Telematics for Risk Scoring Cyber Attacks

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Introduction

Cyber-attacks including ransomware and other attacks have surged dramatically in last few years. In 2025 it is expected that the total costs of cyber insurance world-wide will go to over $25 billion. However, the insurance companies so far do not have good tools to assess the riskiness of their clients. The objective of this research is to create a telematics like service which will automatically measure real risks faced by a particular enterprise.

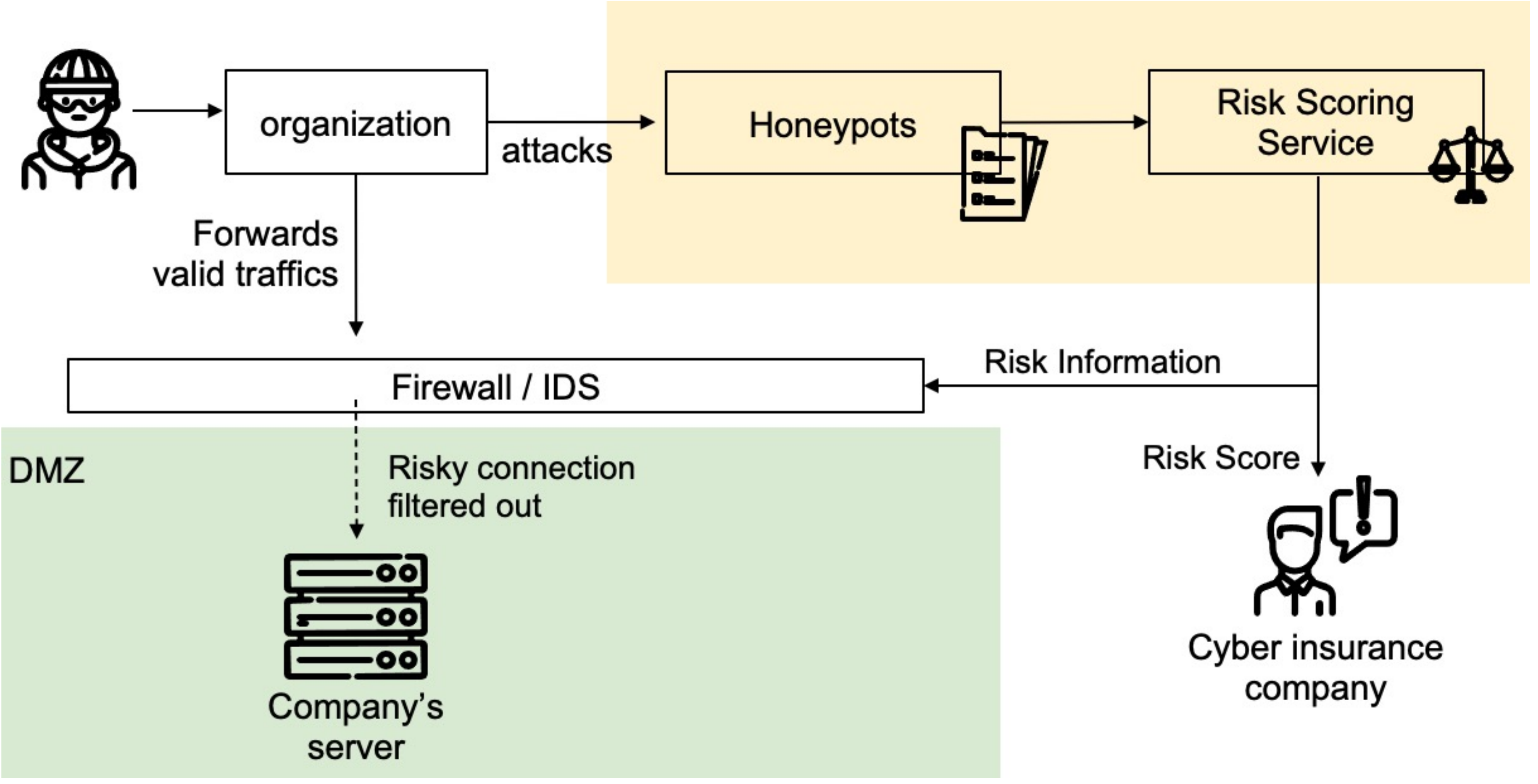


Figure 1. The flow of the enterprise cyber risk scoring

Network Architecture

The honeypots are placed in three crucial positions of the Columbia Network.

(1) Open to internet and interacts with all connections.
(2) Standard Zone blocks connections to certain ports that Columbia security standard defines as unnecessary / unsecure.
(3) Redirected connection from the "load balancer" of CS department's enterprise zone.

