

Application Of 5G Internet System To Improve The Economy (Case Study Of Bali Province)

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Abstract

The background of this research is to know the application of 5G in Denpasar Bali. With the application of 5G technology, what can be obtained to help in all fields, especially in the city of Denpasar Bali. The method used in this research is to use the literature review method, and implement the existing system on the 5G system in the city of Denpasar Bali. The problem raised in this research is how to find out the application of 5g technology that is needed by many people based on the problem of sending data or data supply because the data is too much and too large. It is known whether 5g technology can solve this problem so that it can help the community in making maximum use of data and sending data to help many things. The purpose of this research is how to find out the application of 5G technology in the city of Denpasar Bali, 5G technology that will be applied so that it can help many people, especially in terms of sending data and using virtual data because the data sent has started a lot and requires bigger technology. Again in sending data.

Keyword : Application, 5G, Internet System, Economy, Bali.

I. INTRODUCTION

Denpasar City is one of the developing cities in Indonesia in the tourism and economic sectors. The increase in economic activity and tourism causes the number of population growth and arrivals to increase every year. Along with the increase in population and the development of activities, the demand for data services for telecommunications purposes is increasing, so that the demand for land used as a green field is also increasing. But in reality the available land is very limited. On the other hand, the impact of tower construction that continues to increase will have the potential to worsen the aesthetics and spatial planning of the city [1]. Along with the development of the need for mobile data services and the high data rate in Denpasar City, it is necessary to improve the quality of information and communication networks that can serve all customer needs in quantity and quality, one of which is the availability of 5G network services.

This high demand and limited space and land have triggered the development of rooftop towers that have micro coverage, where the antenna height is not more than 22 meters in urban areas. One of the appropriate places for the placement of a rooftop tower is on top of a building called the banjar hall. Banjar hall is a strategic public facility to place towers, especially on the island of Bali because the Banjar halls are spread out in several locations around residential areas [2]. Banjar itself is a "container" for the Balinese community to carry out activities, where the laws and regulations of the Banjar hall have been directly regulated by the government. Therefore, in addition to the rental fee that will fall into the hands of the community, the construction of a rooftop tower above the Banjar hall building is also useful for facilitating arrangements and licensing aspects [3]. In its application, a study of 5G coverage is needed on the placement of the Banjar hal l rooftop. In the

estimation of tower coverage, it is necessary to choose the right propagation model. The propagation model is determined based on the object of research and the specifications of the rooftop tower. Several models of outdoor propagation for urban areas have been widely studied [4].

II. THEORETICAL FOUNDATION

In a study conducted by Septi Andi Ekawibowo in 2018, discusses the analysis of frequency band candidates on 5G NR technology that are suitable for application in Indonesia based on the conditions of the existing frequency spectrum allocation. In considering the availability of the frequency spectrum in Indonesia, which is based on three levels of candidate frequency bands for 5G NR, namely the 700 MHz band at low frequencies; band 3.3 GHz-4.2 GHz in the medium frequency; and the band 24.25-29.5 GHz in the high frequency, the most suitable frequency band for initial application in Indonesia is the band 3.3-4.2 GHz in the medium frequency band to meet the high capacity and coverage required for the three scenarios use of the 5G system [5]. Meanwhile, to meet the demands of a high data rate for eMBB where the use of cellphones is a valuable market in Indonesia, the 24.25-29.5 GHz frequency band is the most suitable for initial application in Indonesia. The results of this study become a reference for the selection of the frequency band used in the thesis. Research in 2018 by Björn Halvarsson; Arne Simonsson; Anders Elgcrón; Ranvir Chana; Paulo Machado; and Henrik Asplund, discussing the trial of NR technology at a frequency of 3.5 GHz.

