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Designing an Efficient Network System for a Medium-Sized Home: A User-Centric Approach

Introduction

Network management is an aspect of the digital age, as network and computer technologies have changed our way of life including work hours. The setting for this project is to research and design an effective **"NETWORK SYESTEM FOR A MEDIUM-SIZED HOME"** with the provision of family needs inclusive of both domesticated and workplace digits. This problem is a broad topic concerning network management through an all-inclusive approach to the networking system by considering aspects like user needs, device compatibility as well the service availability (Kurose & Ross, 2022; Cisco, 2023).

The purpose here is twofold: first, to dive into the practical aspects of network design such as choosing proper hardware or service providers; and second, understanding theoretical concepts guiding successful network. This project is not just an academic practice but a useful practical application of network theory. As such, the following strategies will shed invaluable insights into making networks that should be resilient and agile to increasing digital needs by users over time

Network management is also very important in home network to ensure there is un interrupted connectivity for a wide range of activities such as telecommuting, online education among many other or even streams live entertainment and smart systems like the thermostat. It supports small business dealings by providing the premise to data processing and customer interchanges, satellite-based service delivery among others. It can make the difference between getting a job or spending money trying to fix security vulnerabilities, inefficiencies and user discontent – frustrating all round. Therefore, this task will focus on formulating a network that meets the two opposing needs of performance and pragmatism to achieve high availability,

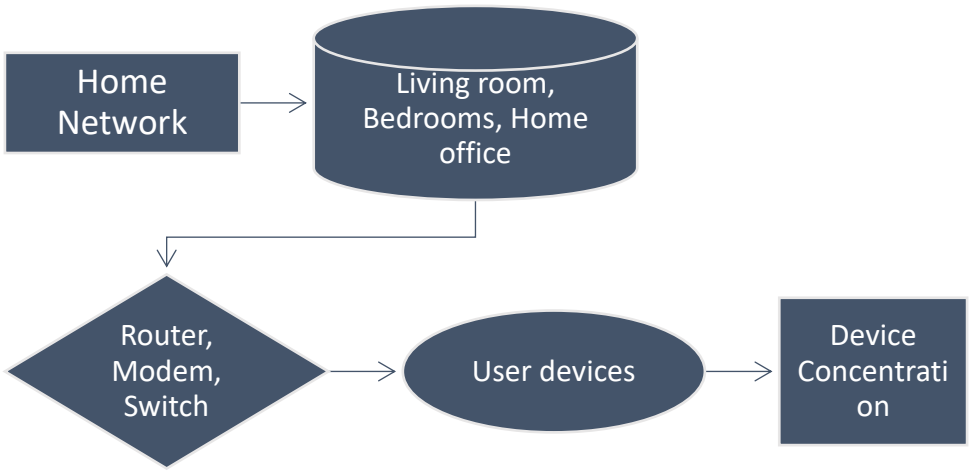
capacity adequacy along with full coverage. Its viable solution will include integration of such forms as wired and wireless, Bluetooth technologies, mobile services or IoT solutions within the cloud environment; this one can be applied to small scale environments which transforms into variegated network requirements dynamically observed today.

Section 1: What Did You Do

1. Scope Definition

The first step in this process of designing a strong home network was defining its domain. The intended usage of this network is such that it would maybe fit in a medium-sized home, designed to serve the digital needs of four adults. The three bedrooms, the living room and the home office in that house illustrate a varied spectrum of connectivity requirements. As far as the family pattern is concerned, there are two employed adults who telecommute and can work from home often with children between nine to fourteen years of age; thus requiring a network which should support both professional activities and learning at school (Comer, 2020).

Diagram 1: Home Network Layout



The home-office requirement points to the importance of having a stable and safe network, whereby work related data can be transferred securely. Furthermore, it should be flexible to accommodate the recreational and instructional demands of children's content online use and interaction since these are pertinent factors in how a network can provide information. This level of complicated needs necessitate a network that is not just widespread in its coverage but also many high-functional with ease to connect every single point from the room. Therefore, the network architecture focuses on a federated environment that accommodates different megazoidal constructs from diverse digital moments across and as opposed to within households (Meyers, 2021).

