COMP4337/9337 Securing Fixed and Wireless Network
Research Report

Term 1, 2020 (Draft)

Revised:
Released: 19th March 2020, draft version without submission instructions/deadlines.

Marks: **20 marks** (**10 marks** for Report + **10 marks** for video presentation and Q&A)

Note: Students will work in groups of 2 members. You can choose either research or the IoT Security analysis project but not both. If you have difficulties finding a partner, please send a request to assign you a partner. Also, feel free to use Forum to seek a partner. You should be able to collaborate with your partner remotely while maintaining the social distancing norms. Please get in touch with LIC if this presents a problem.
We regret to advise that the project using Wifi-penetration testing will be discontinued due to the current crisis as it may require face-face interaction. However, we will release the specs from last year and students who have borrowed equipment can try these in their own time for learning experience. We will assign a tutor to help you with your queries (or support via forum). However, this will not be marked formally.

The research project in this course requires a journal or a conference paper as a starting point. We shall call this your ***anchor paper***, since your project will be anchored around the topic of this paper. The anchor paper should satisfy the following five requirements (exceptions to these requirements may be granted in exceptional cases):

- It is published in an IEEE or ACM Journal, Transactions, or Conference Proceedings.
- The paper is at least as long as the equivalent of 9 pages in IEEE Transactions double-column format.
- The paper was published between **2012 - 2020**. This will allow you to find more recent papers related to anchor paper.
- The paper is relevant to Wired/Wireless/Mobile Network Security. We want to achieve breadth of knowledge via these reports/presentations.
- The paper presents new research activity and is not a tutorial paper, a magazine article, a survey or a review paper. However, an introduction of topic for wider audience should be included in the report and presentation.

Among the best sources for networking papers for this course are –

- Conferences: ACM Wisec, Usenix, NDSS, ACM CCS, IEEE S&P, ACSAC
- Journals: ACM TISSEC, IEEE Transactions on Information Forensics & Security, IEEE Trans. on Reliability Special Section on Trustworthy Computing

Electronic copies of articles are accessible over the Internet: the **IEEE Explore** link

takes you to the database of all IEEE journals and conference proceedings, and the link to the **ACM Digital Library** takes you to the database of all ACM journals and conference proceedings. UNSW has subscriptions to these digital libraries, so you can download papers from these resources while on campus. **Google Scholar** is also an excellent resource for searching for scholarly publications on the Internet.

Please make a special note of the fact that citation indexes such as **CiteSeer** and the **ISI Web of Knowledge** provide information on connections between publications, allowing one to easily establish which later documents cite which earlier documents. These are often extremely useful in academic research in understanding the chronological progress of an idea. UNSW provides free access to these indexes.

Students should form a group and select a paper for approval from LIC before midnight of 26th March by sending an email to eng.cse.comp4337@unsw.edu.au. Your email title should be "RESEARCH TOPIC SELECTION", you can send upto 3 choices with full citation and PDF of papers. You can also send a request by forming a group and ask LIC to assign a default topic. Those groups who don't have a paper selected by this time will be allocated a paper randomly. A final list of papers allocated to each group will be released on 30th March 2020. Please note that due to term teaching, we have firm deadlines.

Your research report should be made of the following two parts:

Report Marking Breakdown (10 Marks):

Part 1: Research Report

Part 1 of the project requires you to summarize and analyze the research done in the same area as that of your anchor paper and also present an overview of the current state of research in the field.

The breakdown of the marks allocation is provided below. The report should *explicitly and separately* answer each of the following questions:

- *Introduction (1.5 mark):* Introduce the research problem of your paper in summary form in your own words, don't copy from the paper itself.
- *Literature Review (1.5 mark):* Summarize and analyze the past research done in the same area as that of your anchor paper and also present an overview of the current state of research in the field. This report should include research done prior to the publication of your anchor paper as well as research done until today after the publication of your anchor paper.
- *What are the strengths of this work (2marks)* In your attempt to answer this question, you should verify the claims made in the paper as best as you can by looking at the related literature (i.e. work published before this paper), and your own knowledge. Are the results providing some new insights over state of the art (or disproving existing theory/results). Is the work based on sound research methodology? Have the results been explained clearly and show statistical significance (if measurements/data plots are provided). Are proofs of theoretical claims included?

