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ANALYSIS PERFORMANSI INTERNET SERVICE BY MEANS OF TECHNOLOGY BROADBAND OVER POWERLINE (CASE STUDY: ICON + BANDUNG)

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ABSTRACT

as internet service providers , indonesian companies comnet plus (icon +) of customer satisfaction are included their final task aims to understand performansi of 7 firm as sample research .The observation is performed by measuring the performance of measuring bpl performance in each company .Later than bpl s performance qos: delay , jitter , packet losses , throughput , and bandwidth .To get a throughput done with downloading file through browser then overlaid the standart tiphon .The delay , jitter and packet loss was obtained through doing private voip then the results in that compares with standart tiphon .

Keywords: bpl , troughput , delay , jitter , bandwidth , packet losses , tiphon

1. INTRODUCTION.

Indonesian companies comnet plus (icon +) that is part state electricity company (pln) has developed information technology with memanfaat right electricity or known as broadband over powerline (bpl) .Bpl is the network the internet use the electric power as a media data communication .Where before the bpl , indonesians use the phone to communicate over the internet ~.

So far, to see performasi of internet services customers are only traffik speed the use of using mrtg (multi router traffic grapher).Mrtg is an instrument which serves to me-monitoring traffik entering tissue from a customer without look aspect such as the delay, packet losses, jitter and value troughput.But to know quality of service (qos) of an internet services should be seen from some aspects consisting of delay, packet losses, jitter and value troughput.Because on condition that have outlined, is to bandwidth same but suffered complaints different There rarely experience and that complaints often experienced almost complaints .Mean the task of writing the end of this is to analyze performansi of internet services corporate icon + in bandung .

The aim to be achieved is , measuring performance

1. Internet services on the internet network using broadband technology overs powerline based on parameters qos namely bandwidth , troughput , packet loss , jitter , and a delay
2. Performs analyses broadband performance overs powerline and analyze performance performansi its internet service based on the results of performance measurement performansi so it can be obtained a conclusion that can be used as the recommendations for icon + nor noc to ensure the quality of service (qos) his web.

1.1 Qos Parameters

1. Troughput

In communications networks , as ethernet or radio package , throughput who or throughput network is the rata-rata success sending message through the communication .This data can be submitted through link physical or logical , or past certain knot network .Throughput usually measured in bits second (bit / s or bps) , and kadang-kadang in data packets per second or data package per a time slot

Tabel **Error! No text of specified style in document.**.1 Parameters throughput value

Kategori Troughput	Troughput (%)
Sangat Bagus	100 %
Bagus	75%
Sedang	50%
Jelek	<25%

Source: (TIPHON)

To measure the value of used the equation troughput like the following

$$Troughput = \frac{\text{Packet data diterima}}{\text{Lama Pengamatan}} X\ 100\% \text{.....(2.1)}$$

2. Delay

Delay is time delay caused by the process of transmission from one point to another been the goal

Tabel **Error! No text of specified style in document.**.2 The Delay Parameters

Kategori Delay	Besar Delay
Sangat Bagus	<150 ms
Bagus	150s/d 300 ms
Sedang	300 s/d 450 ms
Jelek	>450 ms

Source: (TIPHON)

To measure the value of used the equation troughput like the following

$$Delay = \frac{\text{total waktu}}{\text{packet yang diterima}} \dots\dots\dots (2.2)$$

3. Packet Loss

The number of packages lost during package delivery data to the purpose , the best quality at the time of lan / wan if the number of losses most small (santosa , 2004 .In the implementation of the ip network , value this packet loss expected minimum .In general there are four categories decline performansi tissue with tiphon-telecomunications version and the internet protocol harmonization overs (joesman by clarified networks , 2008) , that is as follows

Tabel **Error! No text of specified style in document.**.3 Parameter value *Packet Loss*

Kategori Degradasi	Packet Loss
Sangat Bagus	0
Bagus	3%
Sedang	15%
Jelek	25%

$$Packet\ loss = \frac{Y}{A}\ X\ 100 \dots\dots\dots\dots\dots (2.4)$$

Keterangan

Y= Packet data dikirim-Packet Data Diterima

A= Packet Data Dikirim

4. Jitter

Irregularities jitter is undesirable right of periodicity a periodic assumed signals in electronics and telecommunications , often in relation to a reference source of hours .Jitter may be observed in frequency characteristic like successive pulses , signal amplitude , or phase of periodic signals .Jitter is significant , and usually undesirable , a factor in Design almost all link communication (for example , usb , pci-e , sata , oc-48).

