

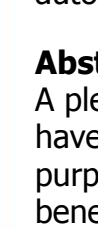
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A Potentially Specious Cyber Security Offering for 5G/B5G/6G; Software Supply Chain Vulnerabilities within Certain Fuzzing Modules



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Keywords: cyber security; fuzzing; wireless networks; 5G; autonomous vehicles; grey-box concolic fuzzer.

Abstract:
A plethora of fuzzing Tactics, Techniques, and Procedures (TTTPs) have been either proposed or described in the literature for the purpose of discerning software vulnerabilities with efficacy. The benefits of fuzzing have been well documented, such as when researchers found dozens of vulnerabilities in 46 LTE wireless networks, and fuzzing has become prevalent among the disparate actors within the wireless network ecosystem (to include 5G). However, fuzzing implementations are varied, and ironically, in some cases, implementations have utilized software bundles that have contained known "High Severity" Common Vulnerabilities and Exposures (CVE). On the surface, it seems that fuzzing the fuzzing module itself would constitute a simple solution to this issue. However, prototypical fuzzers have coverage issues (i.e., they only fuzz certain lines of code or sections of the software program). In addition, as numerous fuzzers utilize Docker containers, which are essentially inert when not in use, the complexity of the challenge is non-trivial. This paper introduces a fuzzing framework that capitalizes upon a sequence of bespoke grey-box concolic (i.e., hybridized symbolic and concrete execution) fuzzers (one set that fuzzes the next) to better address the coverage issue (as well as more likely to discern CVEs) and leverage their hybridized nature to overcome the disadvantages of black-box (higher computational performance, but lower coverage) and white-box fuzzers (e.g., lower computational performance, but higher coverage). The introduced bespoke grey-box concolic fuzzer architecture has certain advantages over other Coverage-based Grey-box Fuzzers (CGF) via the numerical stability-centric approach by which it selects seeds, undertakes seed scheduling, and operationalizes the seed pool.

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