This setup helps in detecting skillful attackers and flaws in enterprise's IDS/IPS systems.

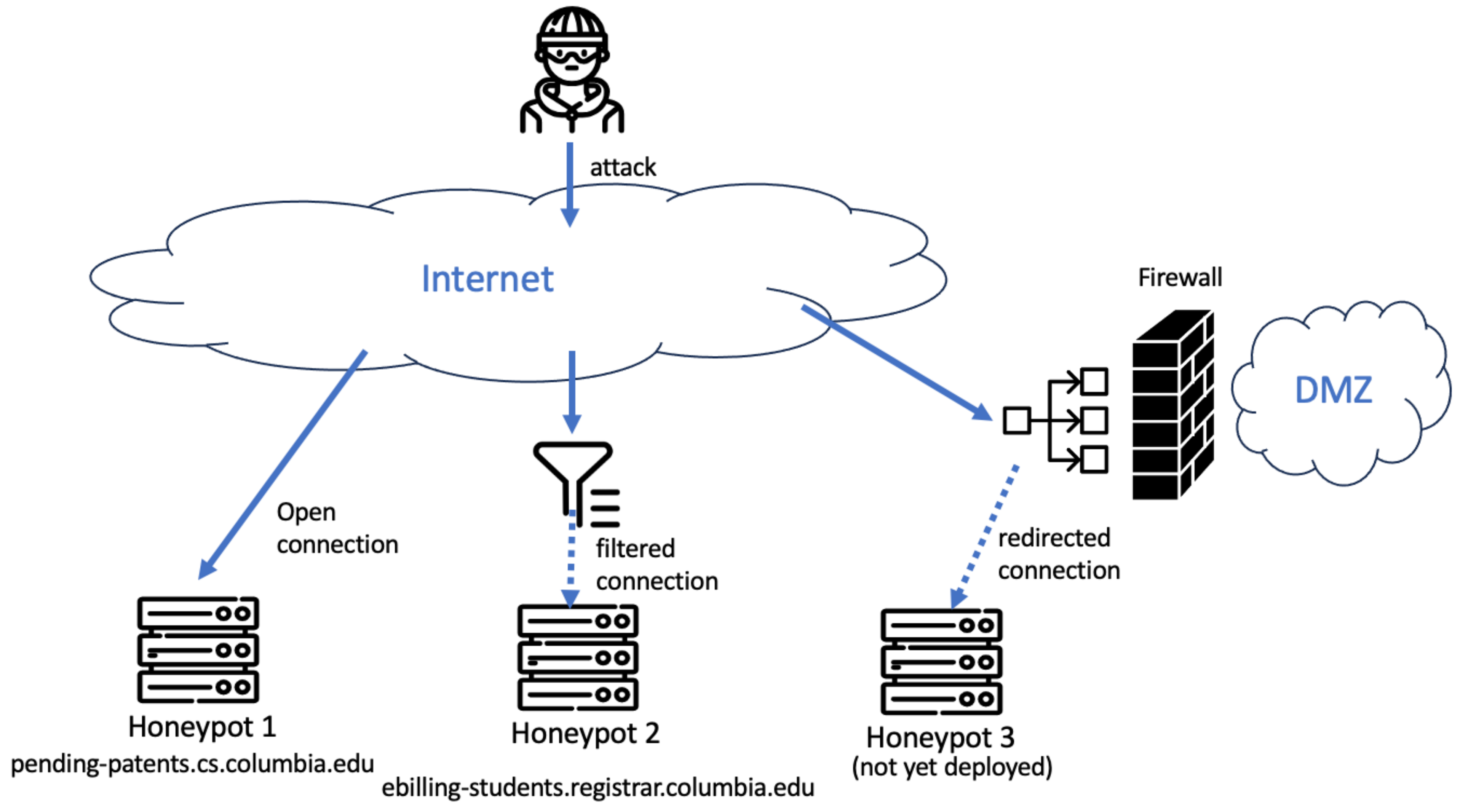
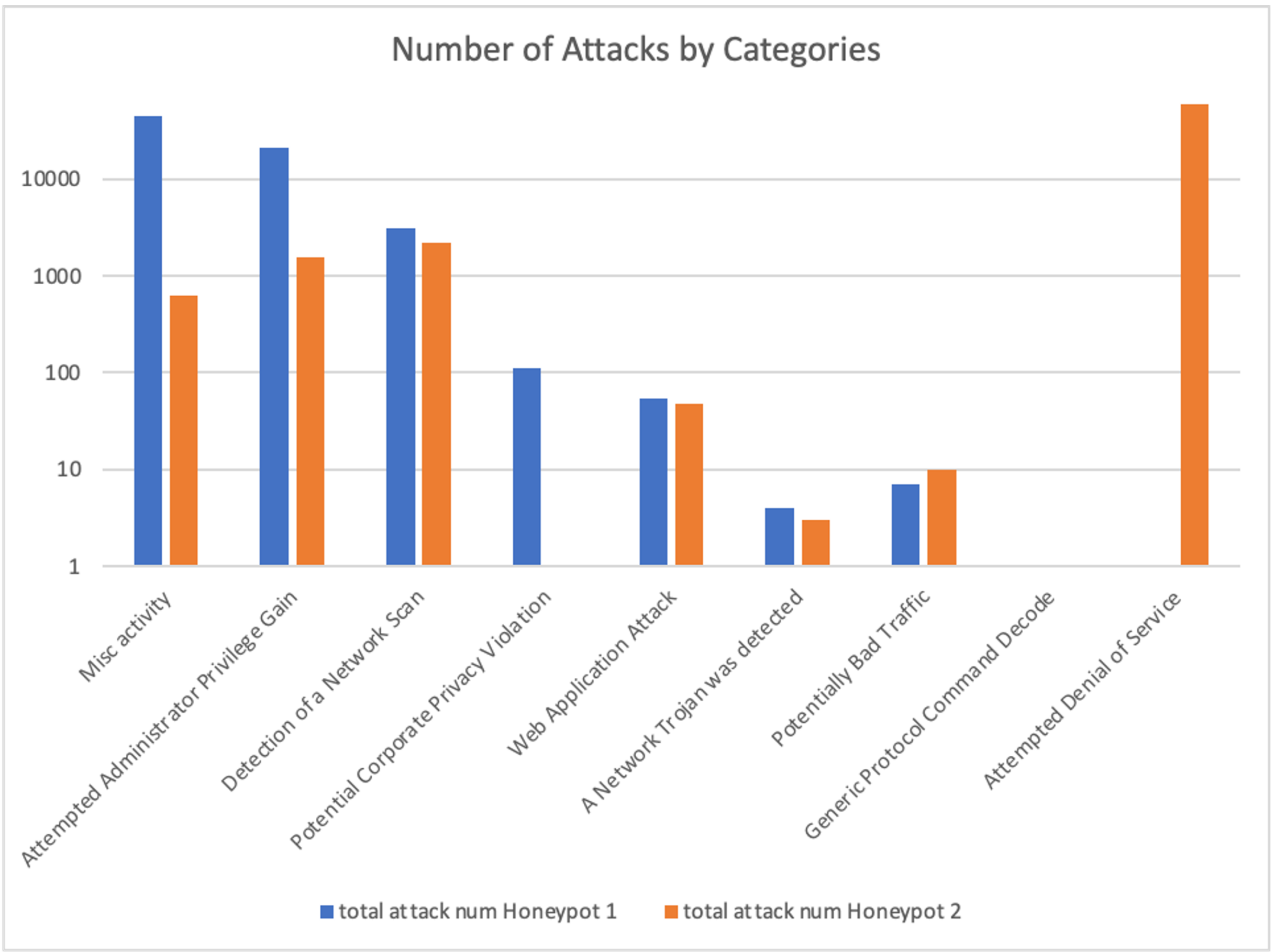


