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PURPOSES OF USING HOME ROUTER

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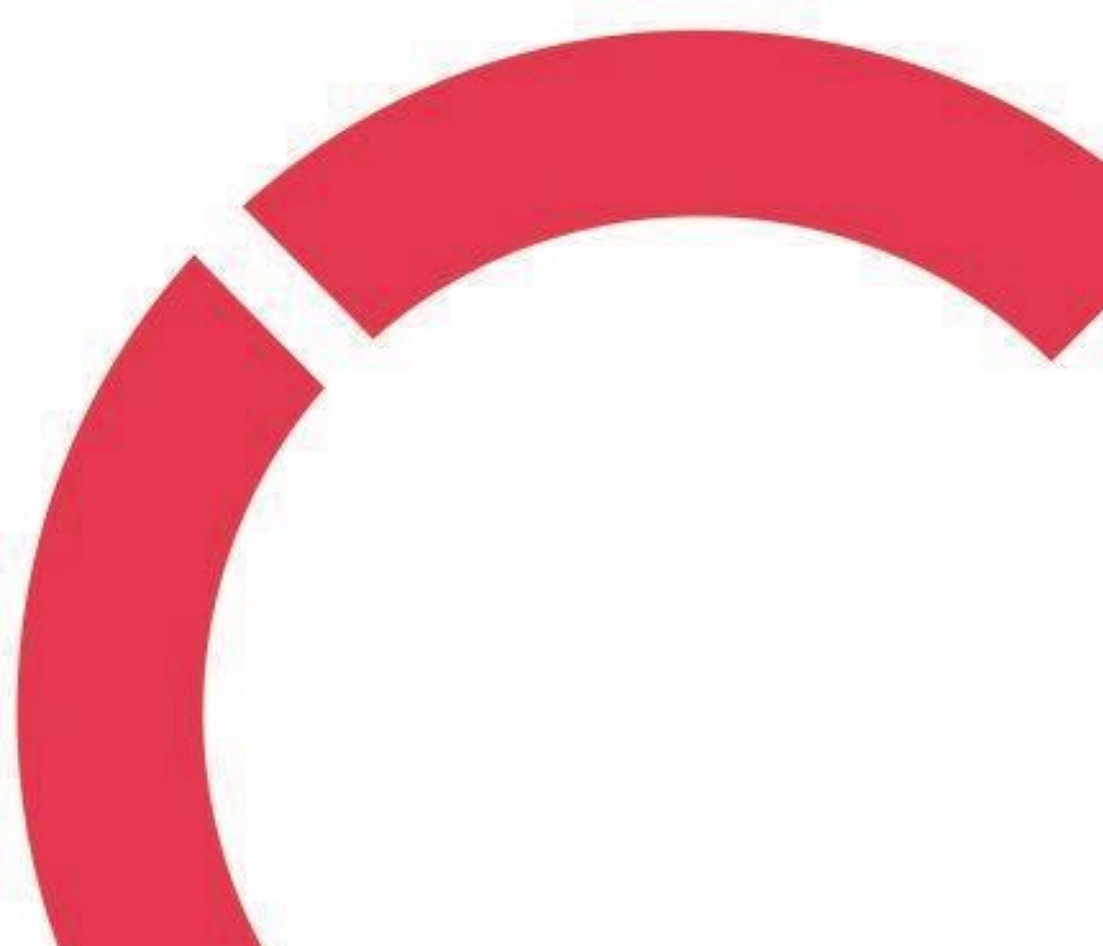

ABSTRACT

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In this thesis study, the various uses of home routers in homes are examined. Household routers are crucial devices that provide a multitude of vital operations in light of the increasing need for digital access and continuous connectivity. The paper explores the main goals of home router adoption, which include supporting multiple-device internet access and maintaining network security and privacy. It also looks at how home routers enable a variety of applications, including communication, work-from-home, and online entertainment. This research illustrates how home networking is changing and how routers are essential to providing modern families with the connectivity they require. It does this by thoroughly examine user actions, preferences, and technology developments.

Keywords
cyber security, globalization, home router, internet, networks, technology

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1 INTRODUCTION

The contemporary digital world is an element of the global media ecosystem. The key developments in the new information environment include the rapid growth of digital information, the availability of Internet resources, and the continuous construction of the worldwide communications network. Using a local area network (LAN) makes it possible for computers, game consoles, smartphones, smart TVs, tablets, and other smart devices to connect and access the internet. A typical home network component is a router, which links devices to the internet and one another. Other common network connections include wired Ethernet and wireless technologies like Wi-Fi. The process of linking several devices and computers within a single household to share resources and information is referred to as home networking. A router serves as the primary hub for connecting devices to the internet and each other, and different networking connections (wired Ethernet) or wireless technologies such as Wi-Fi are common components of a home network. Home networking is critical for modern families, providing seamless communication, entertainment, and productivity, and it has grown increasingly important as smart gadgets proliferate and demand for high-speed internet connection at home grows.

