

Project plan.....	2
1. Project title	2
2. Project Overview (Tomiris)	2
3. Project scope (Amelia).....	2
4. Project objectives (Tim).....	2
5. Stakeholders (Tomiris)	3
6. Project Team (Amelia).....	3
7. Timeline (Tim).....	4
8. Research (Sophia).....	6
9. Proposed Solution (Sophia)	6
10. Work Breakdown Structure (Sophia)	7
11. Resource Plan (Tim & Tomiris)	8
12. Risk Management (Tim).....	9
13. Communication plan (Tim)	10
14. Quality Management (Sophia).....	11
15. Monitoring and evaluation (Amelia)	12
16. Budget (Tomiris).....	13
17. Approval Process (Tomiris).....	13
18. Change Management (Amelia).....	13
19. Closure and Evaluation (Amelia)	13
20. LSEP (All Members)	14
LSEP References	17
21. AI Usage Statement.....	17
22. Ownership Confirmation	18
Project approval	19

Project plan

1. Project title

Network Traffic Profiler Dashboard

2. Project Overview (Tomiris)

This project aims to develop an interactive dashboard that helps users understand their network traffic by uploading PCAP files. The focus lies on training an AI model that can detect normal and abnormal activity, classify different types of traffic, and clearly label them. The dashboard will then display the results through simple visuals and easy-to-read summaries.

3. Project scope (Amelia)

The project focuses on developing a network traffic analysis system that leverages machine learning to classify and visualize network activities. The final product will include several key components. Data input will allow legal users to upload a network traffic PCAP file. Data processing will extract essential features such as the number of packets, average packet size, session duration, and transport protocol. The data will then be cleaned, filtered, and structured into an analysis-ready CSV dataset. Machine learning model training will involve loading the pre-processed dataset to classify network activity types into known activities or anomalies. Finally, dashboard visualization will present traffic statistics and machine learning classification results in a clear and intuitive format.

The system will be designed for small and medium-sized enterprises (SMEs) with up to 50 users as well as supporting the upload and analysis of a single PCAP file at a time to maintain manageability within the defined scope. Future development may extend its scalability to support for large organizations and enable multi-file ingestion. Due to hardware limitations and the unavailability of large-scale datasets, the project will operate with limited machine learning training capabilities. The project also explicitly excludes real-time packet capture and processing of files larger than 500MB, although these features could be considered in future iterations.

4. Project objectives (Tim)

- Develop a system that ingests PCAP files and extracts flow level data
- Build an interactive dashboard that can display flow level data using interactive charts and tables

- Develop an AI model capable of detecting normal and abnormal network activity and classifying different types of traffic.
- Implement the AI's results into the dashboard through clear visuals and summaries.
- Prepare the dashboard and AI model so they can be integrated into a larger project: an AI-driven firewall intrusion detection system designed for small to medium-sized businesses.

5. Stakeholders (Tomiris)

Team Members:

The main group responsible for designing, developing, and testing the system. Includes all four team members who contribute to coding, planning, documentation, and quality assurance.

Client (Plymouth City Council): Tomek Bergier

Sprint Leader: Fatma

Oversees individual sprints, ensuring tasks are completed efficiently and on time, coordinating the team to achieve sprint goals.

End Users:

Individuals who will use the final dashboard to analyse PCAP files and detect abnormal network activity.

Future Developers:

The group who will integrate this project into a full AI-driven firewall/IDS. They depend on clear documentation, clean code, and stable foundations.

6. Project Team (Amelia)

Amelia Lee Sze Yai

- **Team Leader:** Coordinates workflow, monitors To-Do list, removes bottlenecks, and manages the Kanban board.
- **Innovator/Explorer:** Brings in creative ideas and explores new approaches to tasks.
- **Developer:** Responsible for programming and testing the product.

Relationship: Team members coordinate with Amelia for day-to-day workflow and task organisation.

Sophia Krasowski

- **Product Owner:** Defines the product vision, sets priorities, and clarifies requirements.

- **Architect:** Designs the system structure, including tech stack, folder layout, and key technical decisions.
- **Technical Expert:** Supports the team in solving technical challenges and choosing effective solutions.

Relationship: Prioritises tasks, assigns coding responsibilities, and works with the Team Leader and Scrum Master to plan workloads and keep requirements clear.