Figure 2. Honeypot locations in the network.

Attacks and Patterns

We monitored HTTP requests, TLS/SSL exchanges, DNS queries, SMTP connections. Each attack is a sequence of action and each action is categorized as through Suricata IDS categorization system.



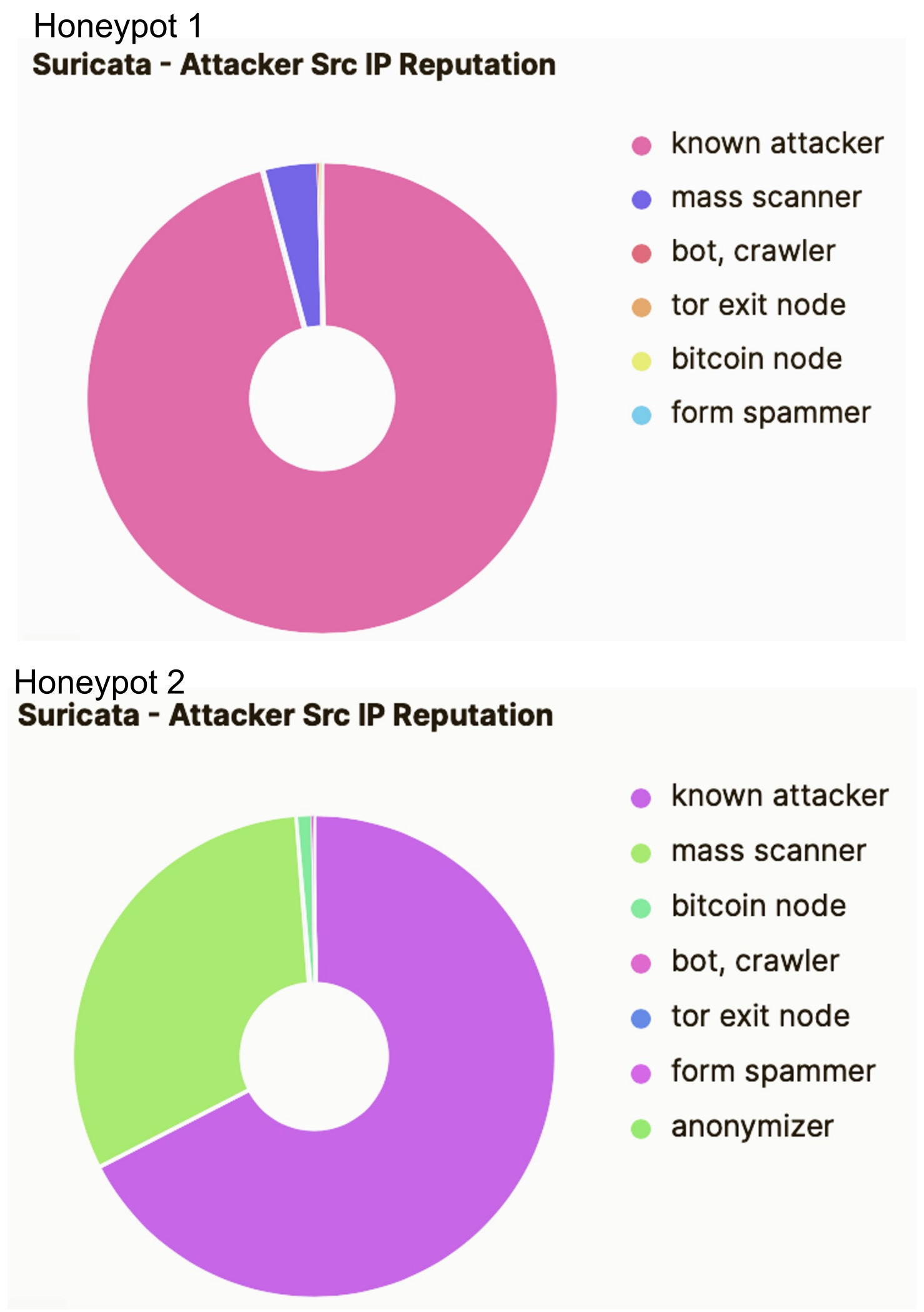


Figure 3. Attack patterns for Honeypot 1 and 2

Risk Scoring

Suricata IDS has 1:1 risk scoring for each incoming attacks based on the category. The table below shows sum of the risk scores by category of the attack.

Category	Sum Risk		Normalized (sum risk/incident count)	
	honeypot 1	honeypot 2	honeypot 1	honeypot 2
Attempted Administrator Privilege Gain	83256	6188	45.95%	3.23%
Potential Corporate Privacy Violation	339	0	0.19%	0.00%
Web Application Attack	220	192	0.12%	0.10%
A Network Trojan was detected	16	12	0.01%	0.01%
Attempted Denial of Service	0	179730	0.00%	93.68%
Potentially Bad Traffic	21	30	0.01%	0.02%
Misc activity	90920	1274	50.18%	0.66%
Detection of a Network Scan	6310	4426	3.48%	2.31%
Generic Protocol Command Decode	2	0	0.00%	0.00%
SUM	181177	191852		

Table 1. Sum of risk scores by attack categories
Red: high severity, yellow: medium severity, green: low severity

Future Work

- Filter out the background radiation of insignificant attacks such as mass scanner.
- Create a method of risk scoring system based on the payload of attack rather than 1:1 scoring system based on the attack category.

References

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Salles-Loustau, Gabriel, et al. "Characterizing attackers and attacks: An empirical study." 2011 IEEE 17th Pacific Rim International Symposium on Dependable Computing. IEEE, 2011.