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Analysis of Power Transmit To 3g Network Based On the Quality Ec / No and Received Signal Code Power In Relation To Intensity Traffic

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---------- *ABSTRACT*----------
The use of power transmit small with user load that large can cause an overload on the network, so it is necessary to raise the parameters of the power transmitting. This study analyze transmit power influence on the quality Ec / No and RSCP in relation to traffic intensity. Site 140 744 research results in Jalan Imam Bonjol, Pontianak, shows that for best results use a plot RSCP 448 dBm power in sector 2 with a range of -74 dBm to 0 dBm, the worst result using a Power 430 dBm at 3 sectors with a range of -83 dBm to - 78 dBm and to plot the results of Ec / No best results use 430 dBm transmit power with a range of -4 dBm to 0 dBm, the worst results using 448 dBm transmit power with a range of -9 dBm to -12 dBm. For the calculation of traffic intensity obtained the highest value of 430 dBm transmit power in sector 3 of 1.6 erlang, lowest traffic intensity obtained from 448 dBm transmit power on the second sector of 0.05 erlang. From these results it was stated that the change of power transmits only a major impact on received Signal Code Power (RSCP) and does not affect the quality of Energy Chip per Noise for Ec / No is strongly influenced by the number of users in relation to traffic intensity, the change of power transmits did not significantly affect the change in value voice traffic intensity significantly, because the voice is transferred to a 2G network in the principle works

Keywords: *Power transmits, RSCP, Ec / No, traffic intensity*

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I. INTRODUCTION

In a cellular mobile communication network, a cell site or channel to provide access through radio waves to mobile users who are within its coverage area. Device Base Transceiver System (BTS) serving in a cell to send and receive signals to and from the Mobile Station (MS) (Fraidoon Mazda, 1993). Cells with base stations provided by the operator to maintain the continuity of communication even when the user is always moving. Therefore, BTS should be able to provide a good signal quality in reach and suppress the blank spot area as little as possible. Besides the availability of channels to service calls as well as data access requests and the quality of the received signal determine the quality of a radio access network. Mobile communication systems 3rd generation (3G) is expected to provide a cellular mobile communication system with wider coverage with a better quality (Billy Santoso, 2006). UMTS is a technology that is widely used today, which has a pair of carrier. Frequency of 5 MHz in the uplink and downlink with frequency allocation for uplink ie 1945 MHz - 1950 MHz and the downlink is 2135-2140 MHz, which allows multiple users to access information in the frequency and time the same (Fitri Imanyah, 2011).

Communication technology development quickened as the need for people to be able to communicate without boundaries with a high speed, one of which is the absence of 3G networks with technology Wideband Code Division Multiple Access (WCDMA) (James Martin, 1990). This technology is very different from the GSM technology. In 3G networks needed better sound quality and a higher rate (up to 2Mbps using 99 release and reached 10Mbps using HSDPA) therefore the bandwidth of 5 MHz is needed in WCDMA system.

WCDMA system using DS-CDMA (Direct Sequence CDMA). This technology allows accessing multiple uses spread spectrum. With this technology, the information signal is transmitted through the field frequency is much wider than the information signal frequency field, or in other words, the information signal is transmitted through the process of spreading the information signal into a wide frequency fields (William S. Davis, 1991). Each 3G mobile phone users, or which is called UE (User Equipment) using the same spreading code with the spreading code on the sender side and do correlations bit-bits of information that can be translated on the EU side. All in WCDMA user can be allocated on the frequency and the same time frame but only distinguished by a code (Billy Santoso, 2006).

Pecarrying on transmit signal from the EU should be controlled so that the Node B receives the same signal strength of some of the EU. Power control allows you to adjust transmit power to the terminal UE and Node B, which is useful to maximize capacity and minimize power and interference levels. The aim is that Node B receives the same power level of all the EU in first range it's where the distance of each UE is not uniform. Node B uses fast power control system to increase or decrease the transmit power of the UE (Robert L. Shrader, 1989).