The thesis study investigates and comprehends the numerous reasons and goals why individuals and households use home routers. Home routers are typically used to give internet connectivity to various devices inside a household, guaranteeing that all family members or residents have access to the internet along with analyzing how the 4G router is better than any other router in this modern time. Two routers have been selected to investigate this study. The selected routers are the D-Link DIR-867 router and the TP-Link AC1200 Dual Band Wi-Fi 4G LTE router. By comparing the function of these routers, one can find out how home routers separate the home network from external networks like the Internet to offer a safe environment for device connection and data exchange. The function of home routers is to provide wireless access via technologies such as Wi-Fi, which allows mobile devices to connect to the network without the use of physical cords. Understand how home routers are meant to be user-friendly, with web-based interfaces that make them simple to set up and configure for non-technical users. The dependability of home routers in terms of maintaining a steady network connection and reducing disturbances.

Home routers play an important part in contemporary home networking and provide several substantial benefits and features, making them an essential component in the majority of houses. Routers enable several devices in the home to share a single internet connection. This is especially crucial in houses with several family members or people who have multiple internet-connected devices such as smartphones, tablets, PCs, and smart TVs. Local area networks (LANs) are created by routers to separate the home network from other networks such as the Internet.

This isolation contributes to increased security and privacy by limiting unwanted access to your devices and data. Most modern home routers incorporate Wi-Fi capabilities, allowing for wireless communication across the home. This wireless access is useful for mobile devices and provides for increased device placement flexibility. Routers provide both cable and wireless connections, allowing computers, printers, cell phones, game consoles, and smart home devices to be linked. To protect the home network from internet dangers such as malware, viruses, and hacking attempts, home routers frequently incorporate built-in firewalls and security capabilities. For enhanced protection, they also include network encryption and guest network options.

2 METHODOLOGIES

This thesis examines the fundamental purposes and growing responsibilities of home routers in modern homes, as well as their effects on digital lifestyles, network connectivity, and security. Connecting to the second query, what are the advantages and six goals of using Wi-Fi 4G LTE routers in home networks, as well as how do they increase connection, security, and performance on the network when compared with other home routers? This thesis paper was completed using the following techniques.

This research paper is mostly an analytical project. A qualitative method approach is used when a research study contains only qualitative data. In this study, the research's data are provided qualitatively. An analytical approach has been used to discuss the case. This study's primary objective is to explain in depth the purpose of using home routers, especially modern routers, and how it is used in homes and offices. A framework of thought is an idea or system that encompasses worldviews, views, mindsets, and cultural motifs. Research that is practical counts as one of them. Pragmatic research involves both qualitative and quantitative methods. This research focuses on the qualitative research method. A study's method analysis outlines the format and style in which the research will be written. This study's research was written by outlining the methods used to address the research issue. The case study has been examined. The collection of information is a paper's primary purpose.

The research paper is a combination of primary and secondary data. Due to several limitations, this article did not use any primary data. All the material utilized in this article is secondary, and it was mostly gathered from several periodicals, newspapers, books, and websites. All of the data were gathered from reliable sources. The paper has avoided including any biased material. Validity and reliability are ideas used to assess the quality of a paper. Validity and reliability ensure how unbiased and accurate is the paper. The data of this thesis work have been collected from various sources keeping in mind that they should not be controversial. While collecting information, restrictions are followed to ensure acceptability. As this research is based on secondary data, the information may be fuzzy, and out of date. The information may not be deemed accurate. But rules and regulations have been followed while making this assignment.

3 LITERATURE REVIEW

A home router serves two primary purposes for these networks: first, it forwards data packets to the correct IP addresses, and second, it permits multiple devices to share an Internet connection. Home connection is used for using the automatic different household appliances and systems. Network infrastructure employed at home as information technology and home automated control system that formed in a corporation home network design in the market. Cell phones have been experimented with home networking by utilizing both wired and broadband wireless connectivity. There are no home networking solutions researched. From them, some of the solutions that are used are unclear. As a result, a local area network built on the universal serial bus is put into place for home connections. The USB hub was portable and extendable. It also delivers a low-cost and dependable technology using an embedded system (Kim, Kim & Lee 2004).

LAN standards defined by IEEE 802 groups are referred to as traditional LAN. The most important protocol for connecting computers in a network via a wired connection is Ethernet. With the price of Ethernet adapters/hubs decreasing, it is now a viable option for connecting household PCs. There are several standards and discussions on this subject. However, in terms of technological potential, they are mature. Ethernet has long been used by organizations to connect personnel, systems, and network devices to construct a Local Area Network (LAN) as a well-established and very robust networking solution. Ethernet is becoming increasingly common in the house. The fundamental benefit of Ethernet is its dependability and reasonable speed. Ethernet, with speeds ranging from 10 to 100 megabits per second (Mbps), is enough for most data networking requirements. Furthermore, Ethernet equipment is reasonably priced (Xinhua 1999).

The growing need for faster speeds and higher performance is driving the development of new technology in the home networking sector. Internet service providers increased their efforts to supply new CPE to their consumers, hoping to capitalize on the rising demand for high-speed, dependable, and consistent internet and Wi-Fi services. Adoption is solidifying among the top brands among consumers who acquired their routers at retail (Glowacki Jeremy, 2019).

These retail routers provide high-speed wireless internet access to homes or small offices. TP-Link and D-Link are two of the most well-known brands among them and each has certain advantages to offer. With support for both 2.4GHz and 5GHz frequency bands, this router offers faster speeds and reduced interference for a variety of devices, making it perfect for uses like 4K video streaming and online gaming. One of the most notable features is its capability for 4G LTE. This enables the router to connect to mobile networks, allowing access to the internet in regions where regular broadband connections are unavailable or unstable. 1200Mbps is the total data transfer rate denoted by AC1200. It offers the fastest Wi-Fi speed in this length and dual bandwidth. The Wi-Fi speed is the 2.4 GHz band speed of 300 Mbps and the 5 GHz bandwidth speed of 867 Mbps (ChesterDigital, tplink).

PICTURE 1. AC1200 Wireless Dual Band 4G LTE Router Archer MR400 (Tp-Link 2024).

The TP-link router can handle several devices at the same time, making it ideal for families or small offices with multiple users and devices connected at the same time. Dual external antennas aid in improving wireless coverage and signal quality, expanding Wi-Fi range and decreasing dead zones. It has Gigabit Ethernet ports for wired connections, making it perfect for devices that demand a solid and fast connection, such as game consoles or desktop PCs. To defend the network from potential internet threats, routers often contain security features such as WPA/WPA2 encryption and a built-in firewall. TP-Link routers are well-known for their simple setup procedures, which are frequently complemented with a web-based configuration interface. QoS feature enables users without data traffic solution. A TP link router can only use apps that have sufficient bandwidth to function properly. A secondary

guest network can be set up on certain models, protecting the main network while allowing visitors to access the internet (Excel technologies, TP-Link Archer).

On the contrary, The D-Link DIR-867 is another type of Wi-Fi router. It is designed as a dual band router to deliver fast and dependable wireless access in the home and small business. The D-Link router supports AC1750Mbps by removing noise-free signal.It has a maximum speed of 450Mbps on the 2.4GHz band and 1300Mbps on the 5GHz band. It is doing excellent performance for broad of appliances and utilization (Blacktubi 2018,8).

PICTURE 2. D-Link DIR-867 (Blacktubi 2018,8)

The D-Link DIR-867 has service system that let users to access a smooth and lag-free online gaming, video streaming, and video conferencing experience. It also supports MU-MIMO technology, which makes it ideal for houses with several connected devices because it can provide data to multiple devices at a time (Blacktubi 2018,8).

4 **HOME NETWORKING AND ROUTER TECHNOLOGIES**

A typical home network is depicted with a single wireless router providing connection to a modest collection of devices. The address space for private networks is used to distribute addresses using DHCP. To give the connected hosts Internet access, the device uses NAT. Instead of being limited to well-known, conventional use cases, the new services that are challenging home networks are actually defining a new issue area (Leao, Esteve & Rogerio, 2013).

Wireless local area networks, wireless metropolitan area networks, wireless personal area networks, and wireless wide area networks are the four categories into which wireless networks are divided. Each form of network has its unique purpose. Wireless LAN (WLAN) is a kind of local network that uses wirelessly within a geographical location. Generally, it is used in homes, offices and public spaces within a local area network. The growth of using wireless Lan has expanded in COVID-19 time due to work-from-home. The layout of this connection is so easy. The gadgets connected to the WLAN, including computers, printers, smartphones, and tablets. The Access points allow devices to transmit and receive signals wirelessly. WLANs have functioned based on IEEE 802.11 standards. It provides data transfer rates, frequency bands, and other features with its standards (Jacobs David, 2022).

Cities all over the world have built wireless metropolitan area networks to provide connectivity to people without access to an office or home network. The fundamentals of these networks are still the same. However, their scope is greater than that of office or home networks. On the outside of buildings or atop telephone poles, APs are placed across the enclosed area. A wireless signal is broadcast throughout the area using APs, which are wired networks connected to the internet. Users connect to the closest wireless access point (AP) to reach their destination, and the AP relays the connection over its internet connection. (Jacobs David, 2022).

For access when a wireless LAN or metropolitan network is out of range, wireless WANs use cellular technology. Calls between users and other users can be made over these networks. WANs can facilitate the delivery of data and speech using the same technologies. Connecting to the internet allows users to browse webpages and server-based apps. In the US and most

other countries, cell towers can be found practically everywhere. The closest cell tower, which is thereafter linked to the wired internet or another tower that is similarly linked to the wired internet, receives the user connection (Jacobs David, 2022).

Network establishment and data flow control are the responsibilities of a router, whereas a modem connects those networks to the Internet. Modems establish an Internet connection by converting signals from an ISP into digital signals that are comprehensible to all connected devices (Jacobs David, 2022).

PICTURE 3. Single or Dual Band Wi-Fi (Mitchell Bradley 2021).

Single radios operating at 2.4 GHz were utilized by home Wi-Fi routers to transmit data. Subsequently, 802.11in routers were introduced, utilizing the MIMO (multiple in multiple out) communication protocol. Home routers may now connect across a broader frequency spectrum or several independent bands thanks to two or more inbuilt radio transmitters. In two bands 2.4 GHz and 5 GHz bands are used by Wi-Fi routers, which contain two radios. Setting up two wireless subnetworks and making use of their advantages is possible with these routers. For instance, 5 GHz connections function better than 2.4 GHz connections, even though 2.4 GHz frequently offers a greater range and is more compatible with older equipment. Examples of new or emerging technologies are Wi-Fi 6 and 802.11ax, integration, Light Fidelity Technology, the Internet of Things, Smart Home Devices, and 5G Networks. (Mitchell Bradley 2021).

