



Review report of a final thesis

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Reviewer: Ing. Alexandru Moucha, Ph.D.
Thesis title: Performance of MultiPath TCP on OpenWRT
Branch of the study: Computer Systems and Networks

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<i>Evaluation criterion:</i>	<i>The evaluation scale: 1 to 4.</i>
1. Fulfilment of the assignment	<i>1 = assignment fulfilled, 2 = assignment fulfilled with minor objections, 3 = assignment fulfilled with major objections, 4 = assignment not fulfilled</i>
<i>Criteria description:</i> Assess whether the submitted FT defines the objectives sufficiently and in line with the assignment; whether the objectives are formulated correctly and fulfilled sufficiently. In the comment, specify the points of the assignment that have not been met, assess the severity, impact, and, if appropriate, also the cause of the deficiencies. If the assignment differs substantially from the standards for the FT or if the student has developed the FT beyond the assignment, describe the way it got reflected on the quality of the assignment's fulfilment and the way it affected your final evaluation.	
<i>Comments:</i> There is no doubt that the student fulfilled the assigned tasks.	
<i>Evaluation criterion:</i>	<i>The evaluation scale: 0 to 100 points (grade A to F).</i>
2. Main written part	<i>75 (C)</i>
<i>Criteria description:</i> Evaluate whether the extent of the FT is adequate to its content and scope: are all the parts of the FT contentful and necessary? Next, consider whether the submitted FT is actually correct – are there factual errors or inaccuracies? Evaluate the logical structure of the FT, the thematic flow between chapters and whether the text is comprehensible to the reader. Assess whether the formal notations in the FT are used correctly. Assess the typographic and language aspects of the FT, follow the Dean's Directive No. 26/2017, Art. 3. Evaluate whether the relevant sources are properly used, quoted and cited. Verify that all quotes are properly distinguished from the results achieved in the FT, thus, that the citation ethics has not been violated and that the citations are complete and in accordance with citation practices and standards. Finally, evaluate whether the software and other copyrighted works have been used in accordance with their license terms.	

Comments:

From the technical perspective it is clear that the student had to read, understand and apply information from many sources and create a working product, to run tests on. I quantise the technical aspect of the work as very good, although there is no comparison with load balancing on the IP protocol (layer 3 OSI), which would have been excellent as there would be a comparison between complementary methods.

From the formal perspective, the text has major problems and my grade to it would be D. The problems are below described:

From the formal perspective there are major problems regarding the thesis, which can be divided in four main categories:

- A. The usage of undefined terms. NEVER use terms which are not previously defined.
- B. Problems with symbols in fonts and typos which should have been detected using a spellchecker.
- C. Inconsistencies. When a term is defined in one way, it must be kept in that way.
- D. Logical inconsistencies in sentences, leading to meaningless sentences or simply non-true sentences.

Below I shall document the formal problems, fitting them into the above mentioned categories. The letter p means page.

p ix: B - strange symbols in the Czech abstract

p x: B - the letters "f" and "l" in "subflow" or "flow" are combined into one symbol which makes the search for these words impossible.

p 1: B - strange symbol "todayas"

p 1: D - no comparison between multihoming, TCP multipath, Layer 3 IP load balancing and routing to a loopback regarding fault tolerance in the thesis. Thus why the sentence that MPTCP is "more tolerant to failures than Multihoming" - where is the discussion or the proof?

p 2: B - theoritically - spellchecker!

p 3: C - TCP is a protocol. It cannot be encapsulated. IP cannot be encapsulated either, as it is an abstract thing. TCP SEGMENTS and IP PACKETS can!

p 3 and 4: C - IP has packets if inside the PDU (protocol data unit) there is a TCP segment and datagrams if inside the PDU there is a UDP segment. To say that "TCP is encapsulate within the data field of IP datagrams..." is inconsistent language.

p 4: too long explanation for the very known 3 way handshake. A reference and 3 lines would have been enough.

p 6: D - "DHCP provides an automated way to distribute and update IP addresses" is obviously incorrect as this is the purpose of routing protocols and convergence. The purpose of DHCP is to lease IP addresses to devices, not to distribute anything.

p 7: D - "ICMP is not typically used to exchange data between systems" - what is it used for, to exchange flowers?

