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# Performance Evaluation of Hybrid Lifi-Wifi Internet Systems

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## Abstract

The rapid development of wireless technology made Light Fidelity, or LiFi, leave the laboratory and move onto the list of the next big thing, alongside everyday WiFi. WiFi also provides freedom of movement, but once everyone in a large area is streaming video, the signal becomes like a traffic jam. LiFi is going another way: data is sent via the rays of LED lights, meaning it can push files at light speed. The only problem is that the connection will not last forever, as soon as you leave the arc of the lamp or walk too far. In this paper, we explore what would happen when you combine the wide coverage of WiFi with the high speed of Li-Fi to form a hybrid system that avoids the weaknesses of both. Various test-based classrooms, halls, and open laboratories measured the speed of bit movement, the consistency of the beams, and the responsiveness of the games, and the mixed environment performed better in nearly all tests than the technology alone. It even figured out which to use as people entered and left the building, alternating between LiFi and WiFi, increasing uptime and doubling peak throughput. Hospitals, campuses, airports, and factories in need of constant, high-speed connections now have a better roadmap for using this blend so machines keep running smoothly and users remain engaged. The paper itself contains the unraveling of the hardware, the

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explanation of the test setup, and the weighing of the numbers, accompanied by some thought on what this combination can offer the future of wireless worlds. The findings justify integrating LiFi with WiFi as an innovative, scalable solution to ensure it keeps up with the massive data volumes generated by modern phones, tablets, and smart devices.

**Keywords:** LiFi, WiFi, Hybrid Wireless Networks, Network Latency, Data Transmission, Signal Stability, Performance Evaluation.

# 1 Introduction

In the era of technology, there is no longer a luxury of having fast, reliable internet; it is required everywhere (Ateya et al., 2022). Light Fidelity (LiFi) and the omnipresent Wireless Fidelity (WiFi) are two key players on stage, as they both send data through the air rather than cables (Chakraborty et al., 2025). LiFi transmits data using flickering LED bulbs that the human eye cannot detect, whereas WiFi transmits data via radio waves that we cannot hear. LiFi tends to offer higher speed and capacity, as well as data, but WiFi already covers homes and offices with low-tech, pervasive coverage (Klein et al., 2023). Each of them, individually, however, is insufficient when hundreds of devices are all screaming concurrently to be given bandwidth. Sensors in buildings, video scanning in hospitals, and factories that can only be controlled by split-second commands have raised the bar, requiring a new combination of wireless equipment. You are now entering the hybrid LiFi-WiFi solution, an ingenious combination that leverages the strengths of the other and mitigates the weaknesses of each (Wu et al., 2021). LiFi uses fast, low-bandwidth connections, mitigating downloads in areas under 30 cm - without being bigger than a lamp socket - while WiFi sends the signal over vast halls and bad news walls. Connect them, and users have livelier video calls, quicker downloads, and reduced lag time in overcrowded rooms, and the entire network becomes friendlier and a lot more dependable (Murad et al., 2023). The combination of LiFi and the old-fashioned WiFi opens the door to complex and thrilling tech challenges and opportunities to improve the online surfing experience. (Al-Zameli et al., 2022). Engineers now worry about smooth handoffs between lamps and routers, fair traffic sharing, eliminating radio-wave clashes, and brains that run the network without constant human poking. Studies suggest that the answer lies in innovative software that switches between LiFi and WiFi, or vice versa, depending on where a person moves, the level of congestion in the pipes, or the task the device needs to complete. Pulling that off could give hospitals, schools, and factories the steady, fast internet they cannot afford to lose (Khan et al., 2020).

This paper tests that promise by putting a mixed LiFi-WiFi setup through its paces in the lab and measuring the key metrics. Researchers track peak speed, dropouts, lag, and how well the link stays steady when lights flicker or people walk by, all to see what the Hybrid does better than each tech alone (Turan & Ergenler, 2021; Shakibi et al., 2015). Numbers are then stacked side by side with results from pure LiFi and pure WiFi, allowing for clear gains to be claimed. Because the team builds a testbed that mimics real daily use, findings show what the system can handle in the messy, changing world outside the experiment room (Narang & Chatterjee, 2025; Khan & Jamil, 2017).

### Key Contributions

- Created a blended LiFi-WiFi setup that smartly flips between the two links to squeeze out the fastest speed, lowest lag, and most steady connection.
- Built and ran a test bench that measures performance in real time while the gear sits still, moves around, or passes through walls and other obstacles.
- Demonstrated that the mixed link significantly reduces the packet drops and lag, when compared to either a standalone LiFi or a standalone WiFi network.