Tim Birtles

- **Scrum Master:** Ensures Scrum and Agile processes are followed; leads stand-ups and sprint planning.
- **Developer:** Contributes to coding and testing.
- **Independent Tester/Auditor:** Responsible for thorough testing to identify issues early and ensure they are resolved, helping the product meet expected quality standards.

Relationship: Works closely with all team members to support collaboration, ensure Scrum practices are followed, and keep the development process running smoothly.

Tomiris Ashim

- **Secretary:** Takes meeting minutes and handles team communication and documentation.
- **Independent Tester/Auditor:** Responsible for thorough testing to identify issues early and ensure they are resolved, helping the product meet expected quality standards.
- **Innovator/Explorer:** Brings in creative ideas and explores new approaches to tasks.

Relationship: Supports the team by maintaining documentation and assisting wherever needed.

7. Timeline (Tim)

General Timeline:

Sprint 1 [3 Nov – 15 Nov 2025]

Week 1: Defining team Roles, Project scope, Backlog establishment and Task assignment

Week 2: Tech stack and solutions research, Data abstraction, Preprocessing and Machine learning research.

Sprint 2 [16 Nov – 30 Nov 2025]

Week 3: Implement PCAP file upload / input system

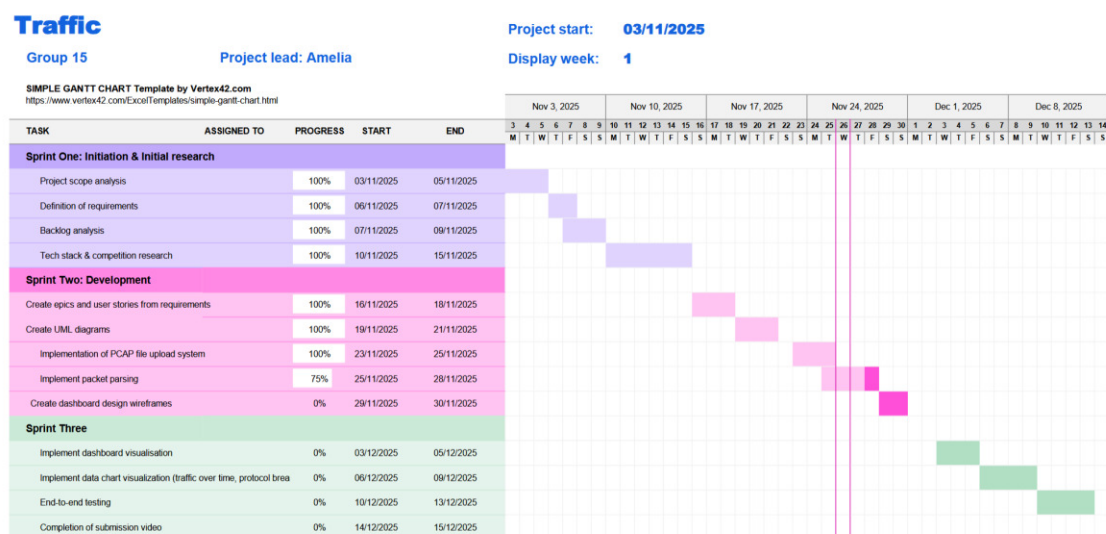
Week 4: Implement basic packet parsing (conversion of raw packets into structured records), Abstraction of relevant information from packets, validation of data and subsequent data cleanup.

Sprint 3 [1 Dec – 15 Dec 2025]

Week 5: Dashboard wireframes, Implementation of dashboard/ data chart visualisation

Week 6: Complete prototype, End-to-end testing, Interim Video filming and submission

Gantt Chart (Updated 26/11/2025):



From Semester 2 Onwards:

- Design and Implementation on ML/AI model training
- Dashboard enhancement with Evaluation Metrics

Backlog in Trello:

WEEK 1: team roles, back log establishment, task assignment
WEEK 2: research on tech stack, data analysis etc.
WEEK 3: implement PCAP upload/input
WEEK 4: implement basic packet parsing (converting raw packets into structured records) and get relevant information from packets
WEEK 5: simple dashboard visualisation
WEEK 6: complete prototype, video submission

8. Research (Sophia)

Existing tools for network traffic analysis include traditional IDS solutions like Snort, Suricata, which focus on live monitoring and signature-based detection. While powerful, they require complex setup and are aimed at experts.

