



МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
СУМСЬКИЙ ДЕРЖАВНИЙ УНІВЕРСИТЕТ
МІЖНАРОДНИЙ УНІВЕРСИТЕТ «АСТАНА»



ІНФОРМАТИКА, МАТЕМАТИКА, АВТОМАТИКА

ІМА - 2025

**МАТЕРІАЛИ
та програма**

**МІЖНАРОДНОЇ
НАУКОВОЇ КОНФЕРЕНЦІЇ
МОЛОДИХ ВЧЕНИХ**

**(Суми-Астана,
21-25 квітня 2025 року)**

**Суми,
Сумський державний університет
2025**

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
СУМСЬКИЙ ДЕРЖАВНИЙ УНІВЕРСИТЕТ
МІЖНАРОДНИЙ УНІВЕРСИТЕТ «АСТАНА»

**ІНФОРМАТИКА, МАТЕМАТИКА,
АВТОМАТИКА**

ІМА :: 2025

**МАТЕРІАЛИ
та програма**

**МІЖНАРОДНОЇ НАУКОВОЇ КОНФЕРЕНЦІЇ
молодих учених**

(Суми – Астана, 21–25 квітня 2025 року)

Суми
Сумський державний університет
2025

Automation of Software-Defined Network Testing Using Python

Serhii Shestopalov, Ph.D. student

Kharkiv National University of Radio Electronics, Kharkiv, Ukraine

The rapid advancement of network technologies and the increasing complexity of network infrastructures demand efficient and reliable methods of network testing and management. Software-Defined Networks (SDN) offer promising solutions due to their flexibility, programmability, and centralized control. However, manual network testing methods often lack efficiency, scalability, and repeatability, highlighting the necessity of automated testing approaches.

The purpose of this study is to explore the potential of automating testing processes in SDN through Python programming. Special emphasis is placed on automating network environment setup, test traffic generation, results collection, and their comprehensive analysis.

An automated testing environment was developed using Mininet, a well-known emulation platform for rapid deployment and evaluation of SDN networks with varying complexity. Additionally, the Ryu controller was implemented to automatically deploy and manage traffic forwarding rules based on the OpenFlow protocol. To generate realistic network loads, the iperf and D-ITG tools were employed, with automation facilitated by custom-developed Python scripts.

These Python scripts enable systematic testing using predefined parameters, automatic results recording, and initial data analysis, thus significantly reducing the manual labor and minimizing errors inherent in manual test execution. Furthermore, automation ensures repeatability and consistent conditions across multiple test cycles.

The obtained results indicate substantial improvements in testing efficiency and reliability, emphasizing the value of using automated tools in SDN performance evaluation and Quality of Service (QoS) assessments. Future research directions include integrating advanced data analysis algorithms, machine learning techniques, and extending automation frameworks to cover more complex network scenarios and adaptive testing methodologies.