It can be said that the transmit power affect the strength of the signal or RSCP (Received Signal Code Power) and signal quality or Ec / No (Energy per chip Noise) in conjunction with traffic intensity. Because in 3G systems each user will share power with the other user, the more users the more power used and raise the level of interference. So the more users, the cell will shrink and cause a reduction in coverage (cell breathing). Conversely the less friendly then the coverage will be enlarged. This is what meant the relationship between coverage with capacity are inversely related.

One of the technologies that are used to check signal strength, signal quality, access failure rate, rate of lost calls (drop call) emitted by base stations and indoor antenna is drive test method. Methods of test drives is indeed need to be done periodically, as the test drive is one way to measure or determine the quality and signal strength, or measurement process communication system for collecting the information real time about the quality of network base stations, from the direction of the transmitter Base Transceiver Station (BTS) to the Mobile Station (MS) or vice versa. Drive test process is done (mobile) and the rest, (Static). So that the operator can determine the result of the quality of the network. The workmanship Drive test this, checking several parameters KPI (Key Performance Indicators) RSCP, Ec / No, Throughput, Scrambling Code, and analyze site that Serving from BTS to MS if there is a problem such as Pilot Pollution, Cross Feeder, Low Throughput, Low RSCP , Low Ec / No resulting signal was ugly.

II. METHOD

The research location is housed in the Imam Bonjol 140 744 Site is located on the roof of a building (rooftop) right in front of Jl. Tanjung Harapan.

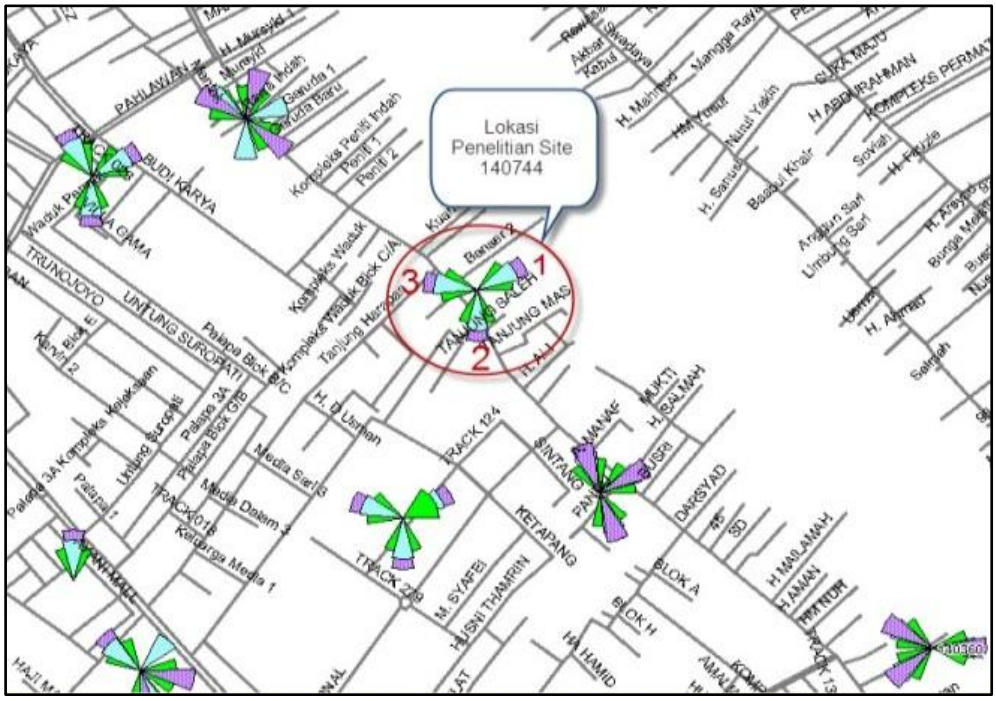

Figure 1. Location Site 140 744

Source: Processed Data

Research Methods of measuring systems is done by (Lingga Wardana, 2011):

1. TEMS Investigation which is a telecom network performance monitoring software issued by the company Ericsson. TEMS software works by connecting a laptop that has been installed TEMs with a mobile phone via data cable. Mobile connected have been conditioned to be connected, monitored and carried out the command of software TEMS. Mobile phone use is specifically issued by the company Ericsson. In addition to mobile phones, TEMS also work with some other devices such as GPS (To determine the position on a map), modem, an external antenna is used for signal transmission scanning (scanner) and others.
2. Drive test is the term used for the testing conducted by the drive (driving). However, the term drive test also is commonly used for testing by foot (walk test) is generally performed on the test network connections in high-rise buildings. Drive tests are fundamental in the optimization of telecommunications networks. Because the drive test, an engineer can determine excellence-built network and improve network performance. Test drive mechanism is determined by what you want to be observed from the performance of the site. Test Drive is one part of the job in radio network optimization. Named driver test is because in the process using a vehicle (car) who live and walk and silent again in accordance with the measurement data that needs to be taken for analysis. The trip is also equipped with digital maps, GPS, handset and sort Agilent drive test software, Nemo (Nokia) or TEMS (Ericsson), where the test drive aims to collect information in real networks in the field. The information collected is the actual condition of the radio frequency (RF) in a base transceiver station (BTS) or Node B in terms of 3G as well as the scope of the base station subsystem (BSS).

Drive tests are also used to check signal strength, signal quality, access failure rate (originating and terminating), the rate of lost calls (drop call) emitted by base stations and indoor antenna. The equipment necessary to carry out the Test Drive include:

1. Laptop application installed Nemo Outdoor. In the measurement of parameters, Nemo can work in two modes, namely:

a) Drive Test displayed information obtained from the Nemo online. For a drive test and recording / recording logfile, connection equipment conditions.
b) Replay, the displayed information is read from the logfile. In this mode there play can be done Logfile for inspection and analysis. The condition is not ter-connect equipment.

2. Broadband Card M2
3. 4 pieces of UE (User Equipment), each 2 Samsung Z500 and 2 Nokia 6120
4. GPS antenna, USB and GPS GARMIN GPS SEEGULL
5. Scanner Scanner 3 port, a USB handset (power port and port data), USB GPS and USB antenna
6. Besides that need to be prepared in advance is a route plan (the area that will be carried drive Test: primary routes, secondary routes and miscellaneous route.

Before doing the test drive it is better to prepare in advance the equipment that will be used such as a laptop (which was installed TEMs), mobile phones, and GPS USB. then make preparations mapping which includes the route and the position of the site to be tested. In observation of 3G networks in particular to observe RSCP and Ec / No, the parameters to be observed are the acquisition signal we can monitor on the block WCDMA Serving / Active Set. block folder must exist to determine the position and movement that ensued block list events to observe events that occur. Figure 2 shows the investigation teams to see who has collated the appropriate parameters to be observed

After the test drive is done then the next step is reporting, which takes the data needed to determine the quality of the network to be tested. Reporting to analyze the quality of the 3G network using the plotting. The data in the plot for the observed signal strength (RSCP) and signal quality (Ec / No) to see the BTS coverage. To make the plot drive test results, previous logfile export to the info folder with Map Info Tab-format appropriate parameter file that you want to plot with TEMS Investigation. 4. Strong signal or Received Signal Code Power (RSCP) is a parameter that indicates the received power measurement of the EU. RSCP is a parameter that indicates a strong level of the receiver signal level in MS (in the range of minus dB), the smaller the value, the weaker the signal. RSCP measurements can be used to verify the site to site coverage BS (base station / Node B) selected. In addition to the RSCP value can also be shown a good idea of how the coverage provided from site to site base station that is generated. At 3 there been standards institute stronger signal at the Key Performance Indicator (KPI) in which the minimum signal strength that must be accepted by the EU customer in accordance with Table 1.