Tools for displaying network statistics, such as Arkime and Malcolm, support PCAP uploads and implement dashboard views, but they require network understanding and require to be set up.

A simpler tool that allows to upload a PCAP file and display stats on a simple dashboard on a web UI is A-Packets, however it doesn't classify and differentiate between activity within the data.

Our project is therefore unique, because it fills the gap between expert platforms and overly simple visualisation platforms, by combining:

- a direct PCAP file upload.
- an AI model that classifies normal vs abnormal traffic and labels activity types.
- a user-friendly dashboard aimed at non-experts.
- a very simple tech stack, built using minimal open-source Python libraries, making it lightweight, accessible, and easy to integrate into larger systems.

9. Proposed Solution (Sophia)

The Network Traffic Profiler Dashboard is developed using modern, well-supported Python libraries to ensure simplicity, maintainability, and effective performance. The dashboard is implemented using Streamlit, allowing for easy local deployment, and

the project leverages a structured approach to parsing, processing, validating, and visualizing network traffic data.

Development Technology Stack (Python Libraries):

- PCAP Parsing & Feature Extraction: pyshark, NFStream
- Feature Storage: pandas (CSV format)
- Dashboard Development: Streamlit
- Data Visualization: Plotly
- Testing: pytest
- Machine Learning: scikit-learn

The project workflow for sprint 1 to 3 is structured into four main components with their solutions.

1. PCAP Parsing and Feature Extraction: Raw PCAP files are loaded using PyShark or NFStream. Key network features are extracted and returned as a Pandas DataFrame [youtubestreamandlike.pcap](#)
2. . Outputs include a sample JSON file and a documented list of available features.
3. Dataset Building: Extracted features are aggregated from raw datasets of normal and abnormal traffic. Data is automatically labelled based on folder structure and saved in CSV format for analysis.
4. Validation and Schema Design: Dataset rows are validated for required columns, data types, and numeric ranges. Validator scripts check for missing values and anomalies, ensuring data quality. Outputs include field schema documentation and validation rules.

In the following sprints in semester 2, machine learning will be implemented.

10. Work Breakdown Structure (Sophia)

1. Project Management (Pre-Sprint)

- 1.1 Project overview
- 1.2 Trello setup
- 1.3 GitHub repository setup
- 1.4 Discord server setup
- 1.5 Role assignment

2. Requirements & Design (Sprint 1)

- 2.1 Individual research

- 2.2 Requirements definition
- 2.3 Project timeline creation (GANTT chart)
- 2.4 Project plan documentation
- 2.5 Design document creation
- 2.6 Tech stack definition
- 2.7 Initial folder structure setup

3. PCAP Processing Pipeline (Sprint 2)

Team A: `extract_features.py`, `build_dataset.py`

- 3.1 Read PCAP files
- 3.2 Extract key traffic features (packet counts, protocols, sizes, domains, IPs)
- 3.3 Save extracted data into CSV format (ready for ML)

Team B: `process_dataset.py`, `README.md`, `requirements.txt`, `/tests`

- 3.4 Define dataset schema and validation rules
- 3.5 Create basic validation script (check missing values, invalid numbers)
- 3.6 Add dependencies file including python libraries
- 3.7 Add basic tests

4. Dashboard Implementation, working MVP and interim submission (Sprint 3)

`dashboard.py`

- 4.1 Set up Streamlit layout (based off of wireframes)
- 4.2 Add PCAP upload interface
- 4.3 Display statistics in simple charts
- 4.4 Test workflow and ensure everything is working
- 4.5 Record video for interim submission
- 4.6 Interim submission

11. Resource Plan (Tim & Tomiris)

The Resource Plan outlines the human, technical, financial, and data resources required to complete the project effectively.

Human Resources

- Project Team Members: Roles and responsibilities as defined in Section 6
- Client Involvement: Availability for requirements meetings, Providing feedback throughout development
- Lecturer Support: Academic and technical guidance, Oversight of project milestones, Evaluation and quality assurance

Technical & Equipment Resources

- Hardware: Personal laptops/workstations, Reliable internet connection
- Project Storage and Repository: GitHub repository for code, documentation, reports, meeting minutes, and version control

Development Technology Stack (Python Libraries):

- PCAP parsing: pyshark
- Feature extraction: nfstream
- Data storage (CSV): pandas
- Dashboard development: Streamlit
- Data visualisation: Plotly
- Testing: pytest
- Machine Learning: scikit-learn

Data Resources:

- Sample PCAP datasets provided by the client
- Additional self-generated or publicly available PCAP datasets
- CSV data files for model training, dashboard visualisation, and analysis.