One of the most intriguing advances in router technology has been mesh networking. Using multiple devices to form a single, seamless network, mesh networks work differently from traditional routers that use a single device to broadcast a wireless signal. Together, these

mesh nodes create a single, more performance-oriented wireless network that covers a larger area. Offering greater coverage than standard routers is the main benefit. These points can be arranged thoughtfully throughout a building or commercial space. In earlier areas, like the basement and upper stories, this produces a strong signal. There are no dead zones or signal strength dips when users connect to the Internet from anywhere within the network.
In order to create a single network with better coverage and a stronger link, mesh networks may enable faster Internet speeds and more reliable connections in addition to more effective data transmission (Wallace Benjamin, 2022).

The smart router is another developing trend in router technology. Traditional routers are exclusively concerned with delivering Internet connectivity. However, a range of additional features and capabilities are offered by smart routers. Better network administration, controls for parents, increased safety, and more communication with electronic appliances in the home are a few of these. The key component of smart routers lies in sophisticated cybersecurity. Better protection against viruses and hackers is what they are meant to do. To secure sensitive data and thwart unauthorized network access, these smarter devices usually include features like firewalls, intrusion prevention, and encryption (Wallace Benjamin, 2022).

These characteristics allow parents to manage their kids' include restricting the amount of time they can spend online or outright prohibiting particular websites. This is a helpful tool for parents who want to protect their kids from inappropriate content. Users may monitor and manage their network with the help of smart routers, which usually include features like device priority and bandwidth allocation. Smart routers have the potential to serve as a central hub for managing all your connected devices and guaranteeing that your home network is always operating properly (Wallace Benjamin, 2022).

5 **USE OF HOME ROUTERS**

The first apparent response to this issue in the age of remote employment is productivity. A home network serves as both the first and last line of communication with our coworkers and businesses. We need a reliable network connection, functional speed, and simple techniques to increase our productivity for our personal happiness or to convince our boss that we should continue to work from home in the future (Codeburst, 2021). The process of translating one internet protocol (IP) address to another while IP packets are in transit is called network address translation (NAT). This lowers the amount of IP addresses needed by a firm while enhancing security. The internal network and the exterior network are the two local networks that are connected by the gateways chosen by NAT.IP addresses that are frequently assigned to internal network systems are not able to be forwarded to external networks, such as networks (for example, networks in the 10.0.0.0/8 block). A couple of externally valid IP addresses are provided to the gateway. The gateway poses as one of the valid external addresses in order to conceal outgoing traffic from an inside system. It redirects incoming traffic directed at a legitimate external address to the appropriate internal system. It routes incoming data to the correct internal system from an authentic exterior address. It is necessary for every request, whether it is coming from outside or coming in, to undergo a translation process in order to qualify or authenticate inbound flows and match them with requests that are being sent out. (Katie Terrell Hanna et al, 2021).

Parents can limit their children's access to information by using the parental settings on their home router. Software, laptops, video games, digital television services, and mobile devices are some places you might discover them. These settings were created to help parents prevent their children from viewing particular types of information. They may feel that this content is more appropriate for an older audience or is inappropriate for their age or level of maturity. The four types of parental controls are usage controls (which restrict the use of these devices by forbidding specific types of usage or imposing time limits). The computer usage management tools (which enforce the use of specific software), monitoring (which can track location and activity while using the devices) and content filters (which restrict access to age-appropriate content). The first widely used type of parental control to restrict Internet access was content filters. Television stations also introduced V-Chip technology to restrict access to

television shows. Modern use restrictions may block a wide range of explicit content, including explicit music and movies. They may also switch off devices at specified times of the day and limit device volume output, and with GPS technology becoming more inexpensive, it is also feasible to quickly find devices such as mobile phones. In this function, UNICEF emphasizes the importance of parents and teachers (Parent controls, 2024).

Content filtering is the process of controlling or limiting access to emails or websites. The intention is to restrict access to material that could be harmful. Content filtering solutions are commonly utilized by organizations to restrict access to certain materials through firewalls. Users of home computers can also make use of them. Content filtering is a common feature of internet firewalls and can be implemented as either software or hardware to restrict access to information. Businesses utilize content filtering technologies, such as social network site screening, to enhance security and enforce corporate policies about information system management. Data filtering prevents users of the internet from viewing potentially hazardous content. It limits access to content deemed inappropriate, illegal, or unwanted (Fortinet, 2022).

Traffic prioritization using Quality of Service (QoS) is a networking technique that helps prioritize and manage traffic so that more important content is sent over the network first. Important network traffic performs better with this functionality. QoS is particularly beneficial in Intelligent Transportation Systems, where it aids in the solidification of Signal Controller communication with huge volumes of local video traffic. It works well for setting other important traffic, such as VoIP phones for emergency call boxes, as a top priority. Video-on-demand is another prominent application of QoS. QoS provides for the optimization of network performance for specific applications as well as the acquisition of network bit rate and packet rate statistics. To prevent transmission delays, packet routing may be fine-tuned. QoS is classified into two types: CoS and DCSP (EtherWAN,2023).