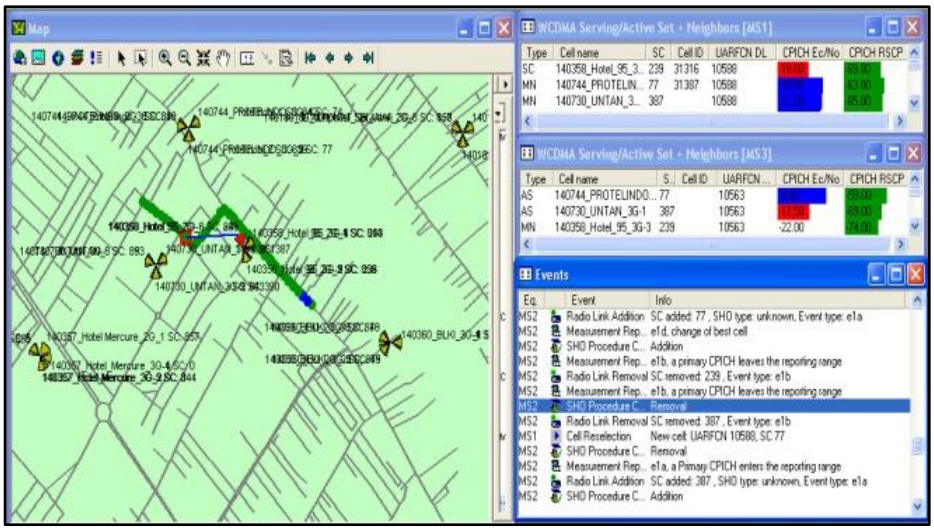

Figure 2 Screenshots TEMS Investigation

Table 1 Standard value RSCP been 3 Table

Coverage plot RSCP level range	
Very Good	-74 ≤ RSCP ≤ 0
Good	-78 ≤ RSCP ≤ -74
Pretty Good	-83 ≤ RSCP ≤ -78
Moderate	-86 ≤ RSCP ≤ -83
Enough	-90 ≤ RSCP ≤ -86
Less	-95 ≤ RSCP ≤ -90
Very Less	-120 ≤ RSCP ≤ -95

Table 2 Standard Value Ec / No

Coverage plot Ec/No level range	
Very Good	-4 ≤ Ec/No ≤ 0

Good	-9 ≤ Ec/No ≤ -4
Pretty Good	-12 ≤ Ec/No ≤ -9
Enough	-16 ≤ Ec/No ≤ -12
Less	-20 ≤ Ec/No ≤ -16
Very Less	-34 ≤ Ec/No ≤ -20

Source: PT. China Com Service Indonesia

7. Ec / No is the ratio of energy per chip of information signals to signal interference or signal noise (noise) that accompanies. Ec / No indicates the quality of the signal received by the EU. Ec / No is the ratio between energy per chip of information signals to signal interference or signal noise (noise) that accompany it. At its core is the ratio between the desired signal strength of the desired signal strength .Ec/No not indicate the quality of the signal received by the EU, Table 2 shows the standard value of Ec / No based on KPIs that operators 3.
8. The intensity of traffic is defined as the average number -rata ongoing call.

III. RESULTS

In the 3G network several important components that must be considered is RSCP and Ec / No. RSCP or Receive Signal Code Power can be used to analyze the coverage while the Ec / No or Chip Energy per Noise is used for quality analysis (John Bellamy, 1990). To make it easier to analyze it will display a plot RSCP coverage shown in Figures 3 and 4.

At 430 dBm transmit power in the area of the antenna cover sectors 1 and 2 in accordance with the sector antenna covlot, only 3 less appropriate sector antenna as shown in figure 3 (daaerah by a red circle) Should the region has a range of -78 dBm to -74 dBm with a light green color while the measurement results obtained -83 dBm to -78 dBm with dark blue. While 448 dBm transmit power in the region that covers the antenna sector 1 and sector antenna 2 is not much different from 430 dBm transmit power, in accordance with covlot.

Striking difference lies in that in the area of the antenna cover three sectors, the results are more in line with covlot compared with the use of power 430 dBm shown in Figure 4 (the area by the red circle). The area is on the cover sector antenna 3 has a building higher than the second area in the cover of the antenna sector 1 and sector antenna 2, it is sufficient to explain the results of measurements RSCP on a sector antenna 3 less well than other areas because more blocking the signal coverage also not maximize

Results of plotting RSCP power transmit 448 dBm better than the power it transmits 430 dBm because theoretically the parameters of power that is greater than the range of the transmit power is also stronger so that the results of measurements in the area in the cover sector antenna 3 received signal coverage better and more closely with coverage plot. But the reality in the field the tools used during the measurement also affect the measurement results for each tool has a received signal level varies.

