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In-Match and Out-Match Tactical Team-Based Shoot Game Screen and Network Performances Analysis (Case Study: East Jakarta, Indonesia)

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ABSTRACT

Online games have transformed the gaming landscape by connecting players from around the globe in immersive and interactive virtual environments. First-person shooters have gained immense popularity among the various genres due to their fast-paced action, strategic gameplay, and realistic graphics. The Sony PlayStation 5 (PS5) has revolutionized the gaming landscape since its launch, establishing itself as a dominant force in the global market. This research aimed to find screen performance (in FPS) and network performance (in ping) during in-match and out-match while playing the game on the PS5 gaming console. This research applied a quantitative method, primary data, and descriptive approach. The analysis of in-match network ping, with an average of 22.7±5.78 ms, reveals a relatively stable connection with some variability. Although occasional spikes up to 32 ms may cause brief delays, the overall network performance is satisfactory for typical internet usage. Conversely, the out-match network ping demonstrates exceptional stability, with an average of 24.43± 0.82 ms, indicating minimal latency variation and ensuring a smooth experience for various online activities. The frame rate analysis on the PS5 showcases a consistent FPS of 60, reflecting a rock-solid performance free from stuttering or frame drops, essential for both casual and competitive gaming.

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1. INTRODUCTIONS

Online games have transformed the gaming landscape by connecting players [1] from around the globe [2] in immersive [3] and interactive virtual environments [4]. First-person shooters have gained immense popularity [2] among the various genres

due to their fast-paced action, strategic gameplay, and realistic graphics. First-person shooter games place players in the protagonist's perspective, often involving intense combat scenarios where quick reflexes and tactical thinking are paramount. These games typically feature multiplayer modes that allow numerous online users to team up or compete against each other in real time, fostering a sense of community and competition. First-person shooter games' widespread appeal and ability to engage large online audiences have solidified their position as a staple in the gaming industry, continually pushing the boundaries of technology and player experience.

Tom Clancy's Rainbow Six® Siege is a tactical team-based first-person shooter game developed by Ubisoft. This game emphasizes strategic planning, teamwork, and precise execution. Players assume the various operator roles, each with unique abilities and gadgets, to engage in intense 5v5 combat scenarios. The game features destructible environments, allowing players to breach walls, floors, and ceilings to gain tactical advantages. Players could adapt and coordinate with teams to achieve objectives in attack or defense modes. This game has a robust online community that is continuously updated with new content, operators, and seasonal events. Its emphasis on strategy, communication, and adaptability makes it a captivating subject for research on online gaming and player behavior [5], [6], [7].

Since its launch, PS5 [8] has revolutionized the gaming site, establishing itself as a dominant global market with a 64.5% market share. PS5 has become the preferred console for hardcore gamers with its high-quality graphics and immersive gaming experiences. In the last financial year, 19.1 million consoles were sold, reflecting a strong position as a market leader. The PS5 is not just about hardware but also about a gaming ecosystem, further enhancing its appeal to gamers worldwide [9]. This research aimed to find PS5 screen performance (in FPS) and network performance (in ping) during in-match and out-match while playing the game [10].

2. RESEARCH METHOD

This research applied a quantitative method, primary data, and descriptive approach. Following Figure 1 shows the research flow.

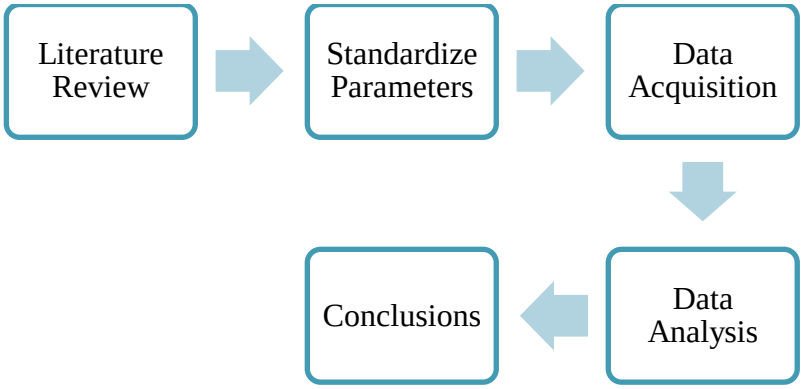


Figure 1. Research Flow

The research flow for the study on FPS and ping analysis in a tactical team-based shooter game on the PS5 involved several meticulous steps. Tom Clancy's Rainbow Six® Siege used for this research was version 74531730 in the platform PS5.