With beamforming, the increase in propagation loss at a frequency of 3.5 GHz compared to 2.1 GHz can be compensated and the range is shown to be equivalent to that of a 2.1 GHz LTE fixed antenna in both outdoor and indoor conditions. Excellent coverage is demonstrated by the massive MIMO tested at 3.5 GHz which has a downlink throughput of 700 MBps on a carrier width of 80 MHz and reaches a distance of 700 m for the LOS case. In a dense urban microcell deployment, 200 Mbps for the case of NLOS in the same cell range. indoor coverage is also predicted to be feasible and equivalent to LTE. Research in mid-2018 by Hutchison Telephone Company Limited (HTCL) to test 5G NR networks in the 26/28 GHz and 3.5 GHz frequency bands in Hong Kong urban environments [6]. From the measurement results, it was found that in an area of about 200 meters, the downlink speed of the 5G NR carrier in the 3.5 GHz band (bandwidth 100 MHz) is about 4-5 times greater than that of the 4G LTE carrier in the 1.8 GHz band (bandwidth 2 x 10 MHz). With the Non-Standalone (NSA) network architecture option based on the 3GPP 15 standardization release, it was found that the 3.5 GHz band has better coverage range than the 28 GHz band. This 26/28 GHz band has small coverage due to high propagation loss and penetration loss. However, when compared to 4G carriers in the 1.8 GHz band, measurements show 5G carriers have comparable coverage, much better speeds and a better user experience. For the 26/28 GHz band, very high download speeds of 4.8 Gbps and 3.2 Gbps respectively in indoor and outdoor environments [7].

III. METHODS

The research was conducted in the Denpasar city area, starting in May 2019. The data sources obtained were grouped into secondary data and primary data. Primary data is data obtained directly by surveying locations, namely in the form of the coordinates of each Banjar and the point of spreading the rooftop tower for the Denpasar area. Secondary data was obtained from the literature with references to books, journals, papers and browsing results on the internet that supported the analysis during the research.

The initial step taken is to determine the parameters to be used during the analysis, namely frequency, fade margin, sensitivity, received signal strength, transmitted signal strength, transmitting antenna gain, receiving antenna gain, electromagnetic wave length, shadowing loss. And the area of Denpasar. Next, calculate the radius using a propagation model for path losses and shadowing, calculate coverage, calculate the number of rooftop towers in Denpasar City, and map rooftop towers in Denpasar City using Google Earth.

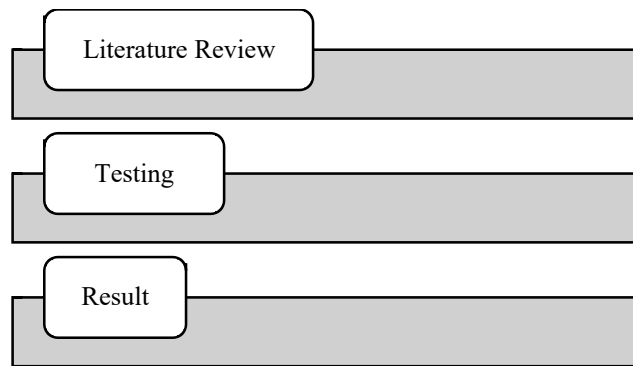


Fig 1. Research Method

IV. DEVELOPMENT

A research method for 5G network coverage in the city of Denpasar. In my opinion, as explained in Chapter 3 related to the research method, there are still variables that have not been listed, such as the implementation of the mobile phone of residents who have not met the verification of the 5G internet. And also if it is correlated with current conditions, conducting a survey in the field is a little difficult because there are health protocols. And at this stage, the author will add a method for researching 5G network coverage more easily based on the current situation.