- *Are there any weaknesses of this paper that you have not mentioned in your answers to the above questions? (2 marks)* Do not assume that published papers are always accurate and flawless. If you do discover flaws in the paper or just dubious statements, explain exactly where and why you think the authors may be wrong. In your answer to this question, you should describe the weaknesses, if any, and explain exactly what the authors could have done differently to improve the paper.
- *Are the ideas and results presented in this paper novel? (2 marks)* In your answer to this question, you should evaluate the novelty of the ideas/results presented in the paper. For example, is it *revolutionary* (i.e., opens a whole new area of research or has significant impact on research directions and engineering practice), or *significantly novel* (i.e., the paper's ideas and its approach depart significantly from earlier ideas presented by other researchers), or *incrementally novel* (e.g., the paper presents ideas that are an incremental but not a significant improvement over ideas presented by other researchers), or just *novel but trivial* (i.e., the paper presents ideas that are novel, but almost any smart individual working on this problem would have readily come up with the same ideas), or *not novel* at all (e.g., the paper's ideas and results have been published in another form elsewhere by other authors) or simply a case of *plagiarism*.
- *Presentation (1 mark):* This is to evaluate the non-technical aspects of your report. These include (i) your English grammar, (ii) logic and continuity in your report (for example, you should avoid, as far as possible, introducing a new thought and then, suddenly, switching the topic to a completely different and unrelated thought leaving the reader wondering why the first thought was introduced to begin with), (iii) coherence (i.e., the report should have a certain consistency in what it covers and not end up discussing a very large array of diverse topics), and (iv) how well you avoid rambling or monotony in your write-up and how well you avoid clichés and awkward expressions. Your report should be interesting to read and make a diligent effort to not bore the reader. The report should be logical progression of ideas. All statements and arguments should be clearly justified and properly cited.
- **Project Diary**: Each group is also required to attach a 1-page project diary (not counted in the 6-page limit) to the report. This diary should maintain a weekly log of activities conducted by each group and should explicitly indicate the part played by each team member in these activities. You may use any format (gantt chart, table, etc) for maintaining the diary. The diary is not marked. However, if the diary is not submitted, a penalty of 2 marks will be assessed. Please attach the diary at the end of the report. Do not submit it as a separate file.
- Always mention all the references and sources that you had to use to compile your report. Never write anything without clearly giving credit to the source of your information. Never list any paper or article in your list of references unless you have actually read that paper or article and understood it. You MUST include a minimum of 8 peer-reviewed IEEE or ACM journal/transaction/conference papers in your reference list. Web (e.g. Wikipedia) references will not be counted.
- While you will compose your report based on information you get from a variety of sources, you are expected to use your own words in your report and reflect your own understanding of the source material. The report *should not be a cut-and-paste job* from your references. This will be considered as plagiarism. The quality of your synthesis of material from all the sources, and your own comments on past

research in this area will carry a significant portion of the credit.

- The report should be written for an audience familiar with basic concepts in security (e.g 4337/9337 students who have done covered first 5-6 lectures). For example, there is no need to describe basic crypto mechanisms that is known from these lectures. The contents of this report, as far as possible, should come from your study of research papers and not basic textbook material or the IETF RFC documents.
- You are expected to read whatever textbooks or tutorial articles you may need to understand the research papers and develop expertise in the area.

NOTE: All students in the group will receive the same marks under the assumption that they have devoted equal effort in completing the report. If there is a reason that a particular student should receive lower marks because of lack of sufficient contribution, then the LIC should be informed about this.

Submission Instructions

You must write the names and e-mail addresses (university address) of all group members and the title of the anchor paper on the first page of each report.

Project report should be sent to eng.cse.comp4337@unsw.edu.au by 17:00 pm, 24thApril. The subject of email should be "REPORT for …. INSERT YOUR PAPER TITLE…."

Only one person (the designated correspondent) in the group should submit the reports, presentation slides. The names and e-mail addresses of all group members and the title of the anchor paper should be included in all e-mail correspondence.

Part2: Research Presentation (10 marks)

Each group is required to upload a video presentation (can provide a URL which is accessible to the class) of their anchor paper. The presentation will be available to the class for comment. Each presentation should last for 12 to 15 minutes. There is no fixed format. We don't expect fancy video editing. Simple set of annotated foils (with audio and or video of speakers) would suffice. No marks are awarded for fancy features; you should focus on communicating ideas in a simple and concise way. We will provide more instructions on Q&A. Each group doing research must ask questions to other research groups. Please note that quality of questions asked will influence your group's marks on Q&A. All other students from the class are free to ask any question to other groups. In general, your presentation (and slides) should be structured as follows:

- Introduction: Introduce the audience to the research topic that is the focal

point of your anchor paper. Provide motivation for why the problem being addressed is important.