The literature review was initially conducted to gather existing knowledge and theoretical frameworks related to FPS and ping in gaming environments. This phase involved analyzing academic articles, industry reports, and technical documents to identify key factors influencing gaming performance and to understand the current state of research in this domain.

Following this, parameters (character, primary weapon with details, secondary weapon with more information, gadget, and ability) were standardized for all matches to ensure a uniform configuration for data acquisition. The server was set automatically. Specific variables and metrics relevant to FPS and ping were defined and standardized to ensure consistency in data collection and analysis. This step was crucial to maintaining the integrity and reliability of the research findings. Figure 2 shows the screenshot of the game character used in this research.

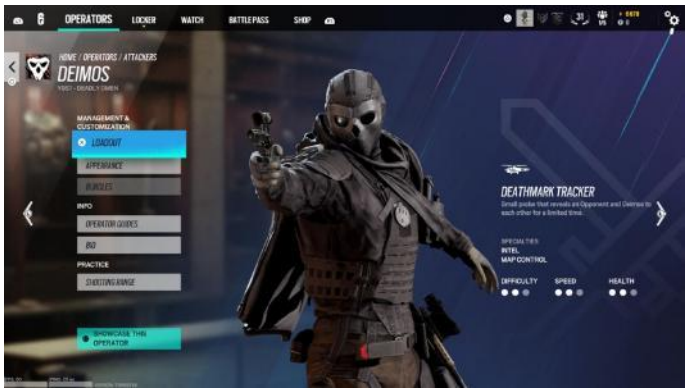


Figure 2. Character Used

Data acquisition involved systematically collecting data from gameplay sessions on the PS5. During the data acquisition period, the game player was only R3XD, the level 31 player, and now reaches level 108. This included recording FPS and ping values during various gaming scenarios to capture a comprehensive dataset that reflects real-world gaming conditions from screenshots. FPS and Ping (ms) are earned from the screenshot on the left. There were 30 in-match data from 10 matches, and 14 out-match data were gathered. Figure 3 shows where to find the information used for the research during the game.

Figure 3. FPS, Ping, and Version

Once the screenshot data was collected, it was written on a spreadsheet for analysis. Statistical techniques and data visualization methods were applied to interpret the

data. This analysis aimed to identify patterns and insights on how FPS and ping impact the gaming experience in a tactical team-based shooter on the PS5. The conclusions were drawn based on the analysis and summarizing the key findings. The study provided valuable insights into the critical factors affecting gaming performance.

3. RESULT AND DISCUSSIONS

Data on the spreadsheet is then processed and analyzed with statistical description, as shown in Table 1.

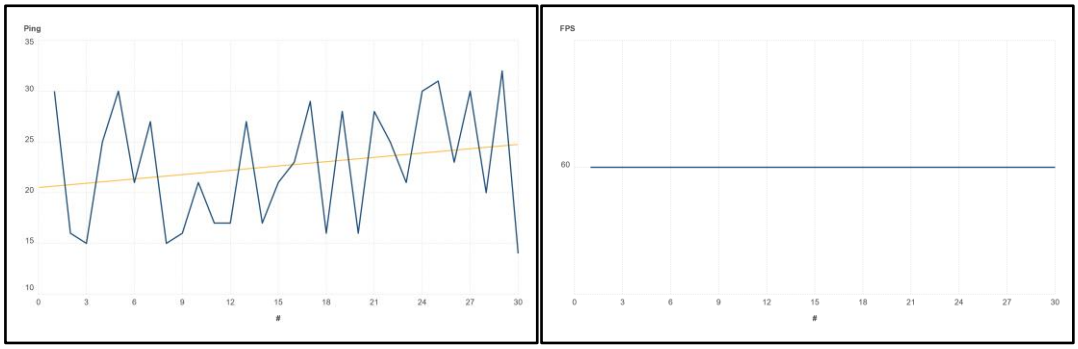
Table 1. Statistical Descriptive

Descriptions	In-Match		Out-Match	
	FPS	Ping (ms)	FPS	Ping (ms)
Average	60	22.7 ± 5.78	60	24.43 ± 0.82
Min	60	14	60	24
Max	60	32	60	26
Median	60	22	60	24