Tabel **Error! No text of specified style in document.**.4 Parameter value *Jitter*

Kategori Degradasi	Peak Jitter
Sangat Bagus	0 ms
Bagus	75 ms
Sedang	125 ms
Jelek	225 ms

(Sumber: TIPHON)

$$Jitter = \frac{\text{total variasi delay}}{\text{total paket yang diterima}} \dots\dots (2.2)$$

5. Bandwidth

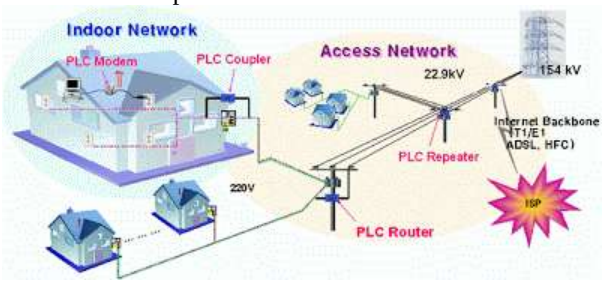
The bandwidth is the value of count or reckoning consumption data transfers telecommunication counted in a unit of bit per second or usual abbreviated bps what happened between computer servers and computer client in a given time in a computer network .

1.2 Broadband Over Powerline

Powerline broadband overs or powerline communication (plc) is technology that uses electricity cable connection that can be used on a network of electricity that has been there to give the energy supply of electricity , and at the same time can also be used to transfer data and noise transmission .Maximum speed achieved that can use this technology more or less approaching the speed of data transmission connection using fiber optic .With technology telephone network the cable , we freely access the internet without closing opportunities if there is a phone that will enter .This is real excess of telephone network through electric cables owned state electricity company pt pln ( ) linking from house to house one another .Initially the technology less well responded because a lot of interested people who hesitated , scared and felt kesetrum not yet safe .However , now the users who held company pln child , pt indonesia comnets plus (icon Can be enjoyed right ease available .Icon + is a company that since early established to support of technological development information and telecommunication date .Icon + can provide extra capacity to meet demand for services tissue or bandwidth greater and the scope of the greater area by using right of ways

The icon + especially for a large family pln living chiefly in jawa-bali, can reduce the use of telephone pulse from the state telecom.The company living in jakarta should not have to worry about swelling account of the phone bill every month, although they have to talk ngalor ngidul interlokal.The use of the internet through an electric current have excellence the faster accessed than if through conventional and clear cheaper for solely

electricity.The facility to use the room as long as there electricity belonging to electricity.Users mencolokkan the phone enough to stop electrical contact using power line communications (plc). In addition to the internet, they usually use speak with eluarganya outside jakarta, but still community large family pt pln.If pln open the connections in kota-kota other, so users who are in jakarta be able to interact with users in other cities.The only good thing, that conversation also toll free and clear.The phone number used only three to five digits.To talk out of town or interlokal not need to use area code as a much more expensive because interlokal



Gambar **Error! No text of specified style in document.**.1 Jaringan Broadband Over Powerline [2]

The technology via the electricity also makes user not afraid of the ribut-ribut rate hike phone .For the internet , users only pay a fee subscriptions per month to providers , it will cost pulse , unnecessary pusing-pusing again .For a year used , users housing pln never had a problem .Everything well , unless power lines fell which means disconnected also telephone network .In using internet , not to worry breaking off in the the road when fun chat or surf .The it makes the other family members could still use the line from the state telecom although there is a family member who was do internet .In addition , there no extension to be cable which means reduce imbroglio cable at home So , if the government allow icon + expand wings to manage public customers , not just a large family company , it is not impossible someday the community especially the trouble to be customers telkom , ramai-ramai install telecommunications equipment own home .Let alone by using electricity in communications , no term the cost of telephone pulse swell is too many telephone use

Theoretically , cable listik is also used to carry data packets like the phone and kaber fiber optic neat used to internet connection . And pengaplikasiannya to internet connection called bpl (broadband over power lines) internet connection is (bpl) using carrier who plays at the low on cable using electricity ac .If dianalogikan , supposing in dalem electric cables to keep us kesetrum , it could disusupin package data and even voices in the electric current ac frequency lower than electric waves ac-nya own .Supposing in one cable seolah-olah there Two cords different , one is setrumnya , one more for internet connection .In principle , data transmission with cable stun is conducted by laying communication signal that contains data under the frequency of electricity .The process of laying data signal are needed wave frequency low scale , 1-50 mhz .Data flows through cable fiber optic high tension .Later in the beginning of the process , signals data last into isp belonging to icon + .From here , data from superimposed into electricity voltage medium , and divided into two lanes: via cable fiber optic and high tension cables .The data were last first enter the distribution of electricity supply , to change electricity voltage of voltage middle to voltage low.

With plc , signals telecommunication (data , a picture , tune can superimposed or diinjeksikan kejaringan electricity of low tension (1-30 mhz) of a network external data .Analoginya , electric current flows like sea water who produce waves and froth .Waves is arusnya , while froth of noisenya .Noise this is that is occupied by technology plc to conduct up a noise and data.

Bpl use of low tension and voltage being / medium in electric cables passing through the path of a road at large in can distribute broadband service frequency on the range 1 mhz up to 30 mhz .Bpl uses frequency above 50 hz to telecommunication service order until some mhz to a process of his transmission .The frequency of commonly used is 9 khz - 200 mhz.

1.3 Technology concepts broadband power Line

On a system broadband powerline the concept of communication that is used is based on masterslave communication .The system to communicate using three equipment , namely: head-end , repeater , cpe .Masing-masing equipment having a specific function and the communication between masing-masing equipment based on master-

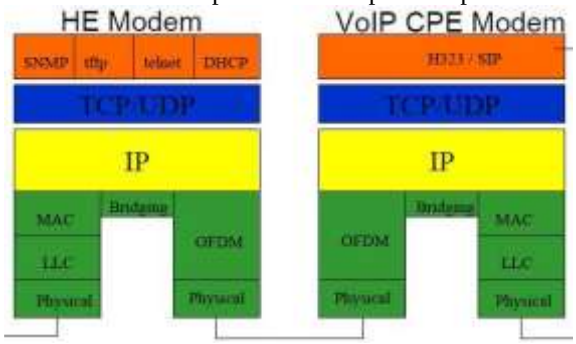
1 .Head-end head-end is device act as master .Head-end serves as a gateway of internet access .Internet access through power line to go through head-end first .This device usually diinstalasi on system shelf or use boxes and placed near control electricity panel .

2 Repeater repeater is a device that serves to strengthen signals from head-end .Repeater is device act as a master and slave .Repeater will act as slave while communicating with head-end and act as a master while communicating with cpe the end user .According to how it works repeater divided into two parts , namely time division repeater and frequency division repeater

3 3 cpe (customer provided equipment) cpe is every terminal and equipment located at the customers and connected with the telecommunications carrier .Cpe being in each of their customers or end user

1.4 Sistem Jaringan BPL

In relation to communication master-slave , on a system bpl work in layer the osi 2 .The illustrations systems generally bpl like a switch that runs on layer the osi 2 .Using table mac to record physical address hardware and its dependent on chipset of bpl itself .



Gambar **Error! No text of specified style in document.**.2 Layer OSI

As for the use of hot 3 equipment bpl have ip stack to regulate ip from every module .Ip from every module had to be unique and will be governed by ip stack .As above that to communicate , every module not using ip layer but instead layer 2 to the osi.

2. The contents of research

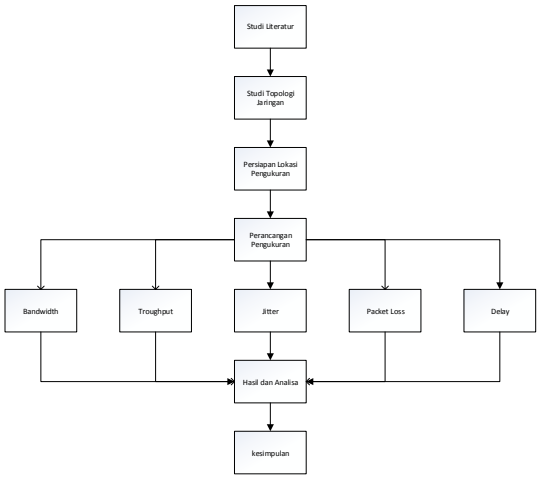
2.1 Design research

Design this study will explain diagram the research , to the scenario measurement to find an outcome that will be analysis based on standards set masing-masing parameter measurements

