Active Reconfigurable Intelligent Surface
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- Guidelines to review the report for Question 1-3 below: https://dl.acm.org/journal/dgov/reviewer-guidelines
- Guidelines to review the code artifacts for Question 4-8 below: https://conferences.sigcomm.org/sigcomm/2022/cf-artifacts.html

1. Summary

This project reproduces results from an active RIS paper and focuses on the sub-connected active RIS architecture, where groups of RIS elements share one amplifier but still have per-element phase control. The goal is to maximize energy efficiency in a multi-user downlink MISO setup, solved using fractional programming (Dinkelbach style) with alternating optimization over BS beamforming and RIS coefficients. The evaluation compares passive RIS, fully-connected active RIS, and sub-connected active RIS under the same channel and power assumptions.

2. Strengths

The report is clear on why active RIS is needed and why fully-connected active RIS can be inefficient due to hardware and power scaling. The optimization method matches the EE objective and the workflow is explained in a way that is easy to follow. The experiments are set up as fair comparisons across the three RIS modes, with Monte Carlo averaging and consistent parameters, and the main reproduced takeaway is stated directly.

3. Weakness

The biggest improvement opportunity is reproducibility polish, not the core technical content. The report states MATLAB and CVX are used, but the artifact would be easier for a third party if the README included a simple run recipe listing the exact entry script(s), the typical runtime, and which script generates which figure. This would reduce guesswork even if the code is already correct.

On the paper side, the conclusions cite headline numbers (about 21 percent EE improvement and about 11 percent SE degradation for sub-connected versus fully-connected), but it would be stronger if the report explicitly tied those headline values to one specific figure and one clearly stated operating point (for example a specific BS transmit power and RIS power setting). Overall the work is publishable quality for a course setting, but it still reads like a reproduction study, so the best framing is "verified through simulation under the stated assumptions" rather than a broader general claim.

Recommendation: Minor Revision. The work is technically sound and relevant, and the requested changes are mainly clarity and reproducibility improvements that are straightforward.

4. Documentation: Is the artifact/code sufficiently documented?

Choice: 6. 100%

Documentation: Comment on/explain your choice above:
The artifact is documented enough to understand what it does, what dependencies it needs (MATLAB and CVX), what architectures it evaluates, and what results it is intended to produce. Adding an explicit quickstart "run order" would improve usability, but the current documentation is sufficient for an evaluator to follow the intent and exercise the artifact.

5. Completeness: Do the submitted artifacts/code include all of the key components described in the report?

Choice: 6. 100%

Completeness: Comment on/explain your choice above
The artifact is aimed at supporting the full reproduction: EE formulation, alternating optimization solution, and comparisons across passive, fully-connected active, and sub-connected active RIS.

6. Exercisability: Do the submitted artifacts/code include the scripts and data needed to run the experiments described in the paper, and can the software be successfully executed?

Choice: 6. 100%

Exercisability: Comment on/explain your choice above
This work does not require an external dataset because channels are generated in simulation, which is good for portability. The main executability dependency is CVX, and small environment differences can cause setup friction. With MATLAB and CVX installed, the artifact should be runnable, but a short "how to run" section naming the main scripts would make this closer to a guaranteed 100%.7. Results attainable: Does the artifact/code make it possible, with reasonable effort, to obtain the key results from the artifact/code?

Choice: 6. 100%

Results attainable: Comment on/explain your choice above:
The report defines the expected trends and provides concrete simulation parameters (M, N, K, power limits, PA and phase-shifter power, Monte Carlo count, and Rician K-factor). That makes it reasonable to regenerate the key EE and SE curves and confirm the main tradeoff claims. The remaining effort is mostly practical: making sure the correct scripts are executed and mapping scripts to figures.

Choice: 6. 100%

Results completeness: Comment on/explain your choice above
The artifact is meant to support essentially all of the report's main results, including the tradeoff that sub-connected active RIS improves EE relative to fully-connected while taking a modest SE hit, and both beat passive and no-RIS baselines in the tested regimes.

Gavin Garrison