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Design and Build a Billing Reminder Communication System for Kiosks in Urban Areas Based on Android

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Abstract— **A kiosk/traditional minimarket is a small store that sells goods in the same way that a modern minimarket does. To break the chain of the Covid-19 virus during this pandemic, it is recommended to pay for an item without making contact (online). Therefore, an Android-based smartphone is very useful for making payments for an item online. an Android-based smartphone is quite beneficial for completing online purchases. Most individuals want to have what they want, even though the price is often prohibitively high. Some purchasers, on the other hand, want the items as quickly as possible and are willing to wait for payment for a specific period of time depending on their financial situation. The kiosk owners suffer as a result of this because they do not receive any revenue from the sale of their goods. This reminder allows retailers to collect bills automatically without having to wait for customers to return to the same kiosk. Aside from that, each customer has a limit, which is beneficial to kiosk owners because it prevents them from losing money. This study requires a communication system that allows kiosk owners to collect bills from their clients without having to wait for the customer to return to the same kiosk. In other words, the kiosk owner has assurance from the consumer that the payment will be made on the agreed-upon due date.**

Keywords—**Android, Covid-19, Kiosk, Payment, Smartphone, Reminder.**

I. INTRODUCTION

Technological developments from year to year are always endless. Its development can lead to competition in any field related to technology, Kiosks located in urban areas inevitably have to keep up with technological developments. Internet technology is one technology that is easy to use for small or medium businesses. A kiosk/traditional minimarket is a small shop that sells goods like a modern minimarket [1]. However, the difference between this traditional and modern kiosk is that the buyer cannot take the goods he wants directly but will be served by the kiosk owner [2]. Another difference lies in the price of an item usually, when buying goods in large quantities, will get a discount. In other words, the price tends to be unstable at traditional kiosks.

Nowadays, every individual and company familiar with e-commerce to make sales and purchase products and services [3]. An e-payment system is online and comes to replace a cash payment system. During this pandemic, it is recommended to pay for an item without contact (online) using e-payment to break the chain of the Covid-19 virus. Therefore, an Android-based smartphone is very useful for making payments for an item online. Most people desire to have an item they want even though the price offered is sometimes quite expensive. However, some buyers want to get the item as soon as possible and wait for payment for a certain period according to their ability.

The previous research, entitled Design and Build of Mobile-Based Academic Activity Reminder Applications, developed an application system in two platforms. First, lecturers and students use a mobile platform to view some academic agenda information and receive real-time information/announcements and notifications/alarms related to academic activities. Second, the web platform used by the Administration to broadcast announcements or invitations to mobile application users [3][4].

Previous research entitled Android-Based Mobile Reminder Application Modeling. Modelling a system to be built, and the most famous in modelling the system is object-oriented modelling using UML tools which have the meaning of a standard language used in industry as visualization, designing and documenting software systems [5]. UML has become a standard for object-oriented software design, which includes the concept of business processes, writing classes in specific programming languages, database schemas and components needed in developing software [6].

The research entitled Android-Based Water Reminder Application System, using the SDLC method, consists of a needs analysis stage where this stage is carried out to determine what needs are needed in building the system— followed by the system design stage, which is carried out to see the system workflow [7][8]. The coding stage or system coding is done by translating the design results into a script. After the application system is built, the output will be carried out in a testing phase to determine the system's work [9]. Finally, a system analysis was carried out to determine the community's extent to which this application was needed [10][11][12].

Given the foregoing context, a communication system that allows kiosk owners to collect bills from their customers without having to wait for them to return to the same kiosk is required. In other words, the kiosk owner must have certainty from the customer regarding the due date for payment of the bill, which has been mutually agreed upon. As a result, an android-based billing reminder communication system at urban kiosks is proposed in this study. The results of this study are expected to make kiosk entrepreneurs in urban areas more advanced even though many customers have bills. This application is easy to use for all people.

Android is a software set of software subsystems needed to provide a fully functional solution for mobile devices. Android had the largest installed base on all mobile operating systems. The Android platform developed by Google is an optimized

platform for mobile devices with the perfect combination of operating system, middleware and application programs [13]. The application on Android can be used anywhere and anytime. With the popularity of Android smart phones everyone finds it convenient to make transactions through these.

