**Paper: Sensors-90063-2025**

**Analysis and Experimental Validation of SSTDR for Simultaneous Distributed Diagnosis of Wire Networks.**

**------------------------------------------------------------------------------------------------------------------**

Dear Editor and Reviewers,

We would like to thank you very much for your valuable comments and the care and time you took in reviewing this manuscript. We have revised the manuscript, guided by your comments, and we believe this has made it a better paper. Thank you very much. Please find the manuscript with changes highlighted in blue in the manuscript, and described below.

Thank you again. We appreciate your expertise and comments

Mouad Addad, Ali Djebbari, Evan Benoit, and Cynthia M. Furse.

**------------------------------------------------------------------------------------------------------------------**

Reviewer: #1

**We really appreciate the time and effort you put into addressing all the questions raised by the reviewers. I believe colleagues working in the field could benefit from learning about this new ZCZ technique.**

**However, although you mentioned that the typos I pointed out had been corrected, all of them are still present (labeled eqs 3, 7 and 14 in the previous version and 3, 6 and 12 in the current version). More concerningly, some equation numbers are now out of sync with their references in the text, and some equations even share the same number.**

Authors’ response:

Thank you very much for your encouraging feedback. We are pleased to hear that you see value in the potential of the ZCZ technique for reducing interference in distributed diagnosis using the S/SSTDR approach, and we hope it proves useful to others in the field as well.

Regarding the typographical and equation numbering issues—thank you for pointing those out again. You are absolutely right: despite our intention to correct them, some of the errors remained in the last submitted version.

We have now carefully reviewed all equations and cross-references. The numbering has been corrected, duplicated numbers removed, and their references in the text have been synchronized accordingly. We sincerely apologize for the oversight and appreciate your patience.

**------------------------------------------------------------------------------------------------------------------**  
Reviewer #2

1. **the writing should be improved, figures are in low quality.**

Authors’ response 1:

Thank you for your comment. We have carefully revised the manuscript to improve the clarity and overall quality of the writing. We have also re-checked all the figures in the manuscript and confirmed that their quality is appropriate in our working version. It appears that some issues may have arisen during the process of exchanging or uploading/downloading the manuscript template, which could have led to a lower-quality version being submitted or viewed. To address this, we have double-checked the final version to avoid any further quality degradation during submission.

1. **How the wire electrical parameters can affect your method? with technology size can your method be affected?**

Authors’ response 2:

Thank you for your question. We have added the following to the conclusion of the paper:

For larger systems, or those with many resonances or multiple reflections, a longer Z\_omay be needed. In that case, longer sequences (larger N) should be used, or fewer sequences (smaller M) will be available. The VOP , which can be impacted by wire and system parameters, also impacts these results, In the case of a wired network, this is relatively minimal, because the vast majority of wires have a VOP that is approximately (within 10%) of 2/3 the speed of light. Attenuation doesn’t impact these results with respect to the ZCZ codes, but it does reduce the magnitude of responses from later time/distance.

1. **Please compare your method with 2025 refrences?**

Authors’ response 3:

Thank you for your comment. Upon further review, we identified several recent and relevant research works on reflectometry and wire network diagnosis. In particular, we have incorporated a number of 2025 publications that present algorithms for assessing network characteristics, which are applicable across various types of reflectometry. These works—now cited as references [5], [7], [8], [12], and [13]—have been added to the reference list and discussed in the revised Introduction as part of our expanded review of existing techniques.

Many techniques have been used for network evaluation with reflectometry, including Multi-Channel 1D-CNN [5], iterative calculations [3], [6], twin Support Vector Machines [7], forensic-Based Investigation algorithm [8], selective averaging [2], wavelet transforms [9], [10], support vector machines [11], residual Voltage Inversion in Cable Networks [12], feature-Image Analysis with Residual Neural Networks [13], Neural Networks [14], residual voltage inversion [15], time reversal [16], and more.

References

[5] Q. Huang, Z. Li, Z. Fu, Y. Hu, Q. Fang, and Y. Wei, “Complex Wired Network Fault Diagnosis Based on Distributed Reflectometry and Multi-Channel 1D-CNN,” *IEEE Sensors Journal*, vol. 25, no. 11, pp. 19415–19427, Jun. 2025, doi: 10.1109/JSEN.2025.3559086.

[7] A. Goudjil and M. K. Smail, “Wiring Network Diagnosis Using Reflectometry and Twin Support Vector Machines,” *Sustainability*, vol. 17, no. 5, Art. no. 5, Jan. 2025, doi: 10.3390/su17051836.

[8] Z. Lacheheb *et al.*, “Topology reconstruction of wiring networks using an iterative process based on Time-Domain Reflectometry and Forensic-Based Investigation algorithm,” *Nondestructive Testing and Evaluation*, pp. 1–33, 2025.

[12] C. Chen, Q. Guan, Q. Guan, X. Jin, and Z. Shi, “Soft Fault Location and Imaging Using Residual Voltage Inversion in Cable Networks,” *IEEE Transactions on Instrumentation and Measurement*, vol. 74, pp. 1–16, 2025, doi: 10.1109/TIM.2025.3542111.

[13] D. Liang *et al.*, “Advanced Sensing Techniques for Cable Fault Detection Enhanced by Power-Line Communications and Integrated Feature-Image Analysis with Residual Neural Networks,” *IEEE Sensors Journal*, 2025.

**------------------------------------------------------------------------------------------------------------------**