QoS is a more general word that encompasses aspects such as policing, shaping, traffic categorization, and queuing algorithms. CoS (Class of Service) is confined to Layer 2 Ethernet and uses the first three bits of the 802.iQ.tag to distinguish your traffic. DSCP functions at Layer 3 and is located in the IP header's 6-bits. Best Effort, Expedited Forwarding, and Assured Forwarding are advanced approaches employed (EtherWAN,2023).

Home network security is critical because if it is not adequately protected, it exposes the user to several security concerns. Hackers can obtain personal data, infect devices with viruses, and use the Internet for free. A hacker may even hijack a Wi-Fi router and use it, along with thousands of other compromised routers, to conduct a large-scale cyberattack against a corporation, government agency, or other institution. Fortunately, most of these dangers may be mitigated with basic procedures such as utilizing the correct sort of Wi-Fi security (the WPA2 security protocol), creating a strong Wi-Fi password, and changing it every few months. Any company may benefit from a guest Wi-Fi network. It provides visitors and guests with convenient internet access without jeopardizing the core network's security. A well-managed guest Wi-Fi network may benefit both the company and its consumers. Visitors who have a positive Wi-Fi experience in your establishment are more likely to return and become loyal customers. They may also tell others about their experience and become brand advocates. A robust Wi-Fi connection may also extend customers' stay time on your premises, resulting in more orders and adding to a company's bottom line (TownSquare, 2023).

To determine the best wireless router with a guest network, it is important to highlight a few essential qualities. Firstly, Dual-band functionality makes it possible to use the 5GHz and 2.4GHz frequencies, which boosts and stabilizes the signal for both the guest network and the main network. Then, Multiple Service Set Identifiers (SSIDs) are the name of the wireless network that users will see when they search for available networks. It usually differs from the SSID of the main network. Public or Guest are the labels. Virtual Local Area Network) which allows for the separation of the guest network from the main network, adding an extra degree of protection. Access limitations for the guest network which is the administrator can configure particular access controls for the guest network, such as Internet access, bandwidth limits, and time constraints. Intrusion detection and firewall protection which is a layer of protection added to the guest network to assist prevent unwanted access and hacking attempts. Quality of Service (QoS) which enables network traffic prioritization, ensuring that vital traffic, such as VoIP or streaming video, is prioritized above less important traffic. Lastly, a Windows feature which is called Internet Connection Sharing (ICS). It enables a computer connected to the Internet to share that connection with other computers on a local area network (LAN). As a gateway device, the shared computer serves as a conduit for all information sent and received between

other computers and the Internet. ICS offers network address translation (NAT) and dynamic host configuration protocol (DHCP) for LAN PCs (Townsquare, 2023).

The goal of network security, a subfield of cybersecurity, is to protect computer networks against online threats. The three main objectives of network security are to stop unauthorized users from accessing network resources, identify and stop ongoing cyberattacks and security breaches, and guarantee that authorized users can safely access the network resources they need when they need them. A firewall is a piece of hardware or software that lets authorized traffic flow through a network while blocking unwanted traffic from getting in or out. To divide a bigger network into smaller subnetworks, firewalls can be installed internally or at network borders. Hackers are prevented from accessing the other components of the network even if they manage to compromise one of them. There are various types of firewalls, and each has a unique set of features. Using packet filtering, basic firewalls evaluate communications. More recent next-generation firewalls (NGFWs) incorporate threat intelligence feeds, application awareness and control, AI and machine learning, and intrusion prevention for increased security. Conventional firewalls were designed to protect conventional networks against conventional cyberattacks. To protect the security of the company's network and the sensitive data it transports, network firewalls need additional functionality and capabilities as corporate networks and the cyber threat landscape grow and change (IBM, no date).

6 **USING A TP-LINK AC1200 DUAL BAND WIFI 4G LTE ROUTER**

The TP-Link AC1200 Dual Band WiFi 4G LTE Router is a flexible networking solution that combines fast wireless access with the convenience of 4G LTE. This router provides continuous internet connectivity, making it suitable for both home and small business settings. It can offer rates of up to 1200Mbps with dual-band capability, providing seamless and dependable data delivery. The inbuilt 4G LTE modem enables for quick and easy setup. Users may simply switch between standard wired broadband and 4G LTE connectivity, guaranteeing continuous internet access even in places where wired infrastructure is restricted. This router's numerous antennas provide good coverage and prevent dead spots, while sophisticated security features like as WPA/WPA2 encryption protect your network from illegal access. It also provides simple management options via TP-Link's user-friendly interface, allowing you to easily control and monitor your network. The TP-Link AC1200 Dual Band Wi-Fi 4G LTE Router provides exceptional performance, versatility, and security, making it an ideal choice for anyone looking for a dependable and adaptable networking solution (AC1200 Wireless Dual Band 4G LTE router, no date).