Table 1 shows an analysis of in-match network ping with an average of 22.7 milliseconds (ms), a standard deviation of 5.78 ms, a minimum ping of 14 ms, a maximum ping of 32 ms, and a median ping of 22 ms, indicating a relatively stable connection with some variability. The standard deviation of 5.78 suggests moderate fluctuations in latency, which could be noticeable during activities requiring consistently low latency. However, with a median ping of 22 ms, the connection is generally reliable [11] for most online tasks, balancing performance and consistency. While occasional spikes up to 32 ms might cause brief delays, the overall network performance remains satisfactory for typical Internet usage.

The out-match network ping analysis reveals an average of 24.43 ± 0.82 ms, 24 ms minimum ping, 26 ms maximum ping, and 24 ms median ping. These indicate an exceptionally stable and reliable network connection with minimal variation in latency [11]. The low standard deviation and closely clustered ping times around the median value suggest that users can expect consistent performance with negligible fluctuations. This stability level is ideal for real-time gaming, where consistently low latency is critical for a smooth experience.

The PS5 frame rate analysis shows an average, minimum, maximum, and median FPS consistently at 60, with zero standard deviation. This indicates a rock-solid and unwavering performance, where the frame rate remains perfectly stable without any fluctuation. Consistency ensures a smooth and visually pleasing gaming experience, free from stuttering or frame drops. This level of performance is ideal for casual and competitive gaming, providing a PS5 seamless and immersive experience. The zero standard deviation is a testament to the system's ability to maintain optimal performance under varying conditions, ensuring that every frame is rendered precisely and consistently.



(a) (b)

Figure 4. In-Match (a) Ping and Linear Regression (b) FPS

Figure 4 shows a range of values from 14 to 32 ms, indicating some variability in network latency during gameplay. With frequent pings around 16, 21, and 30 ms, the data suggests that while the connection is generally stable, intermittent spikes might cause brief delays. Lower ping values, such as 14 and 15 ms, reflect optimal performance with minimal latency, ideal for a smooth gaming experience. Contrarywise, higher values like 31 and 32 ms indicate potential where players might experience a slight lag. Most ping values fall within a range that should still support responsive and enjoyable gameplay.

Linear regression [12] from Figure 5 found the following:

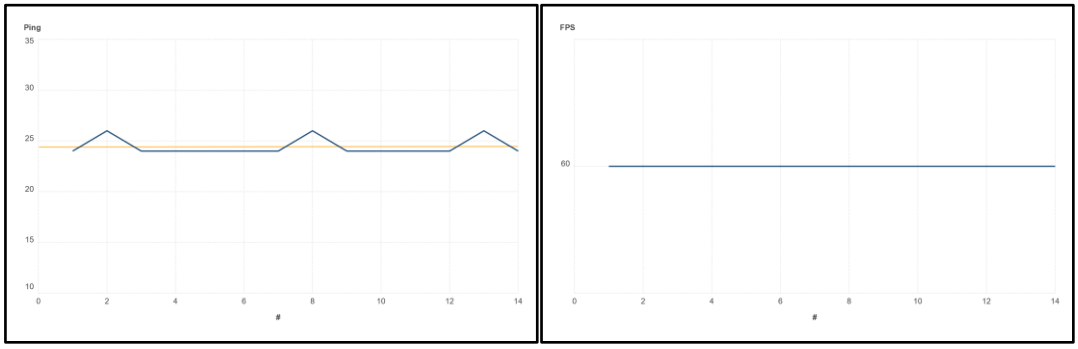
$$y = 0.1417130145x + 20.5034482752 \quad (1)$$

The linear regression equation suggests that for every one-unit increase in the independent variable x, the dependent variable y increases by approximately 0.1417 units. The intercept value of 20.5034482752 indicates that when x is zero, y and it will be approximately 20.5. The slope of 0.1417 implies a moderate positive relationship between x and y, meaning, changes x have a noticeable, albeit not very strong, impact y. This could indicate that x it is a somewhat significant predictor y, although other factors not included in the model may also play an important role. The specific context and domain in which this model is applied will help determine the practical significance of these coefficients.

