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TRANSFORMING WIRELESS COMMUNICATION INTO NEXT-GEN: THE ROLE OF AI & TERAHERTZ WAVES IN 6G NETWORKING

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Abstract

The approaching technology launch in the world is called the sixth generation (6G networking system of newly invented wireless communication system. It is expected to be operational between 2027 and 2030. This new 6G wireless technology is expected to set new trends in human and machine interaction with ultra-fast facelifted data transmission speed with almost zero latency in communication. This research paper has tried to explore the potential of AI-based 6G networks' potential. It also sheds light on major technologies added to make it efficient, for example, Artificial Intelligence (AI), Machine Learning (ML), Terahertz (THz), and Green Effects. A next-generation 6G technology is predictable to reveal new horizons and help to run new applications of holograph communications. This research also explores significant challenges posed by this new technology, for example, safety and vigor competence. The main conclusions of this inquiry are that it finds gaps in 5G and fills the gap and suggests that the gap may be filled by the development of 5G, which is possible by adding devices in 5G systems. These devices and new functions would upgrade 5G into 6G. Moreover, this research focuses on the role of edge computing, IoT integration and security measures. This paper sums up by explaining that real-world applications, for example, smart cities, innovative healthcare and automatic vehicles, are going to launch along with fewer issues in space communication and privacy in 6G technology.

INTRODUCTION

Wireless 5G technology is expected to evolve into 6G wireless technology, which would be more advanced and viable. 6G technology is in the development phase and is expected to incorporate various new features, including extremely high speeds, maximum connectivity, and lower latency. This new 6G technology is anticipated to be completed with the incorporation of Artificial technology (AI). 6G technology is poised to open up new horizons, bringing about significant changes in the world of communication. The expected time frame for the completion of this

innovative technology is as follows: development, 2024 to 2026; standardization, 2026 to 2028; trial deployments, 2028 to 2030; and commercial rollout, 2030. Six generation technology is expected to be significantly faster and more powerful than 5G. The purpose of this is to provide its end users with a super-fast and reliable data transfer facility, making hospitals, shopping malls, and entertainment available to everyone around the globe by 2030.

4G technology in global communication was considered the best, and later, 5G was developed for faster data, increased accessibility, and enhanced connectivity. In comparison, 6G is expected to offer extreme-profligate connectivity and tangible-period information transfer with zero-time delay. 6G is expected to have seamless video streaming and multiple quick downloads. 6G is also expected to enhance range, providing communication facilities to remote areas of the world. The reason for its versatility is its integration with Artificial Intelligence (AI). 6G is expected to revolutionize the world of communication, offering more power, immersion, and advanced capabilities. The plans for 6G technology include its supercharged internet, remote virtual work, and fast and high-definition entertainment [1]. 6G is expected to have a speed of 1,000 times faster, and it is anticipated to work almost instantly with zero latency. Its plans include supporting holographic virtual and video calls, as well as managing Augmented Reality. G6 would allow connecting multiple devices simultaneously to the central server without affecting quality or streaming. One of the reasons for its fast track is the integration with AI. The practice of Artificial Intelligence in six generations would make systems more efficient and innovative for the common public. Moreover, 6G is expected to expand global coverage and reach areas where 5G offers low connectivity and is hard to access [2].

Terahertz offers a high-frequency bandwidth, and 6G communication technology is expected to utilize the Terahertz (THz) frequency range, which spans the occurrence variety of (0.1 THz to 10 THz). This regularity remains higher than it was in 5G. This high-level bandwidth is expected to provide high-frequency, real-time communication, specifically in holographic applications. 6G is expected to provide 3D films and photos, and would heighten the one-to-one or machine-to-machine communication-to-a very high level. 6G, due to its high-tech dimension, ports other advanced technologies in various arenas such as well-being, tutoring, and comical. Businesses are predictable to improvement an enhancement and open up new potentials for immersive and groundbreaking elucidations [3]. The combination of THz, AI and 6G has transfigured the prospective of communication across borders and made it easy to access information in the blink of an eye. Terahertz (THz) waves can reduce latency rate and are a reason to expect high performance from 6G networking. However, THz contains shorter wavelengths, and this thing made it suspicious that it would be good for signal attention. This research raises the question of whether it would contain advanced antenna propagation techniques for signal attention. There is a need to develop solutions that must be innovative based on sophisticated signal processing algorithms [4]. New advancements in 6G to deliver faster data are expected to be more immersive and will move faster. All sorts of connected electronic gadgets are made for WiFi connections, and they would be more reliable and more user-friendly even for end-level users [5]. This 6G technology would revolutionize the world if its antenna propagation technique via THz works well and this research works on it