The TP-Link AC1200 Dual Band WiFi 4G LTE Router is an essential tool for current connectivity needs, enabling users to stay connected and productive in a variety of circumstances thanks to its strong performance and flexible configuration options. This router is useful for people who work from home or in remote regions. It provides a reliable internet connection for video conferencing, file transfers, and other work-related activities. Users use this router to access the internet in case their main broadband wired service goes down. It minimizes downtime by automatically switching to the 4G LTE network. It is popular among travelers, RV owners, and those in transit who want reliable and secure internet connectivity. The 4G LTE functionality makes it simple to establish a network anywhere there is mobile coverage. When standard broadband alternatives are limited or costly, small companies utilize this router as their primary internet source. Customers and staff can connect to dual-band Wi-Fi. Users love the dual-band Wi-Fi for streaming high-definition material and lag-free online gaming. It guarantees that several devices may connect at the same time without affecting performance. Some users incorporate this router with their home security camera systems, offering a robust and secure connection for remote monitoring. Residents in rural or distant regions with few wired broadband alternatives frequently rely on this router for their

primary internet connectivity. Event organizers use this router for temporary Wi-Fi deployments at conferences, trade exhibitions, and outdoor events to ensure participants have consistent access. This router is frequently used on construction sites to give internet connectivity for project management and communication with the main office.

The TP-Link AC1200 Dual Band Wi-Fi 4G LTE Router's performance and benchmarks include analysing its speed, coverage, and dependability. To test the router's download and upload speeds, use a service like Ookla's Speed test or Fast.com. Run many tests at different times of day to account for fluctuations in network congestion. Compare the findings to the quoted speeds of the router to determine whether it fulfils expectations (AC1200 Wireless Dual Band 4G LTE router, no date).

Connecting many devices to the network at the same time simulates a real-world scenario. Download and upload files, watch movies, and play online games. Determine how effectively the router manages traffic without experiencing severe slowdowns or lost connections. When connected to the 4G LTE network, do speed tests. It needs to compare the findings to the quoted LTE speeds of the router. The router's capacity can examined easily to convert between wired broadband and LTE, particularly during network outages (AC1200 Wireless Dual Band 4G LTE router, no date).

7 **USING A D-LINK DIR-867 ROUTER**

For homes and small offices, the D-Link DIR-867 is a dual-band wireless router that offers dependable and quick wireless access. With compatibility with the 802.11ac standard, the router offers a dual-band connection at up to 1750 Mbps (1300 Mbps on 5GHz and 450 Mbps on 2.4GHz). This is ideal for bandwidth-intensive tasks like streaming and gaming. It includes technologies known as multi-user, multiple input, multiple output, or MU-MIMO. This technology minimizes network congestion and improves overall performance by enabling data to be sent simultaneously to several devices. With advanced QoS (Quality of Service) settings, it can give particular apps and gadgets priority, which makes latency-sensitive operations like VoIP and online gaming seamless. Having a user-friendly interference, even those with no prior networking knowledge can easily configure and administer the router thanks to its mobile app and web-based user interface. It is compatible with WPA3 encryption, which offers strong protection by shielding your data and network from outside threats. The DIR-867 is a desirable choice for customers on a tight budget since it offers a good mix of performance and affordability (OpenWrt, 2023).

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The D-Link DIR-867 router has certain drawbacks while having a number of helpful features. The lack of compatibility with the most recent Wi-Fi 6 (802.11ax) standard is one significant disadvantage. This router might not be able to match the exceptional performance and efficiency of Wi-Fi 6-enabled routers when additional Wi-Fi 6-compatible devices hit the market. Furthermore, the DIR-867's range may not be sufficient for bigger residences or workplaces, which might call for the installation of additional access points to keep a strong signal throughout the entire area. Additionally, it only has four Gigabit Ethernet ports, which may not be enough for those that have a lot of connected devices. Lastly, the router has fewer USB ports, which can restrict its ability to connect printers or external storage devices for network sharing. This could be a drawback for users with a variety of connectivity requirements (OpenWrt, 2023).

8 **CONSIDERATIONS FOR PRIVACY AND SECURITY**

To help safeguard the network and data, the TP-Link AC1200 Dual Band Wi-Fi 4G LTE Router has various security features. The router supports both WPA (Wi-Fi Protected Access) and WPA2 encryption protocols, guaranteeing that your Wi-Fi network is secure with industry-standard encryption methods. These methods protect wireless connection by encrypting data sent between devices and the router. Along with that, the router normally contains a built-in firewall that can prevent illegal internet access to your network. One may use the firewall rules to regulate both incoming and outgoing traffic, which improves network security. Moreover, the router frequently has the ability to configure a separate guest network. This disconnects guest devices from your principal network, preventing them from accessing sensitive data and devices on your home network. Many TP-Link routers include parental controls that allow you to limit internet access to particular devices or individuals (Fortinet, 2022).

To provide a secure internet environment for children, it needs to be set up timetables, restrict websites, and regulate access. Access control capabilities on the router may define which devices can join in the network depending on their MAC addresses. This may be used to provide or refuse access to devices. Some TP-Link routers enable VPN (Virtual Private Network), allowing be building of safe, encrypted connections to external networks. This is important for protecting privacy and security while attempting to access the network from a remote place. Intrusion Prevention System (IPS) is a high-end TP-Link router that may have IPS capabilities that aid in the detection and prevention of possible network threats such as malware, viruses, and unusual network activity. Some routers allow to isolate vulnerable devices from the network by quarantining them, preventing possible risks from propagating (Fortinet, 2022).