Figure 5 also found the R^2 = 0.0450320215. An R^2 value [13] indicates that the model explains approximately 4.5% of the variability in the dependent variable based on the independent variable(s). Most of the variability in the data (95.5%) is not explained by the model, suggesting that the model has a low fit to the data. This low R^2 value implies that other factors may not be included in the model influencing the dependent variable or that the relationship between the variables is weak.

Figure 5, illustrating the captured data with a consistent FPS of 60, indicates that the gaming performance on the PS5 is remarkably stable and smooth [14]. A constant FPS of 60 throughout the gameplay sessions suggests that the hardware and software are well-optimized, providing a seamless and visually pleasing experience. This stability was critical for maintaining fluid motion and responsiveness, particularly in fast-paced tactical team-based shooter games where split-second decisions and actions can significantly impact the outcome. No frame drops or fluctuations ensure

that players fully immerse themselves in the game without disruptions or performance issues. After the in-match has been analyzed, Figure 5 shows the out-match.



(a) (b)

Figure 5. Out-match (a) Ping and Linear Regression (b) FPS

Based on Figure 5, the out-match ping data for the game shows a remarkably consistent performance, with values predominantly around 24 ms and occasional spikes to 26 ms. This uniformity in ping indicates a highly stable and reliable network connection during out-of-match activities. The minimal fluctuation in ping values, as evidenced by the small range between 24 and 26 ms, suggests that the network can maintain low latency with minimal variability. This stability is particularly beneficial for tasks sensitive to latency, such as matchmaking, server communication, and general navigation through game menus. The steady ping ensures that players experience smooth and uninterrupted interactions with the game servers, leading to a seamless gaming experience outside actual gameplay.

Linear regression [12] from Figure 7 found the following:

$$y = 0.0043956044x + 24.3956043956 \quad (2)$$

The linear regression equation indicates that for every one-unit increase in the independent variable *x*, the dependent variable *y* increases by approximately 0.0044 units. The intercept value of 24.3956043956 suggests that when *x* is zero, *y* will be approximately 24.4. The slope of the line is relatively slight, implying a weak positive relationship between *x* and *y*. In practical terms, this means that changes in *x* have a minimal impact on *y*. This could suggest that either *x* is not a strong predictor, or other factors not included in the model play a more significant role in determining *y*. These values' context and domain-specific relevance should also be considered to draw more concrete conclusions.

From Figure 6, the R^2 = 0.0004662005. An R^2 value indicates that the model explains only about 0.046% of the variability in the dependent variable based on the independent variable(s). This extremely low R^2 value suggests the model has almost no explanatory power in capturing the relationship between the variables. Essentially, most of the variability in the data (99.954%) is not accounted for by the model, indicating a very weak or non-existent relationship between the variables. A low R^2 value implies that the model is not helpful for prediction or inference in this context, and significant improvements are needed in model specification, selection of

predictors, or perhaps even a reevaluation of the overall approach to modeling the data.

Figure 6 showcases the captured data, which consistently displays an FPS of 60 and highlights the exceptional stability and smoothness of gaming performance on the PS5 [14]. Maintaining a steady FPS of 60 throughout all gameplay sessions indicates that the hardware and software are finely tuned, ensuring an immersive and visually appealing experience. This level of stability is essential for delivering fluid motion and responsiveness, especially in fast-paced tactical team-based shooter games where precision and quick actions are crucial. No frame drops or fluctuations allow players to enjoy the game seamlessly without interruptions or performance issues. The result differed from the previous research [15], where the out-match ping was smaller than the in-match.

4. CONCLUSIONS

For the in-match network, ping with an average of 22.7 ± 5.78 ms reveals a relatively stable connection. Although occasional spikes up to 32 ms may cause brief delays, the overall network performance was satisfactory for typical Internet usage. Conversely, the out-match network ping demonstrates exceptional stability, with an average of 24.43 ± 0.82 ms, indicating minimal latency variation and ensuring a smooth experience. PS5 frame rate analysis showcases a consistent FPS of 60, reflecting a rock-solid performance free from stuttering or frame drops, essential for casual and competitive gaming. Linear regression was analyzed to provide insights into the relationship between variables with R^2 values. The findings underscore the importance of stable and low-latency network connections and consistent frame rates in delivering an optimal PS5 gaming experience in this game.

