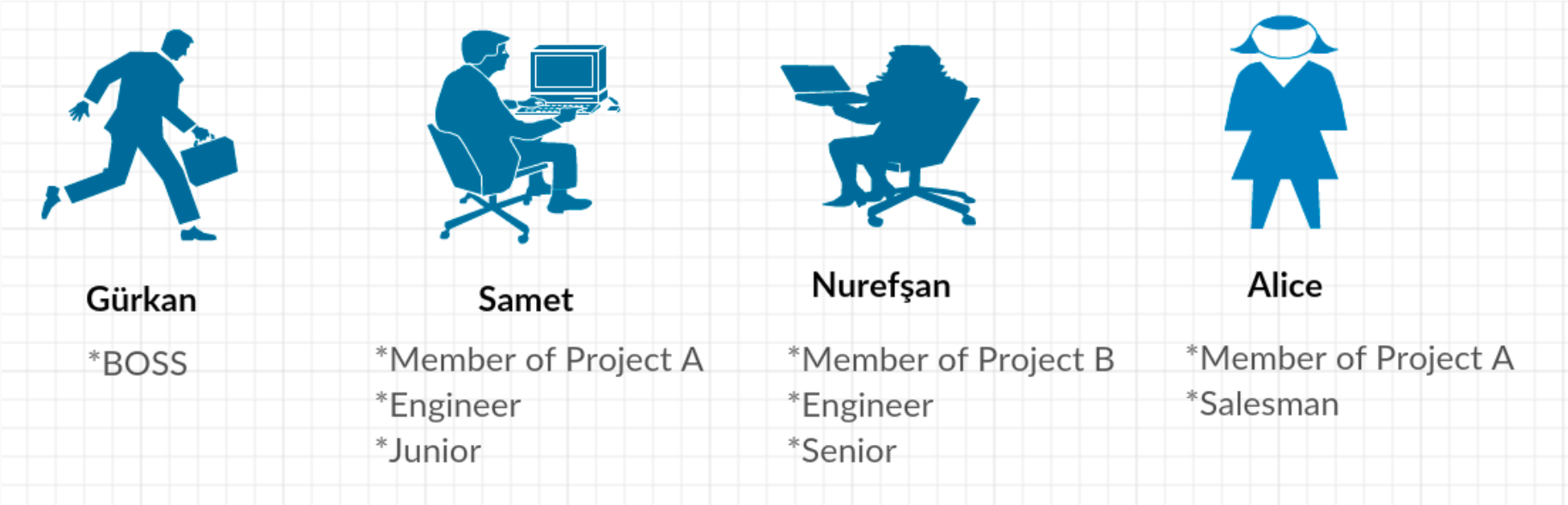
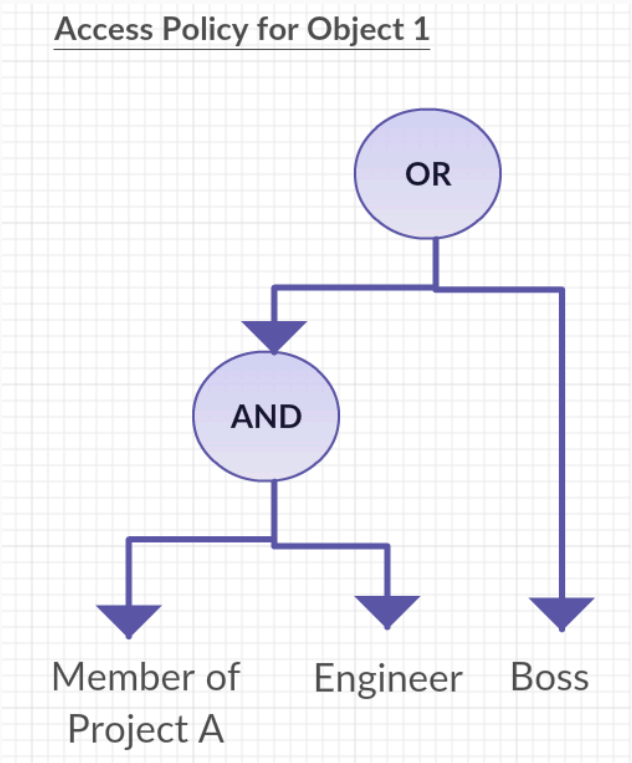
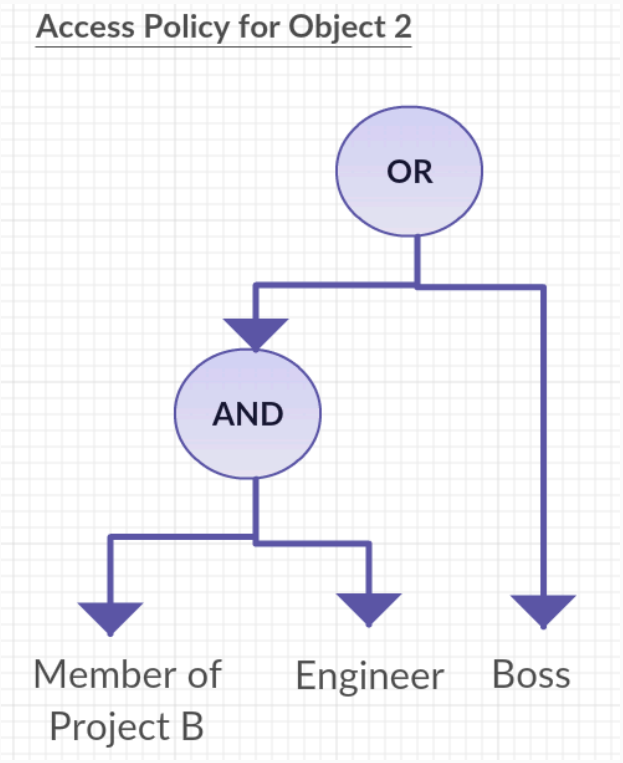


Figure 6: Users with attributes

Access policies for objects





	Content 1	Content 2
Gürkan	•	•
Samet	•	x
Nurefşan	x	•
Alice	x	x

Conclusion and Future Works

Conclusion and Future Works

We implement CP-ABE scheme over ICN to ensure object security

As future work,

- Implementation in real sensor devices
- Therefore, more realistic measurements
- Optimization to decrease the energy consumption of sensors

Source code available at

`https://github.com/sertbasn1/ABE_ICN_Project.git`

Questions?

References I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