# Scope Statement

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| **Project Title: Network Performance Evaluation on Linux Based Operating Systems**  **Date: 20/05/2025** **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 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 performance across all test scenarios for delay, jitter, throughput and packet loss 12. Log all evaluations in Excel spreadsheet 13. Generate visual graphs which shows average performance metrics for all packet sizes 14. Compile final statistical data for comparison and analysis   **Non-Functional Requirements:**   1. Results must fall within a 95% confidence interval 2. Consistent test methodology across all platforms and test rounds 3. Evaluation environment must support the full range of packet sizes 4. Network infrastructure must handle required throughput levels 5. Measurement tools must be precise enough to capture microsecond-level jitter 6. Evaluation environment must maintain consistent conditions across test rounds 7. Hardware configurations must remain stable throughout all testing 8. Evaluation tools must produce repeatable results 9. Complete logs of all test runs must be preserved 10. Detailed recording of test configurations and parameters 11. Consistent testing procedures must be followed across all sprints 12. Clock across all 4 computers must be synchronised 13. Finding the optimal value for packet rate 14. To keep each run only 10 seconds 15. Evaluation and logging only one way from receiver, not for sender 16. Comparison data must allow for direct analysis between operating systems 17. Final deliverable must include both raw logs and statistical summaries   And  **Out of Scope:**   1. Acquisition of the four PCs required for evaluation 2. Physical installation and configuration of hardware 3. Network facility and power supply 4. Physical security of the testing environment 5. Environmental controls of the evaluation facility 6. Long-term maintenance of the evaluation environment 7. Ongoing support for the configured systems 8. Application of findings to production networks 9. Performance optimisation recommendations beyond evaluation results 10. Evaluation of operating systems beyond the specified three distributions 11. Network configurations other than the specified topology 12. Evaluation of protocols beyond TCP and UDP 13. Performance testing at speeds exceeding gigabit Ethernet 14. Implementing changes to improve network performance |
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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 |