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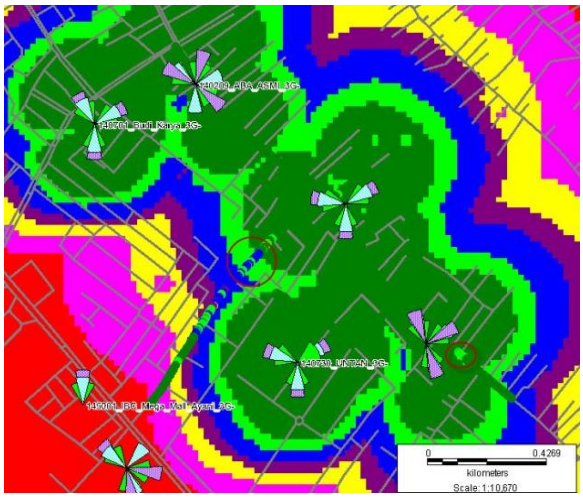

Figure 3 RSCP with 430 dBm transmit power

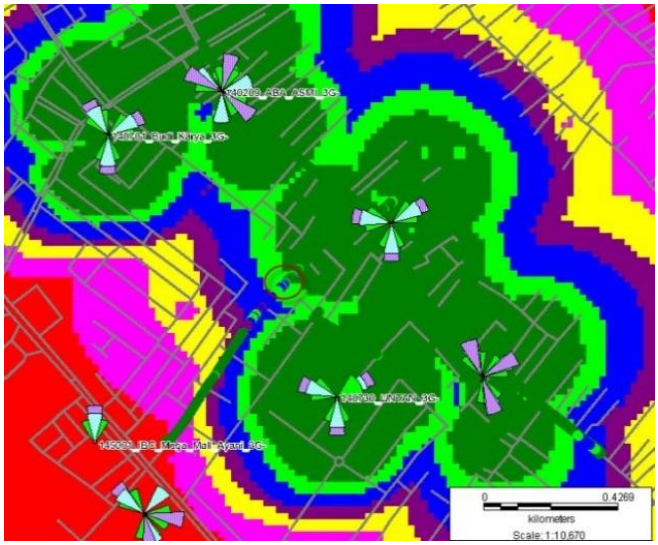

Figure 4 RSCP with 448 dBm transmit power Source: Processed Data

Tools We recommend that you calibrate the first before taking measurements so that we can know the tools that have good signal reception. Tools that have good signal reception tends to be used when measuring to get the plot RSCP, whereas unfavorable tools normally used to retrieve the data. The following will be shown coverage plot Ec / No of 430 dBm transmit power and 448 dBm transmit power to facilitate researchers in analyze and comparing the results of measurements in the field.

Plot Results Ec / No much different from the coverage of the plot, both of which use 430 dBm transmit power and transmit power 448 dBm. To power transmit 430 dBm only area by the red circle in Figure 5 closest covlot while other areas are not appropriate, the average - average has a range between - 12 dBm to - 9 dBm with dark blue and - 16 dBm to - 12 dBm with color light blue. At 448 dBm transmit power results are very different from only a small portion that corresponds to coverage in the plot as shown in Figure

6, which has been given a red circle, the corresponding area has a range of up to -4 -9 dBm dBm with a light green color