You can prioritize certain types of network traffic using Quality of Service (QoS) settings. This way, non-essential traffic is deprioritized and important applications, like video conferencing, have the right amount of bandwidth and latency. Updates to the firmware for TP-Link routers can fix security holes and improve network security in general. Updating the firmware on your router is essential for better security (Fortinet, 2022).

When utilizing any networking gear, including the TP-Link AC1200 Dual Band Wi-Fi 4G LTE Router, privacy and data security are key considerations. Default usernames and passwords are provided with many routers. If these settings are not updated, unauthorized users will be able to access the network. At all times, replace the default login information with strong, one-of-a-kind passwords. Frequent firmware updates are necessary to fix security flaws in the router and enhance performance. TP-Link distributes updates for their router software regularly (Fortinet, 2022).

The use of robust encryption techniques on the Wi-Fi network, such as WPA2/WPA3, to protect data while it's in transit. In this case, the guest network is appropriately segregated from the main network to avoid unwanted access to the devices and data. The router configuration's remote management must be disabled if necessary. While enabling it, one should consider turning on two-factor authentication and make sure the credentials are strong and distinct. To stop unwanted incoming traffic and illegal access, the configuration of the firewall in the router should be ensured. While sending sensitive data over the internet, the sender should use encrypted protocols (such as SSL/TLS for email and HTTPS for web browsing). This provides an additional layer of security by avoiding data eavesdropping. Limit the devices that are permitted to connect to the network by utilizing MAC address filtering and access control lists. This aids in preventing unauthorized devices from entering the system (Fortinet, 2022).

The setting of QoS is to provide priority to important data traffic, such as video conferencing or VoIP so that these applications have enough bandwidth and do not experience too much delay. For further privacy and security while connecting to the network from a distance, one should think about utilizing a Virtual Private Network (VPN). The internet traffic is encrypted as a result, shielding it from prying eyes. Review the data handling practices and privacy rules of the ISP in addition to TP-Link's guidelines. One should keep in mind that these services may collect and share data when you use them (Fortinet, 2022).

Like every networking gear, the TP-Link AC1200 Dual Band Wi-Fi 4G LTE Router has its share of drawbacks and possible risks. If updates are not made regularly, it can have security flaws. Its 4G LTE connectivity is impacted by variations in cell provider coverage and speed. Congested regions may have low bandwidth. Unauthorized alterations may result from physical access to the router. It is performance is also influenced by interference and the surrounding conditions. To lessen possible risks like illegal access, data breaches, and network outages, it is critical to secure the router with strong passwords and keep the firmware updated.

9 **FUTURE TRENDS AND DEVELOPMENTS**

With the development of the digital environment and the introduction and dissemination of new network and information technologies, there will inevitably be a growth in the quantity and quality of risks and threats to individuals and societies. This will lead to the emergence of a variety of information integrity threats. The likelihood is great that new risks will emerge and information security threats will grow, making them an increasingly pressing concern. These factors include the adoption of new network technologies, the expansion of the global telecommunications network, the development of the mass media, and the semantic Internet. (Syuntyurenko, O.V. & Gilyarevskii, 2021).

Future network infrastructures will have to accommodate numerous devices and different access lines, in the 6G supported by several carriers, while providing network services quickly and safely in complicated environments. Furthermore, carrier networks in the future will offer network disaggregation technologies, enabling them to use best-of-breed technology from several providers in accordance with service requirements. To ensure network reliability and quality in unidentified network scenarios, it is imperative to enhance the effectiveness of the verification process for combinations of a substantial number of distinct network devices and constituents that comprise the network infrastructure. The Wi-Fi home router industry is predicted to expand significantly globally between 2023 and 2030. The consistent growth rate and growing adoption of strategies by major players are expected to propel the market beyond the projected horizon in 2022 (Recursive router Metrics prediction using ML-based node modelling for network digital replica, 2022).

The global market for WiFi home routers has shrunk as a result of the COVID-19 pandemic. Its estimated value is USD 3558.7 million in 2022, and it will increase at a compound annual growth rate of 4.1 percent to reach USD 4528.9 million in 2028, after being readjusted for inflation. After accounting for the entire economic impact of the health concern, 300 Mbps or less WiFi home routers, which made up a portion of the global market in 2021, are predicted to reach USD million by 2028, growing at a revised Percent CAGR in the post-COVID-19 future. This section, Home Office Using, will now be shown as a % CAGR for the duration of the prediction. As far as manufacturers go, TP-Link, D-Link, and NETGEAR lead the industry with a combined revenue share of about 41%. Segments Type and Application

comprise the WIFI Home Router market. Players, stakeholders, and others involved in the global WIFI home router market will be able to get an advantage by utilizing the report as a useful resource. Throughout the segmental analysis, the primary subjects are sales, income, and projections by Type and Application for the years 2017–2028 (Chemical Industries by, 2023).