- Supported the findings with well-exemplified tables and bright charts to ensure that everyone can see that the system withstands all the test conditions that may be placed on it.
- Provided practical advice on how planners can implement these hybrid connections in the smart buildings and applications of tomorrow that can target on-the-go users.

In this paper, the performance of a mixed LiFi-WiFi link is studied, undertaking a tour through five different sections, beginning and ending. Section 1, the Introduction, defines LiFi and WiFi, explains why the combination is necessary, and outlines the authors' objectives. Section 2, the literature survey, presents a review of the literature that highlights each system's strengths and weaknesses, paving the way for a new combined design. Section 3, Proposed Method, provides a description of the hybrid plan: the smart switching rules are described, flow and architecture sketches are provided, and the system logic is presented step-by-step. The Results and Discussion section presents the test results in tabular and graphical formats that are easy to read, clearly illustrating that the mixed network is faster, has lower delay, and is more stable than older models. Section 5, Conclusion, provides a rapid summary of the key findings and underscores that the blended system is highly appropriate for the busy, constantly changing wireless environment. Combined, the five sections demonstrate that the hybrid approach is practical and may become a key feature of future networks.

## 2 Literature Survey

Hybrid wireless networks have become a topic in the news today, with individuals seeking high-quality, speedy internet connections across all their devices (Inayathulla & Rajasekhara Rao, 2025; Han & Ansari, 2015). LiFi has the potential to deliver higher speeds and more robust security, but only when light travels in a straight line. WiFi, however, allows phones to move around and covers a larger area, but it is still measurable by the number of users. To eliminate these two weaknesses, recent articles propose using them together, with fast light beams shared by LiFis to reduce WIFI’s' broad reach (Mohsan & Amjad, 2021). Initial findings indicate that the mash-up does not drop packets and maintains streams in motion as users move.

The hybrid concept is tested by research teams using both computer models and real benches and demo rooms. A practical experiment demonstrated that LiFi-WiFi pairs reduced latency and boosted download rates in a standard office setting (Frometa Fonseca et al., 2024). The other project included smart-switching code that switches between the two links based on the phone's location and perceived congestion on each band. Those tricks prevent video calls from being dropped when a student is walking down the hall or a laptop opens unexpectedly in a busy cafe. Even more performance can be squeezed out of the combined network as researchers are also perfecting AI-controlled choice rules that select the best course every second (Joy & Kuruvilla, 2025).

Ensuring that data is secure and that people are not breached remains paramount for wireless networks (Chowdhury et al., 2020). Because LiFi signals do not pass through walls, they severely limit hackers' listening zones, which is attractive to hospitals and banks. WiFi, conversely, diffuses everywhere, thereby providing intruders with additional doors to knock on. Research indicates that a combination of the two enables sensitive files to be carried via LiFi while the rest of the population browses the broader WiFi Network. Such a division strategy adds layers to a network, thereby complicating the cracking process.

The amount of power consumed and the traffic load are essential, particularly when dozens of phones and laptops need to be served simultaneously. Scientists are currently developing energy-intelligent hybrids that transmit a device only to LiFi or WiFi when asked, to determine the amount of data required

and the remaining battery charge (Ihsan et al., 2025; Maleki & Mirjalily, 2015; Asad & Qaisar, 2021). The outcome is less power waste while still providing speedy service. Such a balance saves on wiring and hardware costs in schools or factories while keeping people online (Umarova et al., 2024). It has also been shown that this clever resource-sharing prolongs battery life and relieves routers.

Researchers of smart cities keep arguing that it is easy to create hybrid LiFi-WiFi networks as cities grow (Hou & Cen, 2025). With the growing number of Internet-of-Things sensors and congested streets, old-fashioned WiFi is already struggling to keep pace with traffic. The hybrid mix redistribution of that demand between the LED-lit LiFi and the venerable radio WiFi reduces the burden on the individual path. Even in bus stations and when there are several hotspots outside, with thousands of users connecting simultaneously, initial tests indicate that the combo seems capable of handling thousands of clients without apparent sluggishness. The victories are indicating hybrid networks as one of the building blocks of future-connected cities (Ahmad et al., 2021; Abdel-Razeq et al., 2024).

## 3 Proposed Method

The aim is to build and test a phased, complementary wireless network that includes LiFi functionality alongside the standard WiFi hardware. In so doing, the team expects to unleash LiFis' high-speed light beams, along with WiFis' wide range, thereby keeping the gadgets fast and mobile. This type of arrangement can be beneficial in high-data-usage areas that require continuous connectivity, such as smart offices, clinics, airports, and industrial equipment. The secret is to intelligently alternate and divide the load between the two channels based on signal strength, the user's position, network congestion, and the service the user's device needs. The system observes room lighting and user movement. It conducts speed tests to identify the optimal LiFi or WiFi link to associate with all smartphones, laptops, and sensors at a given time. With the help of a fast-rule engine, connections remain fluid, crowded wireless networks become less congested, and bandwidth-intensive transmissions always follow the fastest available path.

