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Supplementary Material: Detailed Derivations and Additional Results

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Abstract

This supplementary material provides detailed derivations of the mathematical models presented in the main text, specifically the convergence proof in Section 3. Additionally, we present extended experimental results comparing the proposed method with two additional baselines under varying channel conditions.

Contents

S.1. Overview

This supplementary material accompanies the main manuscript. It includes detailed mathematical derivations, additional experimental results, and extended discussions that were not included in the main text due to space limitations.

Template Note: This document uses the ‘class/sup‘ class, which is optimized for supplementary materials:

- **Single Column**: Defaults to ‘onecolumn‘ for better readability of large tables and equations.
- **Simplified Header**: Removes the complex author/affiliation block in favor of a clean title.
- **Numbering**: You can customize section numbering (e.g., S.1) manually if required, though standard numbering is often sufficient.

S.2. Additional Methodology Details

This section provides a deepening of the methods described in the main text.

S.2.1. Algorithm Analysis

The complexity of the proposed algorithm is $O(n \log n)$, as derived from standard principles [1]. Below is the detailed proof.

$$E = mc^2 + \int_0^\infty e^{-x} dx \tag{EqS-1}$$

S.3. Extended Results

S.3.1. Additional Figures

We provide additional comparisons in Figure S1. Note that figures in supplementary materials often use an "S" prefix, which can be configured using standard LaTeX commands (e.g., ‘‘) if not already handled by the journal style.

S.3.2. Raw Data Tables

Table S1 lists the complete dataset used for the simulation.

References

[1] S. Barmpounakis and N. Alonistioti, *RFID Systems: Research Trends and Challenges*. Denmark: River Publishers, 2010.

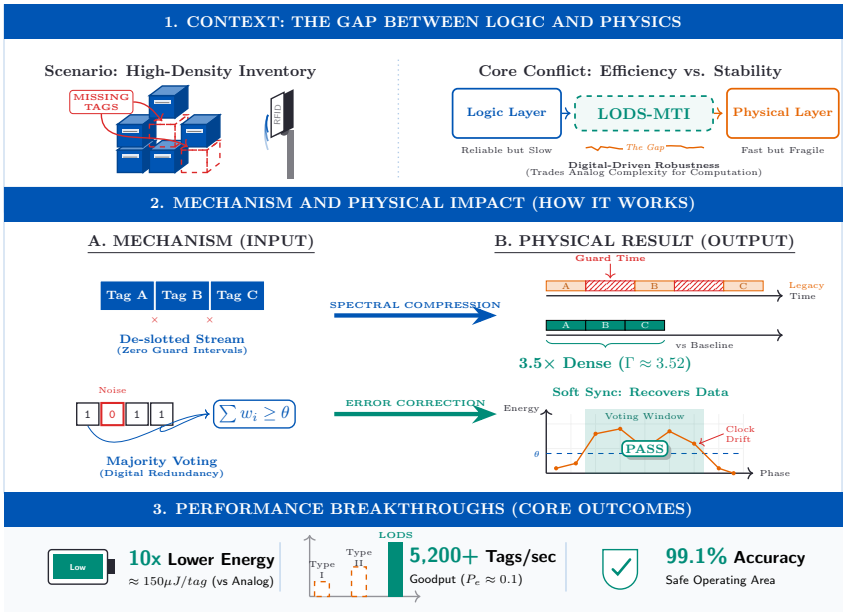

Figure S1. Supplementary Figure: detailed breakdown of the efficient frontier. The data correlates with the findings in Section 4 of the main manuscript.

Table S1. Complete Simulation Parameters and Results

Dataset	Parameter A	Parameter B	Precision	Recall
Set 1	0.5	100	98.2%	97.5%
Set 2	0.6	200	97.8%	96.9%
Set 3	0.7	300	96.5%	96.1%
Set 4	0.8	400	95.1%	95.5%