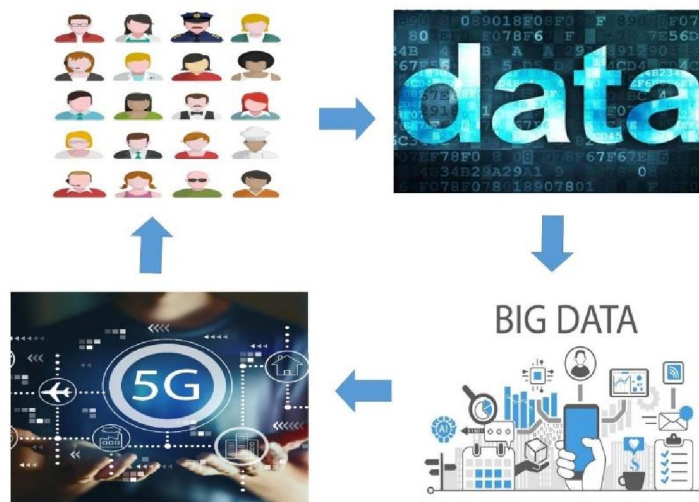


Fig 2. Framework 5G

1. Survey here means to conduct a survey with existing data from previous years. That is by looking at visitor data in the city of Denpasar, as well as local residents who use adequate devices or cellphones. Because if the reach and the network is wide, but the users are few, it becomes less effective. And also some other things, namely.
2. Geographical Conditions the city of Denpasar is known for its beautiful natural beauty, but if you want to expand your reach in that area, you need to have a large number of rooftop towers spread throughout the city.
3. Radio Frequency Spectrum is an important asset for communication service providers. The radio frequency spectrum for 5G covers different frequency ranges, each with different characteristics. Each of the three components comes to the market in a materially different way, in terms of performance and coverage. In early deployments, coverage is a major factor.
4. High Band for revolutionary creativity First, the high band spectrum is suitable for increasing outdoor capacity in urban areas with a high concentration of users, such as train and bus stations, central business

districts, and around landmarks. Second, high band can provide fixed broadband for business and residential areas in suburban areas that are not yet covered by fiber optic networks, and are installed one by one in a residential area. Third are areas that require high data usage, where 5G can provide new business value such as in factories, warehouses, sports venues, universities, hospitals, and so on – where cables are too static and alternative wireless technologies are too slow, or not very good. Reliable or very unsafe.

5. Mid band for phenomenal capacity 5G also has the opportunity to increase phenomenal capacity throughout the metropolitan area. The mid band spectrum is perfect for providing smooth cellular network coverage in metropolitan areas and along highways. You can expect speeds in the hundreds of megabits per second for a few miles on the mid band 5G spectrum. Customers can have 5G access, both outdoors and indoors.

6. Low band for great coverage the scenario of network deployment in low band is suitable for national coverage, in metropolitan areas, small cities, and rural areas. The low band spectrum will be constructed in a similar way to the way 1G and 2G were introduced a few decades ago – with an initial focus on coverage. We can expect increased 4G performance, with a range of up to around 16 kilometers. This spectrum provides outdoor and indoor coverage of large towers.

7. 5G Security in essence, 5G is different from previous generation technologies. The 5G network will serve as a critical infrastructure to facilitate the digitization, automation and connectivity of machines, robots, transportation solutions, and so on. For that, there are important things at stake, and, as such, a different risk tolerance is required. Security is becoming increasingly important in the 5G era as security threats continue to evolve, infrastructure and business risks continue to increase, regulatory requirements increase, deployment scenarios and new use cases are created, billions of new devices, and cloud-related challenges.

8. 5G for Users and Business The launch of 5G opens up new opportunities for society. Our research points to key opportunities in the areas of: Enhanced Video (4K, 8K and 360-degree formats), Live Sports Streaming, Music and Gaming (mobile and cloud), Augmented and Virtual Reality (AR/VR), Consumer IoT Services, Entertainment and Connectivity in the car, and Digital Advertising. Therefore, 5G is becoming an “ecosystem play” that provides communication service providers with new opportunities to increase revenue beyond their traditional domains of connectivity and mobility. In addition, 5G will also change business massively. Following are some of the emerging characteristics of a 5G-enabled business: being able to run any process remotely (regardless of how critical the process is), having actual real-time control of every business process, fully automated operation, using compute resources, and last but not least, have a higher level of security without compromising overall performance.

V. CONCLUSION

From the results of the analysis of the method above, we can conclude that with the wide reach of 5G Internet in the city of Denpasar, we get a lot of benefits, not only in the business sector, but from the eyes of tourists and the world that Bali, which is majestic, is glorified by the people of Indonesia and the people of the world. , the Bali area, especially the city of Denpasar, which is a metropolitan city of Bali, is not outdated. Moreover, the most important thing is the security of the 5G Internet.

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