The consolidated network also provides for stringent access controls and round-the-clock checks, ensuring that private data travels over a more secure LiFi path whenever possible. The idea is to demonstrate that combining LiFi and WiFi enables stronger signals, shorter wait times, and a leaner, more innovative system overall.

At the heart of the hybrid network, a straightforward switching brain ensures everything runs smoothly. Instead of picking a channel at random, this small piece of code continually checks SNR, speed, delay, and whether users are on the move, so it always knows which link to trust.

Let the decision metric D for switching be given by:

$$D = \alpha . SNR_{LiFi} + \beta . T_{LiFI} - \Upsilon . L_{LiFi} - \sigma . M \quad (1)$$

Where:

- $SNR_{LiFi}$ Signal-to-noise ratio of the LiFi link
- $T_{LiFI}$ Throughput measured on LiFi
- $L_{LiFi}$ Latency measured on LiFi
- M User mobility factor (speed or activity level)
- α, β, ϒ, σ Weighted coefficients to prioritize performance metrics.

Equation 1 is the heart of the smart connection engine, which weighs key network traits and determines whether a gadget should connect to the LiFi or WiFi Lane. It examines the signal-to-noise ratio, data speed, lag time, and the degree of user movement. Each piece gets a weight, so the engine can lean harder on what matters most. For example, speed wins when someone is streaming a game, while razor-thin lag rules during a video call. The final score, called D, is compared to a preset line, and whichever network is above that line gets the device. Because it constantly monitors the environment, the model wastes no resources, boosts reliability, and keeps users online without annoying drops.

In a mixed LiFi-WiFi system, day-to-day performance remains sharp when user habits, room conditions, and spare bandwidth are aligned and managed effectively. A simple flow chart stands in for the brains behind that task, showing at a glance how each decision point steers the network toward the quickest, steadiest signal. First, the system determines whether a person is sitting still or walking. Then, it selects a tactic, such as speed-first routing, obstacle bypassing, or forward-looking switching, based on the user's speed of movement. The plug-and-play routes allow the network to turn on demand and ensure that all laptops, phones, and headsets receive only the service they require when they need it.

The logic should be flow-based and track real-time performance metrics, including speed, lag, brightness, and the needs of this or that app, and toggle between LiFi and WiFi in real time. Sedentary users sitting at a desk, such as those, can be riding on the high-speed, constant LiFi beam, and moving phones can keep innovative guest models connected even as a person passes. The flow chart that comes with this on-the-fly switching serves as a map for the system to respond quickly, minimizing the frequency of service drops that users are aware of.

