# Scope Statement

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| **Project Title: Network Performance Evaluation on Linux Based Operating Systems**  **Date: 30/03/2025** **Prepared by:** Win Phyo & Thomas Robinson |
| **Project Justification**  This project is designed to evaluate the network performance of IPv4 and IPv6 on the latest versions of three popular Linux-based operating systems, so that the client may compare the data with historical data to observe changes in performance over time and between operating systems.  Both IPv4 and IPv6 have their own benefits and drawbacks, of which this project intends to evaluate.  With this data, the client can have a better understanding and comparison of how each of the chosen operating systems handles network traffic, which ultimately helps to make adequate decisions on optimising network infrastructure. |
| **Product Characteristics and Requirements**  **Functional Requirements:**   1. Configure Fedora, Ubuntu, and Kali Linux as software routers 2. Implement both TCP and UDP transmission protocols 3. Support both IPv4 and IPv6 addressing 4. Set up a four-PC network topology (1 sender, 2 routers, 1 receiver) 5. Configure dual NICs on router PCs and single NICs on sender/receiver PCs 6. Perform three complete test rounds, one for each operating system 7. Generate network traffic using iPerf or D-ITG 8. Evaluate with 12 specified packet sizes (128 to 1536 Bytes) 9. Run each test configuration at least 10 times 10. Identify and re-run tests falling outside 95% confidence interval 11. Record throughput performance across all test scenarios 12. All evaluations must be run 10 times each with all tests at 95% confidence 13. Record throughput performance across all test scenarios 14. Measure network delays in all test configurations 15. Calculate jitter values throughout testing 16. Track packet loss rates for all test cases 17. Log all evaluations 18. Generate statistical averages using the testing tool 19. Compile final statistical data for comparison and analysis   **Non-Functional Requirements:**   1. Results must fall within a 95% confidence interval 2. Statistical validation of test results 3. Consistent test methodology across all platforms and test rounds 4. Evaluation environment must support the full range of packet sizes 5. Network infrastructure must handle required throughput levels 6. Measurement tools must be precise enough to capture microsecond-level jitter 7. Evaluation environment must maintain consistent conditions across test rounds 8. Hardware configurations must remain stable throughout all testing 9. Evaluation tools must produce repeatable results 10. Complete logs of all test runs must be preserved 11. Detailed recording of test configurations and parameters 12. Final deliverable must include both raw logs and statistical summaries 13. Evaluation must be organised into three distinct rounds/sprints (one per OS) 14. Consistent testing procedures must be followed across all sprints 15. Comparison data must allow for direct analysis between operating systems   **Out of Scope:**   1. Acquisition of the four PCs required for evaluation 2. Physical installation and configuration of hardware 3. Initial operating system installations 4. Network facility and power supply 5. Physical security of the testing environment 6. Environmental controls of the evaluation facility 7. Long-term maintenance of the evaluation environment 8. Ongoing support for the configured systems 9. Application of findings to production networks 10. Performance optimisation recommendations beyond evaluation results 11. Evaluation of operating systems beyond the specified three distributions 12. Network configurations other than the specified topology 13. Evaluation of protocols beyond TCP and UDP 14. Performance testing at speeds exceeding gigabit Ethernet 15. Addressing performance issues identified during evaluation 16. Implementing changes to improve network performance 17. Troubleshooting underlying hardware issues |

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| **Summary of Project Deliverables**  **Project management-related deliverables:**   * Meeting Agendas * Meeting Minutes * Project Charter * Team Contract * Stakeholder Register * Stakeholder Management Strategy * Scope Statement * Project Proposal * Risk Register * Issue Log * Communication Management Plan * Work Breakdown Structure (WBS) * Gantt Chart * Critical Path Analysis * Skills Analysis * Upskilling Plan Schedule * Estimated Cost Breakdown * Milestone Report * Lesson-Learned Report * Mid-Term Review * Final Product Presentation   **Product-related deliverables:**   * Complete evaluation plans detailing procedures for all configurations * Configuration documentation for router setup on each operating system * Scripts or configuration files used for evaluation * Spreadsheet of performance evaluation results * Raw evaluation logs from all execution runs (10 runs per configuration) * Data analysis documentation with statistical validation |
| **Project Success Criteria:**   * Delivery of all specified project deliverables * Statistical validity of all evaluation results * Clear presentation of comparative performance across operating systems * Adherence to project timeline and budget constraints * Comprehensive documentation allowing for evaluation reproducibility |