

## FIT1047 Introduction to computer systems, networks and security – S2 2024

### Assignment 3 – Networks

<b>Purpose</b>	Students will record data from a real-world wireless network and demonstrate that they can analyse it, identify its properties and potential issues. Students also need to analyse Internet traffic and identify servers, clients and protocols used. The assignment is related to Unit Learning Outcomes 5 and 6.
<b>Your task</b>	Part 1a: Submit your reflections. Part 1b: You need to submit a report with your findings regarding the analysis tasks. The instructions below contain concrete questions you should answer in your report. Part 2: In-Person quiz via Moodle. (More details will be provided later in Moodle.)
<b>Value</b>	<b>30%</b> of your total marks for the unit (10% for Part 1; 20% for Part 2) The assignment is marked out of 50 marks.
<b>Word Limit</b>	600 words for Task 1.2, no word limits for the remaining tasks
<b>Due Date</b>	<b>Part 1a &amp; 1b - Moodle submission: 11:55 PM Friday 20 September 2024</b> <b>Part 2 - In-person quiz: Week 12 Your Officially Allocated Applied Session</b>
<b>Submission</b>	<ul style="list-style-type: none"> <li>• Via Moodle assignment submission (Part 1a &amp; 1b) - 2 pdf files (one for each part)</li> <li>• Turnitin will be used for similarity checking of all submissions.</li> <li>• <b>Via Moodle quiz submission (Part 2) during your allocated Officially Applied Session in Week 12 (in-person attendance required)</b></li> <li>• In this assessment, you must <b>not</b> use generative artificial intelligence (AI) to generate any materials or content in relation to the assessment task.</li> </ul>
<b>Assessment Criteria</b>	See rubric
<b>Late Penalties</b>	<ul style="list-style-type: none"> <li>• 5% deduction per calendar day or part thereof for up to one week</li> <li>• Submissions more than 7 calendar days after the due date will receive a mark of zero (0) and no assessment feedback will be provided.</li> </ul>
<b>Support Resources</b>	See Moodle Assessment page
<b>Feedback</b>	Feedback will be provided on student work via: <ul style="list-style-type: none"> <li>• general cohort performance</li> <li>• specific student feedback ten working days post submission</li> </ul>

## INSTRUCTIONS

### Part 1a: Reflection (Hurdle - you MUST submit it in order to pass this assignment!)

Complete your reflection activities in **Week 7 to Week 9** Ed Lesson and copy/paste them into a pdf file. **Each week the reflection must have at least 100 words** (relevant and meaningful to the specific week).

**Failure to submit all relevant week's reflections (missing all submissions or incomplete submissions) will result in your assignment 1 having a maximum mark of 49% only.** For example, if the overall combined mark is 61/100, it will be scaled to 49/100. If the overall combined mark is 44/100 then it will remain as 44/100.

You may use this template:

[https://docs.google.com/document/d/18UIEJQeyarYW1pl8oDEaf--ubCdJ5LDf-9\\_jSLbGxrE/e\\_dit?usp=sharing](https://docs.google.com/document/d/18UIEJQeyarYW1pl8oDEaf--ubCdJ5LDf-9_jSLbGxrE/e_dit?usp=sharing) to write down your reflection.

**Submit your reflection for this part (Part 1a) as a PDF file in Moodle.**

### Part 1b: WLAN Network Design and Security (25 marks)

For this part of the assignment, you will perform a real-world WLAN site survey. Your task is to produce a map of part of a building that gives an overview of the wireless networks that are available, as well as an analysis of the network.

**What you will need:** a WiFi-enabled laptop (some smartphones also work, see below), and a place to scan. You have to perform a survey of parts of the Monash Clayton / Malaysian campus.

You have to complete two tasks (a survey and a report).

Task 1.1: Survey (9 marks)

#### **For Australian campus cohort:**

Create a map<sup>1</sup> and survey of (a part of) the following building on our Clayton Campus:

- Students with student number ending with "0": Hargrave Andrew Library
- Students with student number ending with "1": Sir Louis Matheson Library

<sup>1</sup> An example map is given in the Appendix A. You may use any drawing tool to create a map (excluding heatmap generated by survey tools) or reuse existing floor plans with reference.