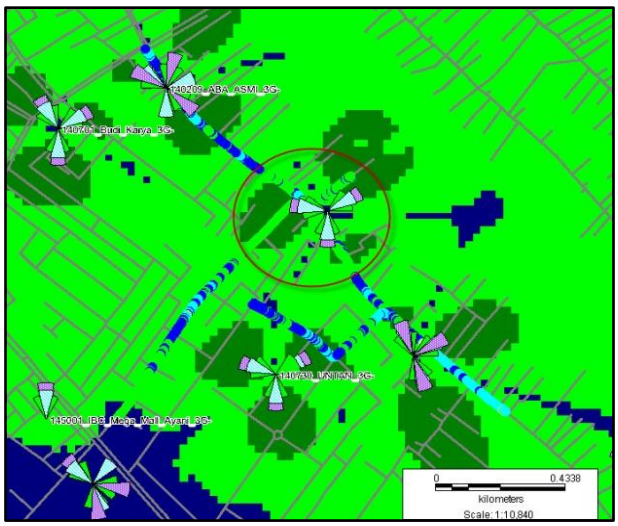

Figure 5 *Ec / No 430 dBm transmit power with*

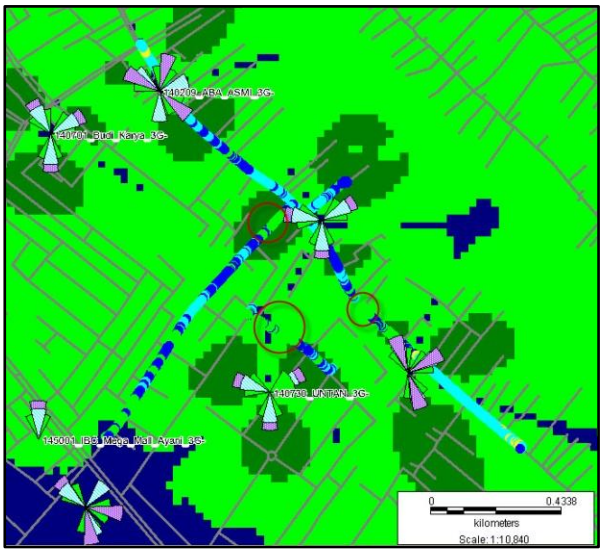

Figure 6 Ec / No with 448 dBm transmit power *Source: Processed Data*

Table 3 shows the results of calculation of the highest traffic intensity of 430 dBm transmit power is the third sector on July 26, 2016, 21:00 1.6 erlang and low traffic intensity is owned sector 1 on July 27, 2016 22:00 by 0 06 erlang. While the highest traffic intensity of 448 dBm transmit power is the third sector on July 30, 2016 at 22:00 of 1.15 erlang and lowest traffic intensity is owned by sector 2 on July 30, 2016 at 0.05 erlang.

Table 3 Calculation Results Overall Intensity Traffic

Traffic Intensity With Transmit Power output is 448 dBm dBm			
28 -7 - 16	Sector 1	Sector 2	Sector 3
19:00	0,45	0,51	0,33
20:00	0,24	0,35	0,35
21:00	0,36	0,24	0,37
22:00	0,13	0,12	0,33
29 -7 -16	Sector 1	Sector 2	Sector 3
19:00	0,58	0,68	0,62
20:00	0,19	0,42	0,46
21:00	0,18	0,24	0,44
22:00	1,07	0,43	0,13
30- 7 - 16	Sector 1	Sector 2	Sector 3
19:00	0,28	0,34	0,33
20:00	0,24	0,18	0,44
21:00	0,44	0,05	0,43
22:00	0,33	0,06	1,15

Traffic Intensity With Transmit Power output is 430 dBm			
25-7 - 16	Sector 1	Sector 2	Sector 3
19:00	0,59	0,6	0,4
20:00	0,4	0,23	0,38
21:00	0,45	0,16	0,4
22:00	0,56	0,83	1,37
26-7 - 16	Sector 1	Sector 2	Sector 3
19:00	0,99	1,36	0,48
20:00	0,67	0,43	0,56
21:00	0,79	0,48	1,6
22:00	0,2	0,36	0,38
27-7 - 16	Sector 1	Sector 2	Sector 3
19:00	0,43	0,39	0,32
20:00	0,25	0,23	0,31
21:00	0,22	0,29	0,42
22:00	0,06	0,14	0,22

The highest traffic intensity both of which use transmit power 430 and 448 dBm is located in sector 3, this means the third sector has more users than the other sectors. It is also evident in figure 3.5 which is an area that covered three sectors is a densely populated area and leads to the campus area ABA ASMI. High traffic

intensity is influenced by the number of calls and the holding time, but the most influential is the holding time (average time calls in one hour), so the higher the value of holding time, the traffic intensity will be higher.