2. User and Device Analysis

Understanding the users and their devices was therefore paramount in ensuring that the network was geared to satisfy different needs. The family comprises four primary users: Between 2 to four persons, with at least two kids of varying digital habits and needs. The adults who work from home or conduct labors sealed through various online activities apply the laptops, smartphones and sometimes tablets. In terms of the children population, we have dynamic consumers in the field of education websites and streaming services as well online games which are operated with devices such as tablets, gaming consoles smart TVs or any other operating.

Apart from personal devices, the home is also installed with some IoT devices such as smart lights, thermostats and security cameras. The devices add extra levels to the dynamism of this network since they need either continuous or minimal latency for them to operate ideally (Beasley & Nilkaew, 2022). An all-inclusive analysis that considered high bandwidth activities such as video streaming, online multiplayer games and continuous low bandwidth communication of IoT devices was performed. The rate of accessibility and connectivity addressing pointed the

demand for a network that ensures solid signal level all over the house, erasing dead zones. This analysis served as the foundation for identifying the kind and size of networking equipment required to set up a network that not only handles current requirements effectively but equally, is scalable in anticipation of future technological evolution and increased usage (Stallings, 2021).

3. Equipment Research

The correct choice of networking equipment is vital to the creation of a decent home network. The focus was on wireless routers and mesh network systems, given the requirement for widespread coverage with continuous connectivity throughout that house.

These devices were to be evaluated on the basis of parameters such as performance, like speed and bandwidth handling; coverage especially in terms of good signal across one's home network from strength perspective; and finally security consideration mandatory for securing these networks against external attacks. However, some of the well-established brands such as NETGEAR, Linksys and TP-Link were analyzed closely to understand their recent WiFi 6 solution that has been reportedly introduced by these top brands for first time era with a promise of improved speed along with performance (NETGEAR, 2023).

Likewise, Mesh network systems—that are tri-band and have inbuilt security protocols—emerged as frontrunners because of their versatility to offer wide coverage for multiple data needs based on varying bandwidth demands. Moreover, a powerful switch was required to support wired engagement when studded connections along with such as the home office setup and high-bandwidth gaming consoles, are needed. It prompted an inquiry into the seclusion of non-administrated switches which offer ease and appropriate ports for numerous gadgets (Lammle, 2023).

4. ISP Analysis and SLA Consideration

Selecting an ISP to provide internet connection is just as important a decision making process for choosing hardware. The mission was to find an ISP that provides a combination of quick bandwidth availability with low downtime at the right cost. Different providers were considered, and Spectrum Internet was the provider that turned out to be appropriate enough, having a plan settling on family's utilization trend as well as its cost (Linksys, 2023).

Apprehending the Service Level Agreement (SLA) was central to this procedure. The SLA is a very important document that details the terms of service such as minimum internet speeds, latency standards and dicking times. These factors are crucial for people too much dependent on internet both in their work and entertainment life. The chosen SLA with Spectrum provides internet speeds of up to 200 Mbps, which is sufficient for the needs of such a family as it can be used to stream high-definition videos or play games online (Spectrum, 2023).

The SLA also ensures a low latency of under 100ms in peak hours which is vital for real time fuse such as video conferencing and online games. Additionally, the contract incorporates a 24-hour MTTR clause in which any moment service irregularities are tended to quickly. Also, the SLA avails for remuneration in case of not meeting these levels which act as a deterrent and guarantees. Comprehensive ISPs and SLAs analysis enabled to choose the provider's service which satisfies not only present requirements but provides stability and customer satisfaction (Kurose & Ross, 2022).