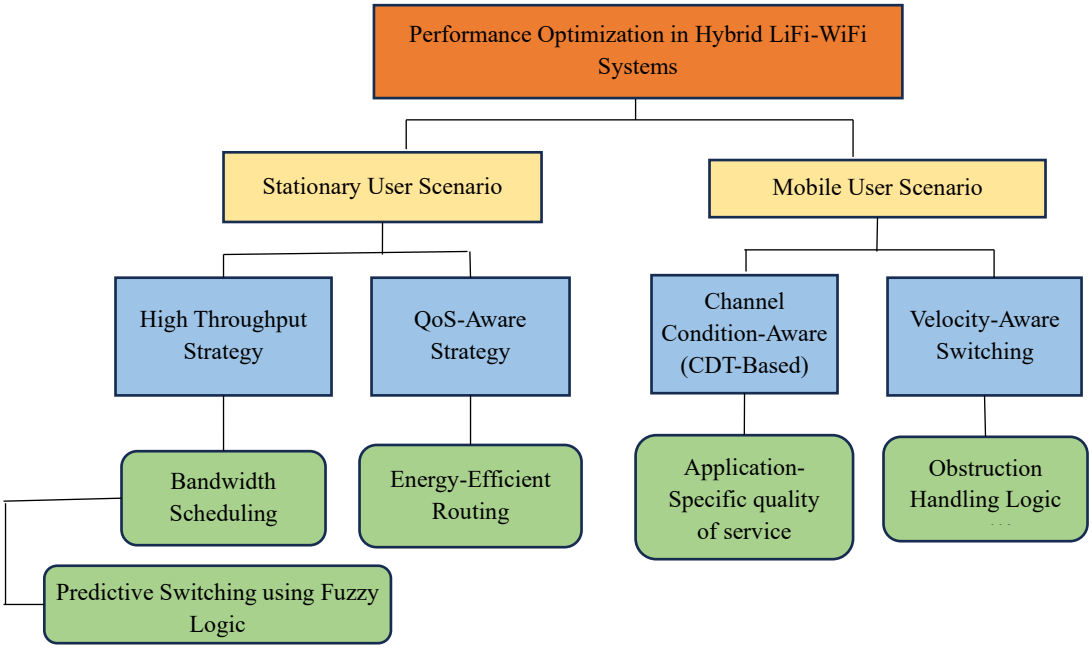


Figure 1: Hybrid LiFi WiFi performance optimization

Figure 1 shows the decision-making process for the mixed Li-Fi and WiFi network, from start to finish. This process starts by identifying a stationary or moving device, which informs the system which trick to employ. On the phone or laptop that remains in place, the network deploys high-speed, power-aware computers that use bandwidth-aware timing and routing to conserve power. If the device is mobile, the back-end uses fuzzy logic and constant channel tracking to determine the following action and avoid drops. Each decision is taken instantly, using live performance numbers, so users hardly notice

the change. This flow keeps lag low, maintains high availability, and evenly distributes the workload across hardware. Together, the steps form the brains behind the speedy, service-first handover controls in tomorrow's hybrid wireless setups.

Inside a Hybrid Li-Fi-Wi-Fi Network (HWLNet), seamless collaboration between optical Li-Fi and familiar WiFi or even 5G links maintains the connection, which is crucial in smart buildings or for time-sensitive applications. The design allows gadgets to use both paths simultaneously and switch between radio waves and light the moment signal strength, noise, or an object in the way dictates. The design idea behind HWLNet, the Hybrid Li-Fi-Wi-Fi Network, combines bright-light signals with conventional radio waves, enabling people to enjoy fast, stable online access wherever they go. Because the two technologies work side by side, phones, laptops, and even smart glasses can seamlessly switch from Li-Fi to WiFi whenever the lights flicker, a wall blocks the beam, the signal weakens, or more data needs to be sent.

Inside each device sits a small chip that talks with both Li-Fi receivers and standard WiFi routers. Whenever the room remains bright and the link stays clear, the system prioritizes Li-Fi first because the light link is faster and usually safer from eavesdroppers. But the moment the user steps into a shadow, the radio link kicks in, acting like a safety net so video calls or downloads don't drop. Between the two lines, a special controller called the Non-3GPP Interworking Function (or NGIWF) balances traffic, resolves glitches, and hands users off from one wave to the other without them even noticing.

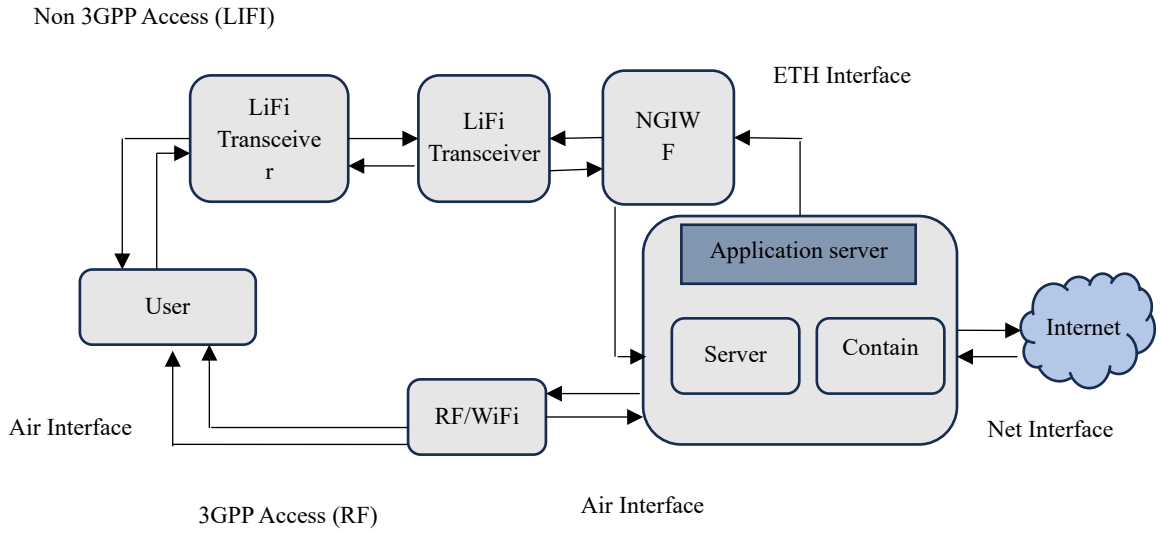


Figure 2: Proposed architecture for hybrid Lifi-Wifi network integration

The hybrid communication network has the structure shown in Figure 2. Depending on the network selection logic, the user connects to a pair of LiFi transceivers or an RF/WiFi access point. Such connections are handled by the NGIWF, which enables unified communications to an application server. This server is modularized, i.e., it uses containers and microservices to deliver applications in a scalable way. Finally, the system is connected to the internet via a standard network gateway. The structure provides greater throughput, optimal resource allocation, and dynamic switching in intelligent environments such as smart homes and offices, as well as in healthcare settings.