5. ACKNOWLEDGEMENTS

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6. REFERENCES

[1] M. Saaty, D. Haqq, D. B. Toms, I. Eltahir, and D. S. McCrickard, “A Study on Pokémon GO: Exploring the Potential of Location-based Mobile Exergames in Connecting Players with Nature,” in *Extended Abstracts of the 2021 Annual Symposium on Computer-Human Interaction in Play*, in CHI PLAY ’21. New York, NY, USA: Association for Computing Machinery, Oct. 2021, pp. 128–132. doi: 10.1145/3450337.3483481.

[2] S. C. Madanapalli, H. H. Gharakheili, and V. Sivaraman, “Know Thy Lag: In-Network Game Detection and Latency Measurement,” in *Passive and Active Measurement*, O. Hohlfeld, G. Moura, and C. Pelsser, Eds., Cham: Springer

International Publishing, 2022, pp. 395–410. doi: 10.1007/978-3-030-98785-5_17.

[3] A. Bandyopadhyay *et al.*, "A Game-Theoretic Approach for Rendering Immersive Experiences in the Metaverse," *Mathematics*, vol. 11, no. 6, Art. no. 6, Jan. 2023, doi: 10.3390/math11061286.

[4] C. Uz-Bilgin and M. Thompson, "Processing presence: how users develop spatial presence through an immersive virtual reality game," *Virtual Reality*, vol. 26, no. 2, pp. 649–658, Jun. 2022, doi: 10.1007/s10055-021-00528-z.

[5] Ubisoft, "Tom Clancy's Rainbow Six Siege | Ubisoft (US)." Accessed: Feb. 23, 2025. [Online]. Available: https://www.ubisoft.com/en-us/game/rainbow-six/siege

[6] Epic Games, "Tom Clancy's Rainbow Six® Siege | Download and Buy Today," Epic Games Store. Accessed: Feb. 23, 2025. [Online]. Available: https://store.epicgames.com/en-US/p/rainbow-six-siege

[7] Steam, "Tom Clancy's Rainbow Six® Siege on Steam." Accessed: Feb. 23, 2025. [Online]. Available: https://store.steampowered.com/app/359550/Tom_Clancys_Rainbow_Six_Siege/

[8] Sony Interactive Entertainment, "PlayStation®5 | Play Has No Limits | PlayStation." Accessed: Feb. 23, 2025. [Online]. Available: https://www.playstation.com/en-us/ps5/

[9] N. Sheridan, "PlayStation 5 Marketing Strategy 2025: A Case Study – Latterly.org." Accessed: Feb. 23, 2025. [Online]. Available: https://www.latterly.org/playstation-5-marketing-strategy/

[10] N. A. Rahim *et al.*, "Battle Royale Console Game Performance Analysis (Case Study: East Jakarta, Indonesia)," *Jurnal Teknologi*, vol. 17, no. 1, pp. 36–41, Jun. 2024, doi: 10.34151/jurtek.v17i1.4695.

[11] Kaspersky, "How To Reduce Gaming Lag." Accessed: Feb. 23, 2025. [Online]. Available: https://www.kaspersky.com/resource-center/preemptive-safety/how-to-improve-game-performance

[12] K. Baždarić, D. Šverko, I. Salarić, A. Martinović, and M. Lucijanić, "The ABC of linear regression analysis: What every author and editor should know," *European Science Editing*, vol. 47, 2021, doi: 10.3897/ese.2021.e63780.

[13] D. Chicco, M. J. Warrens, and G. Jurman, "The coefficient of determination R-squared is more informative than SMAPE, MAE, MAPE, MSE and RMSE in regression analysis evaluation," *PeerJ Comput. Sci.*, vol. 7, p. e623, Jul. 2021, doi: 10.7717/peerj-cs.623.

[14] Lenovo, "FPS: What is an FPS? | How does FPS work? Do all PC games use FPS? | Lenovo US." Accessed: Feb. 23, 2025. [Online]. Available: https://www.lenovo.com/us/en/glossary/fps/

[15] K. L. Bahagia, F. Kusuma, R. Djajasoepena, and W. Wandy, "In-Match and Out-Match Game Console Network Ping Comparison Analysis on a First-Person Arena Shooter (Case Study: East Jakarta, Indonesia)," *Jurnal Teknologi*, vol. 17, no. 2, pp. 125–131, Dec. 2024, doi: 10.34151/jurtek.v17i2.4751.