Table 1: User and Device Profile

User Type	Device Types	Primary Activities	Bandwidth Requirement
Adults	Laptops, Smartphones, Tablets	Telecommuting, Browsing, Streaming	High

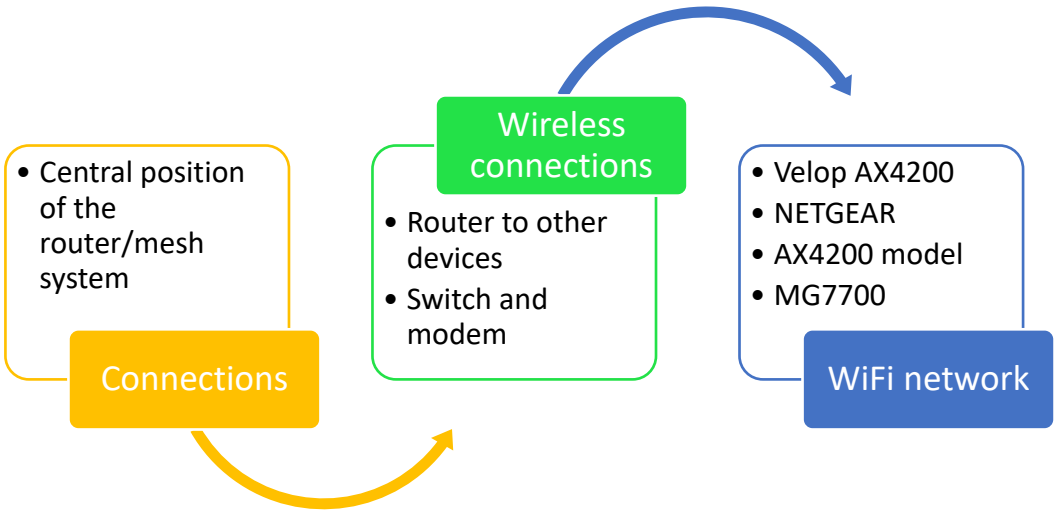
Children	Tablets, Gaming Consoles, Smart TVs	Online Learning, Gaming, Streaming	Moderate to High
General	IoT Devices (Smart lights, Thermostats, Security Cameras)	Continuous Operation	Low but Constant

Section 2: What Are the Results

1. Network Design Requirements

The intended network has been designed to automatically cater for a capacity of 10-35 devices that will function effectively concurrently. This capability describes the wide range of devices belonging to family members starting from PC's, smartphones and tablets, ending with gaming consoles, e-TV sets (smart TV), as well as different applications utilizing IoT principle. To accommodate this, the network must be robust enough to handle various activities that require different bandwidths (Comer, 2020; Meyers, 2021).

Diagram 2: Network Topology



Typical network activities were categorized into three primary groups: browsing, streaming, and gaming. Browsing, encompassing web surfing, email, and social media use, generally requires lower bandwidth compared to the other activities. Streaming activities, which

include watching videos on platforms like YouTube and Netflix, demand higher bandwidth, especially for high-definition (HD) and 4K content. Gaming, particularly online gaming, not only requires high bandwidth for smooth gameplay but also low latency to ensure real-time responsiveness (Kurose & Ross, 2022).

Moreover, the network needs to support telecommuting activities for the adults, which include video conferencing and large data uploads/downloads. This adds to the bandwidth requirements, necessitating a network design that prioritizes both speed and stability. The simultaneous operation of IoT devices, though individually requiring minimal bandwidth, collectively contribute to the network load, especially since they are always connected. The network, therefore, was shielded in the sense that aside from design for volume of devices used it also considered the dynamic and unpredictable nature of their browsing (Linksys, 2023).

2. Equipment Selection and Connectivity

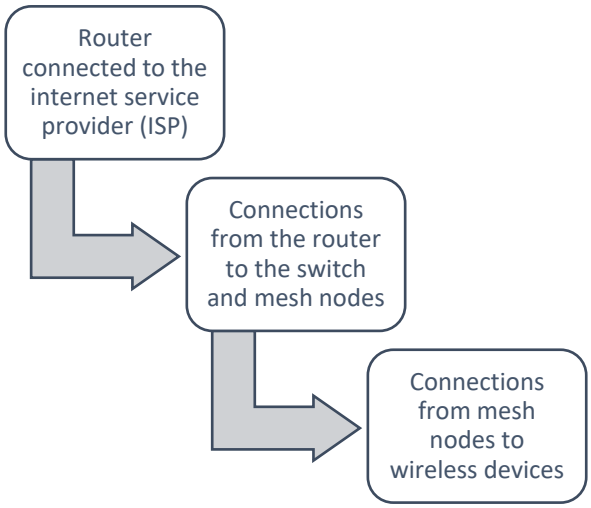
The Linksys Velop AX4200 WiFi 6 Mesh system was chosen for the backbone of this network. This system was selected for various reasons. To begin with, it has WiFi 6 technology that provides speeds that are higher than those of its predecessor's; this feature is very important when there is a family using the internet at high rates. The provision of mesh capability is one of the key strengths offered by this system, as it helps ensure uniform coverage throughout all areas in a house beyond which no signals will be lost hence eliminating hindering dead zones common even between medium to large homes. Also, the tri-band routing feature of AX4200 model makes sure that this is supported by a dedicated backhaul channel to improve performance when many devices are linked which it often happens in such homesteads (Motorola, 2023).