Financial Resources:

- As this is a student project, development is free for both the team and the client.
- All tools, libraries, and frameworks used are open-source and cost-free.

Potential Future Maintenance Costs (beyond project scope):

- Dashboard hosting
- Optional cloud compute resources
- Security patches and updates
- Integration with the client's firewall system

12. Risk Management (Tim)

Development risks

Data loss: Employed use of GitHub version control - Regular repository commits, allowing for reversion to a working commit if code becomes unstable.

Missing or unclear documentation: Update the README whenever new features are added, comment the implemented code, explain code to each other.

Changes in requirements: Adapt using Agile methodology, avoid hardcoding.

Human / Team Risks:

Team members dropping out or being absent: Maintain clear documentation of tasks, assign backup roles, and track progress so others can take over if needed.

Uneven workload distribution: Hold weekly meetings (scrum & standup meetings) to review task allocation; redistribute tasks fairly to avoid burnout.

Miscommunication within the team: Use a shared communication platform (Discord, Outlook) and set clear channels for updates and questions.

Decision-making delays: Assign clear responsibility for decisions (member roles) and document decisions to avoid repeated discussions.

Conflict or disagreements: Establish team norms for conflict resolution, encourage constructive feedback, and escalate unresolved issues to the team leader.

13. Communication plan (Tim)

Discord Server Within the Team: Used for overall project organization and quick communication among team members.

Trello Board Within the Team: Tracks task division and progress for each team member on a weekly basis.

Weekly Stand-up Meetings Within the Team: Held on Mondays and Thursdays, with Saturdays as additional meetings if needed. These meetings primarily cover: Progress made (tasks completed), Upcoming tasks (what to do next), Issues or challenges encountered, Division of subtasks among team members

Bi-Weekly Sprint Review Meetings with the tutor (Fatma): Held on Mondays from 12:40 PM to 1:00 PM at Seamstons Building, SMB 100. Key discussion points include progress made during the current sprint, any issues or blockers, updates and planning for the next sprint

Weekly Client Meetings with the client (Tomek Bergier): Held on Thursdays in person at Portland Square, Room A03, or via Teams if necessary. General meeting objectives includes sharing work progress to ensure alignment with client requirements, confirming that the next steps planned meet client expectations and discuss any considerations, concerns, changes that need to be made.

14. Quality Management (Sophia)

Code Quality

- Abstraction by splitting up code in smaller files.
- Consistent formatting and naming across Python files.
- Catch errors early through exception handling.

Version Control Practices

- Regular GitHub commits on separate branches.
- Team members review each other's code before merging into main branch.
- Clear commit messages to track and understand changes.

Sprint Reviews

- After each sprint, review what worked and what didn't.
- Adjust tasks and improve code where necessary.
- Make sure each sprint ends with a stable and working version of the system.

Testing

- Unit tests for critical functions (e.g., feature extraction, dataset processing).
- Test PCAP parsing with several sample files to ensure stability.
- Test the dashboard manually to confirm that uploads, charts, and outputs work correctly.
- Test the ML model after training, ensuring predictions are accurate.

UI/UX principles

- The dashboard should be simple, clean, and easy to navigate.
- Text outputs and charts must be readable and clearly labelled.
- Errors (e.g., invalid PCAP file) should be clearly displayed.

Documentation

- Up-to-date README with installation steps and usage instructions.

15. Monitoring and evaluation (Amelia)

Project progress will be monitored through consistent communication, structured Agile practices, and performance indicators. The following methods are used to ensure the project remains on track and aligned with the client expectations:

Client Check-ins: Weekly meetings with the client to gather feedback, update progress, and ensure requirements are being met.

Gantt Chart Tracking: Ensuring that each sprint milestone is achieved according to the project timeline.

Sprint Monitoring: Ensuring that each sprint meets its defined goals and deliverables.

Team Stand-up Meetings: For the team to track progress, identify blockers, and plan immediate next steps.

Requirement Alignment: Continuous review of project requirements to confirm that all development aligns with agreed features and constraints.