Table 1: Demonstration of 6G Network

6G Base Station			
Terahertz Frequency Transmitter		**AI Driven resource management**	
End user device	Holographic Communication Unit	Data Traffic Optimization	Spectrum Allocation
Real-Time Communication	3D Hologram Transmission		

Six generation networking is anticipated to production an energetic character till twenty- thirty in the world of communication, broadcasting and technology and will make the world a real global village. 5G to 6G is going to be very different from ever before and is going to prove a big leap from one era to another, and the basic reason for this revolution is the integration of AI with communication technologies. AI is expected to optimize the performance of the 6G network by being a real-time data manager and efficient in resource allocation [6]. AI is going to empower 6G networking by adding its functions for self-organization of data, enhancing traffic patterns and assigning high spectrum traffic load. This high projection in 6G through AI is going to be beneficial by reducing latency and enhancing quality service (Qos) by lowering the consumption of energy. Ultimately, AI technology is going to make 6G an efficient and smarter network and revolutionize network operation. This new amalgamation of AI into WiFi networking for communication would be a new path of reliable and seamless high-speed connectivity and also expected AI-driven technology would be a solution for all previous drawbacks and complaints for low performance and to satisfy its end users with high reliability and going to meet all networking task in a blink of an eye [7]. AI technology would be able to manage large data and connectivity of multiple devices with the main router on 6G networking. For example, in smart cities, the holographic communication system would run more efficiently [8]. Along with AI and terahertz, Machine Learning (ML) approaches would be utilized in 6G networking for security and removal of threats. ML approaches are also expected to eliminate human intervention and make it an automatic, fast-running networking system. It is acceptable to say that AI and ML with high-speed Terahertz are going to revolutionize and optimize the system, capable of delivering unparalleled data and advanced real-time applications. 6G is expected to be very facilitative, efficient, peak performer and exceptional.

6G Networking would be a game changer by revolutionizing the communication process, converting the existing 5G into a faster system. Holographic techniques and the display of images in 3D would create a real-time, immersive display based on holographic images of people, objects, and the environment. Holographic communication

and 3D image display are more interactive compared to traditional video and audio communication, allowing users to feel as if they are part of the situation and interacting with objects. Along with many display qualities, this technique would also possess other characteristics, such as remote meetings, online education, enhanced entertainment, and fast communication, in addition to one-to-one communication. Holographic communication would make the world a global village; people living in far-flung areas would interact as if sitting by a side chair; it would enhance the healthcare department; it would revolutionize entertainment; it would enhance remote collaboration, it would give a charm to business industry in selling and purchasing, and all possibilities of life going to experience its existing its presence. Thus, a holographic technique in 6G and ML, along with Terahertz technology, is expected to facilitate more meaningful engagements between people, regardless of their physical presence [9-12].

One of the best qualities of holographic technology is the illusion of the physical presence of objects, making a situation appear as if the actual entity is physically present. 6G technology has completely revolutionized human interaction and transformed the landscape of communication at all levels. Communities all over the world have welcomed holographic technology due to its highly immersive. 6G technology appears to be a realistic prospect and is often referred to as human-machine interaction (HMI). 6G technology enables remote work as a robot and presents its users as a mimicked presence at another location. This technology will add a more natural aspect and facilitate more effective communication. The holographic technique is also poised to pave the way for business, enhancing customer service interaction, training, and entertainment. Holographic technology is exceptionally capable of conveying complex information in an engaging manner, which is why it is more accessible to run 3D on 6G networking [13]. It includes machine operators and holographic assistance, working in real-time to solve many users' problems while they are away, which was not possible on old window screens. This technique provides end users with trouble-less assistance and engages them effectively. This 6G technology is set to revolutionize the entire internet communication system, making it more user-friendly. This technology will be integrated into all local and international businesses, education, travel, online shopping, and banking.

Manufacture industries are also expected to get maximum benefits from this new holographic technology; for example, visual display of entities, expecting to enhance their sale on account of good presentation of sale items. In the field of medicine, surgeons are expected to use holographic projections to help remove their tumors while staying away using the holographic technique, as if the patient is present in the same room. Moreover,

medical robots are expected to work to operate through this holographic technique; these robots would apply procedures with high precision and fine quality, even if they are not there in the operation place. This technology is going to be planted in remote areas where it is tough for patients to move to other countries for treatments. In the field of medicine, this new technique of holography in 6G is going to open up new possibilities, enabling medical professionals to work more effectively and smartly. Thus, in 6G, the holographic projection is expected to work at an accurate level; it can perform complex operations smartly, improve results, and reduce errors [14-21].

The entry of 6G networking in different fields of life is expected to be fueled by vet less latency rate and extra high data broadcast. This new technology is going to produce a sense of ultra-realism, and people are going to observe immersive experiences and mimic real-time interaction effects. Distance is going to be a concept of old traditions. Relatives working in other countries may talk sitting next to each other; i.e. interpersonal communication at the international border is going to mimic one-to-one talk and bridge the gap between physical and virtual communication among people. Moreover, 6G networking is going to be lag-free, very smooth, with clear holographic projection, highly responsive, and available for twenty hours and seven days [22].

6G's trait of real-time holographic communication is expected to be very significant by producing real-life-like impacts and by taking away people from traditional video calling on screens. This technology is going to bring engaging experience, revolutionize various fields and make life healthier. For example, at the workplace, team members are planning to have a meeting, and they use 3D holographic technology for discussion and presenting ideas. While in their own offices or cities, they would feel like sitting in the same meeting place. In earlier online meetings, the aspect of physical presence was missing [23-27].

Thus, 6G technology is going to be a beneficial invention of this century by adding up in all fields of life, making work teamwork and going to enhance productivity. Education lecturing is also going to be more immersive and interactive by using holographic avatar presentations. International conferences may be attended as a scholar is present at the conference. Thus, it is going to add a new chapter in the world of technology.

II. LITERATURE REVIEW

Technology is progressing day by day, and view versions of every invented item are coming and making life more exciting and worthy. The transition of wireless from 1G to 6G also shows a continuous evolution and advancement; as long as it presents its new version, it means faster data transfer and less data latency. Every time, new features are introduced with improved functions for its end users. In the case of wireless, they are called generations (G). Each generation brings with

it new advanced features and transforms the methods of communication, and people feel at home, though at work and away from loved ones, and it seems they are working alive. This progress is expected to continue in 6G, rather more than ever because it is going to add up in its AI and 3D along with Terahertz. The progression in 6G would be an innovative application having the scope to revolutionize the world of technology [28]. Cellular phone networking has revolutionized to a great extent. Earlier, it was a window, and WiFi was not in it, but now it contains WiFi and a lot of applications on it. Wi-Fi on cellular phones started working with 1G in 1980; 1 G introduced analogue voice, but poor call quality, poor sound quality and security were very limited. Later on, 2 G was introduced in the 1990s; it enabled digital communication, MMS and SMS services, and it brought a little better voice quality and security. Next emerged its 3G version in 2000, which enhanced quality and faster data rate. Later on, 4G in 2005 brought more revolution. 4G followed high-definition streaming, which made faster gaming and browsing rates enhanced with data 1Gbps. In 2011 came 5G, which provided data rates up to 20Gbps, and it almost reduced latency; it brought more revolution than ever, and it was a suitable application for autonomous vehicles, a number of IoT and smart cities. Now, 6G is expected to get start debut in 2030 approximately. It would contain futuristic application of holography, real time reality, XR and it would contain large data exchange AI and MA powered.

Wireless networks have also been revolutionized due to the emergence of AI, which has made them more secure and efficient than ever, enabling them to become increasingly self-optimized systems. The wireless network is now highly efficient, automatically detecting issues and implementing necessary security measures. Wireless networking is made more efficient due to the integration of AI, which has enhanced its functionality and yielded high-performance results [29]. All new inventions that integrate Wi-Fi technology with Machine Learning (ML), Artificial Intelligence (AI), and Deep Learning (DL), as well as Terahertz, 3D, and holographic networking, are dynamically performing very well. High-speed algorithm networking enables fast signal traffic, optimizes and predicts resource allocation, and provides efficient bandwidth resource management services, resulting in high-quality services. One of the significant benefits of AI is that it detects anomalies and continuously monitors the network for potential issues. It has the function of preventing cyber threats. One of the most impressive features is the automatic repair congestion system, a self-healing network that can detect and repair itself autonomously. Furthermore, the self-healing network can automatically detect and repair, thereby reducing downtime and enhancing network reliability. Thus, a combination of all has made it a more efficient, secure, and reliable

network. [30-34]. Since six generation exploits Terahertz, a progressive characteristic of interacting, along with Artificial Intelligence (AI), it plays a central part in advancing and maximum linkage presentation. Artificial Intelligence diminishes latency and allows the real-time implementation of Wi-Fi-based uses, such as holographic communication [35-38]

Electronic communication through Terahertz (THz) frequencies, between 0.1 and 10 THz, plays a crucial role in enabling 6G networking to operate with ultra-fast transmission. THz waves offer high quality and extra wavelength bandwidth in 5G networking. THz quality, being a high-speed data-transferring procedure and real-time holographic technology of data transferring and real-time based holographic technology, has made it an ideal application for huge and massive communication between machine-to-machine (M2M) and machine-human [39-40]. Since 6G networking is based on high-speed wavelength and is only possible with THz, the combination of both made 6G networking bandwidth and very low latency in connectivity and provided high proficiency networking [35-39]. Though there are many positive characteristics of communication through THz, meanwhile it also faces challenges, such as attention to signals and penetration into walls and obstacles due to its short wavelength. Thus, to overcome this issue or to maintain signal integrity, it is crucial to achieve advanced technology, for example, beamforming, innovative sort of designs of the antenna, as well as its need to be an added reconfigurable intelligence surface (RIS). It is expected that the attachments would be good solutions to strengthen and get direct signals. It is also expected that it would provide dedicated communication despite limited THz spirals [41]. Everything in the world has drawbacks along with benefits; for example, Terahertz (THz) is a sort of transmission that faces many challenges, like the consumption of high energy, resulting in low energy efficiency. However, it is expected that the high-quality vast bandwidth offered by Terahertz of high frequencies would make it possible to transmit huge amounts of data at high speed with minimum latency; this is necessary to be integrated into 6G so that real-time applications, for example, automatic driving, telemedicine work in a smoother and better way. This is also good for virtual and augmented Reality (VR/AR) experiences. Though THz observes energy challenges, the benefits of its frequency make it a practical technology and a demanding application around the globe by masses of the human population [42-45].

The growth of the six generation wireless system is going to bring marvelous deviations in one-to-one communication across the world, and it would enhance the standard of people's lives by introducing more technology-oriented devices at home. It is going to update common people's lives by adding new automatic machinery in bedrooms, kitchens, cars and offices. From 2025 to 2023 will

be a new era of automobile applications from an individual to many due to its seamless connectivity. 6G is known as the next-generation network and is expected to unlock new possibilities. It is going to take human-technology interaction to a whole new level of immersion [46]. It is also expected that with 6G networking, the telepresence of holographic technology will become famous for allowing people to communicate in a highly immersive atmosphere as they are present all around each other while staying miles away from each other. This technology adds an aspect of Reality by holography as someone is sitting in the same room while miles away one may be. Thus, remote communication would revolutionize human communication, making it a more interactive field in different institutions of education, business and medicine [47].

The emergence and invention of the 6G have tremendously transformed all fields of life, including medicine, business meetings, and entertainment for kids and adults. 6G's extended Reality is going to be very immersive and interactive with low latency. It will also enhance its versatility by engaging multiple devices with full connectivity and seamless training simulation, resultantly, going to enhance a variety of educational tools. It would be apt to say that these new inventions, devices and applications are going to blur the boundaries between digital words and physical words [48-52]. It is expected in 2030 that AI power in 6G will enable rapid revolution by introducing real-time robotic devices, which would be a game changer, and the whole universe will transform from one situation to another situation: smart cities, IoT ecosystems, and autonomous cars, buses and other vehicles are its best example. As long as this technology is operational, cities will become more efficient, as transportation will turn smart, fast and safe, and it will be connected to devices of people and keep them updated and responsive. This technology will also open up new levels of automation by transforming the way humans interact and use technology [53]. This technology would regulate the work by pressing it, for example, when to deliver, where to deliver and what to whom. It means that purposeful communication would be possible, allowing for more responsive and personalized. Thus, AI would streamline the data exchange, and it would ensure that you have delivered data at the right time and space.

Table 2: Evaluation of Data Spectrum

1.0	data						Spectrum	1.0
0.8	rate						Usage	0.8
0.6	kbps						THz/	06
0.4	/							04
0.2	GBPS							02
0.0		1G	2G	3G	4G	5G	6G	00

Table 2 demonstrates the evolution from 1G to 6G data progression and by the side of the spectrum usage. It would be apt to say data rate is measured in different units, for example, kilobytes (Kbps) per second for 1G to 2G and gigabytes per second for 5G to 6 G. This progression emphasizes the significance in wireless technology with the passage of years [54]. The table shows a significant jump from 5 G to 6 G in data rates. At the level of 6G, it reaches at peak, and its rate exceeds 1,00 Gbps. Spectrum usage reaches its peak in 6G networking, and the sudden rise of the line indicates spectrum usage. Earlier it was less later on it increased very high, suddenly. Thus, progression is shown with every upcoming new generation. This progression shows successive convergence and displays trends increasing bandwidth with every fresh generation. The rise in line from 5G to 6G indicates that every new generation utilizes more and more spectrum and resultantly supports faster and more reliable transmission in wireless technology [55-58]. The sharp increase in spectrum use indicates that there is high-speed data transmission, and the frequencies of THz are higher, too, with the progression. It is worth mentioning that advancements in technology in 6G, particularly, experienced a shift in spectrum bandwidth. The bare and significant development is shown and identifying that 6G can support data transmission to an unprecedented level and speed.

III. AI-DRIVEN NETWORKS OPTIMIZATION IN 6G

With the arrival of six generations wireless it is predictable to developed efficiency in the world of technology, and AI is going to play a vital and significant role in this technology interface. Especially it would be helpful in Reinforcement Learning (RL). Over time, the demand for additional Wi-Fi connections is increasing as more devices require connectivity to the primary router. Thus, the limited available spectrum needs to be improved and used more efficiently and dynamically. Reinforcement Learning (RL) algorithms can optimize traffic load signals and user demand in a real-time dynamic spectrum, meeting the needs. It is expected that this AI-driven phenomenon will enable the spectrum to optimally support high-level performance, a requirement for an efficient 6G network [59].

Latency is not considered suitable for WiFi devices. One of the significant trials for six generation technology is to lessen potential of latency, allowing it to differ significantly from 5G. The more exclusive challenge is to reduce latency to the microsecond level. Minor latency can optimize the edge in a computing framework and is very supportive to end users. Less latency improves network quality by allowing data to be transmitted quickly and efficiently between devices, resulting in more responsive and practical applications. The benefit of AI in wireless computing is to facilitate end users by enhancing data processing between itself and devices [3]. The significant benefit of AI adjustment in WiFi is that it predicts traffic congestion and adjusts its routing protocols, ensuring smooth and seamless operations with minimal delay in sensitive applications. For example, smooth working in automatic vehicles and holographic operations. The 6G network is becoming increasingly complex due to the addition of multiple electronic systems, making it a more robust system. Therefore, security measures are necessary to prevent any malfunctions. It is expected that AI will continue to detect its malfunctions, repair them, and reduce the likelihood of malfunctions, making it more real-time and less threatening.

AI's quality of deep learning can detect anomalies and analyze the amount of traffic, and it can also identify possible cyber bugs. AI systems also learn

new data from their surrounding environment, like humans, and can add to their memory, having the ability to secure themselves from security threats. One of the most notable and impressive qualities of AI is its ability to encrypt. One-to-one encryption made communication more secure and breathless. Encryption enhances the security of sensitive applications of a country or institution; for example, transactions in banking are made more secure and integral. This quality enables people to trust banks more than ever, thanks to high confidentiality and speed. Meanwhile, AI is performing all its functions; it is expected that AI should be able to monitor upcoming and emerging threats so that problems may be prevented from happening. Thus, AI needs to be more evolving and more responsive. AI can ensure security and resilience, safeguarding sensitive information and enhancing its quality to gain the trust of end users [64].

Table 3: AI-driven Resources Allocation Process

	AI system	
	Monitor Network Condition	
	Analysis Traffic Patterns	
	Predict Resource Demand	
Optimal Spectrum Allocation	Optimal Bandwidth Allocation	Optimal Edge Processing
Real Time Spectrum Adjustment	Real Time Bandwidth Adjust	latency reduction via edge computer
Improved Spectrum Utilization	Efficient Bandwidth usage	Ultra-low latency Communication

The data presentation in Table 3 explains that the use of advanced AI algorithms, including those that optimize bandwidth, spectrum, and latency, enhances its functions. All these inclusive functions are efficient and improve the overall capacity and performance of 6G WiFi networking [65, 68]. The inclusion of AI in WiFi networking can monitor and track signal traffic patterns. AI can also read public opinions and have the capacity to learn new trends going on in societies; it learns from the texts entered by people, it knows what type of trends are going on in a society, and it responds accordingly. This analysis in Table 3 predicts that the combination of necessary resources, including spectrum and bandwidth, ensures high performance or optimal networking. Close to the edge of networks, AI systems are being automated for complex and challenging processes. The close-to-edge approach helps reduce latency, prevent delayed communication, and enhance security in the event of sensitive data breaches, as well as improve the HD of holographic communication for end users. Thus, high-spectrum, low-latency designs are reliable for 6G networking.

Another name used for Terahertz is the wave band of the sub-millimeter, which spans from 0.1 to 10 terahertz. This band of sub-millimeter wavelengths is predictable to production an energetic part in the most progressive form of wireless, called six generations. The millimeter surfs cast-off in 5generation have less possible potential as likened to millimeter surfs used in six generations, which is up to 1,000 Gbps /sec. These short wavelengths are more suitable for future technology in holography and for real-time Extended Reality (XR) and would be ideal for massive IoT networking. One of the best qualities of short wavelengths is that they transmit more data, enabling a vast number of connections or devices to operate simultaneously without malfunctioning. However,

it is also noticeable that THz has emerged with significant challenges, and these challenges need to be addressed. The major problem in using short wave length based Terahertz is limited due to its inability to penetrate through walls, and make it less efficient and cause lower connectivity, and it also stops work in bad weather conditions. To control this situation or challenge, this research suggests that beamforming can address this issue and enhance the quality of signals, making them more stable and robust, which can penetrate walls and operate effectively in adverse weather conditions. The addition of beamforming can effectively reconfigure, which is likely the reason for low energy consumption. Adaptive power management systems and energy-efficient hardware can effectively address this issue. Moreover, Terahertz (THz) is needed for line-of-sight transmission to overcome hurdles, which can be reduced by applying a multi-hop relay system, as well as satellite communication, to ensure coverage and maintain connectivity.

Table 4: Terahertz Communication Flow

6G Base Station		
THZ Frequency Transmitter		
Beamforming		
Reconfiguration Intelligent Surface		
THZ Wave Received	Satellite Integration	Wireless Backhaul
End User Device		

Table 4 describes energy flow in a 6G THz frequency communication through beamforming antennas in a specific direction. To gain maximum signal strength, a reconfigurable intelligent surface (RIS) is employed to manage and control data and its pathway on satellite for remote areas. It also illustrates that backhaul connection base stations have seamless connectivity. The end-users receive high-frequency signals and find ultra-fast communication. Thus, the integration of the THz satellite facilitates smooth data transfer.

Table 5: Holographic Communication in 6G

6 G Based station	
AI-Driven Data Compression	
Holographic Transmission	
6G Core Network	
Real-Time Holographic Projection	Latency Reduction via AI
End User Device	

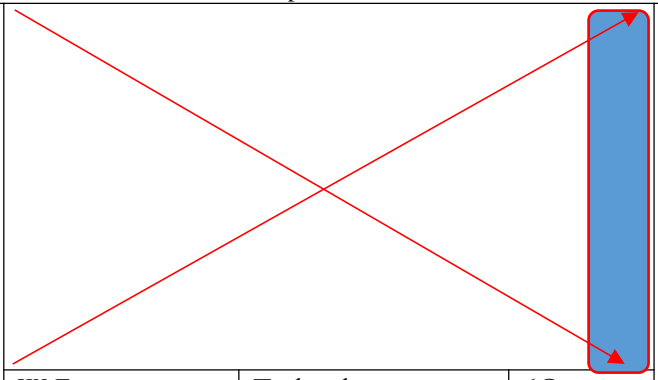
Table 5 describes a communication method for holographic 6G base stations for end users. In this connection, AI condenses the running data and reduces latency, thereby maximizing bandwidth. It ensures an efficient, real-time holographic experience. Holographic transmission applies 3D and real-time holograms. It enables smooth interactions between end-users across far-flung areas and locations. High-speed data transfer on 6G, with very low latency and AI holography telepresence, will become an accepted Reality; it would allow participants to see each other as if they are physically present in the same place. This technology will revolutionize hospitals, enabling patients to receive remote treatment and colleagues to arrange meetings and photographs. Deep learning AI algorithms will adjust holograms, taking into account the real-time changes required. Thus, vast amounts of data on holographic

telepresence will create a seamless experience for end-users.

III. PERFORMANCE EVALUATION AND RESULTS

The comparison between 5G and 6G is outstanding, as 6G is poised to change the world significantly, and its transmission outperforms at an optimized level. Simulations and different experiments have revealed that 6G wireless would be able to transmit data up to 1,000 Gbps, evolve it more favorable for very sensitive application, like; bandwidth and to run holographic filming and real time or extended reality based gadgets.

Table 6: Comparison of Data Rates

1000	data rate GBPS		Latency	20.0	90	Energy Efficiency
800				17.5	85	
600				15	80	
400				12.5	75	
200				10	70	
				7.5	65	
				5.0	60	
				2.5	55	
00		WiFi Technology 6G		00	50	

Nowadays, many self-automobiles have been invented, and they are graded good and evil on account of their performance and low consumption. For example, cars that have self-driving systems are considered reasonable if they have high latency or fast data traveling systems and sound bandwidth systems that their network uses resources efficiently. The addition of AI in wireless networks monitors this traffic and maximizes real-time resources. It indicates that 6G would have very low latency to microseconds and very high-performance communication, which is not possible with 5G. Additionally, 6G would have the capacity to redirect its system and use its resources to optimize and reduce congestion and waste.

6G also has to face many challenges along with benefits. 6G uses Terahertz, and though very promising, it has many challenges to face. One of the significant issues is that it cannot travel far, and buildings and trees can block it, and any hurdle on the way can block it, as the presence of such things may hinder the system from functioning well. Thus, to operate well, a special technology is needed that can run the system better, and antennas may transmit waves properly. Another efficiency it needs is that it should be able to send and receive signals efficiently but without using too much power. We found that, usually, our device disconnected, and we keep finding the device; we need to get a device that may not lost occasionally.

Though 6G technology has to face many challenges, it is the most superfast and responsive technology for communication up till now. One thing that needs to be taken care of is that it is easy to use for end users very environmentally friendly, and does not use much energy. As long as 6G is going to emerge, we need to prioritize that it should be a fast data transmitter, and this is only possible by creating green communication technology it uses in harvesting and reducing environmental impacts. In the future, AI should be able to

optimize spectrum usage, be highly efficient in resource allocation, and have the ability to perform real-time performance. The control of Terahertz is essential as it would be good in preventing congestion, and it would maximize data throughout to work smoothly. For example, for holography's telepresence, 6G needs to ensure low latency and consistency for service quality and to manage the network condition in a better way. Thus, the role of AI is vital in achieving a wireless system that is automatically resource-managed and adaptable according to the changing demand and self-regulatory.

IV. CONCLUSION

To sum up, the emergence of 6G has brought a revolution in the field of technology. The coming of 6G in the field of networking is expected to let data travel fast, almost instant communication is expected, and seamless integration of AI in our daily lives. This new network, with AI, is expected to unlock possibilities, including holographic video calls, the best virtual experience, and speedy data sharing. This new technology is going to add up to making cities and industries smart and enabling them to operate more efficiently and smoothly. It is very sure that Artificial Intelligence is going to play a vital part in fabrication signals fast and reducing energy consumption. However, its use is not without challenges. One of the most significant issues is that though it has high-frequency signals, it can weaken very easily and disrupt signal loss. Thus, this study adds that to overcome these challenges, an innovative solution is needed, for example, a beamforming intelligent surface that can be adaptive to changing conditions.

Another problem is the high consumption of energy to operate the systems. Fortunately, AI can help in this regard by optimizing the resources and managing energy flow and by making it a real-time data traveling system. Thus, by adding up AI-driven solutions, full benefits may be achieved from 6G networking by connecting the world.

Along with its benefits, its emergence has brought many challenges of security concerning sensitive applications and privacy. Particularly for sensitive applications, remote hospitals, and aquatic cars because these entities need high protection. Thus, to protect people's data and cyber threats, Artificial Intelligence is prone to be very important part. Therefore, supportable features which should sustainability in six generation wireless is essential; for better results, green effects and eco-friendly networking are needed. Thus, in the future, several areas need to be investigated, including AI-driven high-frequency terahertz. If this happens, 6G is expected to revolutionize communication and enable groundbreaking innovations, for example, holographic video calls and other autonomous systems. This revolution is expected to have an impact on industries, societies, and other possible opportunities in the world.

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