Understanding key concepts of Android is a basic requirement for designing Android mobile apps. There are some basic concepts of Android, including the app components, app resources, and app manifest. App components are the essential building blocks of an Android app. Each component is a different point through which the system can enter your app. Not all components are actual entry points for the user, and some depend on each other, but each one exists as its own entity and plays a specific role [14].

II. METHOD

The type of research carried out is included in the type of manufacture or development research. In order to be able to answer the formulation of the problem that has been made, it is necessary to design research, design systems, prepare materials and tools, determine procedures and parameters to form tools and systems that can be used.

A. Research design

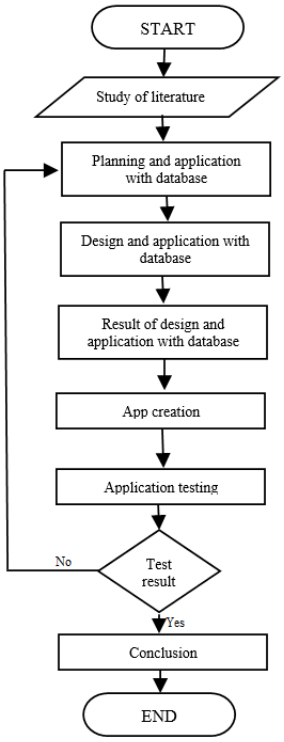

Figure 1. Research design

The research planning has several stages of research, and the first stage is conducting a literature study related to the need for reminders, tools and materials needed for the design of the system to be built. The second stage is application and database planning; this planning includes selecting a suitable database and designing an easy-to-run application display. The third stage is the design of the application and database. At this stage, the application and database design is carried out after the planning has been carried out. The next stage is the results of the application and database design. At this stage, the results of the application design can be said to be the final design before heading to the making of the application.

The fifth stage of making the application is the process of making the application according to the final design that has been done. The sixth stage of application testing is the application test of the application that has been made. The next stage is the test results stage, and the test results stage is the final stage in the application creation process. If the test results are following the planning, the next stage is towards the conclusion, and if the test results are not by the plan, they will be repeated back to the application and database planning stage. The last stage is the conclusion. This is the final stage after the test results are declared following the system planning.

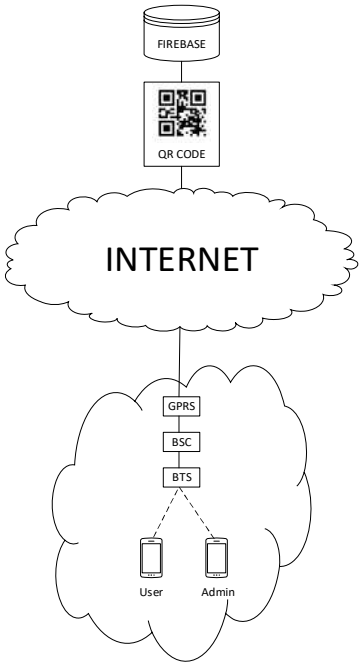

Figure 2. The proposed system model

Figure 2 describes the block diagram of the system design in the research conducted. There are two accounts, namely for Users (Buyers) and Admin (Sellers), then both of them pass through the same network, namely BTS, then to BSC, then go to GPRS, the entire network is called a cellular network, after that, it goes to the Internet and then buyer's data. Furthermore, sellers are stored in Firebase. On the application start page, buyers can create an account first if they do not have an account on this application. After shopping and wanting to make a bill at the store, the seller will open the same application, log in to the main account (the seller), and list the items to be billed. After that, the seller will show a QR Code that contains data on the goods and the total purchase from the buyer. Then the buyer scans the QR Code shown by the seller. The transaction is declared successful when the buyer

successfully scans the QR Code, and a description of the total spending appears on account of the buyer who made the bill.

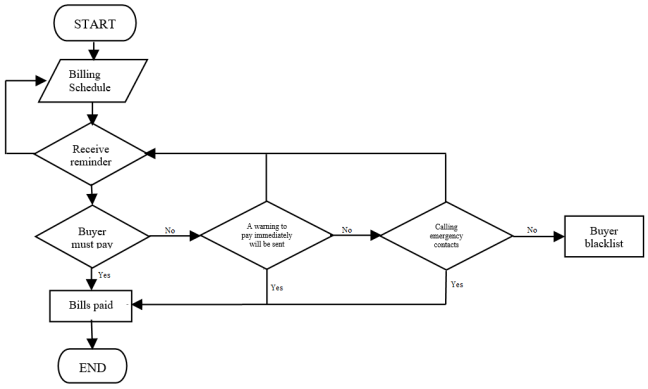

Figure 3. Flowchart system

The Billing System Flowchart has several stages; namely, the first stage displays the billing schedule. This serves so that buyers can know when the bill payment is due to be paid. The second stage is receiving a reminder; at this stage, a reminder will be sent automatically to the buyer; if the buyer receives a reminder, then the next step is to pay the bill. If the buyer does not receive the reminder, it will repeat the billing schedule. The next stage is the buyer must pay the bill; at this stage, the buyer must pay the bill according to the limit obtained; if yes, the bill has been paid. If not, a warning to pay immediately will be sent through the stages. The buyer receives a reminder again, and if it still does not, then emergency contacts are immediately contacted by the seller, but if you still do not pay, it will automatically be on the blacklist.

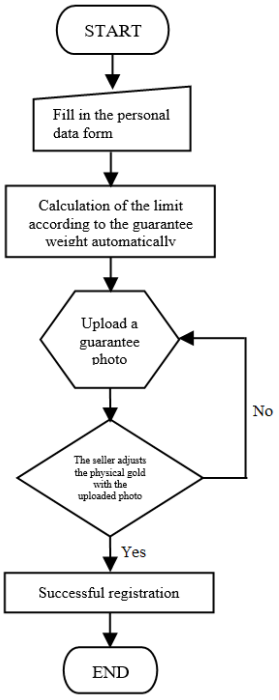

Figure 4. Flowchart system

In the Flowchart system, there are several stages; namely, the first stage is filling out the personal data form, which includes name, address, cellphone number, emergency contact etc. Then the second stage calculates the limit according to the weight of the guarantee, which will automatically be deposited with the seller. The third stage is to upload a photo of the guarantee and the purchase receipt, which will be deposited with the seller. After that, the seller adjusts the physical gold that will be deposited as a guarantee whether it matches the photo uploaded by the buyer or not. If not, the buyer must re-upload the guarantee photo and a note of the physical gold that will be deposited. However, if the photo matches the physical gold, the registration is declared successful.

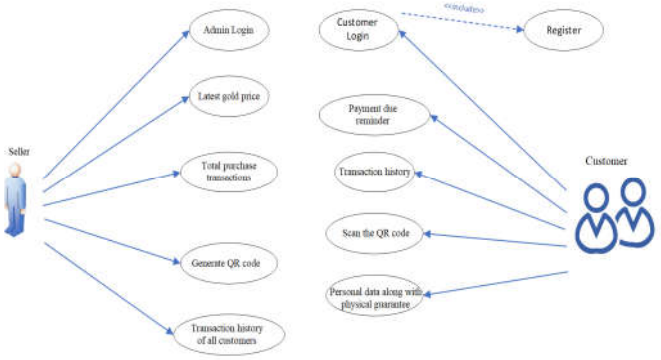

Figure 5. User case diagram

In the use case diagram there are 2 actors, namely the seller and the customer. The explanation is as follows:

- Seller: The owner of a kiosk that sells an item or product.
- Customers: Buyers who will buy an item or product at a kiosk.
- Admin Login: The seller logs into the admin only account on the app.
- Register: Buyers register an account if they don't have an account yet.
- Customer Login: The buyer logs into the customer account that was previously registered
- Latest gold price: The seller inputs the latest gold price.
- Total Purchase Transactions: The seller calculates the total product purchase transactions in the application.
- Creating a QR Code: The seller shows the QR Code that appears after calculating the total product purchase transaction on the application.
- Scan the QR Code: The buyer scans the QR Code shown by the seller to make a transaction.
- Transaction history: Buyers can view transaction history in their respective accounts in the application.
- Transaction history of all customers: Sellers can view the transaction history of all customers in the seller's special account or admin on the application.
- Personal data along with physical guarantees: Buyers fill in personal data in their respective accounts in the application and physical guarantees are submitted to the seller.

III. RESULTS AND DISCUSSION

A. Implementation result

The following is an experimental result when making transactions on the BiMinder application.

Figure 6. Total transaction view

Figure 6 is an example of a transaction display that has been input by the seller. For example, the seller inputs the name of the Toothbrush item for Rp. 2000,- totalling 1 piece.

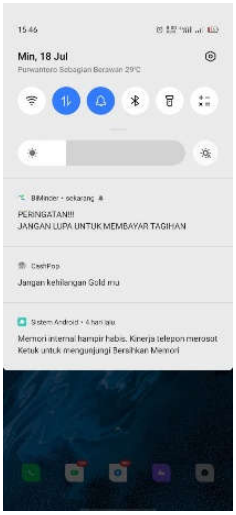

Figure 7. Reminder notification view

Figure 7 shows the reminder notification sent to the buyer's account from the firebase. This notification will appear to the buyer's account after 1 month from the transaction date that the buyer has made.

B. Experiment result

Quality of Service (QoS) testing determines system performance by measuring delay, throughput, and packet loss. The test is carried out using a provider network connection connected to the internet. Software testing using Wireshark.

1) Telkomsel Provider Test

The following are the results of testing data transfer from the android application to Google APIs on the firebase server using the Telkomsel provider.

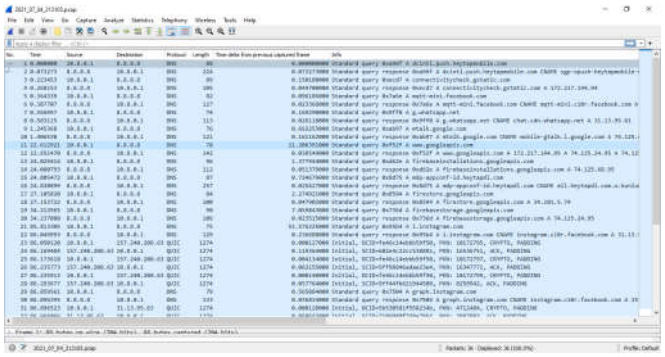

Figure 8. Telkomsel provider test with Wireshark

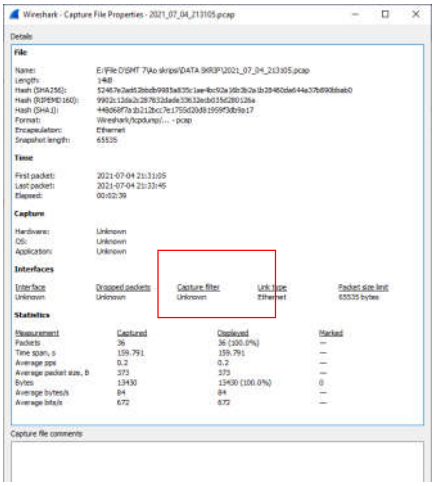

Figure 9. Telkomsel throughput

In calculating the throughput value, two parameters are needed, namely received packets (bytes) and data transmission time (time span, s). The following is the throughput calculation formula:

Throughput = Packet received : transmission time (1)

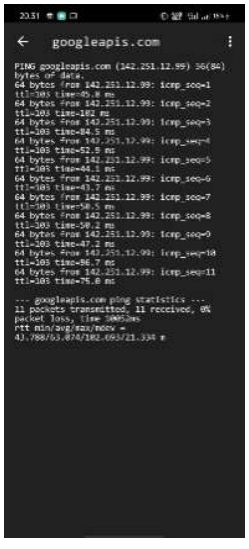

Figure 10. Value of Telkomsel packet loss

Figure 10 shows that the value of Telkomsel's packet loss is 0%.

TABEL 1
TELKOMSEL PROVIDER DATA TRANSFER TEST

Throughput	Packet loss	Delay
	0%	21.206391s
	0%	0.038549s
	0%	1.377944s
672.376 bits	0%	0.051379s
	0%	0.724679s
	0%	0.025427s
	0%	2.274921s
Jumlah		25.699290s

Figure 11 is a graph of several samples of delay data using Telkomsel providers whose values are in accordance with table 1.

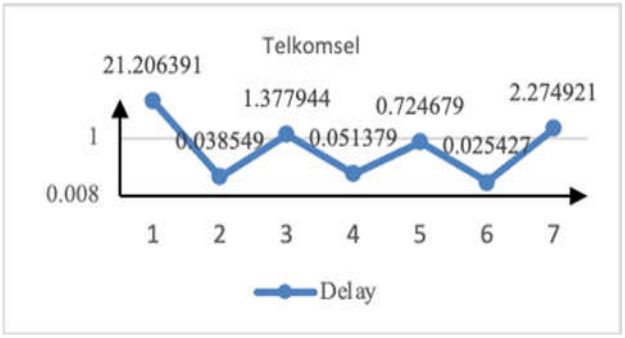

Figure 11. Delay graph in telkomsel provider

In table 1, there are 7 samples of all packets that will be searched for the average delay value displayed on Wireshark. Figure 11 shows a rapid decrease in a delay of 0.038549s. The total delay value of 7 sample data at Telkomsel provider is 25,69929s, and throughput is 672,376 bits.

2) Indosat provider test

The following are the results of testing data exchange between android applications and Google APIs on a firebase server using the Indosat provider.

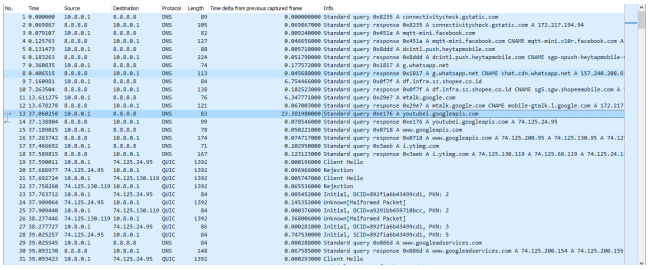

Figure 12. Indosat provider test with wireshark

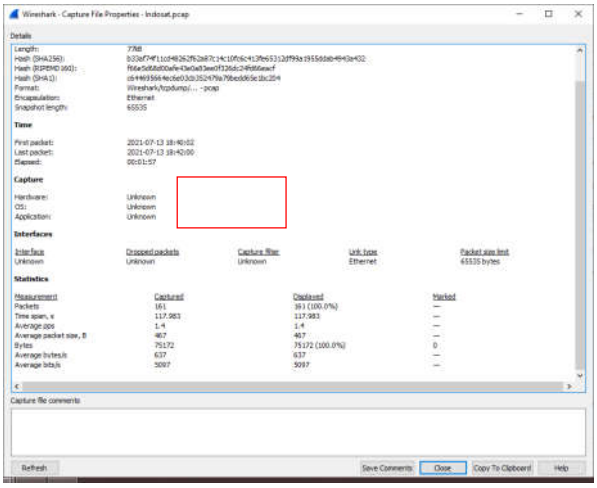

Figure 13. Indosat throughput

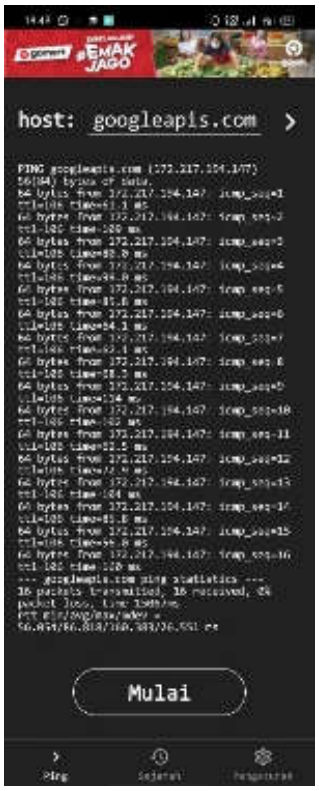

Figure 14. Value of Indosat packet loss

Figure 14 shows that the value of Indosat's packet loss is 0%.

TABLE II
TESTING INDOSAT DATA TRANSFER PROVIDER

Throughput	Packet loss	Delay
	0%	23,38198s
	0%	0,078546s
	0%	0,050221s
5097.144 bits	0%	0,074717s
	0%	0,202950s
	0%	0,123123s
	0%	0,000196s
Jumlah		23,911733s

Figure 15 is a graph of several samples of delay data using the Indosat provider, whose values are following table I.

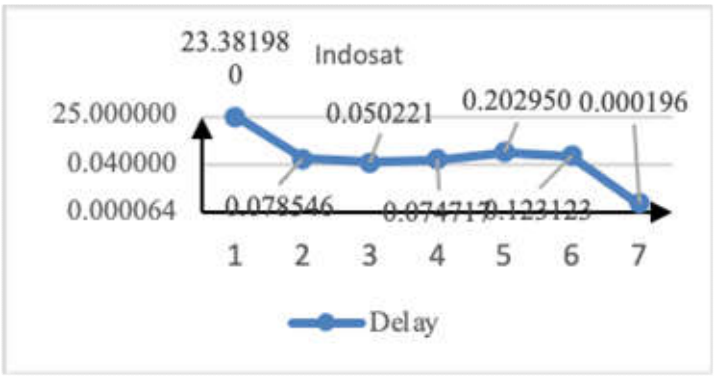

Figure 15. Delay graph at Indosat provider

In table II, there are 7 samples of all packets that will be searched for the average delay value displayed on Wireshark. Figure 15 shows a rapid decrease in a delay of 0.078546s. The total delay value of 7 sample data at the Indosat provider is 23.911733s, and the throughput is 5097.144 bits.

3) *XL provider test*

The following are the results of testing data exchange between android applications and Google APIs on a firebase server using an XL provider.

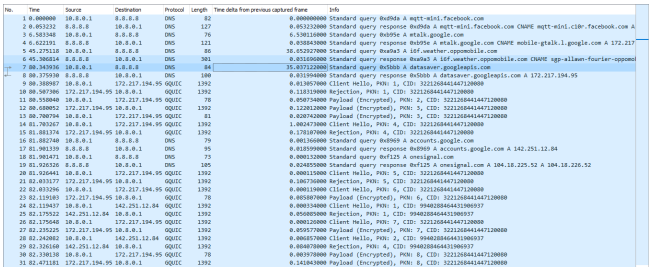

Figure 16. XL provider test with wireshark

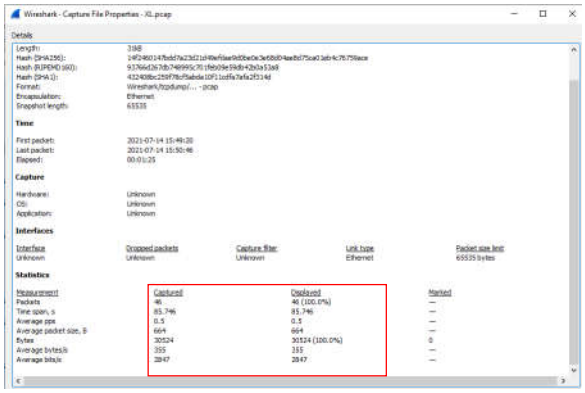

Figure 17. XL throughput

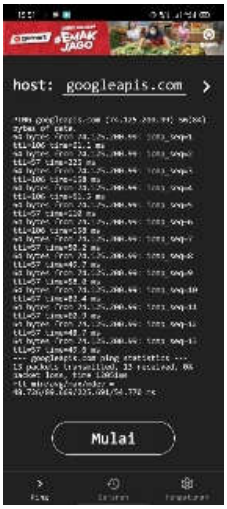

Figure 18. XL packet loss

Figure 18 shows that the value of XL's packet loss is 0%.

TABLE III
XL PROVIDER DATA TRANSFER TESTING

Throughput	Packet loss	Delay
	0%	35,037122s
	0%	0,031994s
	0%	0,013057s
2847.856 bits	0%	0,118319s
	0%	0,050734s
	0%	0,122012s
	0%	0,020742s
Jumlah		35,39398s

Figure 19 is a graph of several samples of delay data using Telkomsel providers whose values are following table III.