Peer Cross-Checking: Team members regularly review each other's work to ensure accuracy, quality, and consistency.

Quality of Data Output: Monitoring the integrity and accuracy of extracted features and ML outputs.

Continuous & Meticulous Testing: Using both normal and abnormal traffic data to evaluate and refine AI performance, while applying consistent and meticulous testing during each sprint to maintain quality.

These Key Performance Indicators (KPIs) will be used to measure project progress and team effectiveness:

Sprint Goal Completion Rate: Achieve $\geq 80\%$ completion of planned sprint tasks on time.

Task Progress Adherence: Achieve a target of $\geq 90\%$ of tasks that is being updated and progressed through "To Do," "In Progress," and "Done" on the Trello board according to the planned timeline.

Team Communication Efficiency: Maintain $\geq 90\%$ attendance and active participation in stand-ups, sprint reviews, and team meetings.

Issue Resolution Rate: Resolve a $\geq 85\%$ of identified issues and challenges within the same sprint which they are identified.

16. Budget (Tomiris)

This project is designed to be low-cost, with a strong focus on using open-source technologies and freely available tools. Because the system is built entirely with Python and community-maintained libraries, there are no licensing fees or commercial software costs involved.

17. Approval Process (Tomiris)

Clear and consistent communication with the client will be maintained throughout each sprint via email and weekly client meetings. The main areas requiring client approval during the project includes Project Requirements, Milestones, Design/Architecture, and the Final Product.

Relevant documents, including links or files for review, will be sent to the client via email and discussed during the client meetings. Approvals will be properly documented and acknowledged using a combination of email, meeting discussions, and meeting minutes to ensure clarity and traceability.

All approvals will be confirmed through written acknowledgment, either via email or signed documents, to prevent misunderstandings. Any changes requested by the client will be reviewed and formally approved before implementation, ensuring alignment with client expectations throughout the project lifecycle.

client's approval/signoff*

18. Change Management (Amelia)

Our agile approach allows the team to respond effectively to evolving needs.

1. Record the change request
2. Evaluate the impact on work and timeline
3. Approve or decline the change
4. Update sprints and Trello
5. Implement the change
6. Review and document the results

19. Closure and Evaluation (Amelia)

Project Closure:

- Conduct thorough end-to-end testing to verify that the final product is fully functional and meets all specified requirements
- Ensure all project objectives, requirements, and deliverables are fully completed, verified against the project specifications, and finalised.
- Record all client approvals, including signed UAT forms or endorsement letters)

- Finalise all documentations (reports, code, design diagrams, presentation materials, and meeting minutes) and ensure they are complete, properly formatted, accessible, and stored in the GitHub repository.
- Carry out a formal client handover, including: A walkthrough meeting, Provision of all relevant files, Delivery of a client instruction manual (installation, usage, troubleshooting)
- Prepare all final presentation materials, including the project poster, slides, team member contribution form, and demonstration video for the showcase.

Post-Implementation Review:

- Hold two review meetings: One involving both the client and project team, One internal review within the project team.
- Compare actual project outcomes against initial objectives, success criteria, and KPIs.
- Identify any unresolved issues, outstanding tasks, or opportunities for future development.
- Gather feedback from both the client and project team on the project process, deliverables, and overall performance.

Lessons Learned

- Document key successes and challenges encountered during the project lifecycle.
- Record insights on what worked well and areas needing improvement in planning, execution, teamwork, and communication.
- Provide recommendations for future projects, including technical, managerial, and procedural improvements.

20. LSEP (All Members)

Legal Compliance (Tim Birtles)

GDPR & Data protection

- The tool is designed to be an offline analysis system for user supplied network Packet Capture (PCAP) files. This means that the developers are not responsible for the storage of input and output data.
- “‘Personal data’ means any information relating to an identified or identifiable living individual” (Data Protection Act 2018, 2018). This means the application may process information that constitutes ‘personal data’. To ensure the application is not unlawfully processing personal data, users are required to

confirm that they possess lawful authority to upload and process the data, before analysis can begin.

- Additionally, the application does not process or save personally identifiable information such as the raw payload of packets, which could contain sensitive information.

Ethical Guidelines (Amelia Lee Sze Yai)

Bias & Fairness

- Training datasets (PCAP data) will be reviewed to prevent bias, ensuring balanced representation of normal and abnormal traffic.