- Related Work: Summarize prior work in this area. Identify open issues raised in previous literature. Clearly discuss how the work presented in the anchor paper differs from the prior work. You may additionally mention about future research developments (if any) that have taken place since the paper was published (this is optional).
- Research Contributions: Provide an overview of the key concepts presented in the paper. Present any evaluations/simulations/experiments that were presented in the paper to demonstrate the effectiveness of the proposed ideas.
- Critique and Conclusions: You should end with your own thoughts on the quality of the research presented in the paper. What are the key strengths of the paper? What are the weaknesses? How can the work be extended?

You should aim to create about 15 slides (expecting to roughly spend 1 minute on each slide).

Submission:
You should upload your video on a server like youtube/vimeo (or any other service) and provide a URL. This will be linked in Moodle for comment by rest of the class.
The URL of your video should be sent to eng.cse.comp4337@unsw.edu.au by 17:00 pm, 23rd April. The subject of email should be "URL for …. INSERT YOUR PAPER TITLE…."

Groups should post questions by 26th April 17.00 hours and allow for up to 24 hours for response from the presenters. All Q&A should be finished by 17:00 pm, 27thApril.

Penalty:

Groups will receive 0 marks if a working presentation URL are not submitted on time.

Marking Breakdown (10 marks)
LIC will look at technical quality of presentations, participation in terms of asking question and answering questions and allocate marks out of 10.

Following should be used to form your mean opinion score.

- *Technical Clarity of Presentation :* This evaluates whether your presentation can be understood without significant effort by a reasonably competent individual who has knowledge of most of the basic concepts in networking. It will evaluate if you are clearly and logically presenting ideas in the presentation.
- *Critique :* This will evaluate whether you can present a critical appraisal of the ideas presented in the paper.
- *Presentation Skills:* This is to evaluate your presentation skills i.e. the non-technical aspects of your talk. These include: enthusiasm, ability to engage the

audience, diction, grammar, style, etc.

- *Question and Answers:* This is to evaluate if you can adequately answer the questions raised during the Q&A session.

Late Penalty

Late penalty will be applied as follows:

- 1 day after deadline: 20% reduction
- 2 days after deadline: 40% reduction
- 3 or more days late: NOT accepted

NOTE: The above penalty is applied to your final total. For example, if you submit your report 1 day late and your score on the assignment is 10, then your final mark will be 10 – 2 (20% penalty) = 8.

Policy on Academic Honesty

Each group is expected to complete the research projects independently; it is not acceptable to copy another group's work or to copy sections from any other source without attribution. Barring action on flagrant violations, an honor system will be assumed. The following is a partial list of activities that will be considered to constitute academic dishonesty:

- Presenting the work of another person (fellow student or not) as your own.
- Using or attempting to use the work of another student or providing your work to other students.
- Failing to take reasonable measures to protect your work from use by other students.
- Plagiarizing sentences from references with or without citations. Note that, when you present ideas from other sources (papers, magazines, etc), you MUST use your own words to express these ideas.

Penalties for academic dishonesty will be strictly enforced and will include a lowering of the mark or a failing mark in the course.

Sample Papers from past reports (these are not available in 20T1):

1. Secure data retrieval for decentralized disruption-tolerant military networks. IEEE/ACM Trans. Netw., 22(1):16-26,
2. Worry-free encryption: functional encryption with public keys. In Proceedings of the 17th ACM conference on Computer and communications security (CCS '10). ACM, New York, NY, USA,463-472.
3. J. Zhang, R. Perdisci, W. Lee, U. Sarfraz and X. Luo, "Detecting stealthy P2P botnets using statistical traffic fingerprints," *Dependable Systems & Networks (DSN), 2011 IEEE/IFIP 41st International Conference on*, Hong Kong, 2011, pp. 121-132.
4. End-to-end transport-layer security for Internet-integrated sensing applications with mutual and delegated ECC public-key authentication IFIP Networking Conference, 22-24 May 2013, Brooklyn, NY, USA, 1-9.
5. Smartphones as Practical and Secure Location Verification Tokens for Payments - Claudio Marforio, Nikolaos Karapanos, Claudio Soriente, Kari Kostiainen and Srdjan Capkun in NDSS 2014.

END OF SPECIFICATION (PLEASE READ CAREFULY)