Statements and Response to Reviewer's Comments

LODS-MTI: A Link-Adaptive, Orthogonal, and De-slotted Protocol for Robust and Fast RFID Missing Tag Identification

Dear Editors and Reviewers:

We would like to express our sincere appreciation to the Editor-in-Chief, the Associate Editor, and the Reviewers for their time and effort in reviewing our manuscript. We are particularly grateful for the encouraging comments from **Reviewer #2** and **Reviewer #4**, who recognized the novelty and readiness of our work.

Simultaneously, we found the critical questions raised by **Reviewer #1** and **Reviewer #3** regarding physical layer assumptions and worst-case scenarios to be insightful. These comments have guided us to perform a fundamental upgrade to our simulation framework and validation methodology.

We have carefully addressed all comments point-by-point. Our major revisions are summarized as follows:

1. Re-executed ALL experiments using an upgraded high-fidelity simulation framework.
2. Implemented a refined dynamic energy model for listening cost analysis.
3. Introduced a Channel Middleware layer to model realistic physical layer imperfections.
4. Conducted a comparative ablation study to verify our "Earliest-Position-First" strategy.
5. Made the complete source code publicly available for transparency and reproducibility.
6. Added a rigorous discussion on worst-case complexity; all major revisions are *highlighted in red* for easy tracking.
7. Updated the references strictly according to IEEE journal requirements.

We believe these extensive revisions have significantly strengthened the technical depth, rigor, and practical relevance of the paper. We hope the revised manuscript is now suitable for publication.

Best regards,

Prof. Xiaolin Jia and Co-authors February 13, 2026

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Reviewer #1

Comment 1.1: The paper assumes perfect physical layer conditions. How does the protocol perform under realistic channel impairments such as timing jitter, sensing errors, and tag dropout?

Response:

Thank you for this insightful comment. We have introduced a Channel Middleware layer in our simulation framework to model realistic physical layer imperfections. Specifically, we now account for:

- Timing jitter ($\pm 5\%$ variation in slot boundaries)
- Bit-level sensing errors (BER $= 10^{-3}$)
- Tag dropout probability ($p_{\text{drop}} = 0.01$)

The revised results show that LODS-MTI maintains its performance advantage with less than 3% degradation. Please see Section 5.3:

Revised Manuscript Text

To validate the robustness of LODS-MTI under realistic conditions, we introduce a Channel Middleware layer that models three types of physical layer imperfections: (1) *timing jitter with $\pm 5\%$ slot boundary variation*, (2) *bit-level sensing errors at BER $= 10^{-3}$*, and (3) *stochastic tag dropout with probability $p_{drop} = 0.01$*. Our experimental results demonstrate that the protocol maintains its performance advantage with less than 3% degradation compared to ideal conditions.

Comment 1.2: The worst-case complexity analysis is missing. What happens when the number of missing tags is very large (e.g., 50% or more)?

Response:

We have added Section 4.4 analyzing the worst-case complexity:

Revised Manuscript Text

Worst-Case Analysis. When the missing rate α exceeds a threshold $\alpha_{\text{th}} = 0.5$, the communication overhead of incremental identification surpasses that of full re-inventory. In this regime, LODS-MTI *automatically triggers a fallback to complete re-inventory mode, which achieves $O(n)$ complexity where n is the total tag population.*

Reviewer #2

Comment 2.1: Some references are not formatted according to IEEE standards. Please update accordingly.

Response:

Thank you. We have reformatted all references to comply with IEEE transaction standards:

- Replaced informal citations with proper IEEE format
- Added DOI links where available
- Ensured consistent author name formatting

Reviewer #3

Comment 3.1: The energy model does not account for the listening cost during idle slots. This may lead to underestimation of total energy consumption.

Response:

Excellent observation. We have refined the energy model to include listening costs. The updated analysis (Section 5.2):

Revised Manuscript Text

The total energy consumption E_{total} is computed as:

$$E_{\text{total}} = \sum_{i=1}^{R} \left(E_{\text{tx},i} + E_{\text{listen},i} \cdot N_{\text{active},i} + E_{\text{idle},i} \right) \tag{1}$$

where *$E_{listen,i}$ represents the per-tag listening energy during round i, and $N_{active,i}$ is the number of active tags in that round.*