- Students with student number ending with “2”: Learning and Teaching Building
- Students with student number ending with “3”: Menzies Building
- Students with student number ending with “4”: David Derham Law Building
- Students with student number ending with “5”: Learning Village
- Students with student number ending with “6”: Biomedical Learning and Teaching (BLTB)
- Students with student number ending with “7”: Mathematics & EAE
- Students with student number ending with “8”: Campus Centre
- Students with student number ending with “9”: Woodside Building

(You can find the location of the building [here](#) - Choosing Clayton campus)

**For Malaysian campus cohort:**

Create a map<sup>1</sup> and survey of (a part of) any building of your own choice on our Malaysian Campus.

(You can find the location of the building [here](#) - Choosing Kuala Lumpur campus)

A simple floor plan will be sufficient, it does not have to be perfectly to scale. See Appendix A for an example. You may also use the Monash digital map as a basis. The map should be labelled with all relevant information (e.g. dimensions, doors, walls and material such as wood or concrete or glass, if used for the discussion). **Your survey should cover an area of at least 60 square metres (e.g. 6x10 metres, or 4x15, or two storeys of 6x5 each).** Be sure to take the analysis in Task 1.2 into account, by designing your survey to include walls, doors etc. it will be easier to write something interesting in Task 1.2.

Furthermore, your survey must include at least three WiFi access points (APs). If you want, you can create an additional AP with your phone (using “Personal hotspot” or “Tethering” features).

For the survey, use a WLAN sniffing tool (see below) in at least eight different locations on your map. For each location, record<sup>2</sup> the technical characteristics of all visible APs. Depending on the scanning tool you use, you record features such as the network name (SSID-Services Set ID), MAC Address (BSSID- Basic Services Set ID), signal strength (shown in multiple formats- %, dBm, graphs etc.), Signal to Noise Ratio (only captured in Apple Computers), 802.11 version(s) supported, band (2.4 or 5 GHz) and channel(s) used.

Add the gathered data from the survey into the map of the covered area. On the map you indicate the location of the access points and the locations where you took measurements. For the access points, use the actual location if you know it, or an approximation based on the observed signal strength (e.g. if you don’t know exactly where it is).

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<sup>2</sup> Take screenshots of survey data at each survey location, and include the screenshots of raw data in the Appendix of your report.

For each measurement point, you either add the characteristics directly into the map, or create a separate table with the details. You can submit several maps if you choose to enter data directly into the maps, or a single map if you use additional tables. Create the map yourself, do not use the mapping features available in some commercial (i.e., paid) WLAN sniffing tools.

Remark:

- We recommend you to go to your allocated building (for the purpose of doing this assignment) before 6pm on weekdays. Some buildings may have access control after 6pm or on weekends. Also, as per Monash policy, this unit (a year one unit) does not schedule any on-campus activities after 6pm. Therefore we do not recommend you to conduct any on-campus in-site activities after 6pm or on any weekends.
- Do not enter any area with access control (e.g. Woodside Building Room G13 Cybersecurity Lab). You do not need to enter those areas to conduct your assignment. You can choose other alternative locations inside or outside the building instead.
- In any circumstance, if there are some teaching activities or events inside any classroom, you should not enter the classroom to disturb the participants inside. You should wait until they have left the room, or find an alternative location for your analysis.
- Even if you cannot enter any classroom or any room inside the building, you can still take the WiFi measurement in the open area or outside the building. Please refer to Appendix B for an example.
- The Monash digital map does not contain any scale. You may use any other tools (e.g. any measurement app in your smartphone) or use Google Map (which contains measurement scale) to compare with the Monash digital map for dimension measurement.