The choice of the NETGEAR 16-port switch was motivated by the requirements for several wired interconnections. There is a need to have solid wired connections for devices that demand

stable and high-speed internet, including the home office computer as well as gamin consoles. The reason for selecting the NETGEAR switch was based on its reliability, working principle as an unmanaged device and a provision of sufficient number of ports which could be increased if need arises (NETGEAR, 2023).

The MOTOROLA MG7700 modem was selected mainly because it combines two features—modem and a router. Download speeds reach up to 400 Mbps, which is quite suitable for the desired ISP plan. The embedded router, not only brings additional convenience to the user but also with it reduces hardware in addition and avails reliable connectivity speed that is so necessary for network's needs (Motorola, 2023).

Diagram 3: Equipment Connectivity



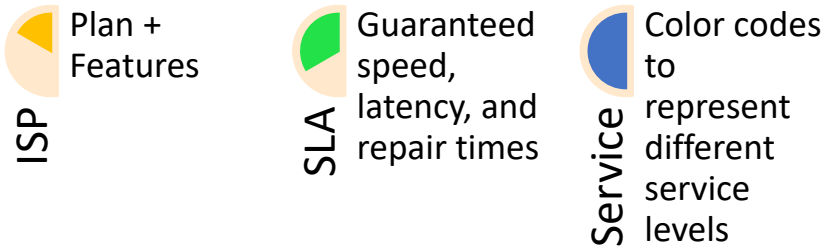
3. ISP Selection and SLA Details

Since Spectrum Internet was chosen as the ISP because of this premium balance between speeds, reliability, and price. The plan provides speeds of as high as 200 Mbps, which is capable enough for a home user to support bandwidth guzzling applications such as HD streaming and online gaming without affecting the performance. In addition to this, the high level of credibility

and good customer service delivered by Spectrum was also an important factor in choosing a network that would not likely fluctuate but resolve these issues.

Considerable attention was paid to the SLA with Spectrum offered by a comprehensive analysis of this document that made it clear that such an agreement meets all needs and requirements, governing operation activities within the network. This ensures that the agreement should guarantee a minimum of 100 Mbps, as without this speed it can be very difficult to support all activities carried by individuals while on Internet use. This speed is especially important for making sure that bandwidth-hungry activities such as ramming HD movies are uninterrupted and of very high quality (Comer, 2020; Stallings, 2021).

Diagram 4: ISP Service and SLA Overview



The SLA also highlights different latencies, and Spectrum offers less than 100 ms during the peak hours. However, this is critical in applications and online gaming which need to be processed at real-time for unnoticeable delays as little ones can have significant impact on the application or gamer user experience. The SLA also incorporates the 24-hour mean time to repair term introducing that any interruptions of service are employed immediately, reducing an effect caused by idle facilities on the family's digital activities (Kurose & Ross, 2022).

It is vital to note that the compensation policy plays a significant role in SLA. It also states that in case of not honouring the promised service levels, Spectrum will give credit to the account. This sub-clause is important because not only does it provide compensation but also makes the ISP responsible for maintaining a quality of service, giving an additional amount in terms of safety and assurance on household's networking demand (Linksys, 2023).