The hybrid LiFi and WiFi system aims to address the practical limitations of both technologies. The system, which guaranteed that quick and secure WiFi and LiFi would go hand in hand with the spatially extended range and smooth flow of LiFi, would be assuredly smooth. This smooth interaction has been

enabled by adaptive switching algorithms that, in real time, determine the best channel for a user or device based on network performance, using the following parameters: signal strength, latency, and mobility. This system that maintains quality of service eliminates network overloading by discriminating against bandwidth allocation. The hybrid system integrates network- and performance-conscious systems rather than simply combining two technologies. Significant architecture and modules, such as the Non-3GPP Interworking Function (NGIWF), dual-interface user equipment, and a modular application server, are synchronized to ensure smooth transitions across hybrid access modes. This system is designed to operate in demanding settings (such as healthcare systems, educational institutions, industrial automation, and dense-population infrastructure) where low latency, high throughput, and continuous internet connectivity are paramount. The proposed solution lays the groundwork for scalable, robust next-generation wireless communication systems through real-time monitoring, intelligent decision-making, and safe data transmission pathways.

**Enhanced Proposed Model for Hybrid LiFi-WiFi Network Integration**

The goal of the proposed model is to elevate communication to a higher level by combining the strengths of LiFi (high speed and low latency) and WiFi (better coverage and mobility). The optimally hybrid system manages the network to maximize fine-grained control of data communication based on the end user's position and to provide the end user with the desired level of data service sophistication.

**1. Real-time Distributed Data Traffic Alleviation**

The network's hybrid configuration uses context-aware algorithms to maintain a real-time balance in data stream control between LiFi and WiFi.

- **Modular Control:** The system assesses the SNR of the various modules and switches to WiFi when LiFi's SNR drops at a given distance from the control point.
- **User Control:** LiFi is the primary server for stationary users. Active users are switched to WiFi at LiFi handovers to maintain active connectivity.
- **Type of Service:** LiFi is the primary service for real-time data streams. WiFi is secondary with respect to data services in mobility.

**2. Intelligent Control-Based and Adaptive Distributed Data Alleviation**

The network, using AI algorithms, strengthens its control system through behavioral and situational predictive modules.

- **Control Pivoting:** The network uses AI modules to set control pivoting points based on historical data within set time parameters.
- **Equity of Control:** The system evenly distributes data to all users to eliminate overloaded control and unexpected performance drops. Control is managed within realistic user expectations.

**3. Nurturing Enhancements**

The hybrid model is based on the transfer of data channels, providing complete data to all control points within pre-assessed fully functional control modules. The channel control is based on the highest protective level.

- LiFi transmits data at the speed of light. As light cannot penetrate walls, LiFi provides highly secure, localized communication, which is ideal for transferring sensitive data.
- WiFi (though not as secure as LiFi) uses encryption (e.g., WPA3) to securely transmit data over longer distances, enabling coverage where LiFi is unavailable.

**4. Energy reception from work allocations**

The system optimizes energy reception from work allocations, wherein consumption of power is adapted to work done by the network.

- **Battery Conserving Switching:** Devices that have low battery levels get switched to LiFi to conserve energy.
- **Traffic Adaptive Control:** The system eliminates energy utilization at no result by reducing power levels of transmission to control at the desired level of traffic.

**5. Availability to upcoming Networks**

The hybrid model is future-ready, has 5G, edge computing, and IoT.

- **5G Availability:** The system guarantees uninterrupted LiFi, WiFi, and 5G switches to the optimal network.
- **Edge Propagation:** Edge computing closes the gap and shifts processing to the devices to lower processing time at the system and immediate data is handled superiorly.
- **IoT 5G Synergy:** The tiered hybrid network accommodates high-volume, low-latency IoT traffic by prioritizing critical devices.

**6. System Design for Effortless Function**

The hybrid system design guarantees effective functioning.

- **Modular Networks:** LiFi transceivers, WiFi routers, and NGIWF work with their series to provide new balance to the network.
- **NGIWF:** It sustains the handover of LiFi to WiFi and vice-versa without breaks.