### Task 1.2: Report (16 marks)

Write a report (word limit 600) on your observations analysing the data collected in the previous step (Task 1.1). Your analysis should investigate the following aspects:

- Channel occupancy: Are different access points competing on the same channels? Are they configured to use overlapping channels? Could the configuration be improved?  
(4 marks)
- Attenuation from walls, doors etc.: How do different materials affect signal strength and/or noise? Can you notice a difference in attenuation for different APs?  
(4 marks)
- Coverage: Do the access points sufficiently cover the desired area? Could the placement or configuration be improved?  
(4 marks)
- Any other aspect of your own choice. Here are a few suggestions to pick one or more:
  - measure the attenuation caused by your own body
  - determine the overlap that has been implemented to enable roaming

- describe how you interpolated the locations of access points from the signal strengths
- measure how interference affects download speeds

Describe your findings and explain them with some technical detail (i.e., not only say what you found, but also how you performed the analysis or why you think the network is behaving that way).

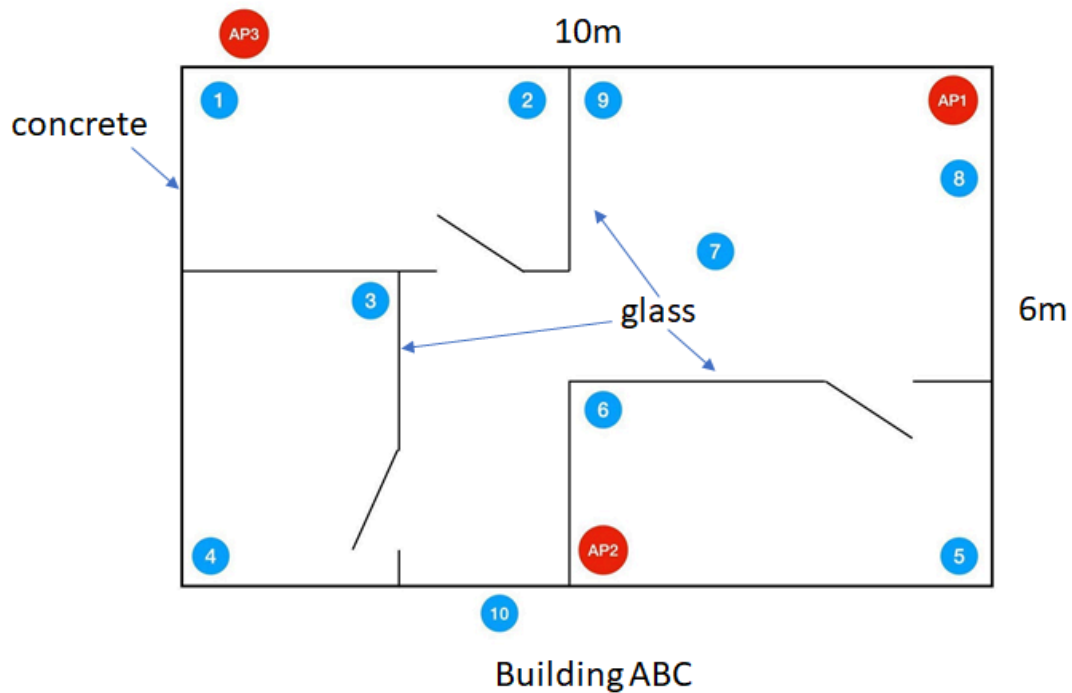
(4 marks)

**Tools:** You can use e.g. Acrylic Wifi (<https://www.acrylicwifi.com/en/>) for Windows, NetSpot (<http://www.netspotapp.com>) for macOS and Windows, and LinSSID or wavemon for Linux. If you have an Android smartphone, apps like Wifi Analyzer can also be used. On iOS, WiFi scanning apps do not provide enough detail, so iPhones may not be suitable for this task.

For drawing the site maps, any drawing tool should work, for example LucidChart, or even presentation tools such as PowerPoint, Keynote or Google Slides. Scans of hand-drawn maps are **NOT** acceptable.

**Submit your work for this part (Part 1b) as a PDF file (independent of Part 1a) in Moodle.**

## Appendix A: Sample map showing APs and survey location details



Appendix B: Even if you cannot enter a classroom (e.g. G02 and G03 below), you can still take the reading inside (e.g. 1, 2) and outside the building (e.g. 3, 4, 5) to conduct this assignment.