Subsequent router models continue to push networking technology forward, delivering a slew of new features and functionalities to satisfy the ever-increasing needs of modern connection. These developments include the use of cutting-edge Wi-Fi protocols such as Wi-Fi 6E (802.11ax) and higher, which provide quicker speeds and more efficient management of many devices at the same time. Multi-gigabit Ethernet ports, such as 2.5Gbps or 10Gbps, are becoming more prevalent, allowing for high-speed wired connections for bandwidth-intensive applications and network storage. By reducing interference and congestion, advanced beamforming technology and Multi-User, Multiple Input, Multiple Output (MU-MIMO) capabilities improve the accuracy and efficiency of wireless communications. WPA3 security implementation provides strong encryption technologies to enhance network security against rising threats. Mesh networking has gained popularity because it provides seamless coverage across broad regions, addresses dead spots, and simplifies network expansion and maintenance. Advanced Quality of Service (QoS) algorithms give apps and network traffic priority for a consistent user experience ((Next.js App Router Update, 2023).

Integration of voice control with smart assistants simplifies network administration, while improved support for Internet of Things (IoT) devices provides improved interoperability, security, and device management. The user-friendly interfaces, automated firmware upgrades and customizability improve router maintenance. While powerful parental controls provide content filtering, time scheduling, and activity tracking. Secure remote access to home networks is enabled with built-in VPN server capabilities, and complete IPv6 compatibility supports the expanding number of internet-connected devices. Advanced security features like intrusion detection and prevention systems (IDS/IPS) and powerful firewalls help to reduce the risk of cyberattacks. Intelligent traffic management enhances latency-sensitive applications, while mobile apps simplify setup, monitoring, and control. Some routers have energy-saving capabilities to decrease energy use. Finally, advanced options are designed for sophisticated users who want to fine-tune their network performance. These characteristics

together illustrate router growth to satisfy the diverse needs of modern households and businesses, enabling quicker, more secure, and intelligent network experiences. (Cisco, 2023).

The Routers have far-reaching consequences for both residential customers and the larger technology sector. Routers are the backbone of modern connection at home, allowing households to connect to the internet, connect many devices, and engage in a variety of online activities. A well-functioning router offers smooth video streaming, online gaming, and dependable video conferencing, improving users' quality of life. A slow router, on the other hand, might cause annoying connectivity difficulties, hindering work and pleasure. Demand for sophisticated routers stimulates innovation and competition among technology firms on a sectoral level. This encourages the creation of faster, more secure, and feature-rich routers, which propels the networking industry ahead. Furthermore, the proliferation of IoT devices emphasizes the significance of reliable, secure routers. However, the industry confronts difficulties in tackling security flaws and the necessity for standardized, interoperable products. In conclusion, routers are essential for modern home life and push technological growth, but their potential hazards and obstacles should not be overlooked. (Cisco, 2023).

10 **CONCLUSION AND RECOMMENDATIONS**

To tackle the difficult tasks of digital economic development, the national information infrastructure must be modernized, including network topologies. New enhanced data interchange and network management protocols, information and telecommunication technologies, network software, and reliability improvements must also be developed. Potential paths like broadband Internet access and big data technologies, whose development in Russia is far behind global norms, have been given priority (Syuntyurenko, O.V. & Gilyarevskii, 2021).

When comparing the D-Link DIR-867 router to the TP-Link AC1200 Dual Band Wi-Fi 4G LTE Router, there are a number of drawbacks to take into account. First of all, if you want to ensure that your network is future-proof, the DIR-867 is not compatible with the most recent Wi-Fi 6 (802.11ax) standard. The TP-Link AC1200, on the other hand, provides quicker and more effective Wi-Fi 6 support, which can manage more devices and provide superior overall performance. Furthermore, because of its range, the D-Link router might not be as trustworthy for bigger homes or workplaces as the TP-Link router, which is more adaptable and capable of providing dependable 4G LTE access in places with little to no wired infrastructure.

Lastly, the TP-Link AC1200 router provides both wired and wireless connectivity, whereas the DIR-867 has a restricted number of Gigabit Ethernet ports (often four), which may limit the number of wired connections. Lastly, even though the D-Link DIR-867 has basic functions, certain power users could think that it does not have enough further functionality or sophisticated customization. On the other hand, the TP-Link AC1200 is a more complete networking solution because it comes with an integrated 4G LTE modem in addition to several security and administration capabilities. The utilization of computers and computer networks is the foundation of modern information technology. It is developing extremely quickly and successfully in developed countries. It has a significant impact on many facts of work and life.

A system that unites disparate or comparable devices into a single unit is called a computer network. Network elements must be properly configured, connected, and monitored as part of network administration. The TCP/IP protocol set is being used more and more in modern computer networks in order to facilitate the easy definition of device addresses on the network as well as the ability to connect to the Internet and utilize its network services. The implementation of the networking model is critical to the firm's survival in the face of escalating market rivalry, as it facilitates the enhancement of state administration and public company operations, which are anticipated to deliver higher-quality services. Wi-Fi routers are typically plug-and-play devices that don't need any additional settings to function.

Additionally, clients are aware that it is a crucial security tool. Customers use Wi-Fi routers for more than simply checking social media and sending emails; they also use them to stream movies, play games, and work online from home. For these purposes, they want the fastest possible speed as well as safe configurations.

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