Data Confidentiality:

- All PCAP files are handled securely and legally
- Uploaded files are processed temporarily and not stored permanently unless explicitly authorised.
- Team members are to ensure that data is not shared or exposed outside the project team

Transparency:

- Documentation will clearly describe what the system can and cannot detect.
- Misinterpretation of data will be minimised by providing clear explanations in the dashboard.
- Users will be informed of the AI model's limitations and the scope of the analysis.

Avoidance of Harm

- The system will not be used for surveillance, tracking individuals, or malicious purposes.
- Ethical disclaimers will inform users of proper, responsible usage.

Social Impact (Tomiris Ashim)

Digital Awareness & Education

- Helps non-technical users understand how everyday network activities generate analytical data.
- Visualisations make complex traffic patterns accessible, increasing awareness of data visibility, privacy, and responsible digital behaviour.
- Supports basic digital literacy by showing how raw traffic can be transformed into meaningful insights.

Support for SMEs & Learning Environments

- Provides an accessible tool for small and medium-sized organisations that lack specialised cybersecurity resources.
- Enables analysis of a PCAP file without advanced infrastructure, supporting training and introductory research.
- Encourages more informed security practices within smaller organisations and academic settings.

Limitations & Realistic Impact

- The system is not designed for large-scale enterprise monitoring or real-time traffic capture.
- Social impact lies primarily in awareness, education, and demonstrating concept feasibility rather than full threat detection.

Professionalism, risks, sustainability, and continuity (Soph)

Following the Software Engineering Code of Ethics written by Gotterbarn, Miller and Rogerson (1997), our project ensures professionalism by:

Development practices

- Accepting full responsibility for the software and its outcomes (Section 2.09).
- Documenting the project and ensuring clear communication with the client as well as the client's approval (1.01).
- Using structured development methodologies such as Agile and Scrum (Section 1.05).
- Using data from legal sources and in authorised ways by citing external sources (Section 1.11).
- Following coding industry standards (Section 1.15).
- Reviewing each other's work (Section 7.01).
- Continuous improvement of abilities (Section 8).

Risks

- Informing the user about correct usage to avoid misinterpretation of results by disclosing any potential dangers, risks, or limitations to the user (Section 2.01).
- Ensure errors in the code are detected and corrected (Section 6.06).

Sustainability

- Approving the software only when it meets safety, testing, and quality requirements (Section 2.02).
- Using lightweight, widely supported open-source tools, minimising cost while ensuring maximum quality (Section 1.14).

- Ensuring truthfulness in all documents regarding the project (Section 2.06).
- Ensuring accuracy regarding the software's functionality (Section 6.08).

Continuity

- Designing software in a maintainable way so that it can be developed further in the future (Section 1.06).
- Ensuring future developers can understand the project through clear documentation (Section 1.01).

LSEP References

Data Protection Act 2018 (2018). Available at:

<https://www.legislation.gov.uk/ukpga/2018/12/part/1/enacted?view=plain> (Accessed: November 16, 2025).

Gotterbarn, D., Miller, K., & Rogerson, S. (1997). Software engineering code of ethics. Communications of the ACM, 40(11), 110–118. <https://doi.org/10.1145/265684.265699>

21. AI Usage Statement

AI assistance was leveraged across the entire software development lifecycle as permitted by the module guidelines. Our use of AI for development covered three core areas:

1. **Research assistance:** AI was utilised to identify optimal programming languages and subsequent Python libraries.
2. **Vibe Code generation:** AI was employed to enable rapid prototyping, allowing the project to be undertaken successfully in its limited timespan.
3. **Code Debugging:** AI was crucial to debugging complex code, correctly identifying errors and suggesting solutions

In accordance with the module requirements, an AI Usage Declaration can be found on page 20 of this document. Additionally, a comprehensive log containing every prompt and corresponding response can be found in the 'AI Prompts' file in the project's GitHub repository.

22. Ownership Confirmation

We, the project team 15, hereby confirm that we are the creators and rightful owners of the Network Traffic Profiler Dashboard project.

We affirm that,

1. Project Ownership

All code, documentation, designs, diagrams, dashboards, machine learning models, and other deliverables created by the team are our intellectual property.