p 7: A - LEDE? CPE? God knows what they are.

p 10: B - doesnat with a with a hat

p 10: A, D - "OpenWrt is resistant to common vulnerabilities thanks to its Linux OS which is unaffected by many common attacks". What is a common vulnerability and a common attack? Resistant to vulnerability or to attack? Attack is NOT vulnerability - see definitions of security terms!

p 11 and many other: A - written code which is not explained. I am sure everybody (except me) knows from birth what "iperf3 -s" does. I certainly do not know. The same for "iperf3 -c 192.168.200.1 -t 60" - it may be that c represents some coordinates and t a time, thus it must be a meeting place.

p 13: D - "Packet loss is the discarding of packets in a network when a router or other network device is overloaded and cannot accept additional packets at a given moment." - thus if packets are lost due to a cable being disconnected it is not packet loss. Really?

The entire chapter 1 contains a list of technologies, protocols, descriptions but there is no explanation to how they are related or needed. Why do we need both Wireshark and GNS3? Mystery.

p 22: D - "If, during the lifetime of an MPTCP connection, a previously announced address becomes invalid (e.g., if the interface disappears) the affected host should announce this so that the peer can remove subflows related to this address." - invalid IP address? Like it becomes 816.1022.mama.tata?

p 25: A - rate of subflow (litters per hour), what is RTT, what is BDP?

p 25: C - Are Cubic and CUBIC the same thing?

p 26: A - what is a shared bottleneck?

p 27: C - Balia and BALIA

p 28: C - Lede and LEDE

p 28: A - "ordinary TCP-connection", then the other connections are extraordinary, magnificent?

p 28: A - "recipe for target 'world; failed openwrt" - I have no idea what that is

p 21: C - in the text Ubuntu 1 and in the diagram Ubuntu-1

p 33 and on: why is the code important or useful, especially not commented?

p 37: C - strong definition of "100 mbits/sec" followed on the next page by "100mbits/sec". ISO standards specify a space between the numerical value and the unit of measurement. Moreover mega is M not m (which is mili) and second is s not sec. Why do you need to rewrite the units??? 100 Mbps is a STANDARDISED notation, why do you make yours?!?

p 39: D - "However, irrespective of different bandwidth used, MPTCP is always better than TCP." - on multiple subflows versus one single flow of the same total theoretical data rate, otherwise obviously NOT TRUE!

p 41: A - "However, when compared to TCP, Multipath TCP achieves good performance irrespective of the delay." - GOOD is a relative term, what is good from a perspective of a person is not so good from the perspective of another person. We talk numbers in science.

Evaluation criterion:

The evaluation scale: 0 to 100 points (grade A to F).

3. Non-written part, attachments

85 (B)

Criteria description:

Depending on the nature of the FT, comment on the non-written part of the thesis. For example: SW work – the overall quality of the program. Is the technology used (from the development to deployment) suitable and adequate? HW – functional sample. Evaluate the technology and tools used. Research and experimental work – repeatability of the experiment.

Comments:

Very good work from the technical perspective, as stated in 2.

Evaluation criterion:

The evaluation scale: 0 to 100 points (grade A to F).

4. Evaluation of results, publication outputs and awards

80 (B)

Criteria description:

Depending on the nature of the thesis, estimate whether the thesis results could be deployed in practice; alternatively, evaluate whether the results of the FT extend the already published/known results or whether they bring in completely new findings.

Comments:

The results are interesting though more testing and comparisons should be done before it will gather momentum for a scientific work.

Evaluation criterion:

No evaluation scale.

5. Questions for the defence

Criteria description:

Formulate questions that the student should answer during the Presentation and defence of the FT in front of the SFE Committee (use a bullet list).

Questions:

N/A

Evaluation criterion:

The evaluation scale: 0 to 100 points (grade A to F).

6. The overall evaluation

70 (C)

Criteria description:

Summarize which of the aspects of the FT affected your grading process the most. The overall grade does not need to be an arithmetic mean (or other value) calculated from the evaluation in the previous criteria. Generally, a well-fulfilled assignment is assessed by grade A.

Comments:

Good overall work. Very good on the technical side, enough on the written side, on average good.

Signature of the reviewer: