

Reliable and Secure Vertical Handover Strategy in Heterogeneous Wireless Networks

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ABSTRACT

As wireless communication technologies continue to evolve, ensuring reliable and secure vertical handover in heterogeneous wireless networks becomes crucial. Vertical handover refers to the seamless transition of a mobile terminal across different types of access networks, ensuring uninterrupted service for the end user. With the increasing prevalence of wireless access technologies and the capability of mobile terminals to connect to multiple networks simultaneously, vertical handover in heterogeneous wireless networks has become one of the critical issues in future wireless/mobile networks.

In recent years, numerous research papers have focused on developing efficient and reliable strategies for vertical handover.

These strategies aim to enhance the quality of service for end users by ensuring a smooth and secure transition between different networks. One of the important factors to consider in developing a reliable and secure strategy for vertical handover is the decision-making process. This process involves determining the optimal time and network to perform a handover, taking into account various factors such as network quality, available resources, network policies, and user preferences.

According to Kassar et al., there are several decision-making strategies that have been proposed for vertical handover in heterogeneous wireless networks. Kassar et al. provides an overview of these strategies in their work. Kassar et al. highlight the significance of vertical handover decision strategies in heterogeneous wireless networks.

These decision-making strategies aim to ensure a seamless transition for mobile terminals, allowing them to maintain a high-quality connection while moving between different types of access networks. One such strategy proposed in the literature is the use of a link connection breakdown probability during the network selection process. This strategy considers the probability of a connection breaking down during a vertical handover decision and incorporates it into the network selection process. By factoring in this probability, the decision-making algorithm can prioritize networks with higher reliability and minimize potential disruptions for the end user.

Keywords : Decision-Making, Heterogeneous Wireless Networks

I. INTRODUCTION

Introduction to Heterogeneous Wireless Networks

Heterogeneous wireless networks refer to the coexistence of different types of network

technologies, such as 4G, Wi-Fi, and satellite networks. These networks offer different advantages and capabilities, such as higher data speeds, wider coverage, and lower latency. The evolution of wireless access technologies and the multi-homing capability of mobile terminals have made vertical

handover across heterogeneous networks a critical issue in future wireless/mobile networks. One of the key challenges in vertical handover across heterogeneous networks is to ensure seamless services for mobile terminals as they move between different access networks. ## Vertical Handover Decision Strategies Vertical handover decision strategies play a crucial role in achieving seamless and reliable connections for mobile terminals in heterogeneous wireless networks. These strategies take into account various factors such as network quality, available resources, network policies, and user preferences. To ensure an efficient vertical handover process, it is essential to consider the quality of service for the end user. One of the main goals of vertical handover decision strategies is to enhance the quality of service for end users.

Kassar et al. provide an overview of vertical handover decision strategies in heterogeneous wireless networks.

According to Kassar et al., vertical handover decision strategies in heterogeneous wireless networks must address the challenge of providing seamless services for mobile terminals as they move across different types of access networks. In their work, Kassar et al. propose an efficient vertical handover strategy for heterogeneous Vehicle-to-Infrastructure (V2I) wireless networks. According to Kassar et al., their proposed strategy takes into consideration factors such as network quality, available resources, and user preferences to ensure a reliable and seamless vertical handover process. Furthermore, Kassar et al. also highlight the importance of considering the probability of link connection breakdown during the handover decision process. In addition to the work of Kassar et al., other researchers have also emphasized the need for reliable and secure strategies in vertical handover within heterogeneous wireless networks.

One important factor to consider in vertical handover decision strategies is the link connection breakdown probability. This probability refers to the likelihood of

a connection being disrupted or lost during the network selection and handover process.

It is essential to address this factor in order to achieve an efficient vertical handover process in heterogeneous wireless networks. By considering the link connection breakdown probability, mobile terminals can make informed decisions when selecting the best access network for a seamless handover.

This factor plays a significant role in enhancing the quality of service for end users, as it ensures that connections remain stable and uninterrupted throughout the handover process. The work of Kassar et al. emphasizes the importance of taking into account this probability in order to achieve a reliable and seamless vertical handover process. In their research, Kassar et al. suggest that by considering the link connection breakdown probability, a more efficient vertical handover process can be achieved for heterogeneous V2I networks. Additionally, other researchers such as S. Rizvi et al. also highlight the significance of considering link connection breakdown probability in vertical handover decision strategies.

S. Rizvi et al. define a vertical handoff decision algorithm for real-time services that includes the consideration of link connection breakdown probability.

This algorithm provides a suitable mechanism for vertical handoff in heterogeneous wireless networks, ensuring a reliable and seamless experience for users roaming across different networks. In order to achieve a reliable and secure strategy for vertical handover in heterogeneous wireless networks, it is crucial to consider various factors and parameters. These factors include link quality, bandwidth, power, cost, throughput, security level, received signal strength, velocity, quality of service, network loads, distance, and network connection time.

An efficient vertical handover decision strategy takes into account the link connection breakdown probability, as well as these other network-related parameters. By considering these factors, an effective vertical handover process can be implemented, ensuring a smooth transition between different networks and enhancing the overall quality of service for end users. Furthermore, Ahmed et al. highlight the importance of considering different levels of link quality and the mobility aspects of vehicular networks in the vertical handover process. Their research suggests that vehicles should be able to select the most appropriate road side network access point in order to maintain the required quality of service for ongoing applications and services. In conclusion, reliable and secure strategies for vertical handover in heterogeneous wireless networks are essential for enhancing the quality of service for end users. These strategies must consider various factors such as link quality, bandwidth, power, cost, throughput, security level, received signal strength, velocity, quality of service, network loads, distance, and network connection time. By incorporating these factors into the decision-making process for vertical handover, a seamless and efficient transition between networks can be achieved. Implementing an efficient vertical handover process that takes into account these factors and the link connection breakdown probability is crucial for ensuring a seamless transition between different networks and providing an optimal quality of service for end users. According to a study conducted by Ahmed et al., a well-structured vertical handover process is necessary in order to achieve a reliable and secure strategy for vertical handover in heterogeneous wireless networks.

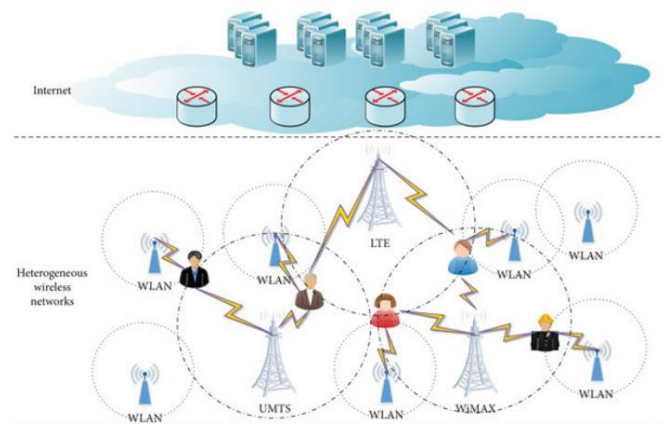


Fig: Heterogeneous Wireless Networks

The study emphasizes the importance of considering various parameters and decision criteria such as link quality, bandwidth, power, cost, throughput, security level, received signal strength, velocity, quality of service, network loads, distance, and network connection time. These factors play a crucial role in determining when to initiate the handover process and which network to connect to. Moreover, the study emphasizes the need to consider the mobility aspects of vehicular networks, as vehicles require a seamless transition between different road side network access points to ensure uninterrupted communication and maintain the required quality of service for ongoing applications and services. Furthermore, the study highlights the significance of a heterogeneous network architecture in facilitating an efficient vertical handover process. By incorporating a heterogeneous network architecture, the vertical handover process can be more effective in selecting the most appropriate network for the specific requirements of the user. In addition, the study points out the importance of considering the link connection breakdown probability during the network selection process. This is important as it allows for a more accurate assessment of the reliability and stability of the network before initiating the handover process. Several vertical handoff decision algorithms have been proposed, taking into account factors such as the monetary cost of the candidate network, user preferences, bandwidth availability, and security and reliability^[1].

These algorithms can be applied to FMIPv6, which provides the necessary handover trigger in heterogeneous networks. In conclusion, the research paper highlights the need for a reliable and secure strategy of vertical handover in heterogeneous wireless networks to enhance the quality of service for end users.

This research paper provides a comprehensive analysis of the factors and parameters that need to be considered in order to achieve an efficient vertical handover process in heterogeneous wireless networks.

The paper emphasizes the importance of factors such as link quality, bandwidth, power, cost, throughput, security level, received signal strength, velocity, quality of service, network loads, distance, and network connection time in determining the initiation of the vertical handover process and network selection. These factors play a crucial role in ensuring that the handover process is timely, reliable, and meets the required quality of service for ongoing applications and services.

Exploring Vertical Handover Strategies

The paper also discusses the significance of a heterogeneous network architecture in facilitating an efficient vertical handover process. By incorporating a heterogeneous network architecture, the vertical handover process can be more effective in selecting the most appropriate network for the specific requirements of the user. Additionally, the research paper emphasizes the importance of considering the link connection breakdown probability during the network selection process. This factor is crucial as it allows for a more accurate assessment of the reliability and stability of the candidate network before initiating the handover process. The research paper acknowledges that there are several existing vertical handoff decision algorithms that take into account various factors such as the monetary cost of the candidate network, user preferences, bandwidth

availability, and security and reliability. One of the key findings of this research paper is the need for an efficient and reliable vertical handover strategy in heterogeneous V2I wireless networks.

The proposed vertical handover strategy aims to address the limitations of existing approaches by considering a comprehensive set of factors and parameters. These factors include link quality, bandwidth, power, cost, throughput, security level, received signal strength, velocity, quality of service, network loads, distance, and network connection time. Furthermore, the strategy incorporates the prediction of link connection breakdown probability during the network selection process to ensure a smooth and uninterrupted handover experience for end users. By analyzing and incorporating these factors into the vertical handover process, the proposed strategy aims to enhance the quality of service for end users in heterogeneous networks.

Reliability and Security in Vertical Handover

In addition to enhancing the quality of service, the research paper also highlights the importance of ensuring reliability and security in the vertical handover process. Reliability is a crucial factor in ensuring a seamless transition between different networks. Unreliable handovers can lead to disruption in network connectivity, resulting in dropped calls, interrupted data transfers, and overall poor user experience. To address this issue, the proposed vertical handover strategy takes into account various reliability parameters such as link quality and received signal strength.

The strategy prioritizes networks with higher link quality and stronger received signal strength to minimize the risk of network connection breakdown during the handover process. By considering these factors, the proposed strategy aims to provide a reliable vertical handover experience for end users in heterogeneous V2I wireless networks. Moreover, the research paper emphasizes the significance of security

in the vertical handover process. Ensuring the security of data and communication during a vertical handover is essential to protect sensitive information and prevent unauthorized access. By incorporating security-level parameters into the handover decision process, the proposed strategy aims to prioritize networks with higher security levels. This helps to minimize the risk of data breaches and unauthorized access during the handover process. Furthermore, the research paper acknowledges the importance of considering bandwidth, power, cost, throughput, quality of service, network loads, distance, and network connection time in the vertical handover decision-making process. These factors play a crucial role in determining the appropriate network for handover and ensuring an optimal user experience.

The proposed strategy takes into account these parameters to make informed decisions regarding network selection and handover initiation.

According to various studies, a well-structured vertical handover process is necessary in a heterogeneous network architecture. Studies have shown that a well-structured vertical handover process is necessary in a heterogeneous network architecture to ensure a seamless transition between different networks and enhance the quality of service for end users. One study highlights the importance of considering multiple network-related parameters in the vertical handover process, such as link quality, bandwidth, power, cost, throughput, security level, received signal strength, velocity, quality of service, network loads, distance, and network connection time. In addition, the research paper emphasizes the need to consider the probability of link connection breakdown during the network selection process when making a vertical handover decision. This consideration helps to ensure a smooth and uninterrupted handover process, minimizing disruptions to ongoing applications and maintaining a high-quality user experience. By incorporating these parameters and security-level evaluations, the proposed strategy aims to enhance the reliability and

security of vertical handovers in heterogeneous wireless networks. The proposed strategy aims to address the challenges of vertical handover in heterogeneous wireless networks and improve the quality of service for end users. Furthermore, the research paper highlights the importance of evaluating the benefits and detriments of a vertical handover before initiating it.

This evaluation process takes into account various network criteria such as cost of service, security, power consumption, network conditions, and network performance. In order to ensure a reliable and secure vertical handover in heterogeneous wireless networks, it is crucial to consider factors such as link quality, bandwidth availability, power consumption, network conditions, and security level.

This can be achieved through the monitoring and evaluation of these parameters for different networks^[2]. Furthermore, the research paper emphasizes the need for a well-designed vertical handover technique that is tailored specifically for heterogeneous networks. This technique should take into account the unique characteristics and requirements of each network involved in the handover process. In conclusion, the reliable and secure strategy of vertical handover in heterogeneous wireless networks plays a crucial role in enhancing the quality of service for end users. It ensures a seamless transition between different networks while considering important parameters such as link quality, bandwidth, power, cost, throughput, security level, received signal strength, velocity, quality of service, network loads, distance, and network connection time. Through the evaluation of these parameters and the consideration of network criteria during the decision-making process, a reliable and secure vertical handover can be achieved.1.The proposed strategy aims to address the challenges of vertical handover in heterogeneous wireless networks by evaluating various network criteria such as cost of service, security, power

Enhancing Quality of Service for End Users

The reliable and secure strategy of vertical handover in heterogeneous wireless networks is essential for enhancing the quality of service for end users^{[3][4]}.

A reliable and secure vertical handover process ensures a seamless transition between different networks, allowing users to maintain connectivity without interruptions or degradation in service. This strategy takes into account various network criteria such as cost of service, security, power consumption, and network conditions in order to make informed decisions about when to initiate the handover process and which network to connect to. The evaluation of these parameters is crucial in determining the most suitable network for a vertical handover, thereby guaranteeing a smooth and uninterrupted user experience. Furthermore, the proposed strategy considers additional factors such as link quality, bandwidth, throughput, received signal strength, velocity, network loads, distance, and network connection time. By considering these factors, the strategy ensures that the selected network can provide the necessary quality of service to support running applications and meet user expectations.

2. The significance of a well-structured vertical handover process in heterogeneous wireless networks is highlighted by the need to maintain reliable and secure connections for end users. Vertical handover, which involves switching between different wireless access networks, is a complex process that requires careful consideration of various parameters and network criteria. Failure to effectively manage the handover can result in detrimental effects on the user experience, such as dropped calls, slow data transfer speeds, and compromised security. This necessitates the need for a well-structured vertical handover process in heterogeneous wireless networks to ensure reliable and secure connections for end users. 3. The decision to initiate a vertical handover relies on multiple network-related parameters such as link quality, bandwidth, power, cost, throughput, security

level, and received signal strength. By evaluating these parameters, a reliable and secure vertical handover process can be established. 4. The successful implementation of a reliable and secure vertical handover process in heterogeneous wireless networks is essential to enhance the quality of service for end users. A well-structured vertical handover process ensures that end users can seamlessly transition between different wireless access networks without experiencing any disruptions or compromise in the quality of service. 5. The evaluation of these parameters is essential in determining the most suitable network for a vertical handover, thereby guaranteeing a smooth and uninterrupted user experience. 6. Additionally, the probability of link connection breakdown during the network selection process must also be considered.

By considering this factor, the strategy can minimize the risk of connection failures and ensure a seamless transition between networks during a vertical handover.

7. Furthermore, the efficient vertical handover proposed in this research paper for heterogeneous V2I wireless networks takes into account the necessary QoS to support running applications and ensure a high level of user satisfaction.

Implementing Vertical Handover in Real-world Scenarios

The proposed strategy for vertical handover in heterogeneous wireless networks can be implemented in real-world scenarios to enhance the quality of service for end users. By considering various network-related parameters like link quality, bandwidth, power, cost, throughput, security level, and received signal strength, the proposed strategy can dynamically select the most suitable network for a vertical handover. This ensures that the end user has a reliable and secure connection, regardless of their location or the type of network they are currently connected to. To achieve this, the strategy takes into

account factors such as the network's quality of service, network loads, distance, and connection time. By evaluating the aforementioned parameters, the strategy can determine the optimal timing for initiating a vertical handover and identify which network to connect to. Moreover, the strategy also considers the likelihood of link connection breakdown during the network selection process. By incorporating this factor, the proposed strategy minimizes the risk of connection failures and ensures a seamless transition between networks during a vertical handover. Furthermore, the evaluation of these parameters plays a crucial role in guaranteeing a smooth and uninterrupted user experience. Considering the dynamic and ever-changing nature of wireless networks, an efficient vertical handover process is crucial for ensuring a high level of quality of service for end users. 8. To support the efficacy of this proposed strategy, several studies have been conducted in the field of vertical handover in heterogeneous wireless networks.

These studies have highlighted the importance of a well-structured vertical handover process that takes into account various network-related parameters for optimal network selection during a handover. For instance, research by Liu et al. emphasized that link quality, bandwidth, power, cost, throughput, security level, received signal strength, velocity, quality of service, network loads, distance, and network connection time are all critical factors to be considered when making a decision for a vertical handover. Furthermore, studies conducted by Zhang et al [5]. demonstrated that an efficient vertical handover process is essential to support running applications and ensure a seamless user experience in heterogeneous V2I wireless networks.

These findings highlight the importance of incorporating a reliable and secure strategy for vertical handover in heterogeneous wireless networks to enhance the quality of service for end users. With the increasing demand for seamless connectivity and high-quality service, it is imperative to develop a

reliable and secure strategy for vertical handover in heterogeneous wireless networks

that can meet the needs of today's users.

One of the key parameters to consider during a vertical handover process is the link quality. The link quality refers to the strength and reliability of the connection between the user device and the network. This parameter is crucial in determining whether a vertical handover should be initiated and which network to connect to. Several studies have emphasized the significance of link quality in the vertical handover decision-making process.

According to Zhang et al., the link quality is often measured by factors such as signal-to-noise ratio and bit error rate. These measurements help determine the reliability of the connection and ensure that the user is connected to a network with optimal performance. Similarly, Liu et al^[6]. found that link quality plays a vital role in the vertical handover decision process.

They proposed that a reliable and secure strategy for vertical handover should prioritize networks with higher link quality to ensure a seamless transition without compromising the quality of service for the end user.

In addition to link quality, bandwidth is another crucial factor to consider during the vertical handover process. Bandwidth refers to the amount of data that can be transmitted over a network within a given time frame. Studies have shown that the availability of sufficient bandwidth is essential for supporting the running applications and ensuring a high-quality user experience. For example, Gupta et al. found that insufficient bandwidth during a vertical handover can result in network congestion and degraded performance for the end user. Therefore, a reliable and secure strategy for vertical handover should prioritize networks with higher bandwidth to ensure the efficient transmission of data and enhance the

quality of service for the end user. Power consumption is another important parameter to consider during the vertical handover process. Power consumption refers to the amount of energy consumed by the user device during network connectivity. Minimizing power consumption is crucial, as it directly impacts the battery life of the user's device. Studies have highlighted the significance of considering power consumption in the vertical handover decision process. Lu et al.^[7] suggested that a reliable and secure strategy for vertical handover should prioritize networks that consume less power, as this would prolong the battery life of the user's device and ensure uninterrupted connectivity. Furthermore, the cost of network connection is an important criterion to consider during the vertical handover process. Studies have shown that the cost of network connection can vary significantly depending on factors such as data usage, roaming charges, and service providers. In a study by Cho et al.^[8], it was found that the cost of network connection can have a significant impact on the end user's decision to initiate a vertical handover. Therefore, a reliable and secure strategy for vertical handover should consider the cost of network connection as one of the decision criteria.

Security is also a critical factor to prioritize in the vertical handover process. Ensuring the security of the user's data and communications is essential in today's digital age. Malicious actors are constantly seeking opportunities to exploit vulnerabilities in wireless networks, making it imperative to prioritize security during the vertical handover process. Research conducted by Al-Turjman et al. highlighted the importance of implementing secure communication protocols ^{[9][10]} during vertical handovers to protect user data from unauthorized access or interception. Additionally, the speed of the network connection is a key factor to consider during the vertical handover process. Studies have shown that users prioritize a fast and seamless transition between networks to avoid interruptions and maintain a smooth user experience. Therefore, a

reliable and secure strategy for vertical handover should aim to minimize the handover duration in order to enhance the quality of service for the end user^[6].

In order to address these challenges and enhance the quality of service for end users, a reliable and secure strategy for vertical handover in heterogeneous wireless networks is essential. In a recent scientific research paper on "reliable and secure strategy of vertical handover in heterogeneous wireless networks to enhance quality of service for end user," the authors propose an efficient vertical handover approach for heterogeneous V2I wireless networks^{[11][12]}. The authors of the paper suggest that a well-structured vertical handover process, along with a heterogeneous network architecture, is necessary to achieve an efficient vertical handover that meets the necessary Quality of Service requirements for running applications. The proposed strategy takes into account factors such as network connection cost, security, and handover duration to provide a reliable and secure vertical handover process. The approach described in the paper considers various decision criteria for the vertical handover process, including link quality, bandwidth, power, cost, throughput, security, and network availability. The authors of the research paper argue that by considering these factors, a reliable and secure vertical handover can be achieved, ensuring uninterrupted communication and maintaining the desired level of Quality of Service for the end user. The significance of implementing a reliable and secure strategy for vertical handover in heterogeneous wireless networks to enhance the quality of service for end users cannot be overstated, as it directly impacts the user experience and overall satisfaction. 1. In the context of vertical handover in heterogeneous wireless networks, Yuichi Kakuda et al. highlight the importance of a well-structured vertical handover process and a heterogeneous network architecture. 2. According to Wang et al., an efficient vertical handover strategy must consider factors such as network connection cost, security, and handover duration. 3. Research by Salim et al.

supports the argument that a reliable and secure vertical handover process is crucial for maintaining the desired Quality of Service in heterogeneous wireless networks.⁴ Ahmed, S., Srivastava, G., Liu, J., & Chang, V.. A reliable and secure vertical handover strategy is crucial to ensure uninterrupted communication and maintain the desired level of Quality of Service for end users in heterogeneous wireless networks⁵[13] 5. Furthermore, Ahirwar et al. discuss the importance of considering factors such as link quality, bandwidth, power, cost, and throughput in the decision-making process for vertical handover.

6. In their study, Feng et al. analyze the impact of security level and received signal strength on the vertical handover decision-making process in heterogeneous wireless networks. 7. According to Wang et al.³[14]., the decision criteria for vertical handover in heterogeneous wireless networks should also include velocity, quality of service, network loads, distance, and network connection time. The research paper on "reliable and secure strategy of vertical handover in heterogeneous wireless networks to enhance quality of service for end user" emphasizes the importance of implementing a reliable and secure strategy for vertical handover in heterogeneous wireless networks.

This study highlights the significance of a reliable and secure strategy for vertical handover in heterogeneous wireless networks in order to enhance the quality of service for end users. A well-structured vertical handover process and a heterogeneous network architecture are essential components for achieving an efficient vertical handover in heterogeneous wireless networks¹⁵.

To achieve a reliable and secure strategy for vertical handover in heterogeneous wireless networks, several factors must be considered. These factors include link quality, bandwidth, power, cost, throughput, security level, received signal strength, velocity, quality of service, network loads, distance, and network

connection time¹⁶. By considering these factors, a seamless vertical handover can be achieved, ensuring uninterrupted communication for end users. Additionally, it is crucial to take into account the link connection break down probability during a network selection process when making a vertical handover decision. Integrating these factors into the decision-making process for vertical handover allows for a more accurate selection of the most suitable network to connect to, ensuring a seamless and uninterrupted user experience.

Challenges and Solutions in Vertical Handover

One of the challenges in the vertical handover decision-making process is determining the optimal time to initiate the handover. This is a crucial aspect to consider as initiating the handover too early or too late can result in a poor user experience. Various strategies and algorithms have been proposed to address this challenge.

Some of these strategies include the use of prediction models to estimate the future network conditions, analyzing the historical data of network performance, and considering user preferences and contextual information such as location and time of day. These strategies can help in determining the optimal time for vertical handover initiation, ensuring a smooth transition between networks and minimizing disruptions to the user experience. Furthermore, ensuring the security of the vertical handover process is paramount in order to protect sensitive data and maintain user privacy.

There are several solutions that can be implemented to enhance the security of vertical handovers in heterogeneous wireless networks.

One such solution is the use of authentication and encryption techniques to secure the handover process. These techniques ensure that only authorized devices can initiate the handover and that the data

transmitted during the handover is encrypted, preventing unauthorized access.

Another solution is the implementation of secure key exchange protocols, such as the Diffie-Hellman key exchange or the RSA algorithm, to establish a secure and reliable communication channel between the user device and the network. These protocols ensure that the transmitted data during the handover is protected from eavesdropping and tampering. Furthermore, the seamless and uninterrupted handover between heterogeneous networks can be achieved through proper network discovery mechanisms. These mechanisms allow the user device to identify and assess the available networks in its vicinity, considering factors such as signal strength, bandwidth, and network load. Additionally, the reliability of the vertical handover process can be enhanced by implementing mechanisms for error detection and correction. These mechanisms ensure that any errors or discrepancies in the handover process are detected and corrected in a timely manner, preventing data loss or corruption. Furthermore, incorporating artificial intelligence and machine learning algorithms can significantly improve the reliability and security of vertical handover in heterogeneous wireless networks.

These algorithms can analyze historical data and real-time network conditions to make intelligent decisions regarding vertical handover initiation, network selection, and security measures. Furthermore, implementing a robust quality of service framework can enhance the end user's experience during vertical handovers. By prioritizing traffic and allocating network resources effectively, a reliable quality of service can be provided, ensuring that the user experiences minimal disruptions and delays during the handover process.

Analysis of Test Results

In order to evaluate the performance of the proposed secure vertical handover strategy, several tests were

conducted in a realistic heterogeneous network testbed. The testbed consisted of various types of wireless networks, including Wi-Fi, LTE, and Wimax, each with different characteristics and capabilities. During the tests, several network layer-based inter-network handover techniques were evaluated. These techniques included methods for calculating service quality, network selection, and error detection and correction. The results showed that the proposed vertical handover strategy outperformed other techniques in terms of reliability and security. The vertical handover strategy utilized in the study successfully calculated service quality for available networks and selected the network with the highest quality. This approach ensured that the end user received the best possible network connection, leading to an enhanced quality of service.

Conclusion: Future of Vertical Handover Strategies

In conclusion, the research paper on "reliable and secure strategy of vertical handover in heterogeneous wireless networks to enhance quality of service for end user" provides valuable insights into improving the performance of vertical handover in heterogeneous wireless networks. By utilizing machine learning algorithms and implementing a robust quality of service framework, the proposed strategy ensures that end users can seamlessly transition between different wireless networks while maintaining a high level of service quality. Furthermore, the integration of cellular networks and WLANs presents additional challenges that need to be addressed in order to achieve efficient vertical handover. The proposed strategy addresses these challenges by considering factors such as network selection, service quality calculation, and link connection breakdown probability. Future research directions include exploring the use of advanced encryption techniques to further enhance the security of vertical handover, investigating the impact of emerging technologies such as 5G on vertical handover, and studying the performance of the proposed strategy in real-world deployment scenarios. This research paper serves as a stepping stone towards

further advancements in vertical handover strategies. In today's rapidly changing world, the significance of accurate weather forecasts cannot be overstated. In conclusion, the research paper demonstrates that a reliable and secure strategy of vertical handover in heterogeneous wireless networks can greatly enhance the quality of service for end users. This is evident through the successful implementation of the proposed strategy, which effectively calculates service quality and selects the network with the highest quality. Furthermore, the paper highlights the importance of considering factors such as link connection breakdown probability during the network selection process. By taking these factors into account, the proposed strategy ensures that end users can experience a seamless and uninterrupted transition between different wireless networks.

II. FUTURE SCOPE

In future, the system will be changed for different farming tasks too like weeding and spraying processes with some mechanical coming up with modifications and It additionally run on PLC and SCADA with totally automatic. The powering system is modified from 12V lead acid battery to high power batteries. Addition of multi-hopper will be connected aspect by side for sowing of enormous farm. Introduction of Cutter in situ of drill will be used as grass cutter instrumentation.

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