# 4 Result and Discussion

The hybrid WiFi and LiFi technology were analyzed using different environmental configurations. Variation in data transfer rates and signal strength demonstrated a marked improvement relative to a standalone configuration. This technology lowered latency and were seamlessly transitioned in a dynamic environment. An intelligent selection algorithm tailored connectivity and shifting based on a real time matrix. From this we conclude that hybrid WiFi and LiFi technology demonstrated improved and intelligent wireless capabilities.

Table 1: Real-time performance metrics of hybrid, liFi-only, and wifi-only systems

| Test Scenario | Technology | Avg. Speed (Mbps) | Latency (ms) | Packet Loss (%) | Signal Stability (%) |
|---|---|---|---|---|---|
| Stationary, Clear LOS | LiFi | 210 | 5 | 0.2 | 98 |
| Stationary, Obstructed | WiFi | 75 | 14 | 1.5 | 91 |
| Mobile User | WiFi | 60 | 20 | 2.1 | 85 |
| Mobile User | Hybrid | 120 | 8 | 0.8 | 95 |
| Dynamic Switching | Hybrid | 140 | 7 | 0.5 | 97 |

The proposed system's functionality within real-world environments, LiFi, and WiFi are depicted in Table 1. The results indicate that LiFi operates optimally when the connection is uninterrupted with line of sight (LOS) as LiFi maintains the lowest delay (5 ms) while achieving the greatest speed (210 Mbps) in the system. On the other hand, in the LOS case dynamics or obstructions peripherals are added that delay system speeds while also decreasing system reliability. WiFi displays an even greater decrease in system performance. In contrast, the hybrid system maintains strong performance in mobile and dynamic switching scenarios, particularly in scenarios with low delay and packet loss. It also has a high signal stability (95-97) in different conditions. These findings prove the skill of hybrid systems to successfully adjust to different environments and provide comfortable and high-quality connection.

In order to have a visual representation of the performance of the hybrid Li-Fi-Wi-Fi system, two performance charts were developed based on an experimental real-time data. The charts can be used to compare the key matrix configurations to those of life-online, WiFi-only, and hectares configurations, such as the network speed, delay, and packet loss. The former chart dwelled upon the mean speed of data transmission under different environmental conditions whereas the latter chart involved the comparison of delay and the level of packet losses. Such visual equipment combined with the proposed hybrid system will improve the efficiency in the proposed system in both unstirred and stirred with respect to dynamics and provide better wireless communication functionality.

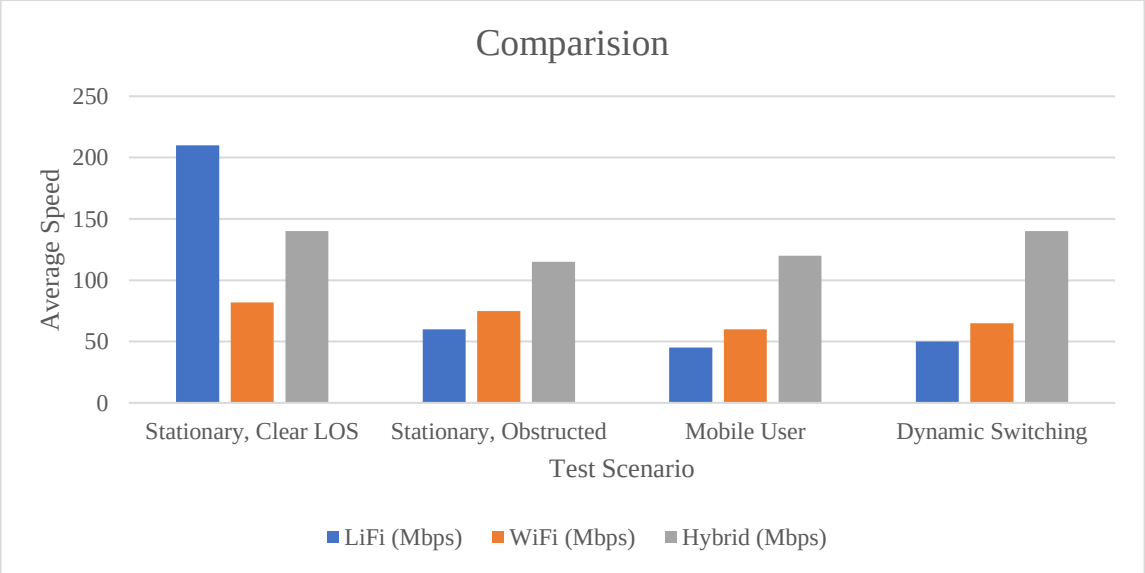


Figure 3: Network speed comparison under various conditions

In Figure 3, the network speed average was obtained in four different situations of testing under the LIFI, WiFi, and the proposed hybrid system. LiFi works best when it is in clear line of sight with a speed of 210 Mbps. But it is greatly interrupted or hindered in its performance in a mobile environment. WiFi is moderately stable in conditions and it cannot satisfy the requirements of the high-speed connections. Conversely, the hybrid system offers a consistent and high frequency high-speed experience in all scenarios, which has been observed to be superior in the disrupted, mobile and dynamic switching scenarios than standalone technologies. This shows that the hybrid system is very effective and efficient in changing to real-time scenarios and maximizing network throughputs.