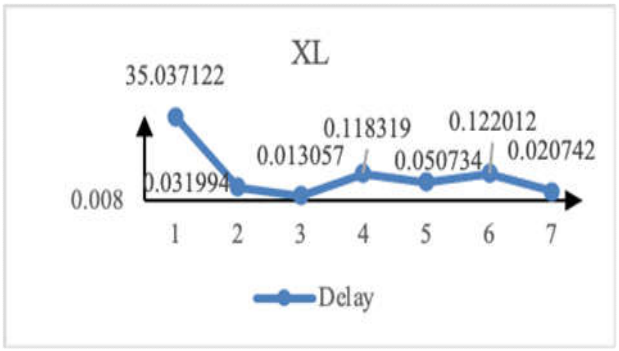

Figure 19. Grafik delay in XL provider

In table III, there are 7 samples of all packets that will be searched for the average delay value displayed on Wireshark. Figure 19 shows a rapid decrease in a delay of 0.031994s. The total delay value of 7 sample data on the XL provider is 35.39398s, and the throughput is 2847.856 bits.

4) Data Analysis Based on Experiment Results

In data analysis based on the results of this test, which takes 2 parameters, namely the sum of the values of the delay of several samples and the throughput value of each provider. The following is a comparison of the delay and throughput values of each provider.

TABLE IV
TABLE OF DELAY AND THROUGHPUT COMPARISON VALUES

Provider	Delay	Throughput
Telkomsel	25.699290s	672.376 bits
Indosat	23,911733s	5097.144 bits
XL	35,393980s	2847.856 bits

From table IV to compare the delay value if it is described as a graph, it is as follows:

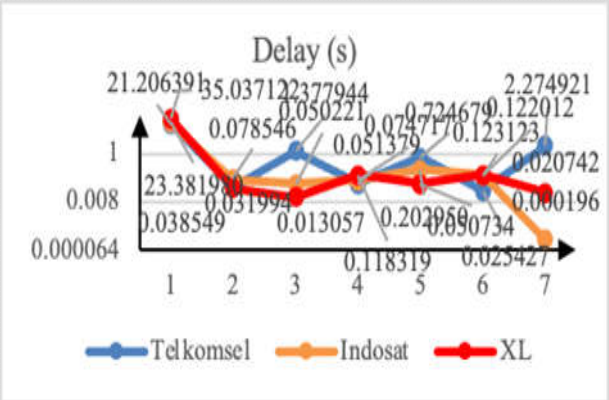

Figure 20. Delay comparation

From table IV, if it is described as a graph about the comparison of throughput values, it is as follows:

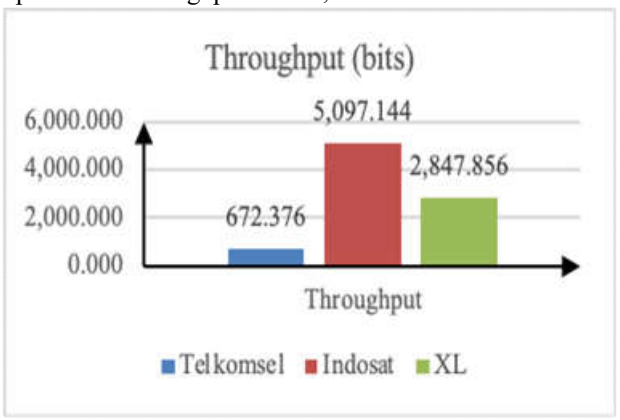

Figure 21. Throughput comparation

Table IV is the sum of the delay values from several samples and the throughput values obtained after calculating the formula. Figure 20 shows that the XL provider has the most extended/highest number of delay values, 35.393980s. Then the highest throughput value is shown by the Indosat provider, which is worth 5097,144 bits.

IV. CONCLUSION

The BiMinder application is used for transactions between sellers and buyers and it may also help kiosk sellers remind buyers who have bills. According to the billing due date, push notifications will be delivered to buyers automatically. The gold guarantee scheme in this study requires the customer to pay the bill as it is due. Otherwise, the seller will contact the emergency contact listed on the buyer's account via the form, but if there is still no response, the seller will withhold the buyer's gold guarantee. According to the comparative value of the delay data sample graph utilizing three distinct providers, namely Telkomsel, Indosat, and XL, the most significant/longest delay is XL, which is worth 35.393980s, and the lowest / fastest delay is Indosat, which is worth 23.911733s. The most significant throughput graph comparison value is obtained by Indosat provider with a value of 5097,144 bits, followed by Telkomsel with a value of 672,376 bits.

