The effect of a corrupt program on virtualized P4 programs in HyperVDP

1. Background

- Virtualization of the programmable data-plane
- Difficulties of virtualizing P4 [1]
- Compiler based vs hypervisor based approaches
- High-Performance Virtualization of the Programmable Data Plane [2]

2. Research question

- Can a malicious P4 program corrupt behaviour of another P4 program when running alongside each other?

3. Methodology

- Simulate virtual test network using mininet with HyperVDP
- Populate match-action tables
- Look for vulnerabilities using scapy

4. Results

- Stable HyperVDP framework created [3]
- No significant vulnerability found for now

5. Conclusions

- Recommended to investigate further
- Time constraints
- HyperVDP provides flexible virtualization of multiple P4 programs

References

[1] P. Bosshart, D. Daly, Gl. Gibb, M. Izzard, N. McKeown, J. Rexford, C. Schlesinger, D. Talayco, A. Vahdat, G. Varghese, and D. Walker. 2014. P4: programming protocol-independent packet processors. SIGCOMM Comput. Commun. Rev. 44, 3 (July 2014), 87–95. https://doi.org/10.1145/2656877.265689

[2] C. Zhang, J. Bi, Y. Zhou and J. Wu, "HyperVDP: High-Performance Virtualization of the Programmable Data Plane," in IEEE Journal on Selected Areas in Communications, vol. 37, no. 3, pp. 556-569, March 2019, doi: 10.1109/JSAC.2019.2894308..

[3] https://github.com/2016Ruben/HyperV

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