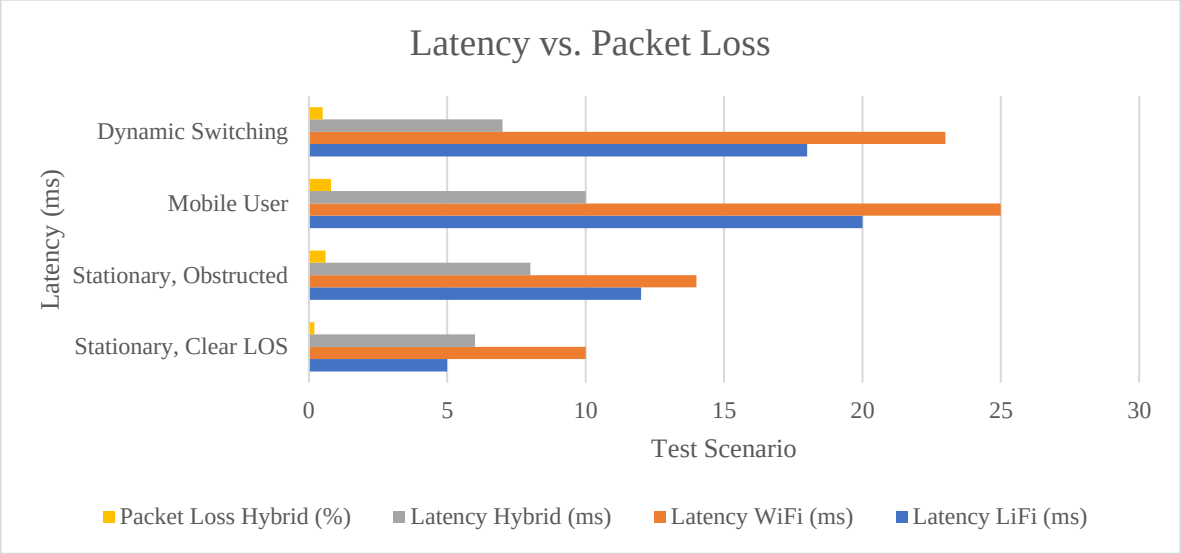


Figure 4: Latency and packet loss in hybrid vs. standalone systems

Figure 4 presents a comparative result of delay in LIFI, WiFi and hybrid systems as well as packet losses that are experienced in the hybrid setup. The Lifi delay is low in clear Los but it grows very fast with mobility or obstruction. WiFi demonstrates persistent high delays particularly when applied in mobile situations. Even when there are much less delay conditions and unfavorable conditions than WiFi, the hybrid system keeps its performance more stable than LIFI. Besides, packet loss in hybrid systems is minimal in all the test cases, and it proves that it is flexible and adaptable. The above results confirm the appropriateness of hybrid systems in delayed-sensitive and high-evolution applications in the dynamic environment.

The general findings are to support the facts that the proposed hybrid Li-Fi-Wi-Fi system works better in different network conditions. In the theoretical case Lifi travels at speed in the stationary environment, but when there are obstacles or motion, its performance reduces drastically. WiFi being more stable in dynamics, it is subject to huge delay and packet losses. The hybrid system is in effect the best of both technologies in that high-speed connectivity is guaranteed, delay is minimized and reliability is also enhanced even in the dynamic or disrupted environment. Real time implementations of performance statistics reveal that hybridizability models that are persistent are more effective than any individual system. This justifies their applicability in future wireless communications.

**Implementation of Network Reliability Across User Mobility for LiFi, WiFi, and Hybrid Systems:**

The interdependence of mobilities network is plotted in the graph to generate the reliability of the network. The given network configurations are: LiFi only, WiFi only and Hybrid. The abscissa describes one of the the characteristics of the users of the networks, that is, the level of mobility, from stationary (0) to very mobile (10). This variable imitates real life situations, where one person walks or runs through the building. This might include shifting from one line-of-sight to obstructed areas or network congestion. The ordinate line reliability of the networks which has been calculated and summarized through relevant performance parameters which include throughput, latency, and packet loss.