IV. INFERENCE

DISCUSSION

The quality Ec / No is strongly influenced by the number of users, the more users, the quality Ec / No to be getting worse and vice versa the less the user, the quality Ec / No, the better, in other words the quality Ec / No is directly proportional to the density of traffic. Therefore, the results plot Ec / No to power transmits 430 dBm better than the power it transmits 448 dBm for the measurement data Ec / No to power transmits 430 dBm taken at Site 140 074 on air, which means that the conditions of the Site is not burdened with a lot of users while at 448 dBm transmit power Site has burdened many users so that the plot Ec / No more ugly. One reason for the raising of the transmit parameter is capacity user who has full.

In contrast to the plot RSCP that is not affected by the number of users but is influenced by the parameters of the transmit power so that the greater transmit power parameters of the transmission power will get stronger and the results will be better RSCP plot. On 3 Operator parameter transmit power can be raised a maximum of 460 dBm, in the process of gradually raising parameters and performed per cell depending on the density of the user. Which means that when one sector has been full while the second sector and third sector can still accommodate user then only sector 1 will be on raising the power parameter transmit it. In research conducted at Site 140 744 third sector, changing the parameters of 430 dBm transmit power becomes 448 dBm for areas in the Site cover a densely populated area that is close to the university and the ASMI Tanjungpura ABA.

An increase parameter power transmits not really affect change in the intensity of traffic voice significantly, on 3G networks, voice does not significantly affect the capacity of the network operator 3 for the working principle of voice more moved to a 2G network, so when making a call with an automatic user directly switch to a 2G network, so that voice traffic intensity on the 3G network is not too high. Very big influence on the capacity of 3G networks is data. Data usage is also a benchmark to increase capacity on the 3G network for data usage takes more capacity than voice. But that does not mean the voice was not considered in the 3G network, the operator also maintaining voice quality on 3G networks because most users also conduct 3G lock on the handset.

Based on Figure 3 to 6 and Table 3 transmits power changes affect the signal strength (RSCP) but does not affect the signal quality Ec / No for the quality of the signal is affected by the number of users. In conjunction with traffic intensity, change of power transmits not affect the value of traffic intensity significantly as voice over diverted to the 2G network in its working principle, but the worse the quality Ec / No, the traffic intensity is getting higher and vice versa, the better the quality Ec / No, the intensity traffic will be smaller while the RSCP which is a strong signal affects the signal range for the comfort of the user in making a call.

V. CONCLUSIONS AND RECOMMENDATIONS

From the discussion and analysis has been done, it can be concluded that the radio wave propagation is the process of propagation of radio waves from the transmitting antenna to the receiving antenna. At the time of wave propagation process is likely to occur in the form of propagation attenuation or pathloss attenuation of the building, namely the decrease in the signal power level when the radio wave propagation process. Outdoor propagation model is a model that affects the propagation characteristics of radio wave propagation. Profile mobile environment used in outdoor propagation model, which is an urban area that has a high population density and height of buildings are diverse. From the results of the test drive to change the transmit power, RSCP plot best results use 448 dBm power in sector 2 with a range of -74 dBm to 0 dBm, the worst result using a Power 430 dBm at 3 sectors with a range of -83 dBm to -78 dBm. For the plot Ec / No is not in accordance with covlotnya, the best results using 430 dBm transmit power with a range of -4 dBm to 0 dBm, the worst results using 448 dBm transmit power with a range of -9 dBm to -12 dBm. For the calculation of traffic intensity obtained the highest value of 430 dBm transmit power in sector 3 1,37 erlang, lowest traffic intensity obtained from 448 dBm transmit power on the second sector of 0.05 erlang. High traffic intensity is influenced by the number of call attempt and holding time.Nilai RSCP and Ec / No greatly influenced by distance and obstacles, the farther the distance UE by Node B then signal reception and quality of downloads are also going to get worse, the obstacle in the regions dense and there are many buildings. The few things that could be added in the development of this research is the need to perform calculations on the traffic intensity data and compare it back to the effects of changes in power transmit in conjunction with the intensity of traffic voice alone but it is also necessary to feature video call service free of charge as Line, WeChat, Cocoa talk and so on.

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