2. Right to Use and Distribute

We retain full rights to:

- Include this project, its code, design work, and output in our personal and professional portfolios,
- Present it for academic, career, and assessment purposes,
- Publish, showcase, or demonstrate it publicly (e.g., GitHub, LinkedIn, presentations)

3. Client Usage Rights

The client (Plymouth City College, Tomek Bergier) is granted permission to use, review, test, and integrate the project within the scope of the agreed coursework requirements. This permission does not transfer ownership of the project to the client.

4. Non-Exclusive Rights

Both the project team and the client may reference or demonstrate the project, but intellectual property ownership remains with the team.

By including this statement, we formally affirm our rights over the project and its future use in academic, professional, and open-source contexts.

Project approval

Version: 2

I hereby review and approve the Project Plan document for Network Traffic Profiler Dashboard. I confirm that the scope, objectives, schedule, resources, deliverables, and risk management strategies outlined in this plan are acceptable and aligned with the project goals. The project team is authorized to proceed with execution according to this plan.

Client approval

Approved by: T Bergier

Name: Tomek Bergier

Date: 06/01/2026

Project Team Approval

Approved by: Amelia

Name: Amelia Lee S Y

Date: 7/1/2026

Declaration of AI Tool use in this Assessment

Solo Work	S1 - Generative AI tools have not been used for this assessment.	<input type="checkbox"/>
Assisted Work	A1 – Idea Generation and Problem Exploration Used to generate project ideas, explore different approaches to solving a problem, or suggest features for software or systems. Students must critically assess AI-generated suggestions and ensure their own intellectual contributions are central.	<input type="checkbox"/>
	A2 - Planning & Structuring Projects AI may help outline the structure of reports, documentation and projects. The final structure and implementation must be the student's own work.	<input type="checkbox"/>
	A3 – Code Architecture AI tools maybe used to help outline code architecture (e.g. suggesting class hierarchies or module breakdowns). The final code structure must be the student's own work.	<input type="checkbox"/>
	A4 – Research Assistance Used to locate and summarise relevant articles, academic papers, technical documentation, or online resources (e.g. Stack Overflow, GitHub discussions). The interpretation and integration of research into the assignment remain the student's responsibility.	<input type="checkbox"/>
	A5 - Language Refinement Used to check grammar, refine language, improve sentence structure in documentation not code. AI should be used only to provide suggestions for improvement. Students must ensure that the documentation accurately reflects the code and is technically correct.	<input type="checkbox"/>
	A6 – Code Review AI tools can be used to check comments within the code and to suggest improvements to code readability, structure or syntax. AI should be used only to provide suggestions for improvement. Students must ensure that the code accurately reflects their knowledge and is technically correct.	<input type="checkbox"/>
	A7 - Code Generation for Learning Purposes Used to generate example code snippets to understand syntax, explore alternative implementations, or learn new programming paradigms. Students must not submit AI-generated code as their own and must be able to explain how it works.	<input type="checkbox"/>
	A8 - Technical Guidance & Debugging Support AI tools can be used to explain algorithms, programming concepts, or debugging strategies. Students may also help interpret error messages or suggest possible fixes. However, students must write, test, and debug their own code independently and understand all solutions submitted.	<input type="checkbox"/>
	A9 - Testing and Validation Support AI may assist in generating test cases, validating outputs, or suggesting edge cases for software testing. Students are responsible for designing comprehensive test plans and interpreting test results.	<input type="checkbox"/>

	A10 - Data Analysis and Visualization Guidance AI tools can help suggest ways to analyse datasets or visualize results (e.g. recommending chart types or statistical methods). Students must perform the analysis themselves and understand the implications of the results.	<input type="checkbox"/>
	A11 - Other uses not listed above Please specify:	<input type="checkbox"/>
Partnered Work	P1 - Generative AI tool usage has been used integrally for this assessment Students can adopt approaches that are compliant with instructions in the assessment brief. Please Specify:	<input checked="" type="checkbox"/>

Please provide details of AI usage and which elements of the coursework this relates to:

AI has been used for this assignment for Research Assistance, Vibe Code Generation and Code debugging, for the practical programming section of the assignment. Please see 'AI Prompts' on the GitHub classroom repository for specifics.

I understand that the ownership and responsibility for the academic integrity of this submitted assessment falls with me, the student.	<input checked="" type="checkbox"/>
I confirm that all details provide above are an accurate description of how AI was used for this assessment.	<input checked="" type="checkbox"/>