Lehrstuhl für Netzarchitekturen und Netzdienste
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Antrittsvortrag zur Bachelorarbeit

Performance-Analyse von VPP

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Topic

VPP (Vector Packet Processing) [1] is an open source software for providing efficient network switching and routing. In contrary to common hardware switches, the whole packet processing is done in software. This allows a more versatile use of the same router in different applications and provides flexibility regarding hardware it can run on.

Typically hardware routers are expected to be faster than software routers, but VPP has several approaches to perform better compared to similar software projects like Open vSwitch [2] or the Linux Router: As the name indicates, it processes packages in vectors, in other words, multiple packages at a time which reduces overhead per package. Furthermore it doesn't use the slow linux network drivers for it's interfaces, but an own one.

The scope of this Bachelor's thesis shall be to measure the performance of VPP and to evaluate which scenarios are important to be tested.

Approach

For this Bachelor's Thesis automated tests shall be implemented to run test scenarios on the Baltikum testbed. Moongen [3] shall be used on the tester to generate loads. The testing shall be reproducable by beeing automated and shall be comparable by documenting circumstances well.

VPP shall be tested torwards IPv4 versus IPv6, packet sizes, test traffic patterns, cpu scaling (optionally multi socket NUMA architectures) and size of the Forwarding and Routing Information Base (BGP size $>$600.000 entries in 2017 [4]). Optionally one advanced scenario can be analyzed, too, like tunneling, firewall, NAT or virtualization.

Measurement results shall contain package count (per time), package loss, latency and whitebox testing results using perf: Cpu load and cache misses.

In the end a performance model shall be created (as in [5]) and a conclusion shall be made, giving VPP a rough rank relative to real world routing solutions.

Timetable

Deadline after *n* Months	Task
0.5	Automate a basic testbench setup and run a test using moongen for the tester and VPP for the DUT
1.0	Design and run benchmarking scenarios for basic VPP configurations
1.5	Create result visualization pipelines and analyze them
2.5	Improve tests and implement advanced test scenarios
3.0	Analyze new results and review testing methodology
4.0	Assemble Thesis from analysiss and testing results

Literatur

[1] FD.io, “Vpp website,” https://wiki.fd.io/view/VPP, accessed on 2018-11-10.

[2] https://www.openvswitch.org/.

[3] https://github.com/emmericp/MoonGen.

[4] http://www.bgphelp.com/2017/01/01/bgpsize/.

[5] S. Gallenmüller, P. Emmerich, F. Wohlfart, D. Raumer, and G. Carle, “Comparison of frameworks for high-performance packet io,” pp. 29–38, 2015.