REFERENSI

[1] F. K. S. Dewi, T. D. Indriasari, and Y. Prayogo, “Rancang Bangun Aplikasi Pengingat Kegiatan Akademik Berbasis Mobile,” J. Buana Inform., vol. 7, no. 4, pp. 303–312, 2016.

[2] Kosidin and R. N. Farizah, “Pemodelan Aplikasi Mobile Reminder Berbasis Android,” Semin. Nas. Teknol. Inf. dan Komun. 2016 (SENTIKA 2016), vol. 2016, no. Sentika, pp. 271–280, 2016.

[3] M Masihuddin, B U I Khan, M M U I Mattoo & R F Olanrewaju, "A survey on e-payment systems: elements, adoption, architecture, challenges and security concepts", *Indian Journal of Science and Technology,* Vol 10(20), Mei 2017.

[4] A. S. Shani, “Sistem Aplikasi Water Reminder Berbasis Android Android,” Sist. Apl. Water Remind. Berbas. Android, 2017.

[5] R. H. Y. Perdana, Hudiono, M. Taufik, A. E. Rakhmania, R. M. Akbar, and Z. Arifin, “Hospital queue control system using Quick Response Code (QR Code) as verification of patient’s arrival,” Int. J. Adv. Comput. Sci. Appl., vol. 10, no. 8, 2019.

[6] A. E. Rakhmania, M. Taufik and M. Sa’adah, "Centralized Post Paid Water Meter Controller Using Wireless Sensor Network," 2019 International Conference on Advanced Mechatronics, Intelligent Manufacture and Industrial Automation (ICAMIMIA), 2019, pp. 302-305.

[7] Taufik, M., Rakhmania, A. E., & Afnani, Y. N. (2020). Prepaid water meter card based on internet of things. In IOP Conference Series: Materials Science and Engineering (Vol. 732, No. 1, p. 012105). IOP Publishing.

[8] M. Taufik, H. Hudiono, A. E. Rakhmania, R. H. Y. Perdana, and A. S. Sari, “An Internet of Things Based Intercity Bus Management System for Smart City,” Int. J. Comput. Digit. Syst., vol. 10, no. 1, pp. 1219–1226, 2021.

[9] A. I. Sasongko, “Billing Management System Design for Cellular Phone Network Practicum Module 2.4 Ghz WiFi Transmission”, Jurnal Jaringan Telekomunikasi, vol. 6, no. 1, pp. 17-22, May 2018.

[10] A. D. Widowatie, “Optimization of Placement of Electronic Data Capture (EDC) Based on 3G Test Drive in Shopping Center Buildings”, Jurnal Jaringan Telekomunikasi, vol. 6, no. 1, pp. 62-66, May 2018.

[11] R. Suryawati M, M. A. Anshori, and M. D. Atmadja, “Design of Vehicle Number Identification Systems at Toll Gates Using Image Processing Methods”, Jurnal Jaringan Telekomunikasi, vol. 11, no. 1, pp. 27-31, Mar. 2021.

[12] T. K. A. Ahmad, “Implementation of IoT as an Android-Based Monitoring Fee Payment System”, Jurnal Jaringan Telekomunikasi, vol. 10, no. 1, pp. 60-70, Mar. 2020.

[13] A. N. Kartina, M. Kusumawardani, and R. Saptono, “Microcontroller-Based Boarding House Access System using QR Code with A Payment Reminder System on The Android Application”, Jurnal Jaringan Telekomunikasi, vol. 11, no. 4, pp. 175-181, Dec. 2021.

[14] Lazarela Lazareska, Kire Jakimoski. "Analysis of the Advantages and Disadvantages of Android and iOS Systems and Converting Applications from Android to iOS Platform and Vice Versa", *International Journal of Engineering Management,* Vol. 6, No. 5, pp. 116-120, 2017.

[15] Meikang Qiu, Wenyun Dai, and Keke Gai, *Mobile Applications Development with Android Technologies and Algorithms,* Boca Raton: CRC Press Taylor & Francis Group, 2017.