Table 2: Network Equipment Selection

Equipment Type	Model	Key Features	Reason for Selection
Mesh WiFi System	Linksys Velop AX4200	WiFi 6, Tri-band, 6,000 sq ft coverage	High performance, extensive coverage
Switch	16-port NETGEAR Switch	Unmanaged, 16 ports, Easy setup	Reliable for multiple wired connections
Modem	MOTOROLA MG7700	400 Mbps speed, Built-in router	Dual functionality, High-speed compatibility

Section 3: What Did You Learn

1. Insights on User and Device Analysis

The process of studying user profiles and device requirements proved to be an eye-opener revealing the need for a human centered approach in dealing with network architecture. This was not just a matter of need for technicality, however, the recognition of each family member's and device needs were treating as an important step in ensuring efficiency and effectiveness at which network operates.

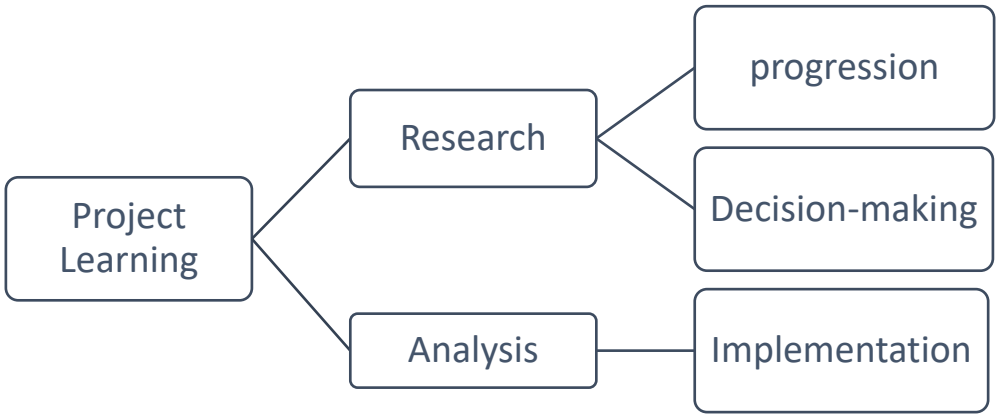
This deep analysis helped to draw the strict boundaries for different devices showing opposing needs; from streaming mode, where necessary high bandwidth is required versus constant but low one sufficient for IoT network. It then became clear that if a homogenous way of designing network was to be used, the result would be faulty. A subtle approach, one that takes

into account the particular needs of each device but at the same time ensures network harmony, was required.

This provided a great understanding to the network design and capacity planning. For example, the installation of a mesh network system was directly related to the need to cover wide range and constant intensity signal by means off devices used at different locations in their house. The ability to operate with a high number of devices at the same time maintaining both performance and stability was an essential aspect fundamental for determining this alternative, which is based on advanced hardware able to cope with such requests properly.

In addition, this analysis emphasized the fact that network design needed to be scalable. With the ongoing technological development, more connected devices will be found within homes and so this network needs to evolve over time without rebuilding. This forward-thinking proved to be key in purchasing equipment that was not only fulfilling the present demand but also one that could comfortably adapt changes into technological advancements.

Diagram 6: Learning and Application Process



2. Learning from Equipment and ISP Research

The focus on networking equipment and ISPs provided useful knowledge about the operational technical side of network exploitation. I now have a better understanding of different network technologies and their capabilities, as well as the specific needs that they accommodate in networking. For instance, the Wi-Fi 6 technology together with its advantages in terms of speed and performance was educationally quite enlightening as it depicted how swiftly networking technologies have continued to grow (Comer, 2020; Meyers, 2021).

A detailed comparison between various types of equipment ranging from routers to switches and their functions in the entire network infrastructure was equally important. It emphasized the significance of pairing appropriate technology with certain network requirements, which are outlined as needing a mesh functioning for broad coverage or perhaps placing over needed switch in regards to stable wired hookups.

Additionally, the procedure of selecting an ISP and breaking it down to its SLA was educational. It was not just about price and bandwidth speed comparisons; it extended into the service's dependability, to support services offered by pre-installed and third party customer software solutions being used with that provider. Also considered were guarantees made either explicitly as terms of a Service Level Agreement or implicitly from actual knowledge This process has reinforced a network management role of the ISP as respect those who are involved in shaping and commitment to ensuring quality service directly affects how much success is achieved on every project.

