BAB 1
PROPOSED IDEAS

1.1 Background of the Problem

Broadband network communication is a network that supports several types of *traffic* including voice, video, and data or can also be referred to as multimedia even though it supports several different types of *broadband* network communication only needs to send it in one *packet* to the user. [1]. *Broadband* networks are essential because they provide high-speed and reliable internet access, enabling seamless communication, information sharing, and access to *online* services and opportunities that improve education, employment, healthcare, and overall quality of life. *Broadband* usage is increasing due to several factors which can be caused by the number of devices that require *online* networking and can also be motivated by work from home regulations due to Covid-19. Working from home causes an increase in *broadband usage,* this can be seen on the Japanese NHK news site that *broadband* usage has increased by around 30 to 40 percent, this is due to the increasing number of workers working from home. [2].

1.2 Problem Supporting Information

Broadband network communications can be deployed across a variety of interfaces, including wired connections such as Ethernet and fiber optic cables, as well as wireless technologies such as Wi-Fi, cellular networks (3G, 4G, 5G), satellite connections, and other emerging technologies.[3]

One of the most popular *wireless* technology standards is Wi-Fi. Wi-Fi or WLAN using the IEEE 802.11 standard is a very popular protocol for wireless connections. Based on Cisco's visual index network forecasts, by 2022 as much as 51% of *traffic* on the internet will come from Wi-Fi. IEEE 802.11 itself is in the frequencies of 2.4 GHz, 5 GHz, 6 GHz, and 60 GHz[4]. It is expected that in the future 802.11be Wi-Fi networks can accommodate very low latency and very high *traffic* reliability.

Wi-Fi or Wireless Fidelity is a standard used by Wireless Local Area Network (WLAN) that uses the 802.11 standard.[5]. This term was initiated by the WI-FI Alliance organization. WI-Fi was originally intended for wireless devices and local networks (LANs). Wi-Fi has a much higher speed than even the fastest cable modem. Wi-Fi only works on devices that have been configured with a Wi-Fi certified Radio.

Wi-Fi has four variations based on the IEEE 802.11 specification, namely: 802.11a, 802.11b, 802.11g, and 802.11n.[6]. Specification b is the first product of Wi-Fi. Currently, Wi-Fi technology has evolved to the 7th generation with the 802.11be standard.

Wi-Fi was invented and first released to consumers in 1997 when a committee called 802.11 was created. This led to the creation of IEEE802.11, which refers to a set of standards that define communications for wireless local area networks (WLANs). Following this, the basic specifications for Wi-Fi were established, allowing the transfer of two megabytes of data per second wirelessly between devices. This triggered the development of prototype equipment (*routers*) to comply with IEEE802.11, and in 1999, Wi-Fi was introduced for home use.

In the communications business, Wi-Fi has become one of the most successful areas. Industry revenue from Wi-Fi has exceeded $1 billion per year and is expected to reach over $4 billion by 2007.[7]. Initially, Wi-Fi was only an add-on feature available through PCMCIA interface cards, but it has now become a built-in feature on various user devices. The popularity of Wi-Fi is also evident from the high interest in the mass media. As time goes by, Wi-Fi is no longer considered just a new networking device, but rather a tool that brings the revolution of free *broadband* internet access to everyone.

Wi-Fi is a great example of how a solution to a small problem such as wireless network extension of Ethernet can be the basis of a larger vision of ubiquitous *broadband* mobility. We focused on Wi-Fi services designed to support the needs of professionals who travel frequently. Through this effort, we identified four key areas of ease of use, security, mobility, and network management.

In addition, one of the factors that plays an important role in good Wi-Fi usage is the implementation of Wi-Fi Management. Effective Wi-Fi management consists of monitoring devices that create and use Wi-Fi networks, analyzing their traffic, and troubleshooting slowdowns that can affect the end-user experience. Overall, Wi-Fi management aims to avoid downtime and prevent rogue devices from accessing the network. Wi-Fi management is essential for large-scale and dynamic business networks.

When there is an outage on the Wi-Fi network, or if the signal strength is inadequate in a certain area, end users cannot do their jobs. In an era when many employees rely on mobile devices such as laptops and smartphones, critical network management incorporates best practices for Wi-Fi networks, not just wired networks. With adequate Wi-Fi network management, admins can ensure outages are fixed quickly and don't affect business productivity.

At the same time, admins can keep an eye out for unauthorized devices or rogue access points that could infiltrate the network and cause potential data loss - after all, Wi-Fi networks are typically very dynamic, with devices leaving and joining the network continuously, potentially resulting in vulnerabilities.

For effective Wi-Fi management, users must have insight into the various relevant devices, including access points, routers, and client devices. To effectively manage these devices, users must ensure that they have updated hardware, are properly configured, and are authorized to be on the Wi-Fi network.

1.3 General Analysis

1.3.1 Economic Aspects

Conventional Wi-Fi, with its proprietary systems and closed architecture, presents several economic challenges. High development costs, lack of flexibility, rising Total Cost of Ownership (TCO), and vendor lock-in limit innovation and increase the financial burden for businesses. The solution lies in an open and collaborative approach that drives cost-effectiveness, agility, and adaptability. By moving to open standards, businesses can overcome these economic disadvantages, drive innovation, and deliver a brighter and more sustainable future for the wireless industry.

