ISSN(O): 2320-5407 | ISSN(P): 3107-4928

ISSN NO. 2320-5407

International Journal of Advanced Research

Publisher's Name: Jana Publication and Research LLP

www.journalijar.com

REVIEWER'S REPORT

Manuscript No.: IJAR-59600

Title: ENERGY OPTIMIZATION OF NETWORKS THROUGH A HYBRID SDN-CRDT ARCHITECTURE: AN EXPLORATORY STUDY BASED ON SYNTHETIC DATA

Recommendation:

Accept as it is .....

Accept after minor revision.....

Accept after major revision ...✓.....

Do not accept (*Reasons below*) .....

Rating	Excel.	Good	Fair	Poor
Originality		✓		
Techn. Quality		✓		
Clarity		✓		
Significance		✓		

Reviewer's ID: JPR-098

Detailed Reviewer's Report

Decision: Accept after Major Revision

Major Revisions

1. Lack of Experimental Validation: The manuscript relies entirely on a synthetic dataset containing 270 observations. The authors should validate the proposed SDN-CRDT architecture using an actual network simulation environment, such as Mininet or NS-3, to establish the practical effectiveness of the proposed approach.

2. Justification of Synthetic Data Generation: The mathematical equations used to generate the synthetic dataset contain predefined coefficients that influence the reported performance outcomes. The authors should provide a stronger justification for selecting these coefficients and explain how they represent realistic network conditions.

3. Validation of Energy Efficiency: The reported energy reductions of 3.3%, 5.8%, and 10.3% are derived from hypothetical equations. The authors should provide experimental evidence to demonstrate whether the proposed architecture can achieve similar energy savings under realistic network conditions.

4. Insufficient Architectural Implementation Details: The proposed hybrid SDN-CRDT architecture is mainly described conceptually. The authors should provide a detailed architectural diagram, identify the SDN controller components, specify the CRDT implementation, and explain the communication and synchronization mechanisms between distributed controllers.

ISSN(O): 2320-5407 | ISSN(P): 3107-4928
International Journal of Advanced Research
Publisher's Name: Jana Publication and Research LLP
www.journalijar.com

REVIEWER'S REPORT

5. CRDT Selection and Implementation: The manuscript discusses different CRDT structures, including G-Counter and delta-state CRDTs, but does not specify which structure is actually implemented in the proposed framework. The authors should clearly identify the selected CRDT mechanism and justify its suitability for distributed network-state management.

6. Comparative Evaluation: The comparison among conventional networks, SDN alone, and SDN-CRDT is based on generated values. The authors should conduct a systematic comparative evaluation under identical network configurations, traffic loads, and hardware conditions.

7. Statistical Analysis: Although the manuscript reports mean and standard deviation, it does not provide sufficient statistical evidence to assess the reliability of the observed differences. The authors should incorporate appropriate confidence intervals, effect sizes, and statistical analysis when experimental data become available.

8. Scalability Evaluation: The study considers networks with only 20, 50, and 100 nodes. The authors should extend the scalability evaluation to larger network configurations and investigate the effects of increasing controllers, replicated states, and synchronization frequency.

9. Energy and Performance Trade-off: The results indicate that the hybrid architecture has higher CPU utilization and control overhead than SDN alone. The authors should investigate these additional computational costs and their impact on overall energy consumption, latency, throughput, and network performance.

10. Strengthening the Research Contribution: The manuscript does not sufficiently demonstrate the novelty and practical contribution of integrating CRDT with SDN for energy optimization. The authors should clearly distinguish the proposed contribution from existing SDN-based energy optimization and distributed-state replication approaches.

Minor Revision Comments

1. Title: The title should be revised to make the research contribution more precise and concise while retaining the SDN-CRDT architecture and energy optimization aspects.

2. Abstract: The abstract should clearly distinguish the synthetic results from experimentally validated findings and explicitly mention that the study is exploratory.

3. Keywords: The authors should consider including additional relevant keywords such as Network Simulation, Distributed Controllers, and Energy-Aware Networking.

ISSN(O): 2320-5407 | ISSN(P): 3107-4928
International Journal of Advanced Research
Publisher's Name: Jana Publication and Research LLP
www.journalijar.com

REVIEWER'S REPORT

4. Introduction: The introduction should provide a more focused explanation of the research problem and clearly establish the motivation for integrating CRDT with SDN.

5. Research Gap: The research gap should be explicitly presented with stronger support from recent studies on SDN-based energy optimization and distributed network-state management.

6. Architectural Diagram: A clear and properly labelled diagram of the proposed hybrid SDN-CRDT architecture should be included to improve the understanding of the interactions between the control, data, and management layers.

7. Equation Formatting: All mathematical equations should be consistently numbered, formatted, and accompanied by explanations of the variables and parameters used.

8. Tables and Figures: Tables and figures should follow a consistent formatting style. The authors should improve figure readability, axis labels, captions, and numerical presentation.

9. Terminology and Language: Some technical terms and expressions require correction and consistency. In particular, the terminology used for CRDT and its full form should be checked throughout the manuscript.

10. References: The authors should improve the reference section by ensuring consistent APA formatting and including more recent and relevant publications on SDN, CRDT, and energy-efficient networking.