Through this research, not only I acquired the ability to make rational decisions regarding networking apparatus and vendors but also practical insights into how the market operates as well as consumer choices in regard to processes of choose which one is applicable.

3. Overall Reflections and Key Takeaways

This work was an extensive learning path that went beyond the technical aspects of network creation and implementation. For personal development, it promoted growth in vital areas such as analytical thinking, strategic planning and decision making. The entire project required an approach based on a user-centric mindset was highly educative in terms of technical impacts, which the solutions had through business ramifications.

An important insight was that good network management is about ‘acting balancing’ (equivalent with balancing rider). It is concerned with the integration of technical limitations of networks to cope up, in terms, to live within needed requirements and expectations users’ desire from it. The key feature of this project was that foresight became a cornerstone in network design by helping to predict trends and changes how technologies will be used.

This process also re-emphasized the importance of learning and adjusting as a continuing aspect of network management. Given that the field of technology is dynamic and relevant an up-to-date knowledge about latest innovations and ideal repertoire with regard to designing networks striving towards serving both timely fitted as well future oriented services, should be kept in mind. In the future, this project will be invaluable for use even as far as personal matters or professional ones first and foremost where network management is a necessity. The acquired competences of searching, analyzing and synthesizing information would be applicable under all conditions for creating networks that are not only operational but stable on the flexible level broad enough to satisfy demands created by specific users.

This was in fact, not only a theoretical experiment of the homework network but also an investigative rally into how complicated networks develop and manage, which will serve as excellent preparation for our future business whatever field it is.

Table 3: ISP Selection and SLA Analysis

ISP	Selected Plan	Key SLA Terms	Importance
Spectrum Internet	200 Mbps Plan	Minimum 100 Mbps speed, 100 ms latency, 24-hour repair time	Balances speed with reliability, Meets family's digital needs
		Compensation for service failures	Ensures accountability and service quality

Conclusion

The merits of this project were such that it offered a general analysis concerning the right kind of design and terminologies as well as naming standards used to design home network machines hence facilitating an appreciation, understanding into challenges in networking. The main findings were condensed in the significance of user requirements, facts about the choice of hardware and details regarding work with an ISP under a specific SLA. The factors listed above are collectively an active system that can provide appropriate digital solutions for varying needs. This case depicts that the network planning is one of the most important points in interconnectivity reality nowadays and leads toward enabling flawless originality connections for home holders, small companies. The subject of this project is evident in the aspect of how network design has major implications to our world today which is highly digitized hence implies on the appropriate management techniques that can be used in different settings.

References

Cisco. (2023). *Cisco Networking Basics*. Cisco Press.

Kurose, J. F., & Ross, K. W. (2022). *Computer Networking: A Top-Down Approach*. Pearson.

Tanenbaum, A. S., & Wetherall, D. J. (2021). *Computer Networks*. Pearson.

Comer, D. E. (2020). *Internetworking with TCP/IP Volume One*. Pearson.

Meyers, M. (2021). *CompTIA Network+ Certification All-in-One Exam Guide, Seventh Edition (Exam N10-007)*. McGraw-Hill Education.

Beasley, J., & Nilkaew, P. (2022). *Networking Essentials: A CompTIA Network+ N10-008 Textbook*. Pearson IT Certification.

Stallings, W. (2021). *Data and Computer Communications*. Pearson.

Lammle, T. (2023). *CCNA Certification Study Guide, Volume 2: Exam 200-301*. Sybex.

NETGEAR. (2023). *NETGEAR Product Specifications*. Retrieved from NETGEAR Official Website.

Linksys. (2023). *Linksys Velop AX4200 WiFi 6 Mesh System Product Details*. Retrieved from Linksys Official Website.

Spectrum. (2023). *Internet Service Level Agreements and Policies*. Retrieved from Spectrum Official Website.

Motorola. (2023). *MOTOROLA MG7700 Modem Product Specifications*. Retrieved from Motorola Official Website.