1.3.2 Development Aspects

Conventional Wi-Fi, with its proprietary systems and limited development opportunities, hinders progress in the industry. The closed architecture limits innovation, making it difficult for aspiring developers, including Indonesian individuals, to become active producers in Wi-Fi development. However, by embracing a more open and collaborative approach to Wi-Fi development, businesses can empower individuals around the world, including talented Indonesians, to contribute their skills and ideas to create cutting-edge solutions that drive technological progress and benefit the global community.

1.3.3 Aspects Mobility

Another aspect of *WiFi* is firstly mobility, Wi-Fi connection users can easily move because users do not have to connect their devices with physical media such as cables. Waste, *access points* used as Wi-Fi signal transmitters will produce waste that is very difficult to decompose or recycle because of the components used.

1.3.4 Operational Aspects

The operational aspects of conventional Wi-Fi are challenging due to its closed nature and lack of interoperability. Managing and maintaining multiple proprietary systems results in higher operational costs and complexity. Troubleshooting across different vendor solutions becomes time-consuming and inefficient. In addition, dependence on a single vendor leads to limited flexibility in scaling and upgrading the network. Embracing an open and interoperable approach can revolutionize the operational landscape by simplifying processes, reducing costs, and enabling seamless Wi-Fi network integration. OpenWiFi's community-driven development and standard APIs offer a viable solution, empowering businesses to optimize operational efficiency, ensure smoother network management, and ultimately deliver a more reliable and hassle-free Wi-Fi experience.

1.4 Needs that must be met

Based on the analysis that has been done, Wi-Fi or Wireless Fidelity was originally intended for wireless devices and local networks (LAN). In 1999, Wi-Fi was introduced for home use, but as times have changed, especially in the era of the industrial revolution 4.0 with the arrival of Wi-Fi amidst the rise of technological developments today, Wi-Fi is seen not just as a newfangled networking gadget, but as a vehicle that will usher in a new era of untethered *broadband* internet access for the general population. Through this scenario we identify four areas - ease of use, security, mobility and network management - that present key challenges for the evolution of Wi-Fi.

With that, things that are needed include:

- Wi-Fi can cover the entire room with a good and reliable connection
- Wi-Fi design must fulfill the configuration that suits the services required by users
- Parameters must meet the standards required for the services required by users

1.5 Proposed System Solution

1.5.1 Product Characteristics

1.5.1.1 Conventional Wi-Fi

Conventional Wi-Fi products are integrated between hardware and firmware. Conventional Wi-Fi has a controller that is limited in use for Access Point configuration. Installation of conventional Wi-Fi must use the services of a technician directly to the site. The features that can be used will also be limited by the Wi-Fi operator. Conventional Wi-Fi cannot modify the *firmware/controller* according to existing needs because it is fixed to one vendor.

1.5.1.2 OpenWiFi

OpenWiFi itself is characterized as a low-cost product, easy integration into the market, and provides choice and flexibility for enterprise-class Wi-Fi infra.[8]. OpenWiFi can be considered cheap because it has features that are included in the enterprise class so that new or old suppliers can easily offer these features with less effort. OpenWiFi also uses cloud-based control that uses open north-bound APIs so that almost all Wi-Fi devices can easily integrate OpenWiFi with minimal effort and time. OpenWiFi can provide choice and flexibility because OpenWiFi itself is open source so that vendors or developers can develop products according to the needs and vision of the company compared to *closed source*.

1.5.2 Usage Scenario

1.5.2.1 Conventional Wi-Fi

Conventional Wi-Fi is used as a base for connecting multiple devices. The use of conventional Wi-Fi starts with the setup of the network architecture by experts related to it. After a good architecture is built, users can use internet access through the Wi-Fi network.

1.5.2.2 OpenWiFi

OpenWiFi is being used as a new base for future Wi-Fi usage. This scenario is envisioned when looking at the features and advantages that OpenWiFi has over those used today such as ease of integration into the market and cost.

1.6 CD-1 Conclusion and Summary

This chapter discusses the importance of Broadband Network Communications, particularly in the context of the use of Wi-Fi technology, in improving high-speed internet access, seamless communication, and *online* services that have a positive impact on various aspects of life. The issue discussed is the increasing use of *broadband* networks, triggered by the growth of devices that require internet access and *work from home* regulations due to the Covid-19 pandemic. Data supporting this issue includes a 30-40% increase in broadband usage recorded on Japan's NHK news website.

The ideal condition is to have reliable and evenly distributed high-speed internet access throughout the space. The current condition is the increasing use of broadband networks, especially Wi-Fi, which requires effective management to ensure good performance. Some of the research and methods discussed in this chapter are the development of Wi-Fi standards, the use of effective Wi-Fi management, and the comparison between conventional WiFi and open approaches such as OpenWiFi.

This research is relevant because it faces real problems in the management of broadband and Wi-Fi networks. By understanding the economic, development, mobility, and operational challenges faced in the context of conventional Wi-Fi, we can look for better solutions such as OpenWiFi. In this assignment, the research and methods used are data analysis and concept development of OpenWiFi as a more open and economical alternative.