Team Name - SecureNet Innovators

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**Problem Statement**: Intrusion Detection/Prevention System (IDS/IPS) Throughput and Latency Benchmarking.

**Problem Statement Description**: IDS/IPS devices are used to detect and prevent security threats, but their performance can vary with traffic volume, packet sizes, and the complexity of signatures used.

**Project Objective**: Develop a benchmarking solution to evaluate the throughput and latency performance of an IDS/IPS device/solution.

The solution should support:

→ Different traffic profiles (e.g., regular traffic vs. attack traffic).

→ Signature complexity impact.

→ Latency and packet drop measurements during high-traffic loads.

**Deliverables**: A tool that benchmarks IDS/IPS devices based on throughput, latency, and detection accuracy under various conditions. The tool should visualize performance degradation as traffic increases.

**[RFC 9411]**

"Benchmarking Methodology for Network Security Device Performance". (Published: March 2023)

The solution proposed in reference RFC:

**Benchmarking Methodology**: The benchmarking tests measure key performance indicators such as throughput, latency, and detection accuracy under controlled conditions.

**Traffic Generation Profiles**: The RFC emphasizes using varied traffic profiles, including regular (benign) and attack (malicious) traffic, to simulate real-world environments. These profiles include different packet sizes, traffic rates, and protocols to ensure a comprehensive assessment of device capabilities.

**Signature Complexity Impact**: RFC 9411 recommends using signatures with varying levels of complexity, as IDS/IPS performance can vary significantly based on signature structure and computational load.

**Latency and Packet Drop Measurements**: The RFC specifies methods for measuring both latency and packet drop rates under increasing traffic loads. The RFC provides a framework for understanding performance degradation and pinpointing bottlenecks by assessing how latency changes as traffic volume grows.

**Throughput and Detection Accuracy**: A primary focus is on measuring throughput—the maximum rate at which the IDS/IPS can process traffic without significant packet loss or latency—and detection accuracy, which includes the rate of true positives and false positives.

Optimization proposed by our team:

**Adaptive Traffic Scaling**: Implement dynamic traffic adjustment to simulate sudden load spikes, enabling real-time stress testing of IDS/IPS scalability limits.

**Machine Learning Analysis**: Use machine learning to analyze performance data, predicting potential failure points and optimizing IDS/IPS configurations for improved resilience.

**Visualization Enhancements**: Add interactive, real-time visualizations for throughput, latency, and accuracy metrics, offering deeper insights into IDS/IPS performance under varying conditions.

Timeline of Delivery: 8th December, 2024.

References:

[RFC 9411 - Benchmarking Methodology for Network Security Device Performance](https://datatracker.ietf.org/doc/rfc9411/)

[Information on RFC 9411 » RFC Editor](https://www.rfc-editor.org/info/rfc9411)

[Benchmarking Network Security Device Performance with Open Standards - Spirent](https://www.spirent.com/blogs/benchmarking-network-security-device-performance-with-open-standards)

Solution architecture and design: [Below]