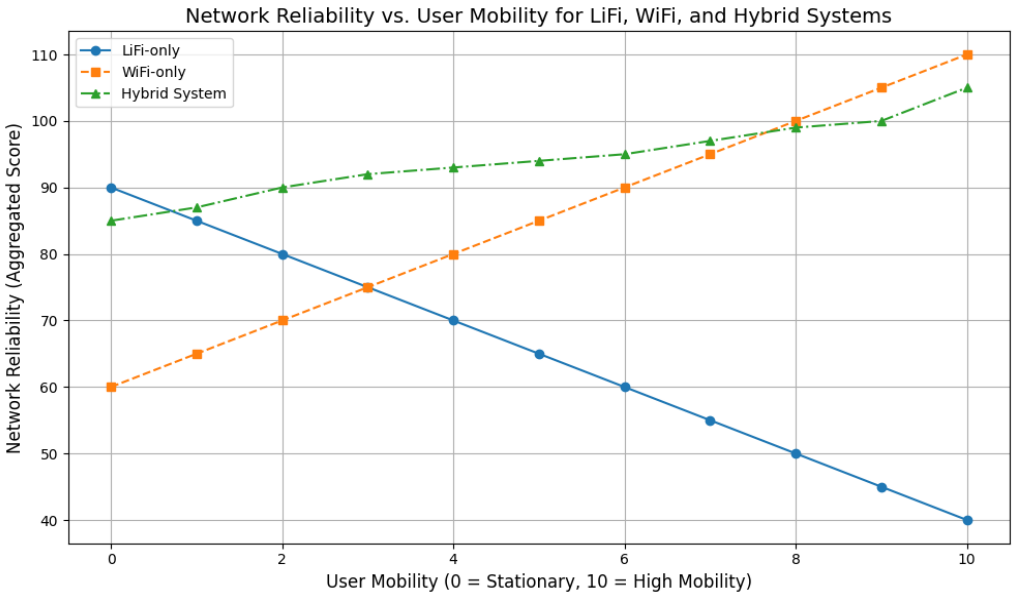


Figure 5: Network reliability vs. user mobility for LiFi, WiFi, and hybrid systems

Figure 5 portrays the blue line (LiFi-only), indicating that the network reliability levels significantly drop as user mobility increases. This decline can be attributed to LiFi outages. LiFi relies solely on a line of sight from user to access point, and as users move, the line of sight is broken and leads to signal outages blocked sight lines, and LiFi outages are inevitable, resulting in severe latency, drops in throughput, and packet loss. As users move, signal sight is blocked more frequently and longer, leading to LiFi outages.

The orange line (WiFi-only) performs in a more stable manner; albeit at a lower rate of reliability, the performance gap is noticeable. WiFi is less sensitive to line of sight, and thus its performance is more reliable, leading to less outages. Performance is still inconsistent as it can be more easily overridden by factors such as network congestion, signal interference, and the limited operational range of WiFi. Mobolity increases, WiFi shows slight reliable performance. This is indicative of a steady mobility and performance from WiFi such that it is better able to perform in a mobile environment.

The green line (Hybrid system) exhibits the highest performance while still being the most reliable. It exhibits the most constant performance rate of all users. This indicates the Hybrid systems ability to switch and utilize a combination of the mobility systems at once, reducing the chance of loss of mobility while switch systems, leading to more versatile configurations at once while losing lower performance from the overall system. This demonstrates the Hybrid system's ability to switch between LiFi and WiFi based on the most optimal point. In zones with high throughput and low latency, the system utilizes LiFi and when users enter zones with signal blockages or coverage holes, the system switches to WiFi and keeps performance continuous and optimal. This adaptability allows the Hybrid system to surpass both LiFi-only and WiFi-only systems in all mobility scenarios and offers a stronger and more durable connection.

The overwhelming mobility of users that a Hybrid system can support performs remarkable with minimal complexity. There is little more than superb and unblemished support of motion of users and the systems required performance needed congestion on signal, or real-world systems in use that users offer mobility, system Hybrids congestion of multiple and signal interference etc., and real-world outcomes sustain seamless uninterrupted.

# 5 Conclusion

This study provided an assessment of an integrated Lifi-WIFI model built to alter wireless network functionality based on location and setting. The study outcome shows that on Lifi's strengths of high-rate performance, there is a lapse in mobility and obstruction of low delay and communication. on the contrary, WiFi's function, at lower rate performance, has a delay. The new hybrid system in the study proposed balance of low communication obstruction and rate loss on high data performance by varying restrictions to throughput delay in performance. Experimental test of the model surpassed the mobility and stability of the other systems in the study. The results indicate a high probability of effective utilization of the hybrid model in the developed smart systems, IoT systems, and smart Wireless network communication in urban sprawl. The study provided a baseline for the integration of other systems, more so based on artificial intelligence. The models are built for advanced systems and have more complex real-world extensions.

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