2.2 Diagram Alur Penelitian

Researched process begins with the determination of recipient we do the formulation of problems , continued to the study litelatur same time for finding data .After searching data followed by design early namely the mapping or the division of sample each of the enterprises that experienced complaints that is in the company used as sample as many as six districts namely , a company , b company , company c , company d , company e , company f and icon + .Then determine time to withdraw the data the time the data was undertaken at random of them peak hours customers and hours no so busy from customers icon +

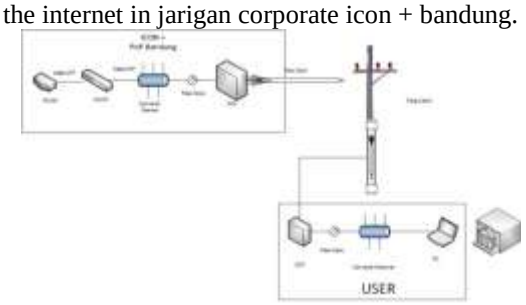
From the description above, it can be made a groove analysis qos internet connection corporate is as follows



Gambar **Error! No text of specified style in document.**.3 Diagram a groove design

2.3 Cara Kerja *Broadband Over Powerline*

Measurement done in internet service providers corporate regional west java is on bandung.First, conducted measurement internet connection using the internet in jarigan corporate icon + bandung.



Gambar **Error! No text of specified style in document.**.4 Topologi Jaringan di ICON+

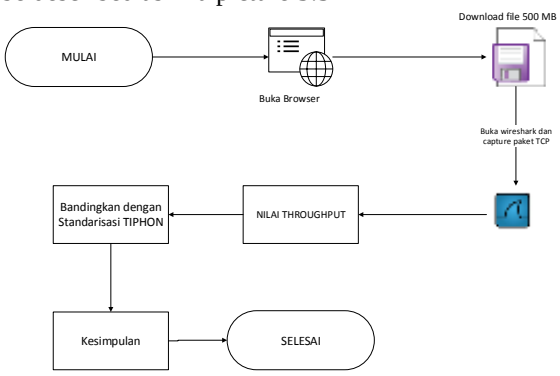
Of a picture above is the process of life of the internet corporate from the server to client .The process of his started from a network configuration ip public and the provision for each customers .After setting done , so router will be connected to switch use kebel utp which will then in convert to fiber optics used a converter ethernet .After in convert , before plugged into user fiber optics that is in icon + pop bandung connected first through this odf because fiber optics to hooked up through electric pole different from fiber optics are still in server .Fiber optics later in get through electrical poles until to user .When up to user the process is nearly equal to from server .Connected to odf later in convert through converter ethernet new hooked up with cable utp to pc that is in customers . Before used by the subscribers , done testing to the networks the internet And if all is going well and the internet can already used .Max adapaun value on network bandwidth icon + was 100mbps .At the end of this task , voltage electricity in observation covering low

voltage with fiber optic .On any router that will give an lebel told data packets customers that she received.

2.4 Performansi The Framework Of Analysis

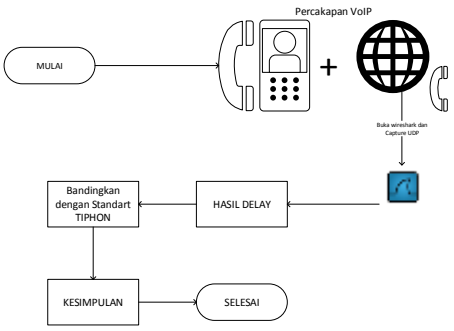
Based on the scenario , it can be described the analysis performansi to masing-masing qos parameters , namely:

1 Measurement throughput to download file of 500 mb through browser , then using wireshak , doing capture package tcp .Capture the results , obtained parameter package and time .9 times of result of measuring (3 times in masing-masing hours measurement) then sought value rata-rata (the number of divided many observation) .With both formula on similarities 2.3 obtained the througput value .Then based on the table 2.3 sought appropriate services .But penjesalan above , can be described as in a picture 3.5



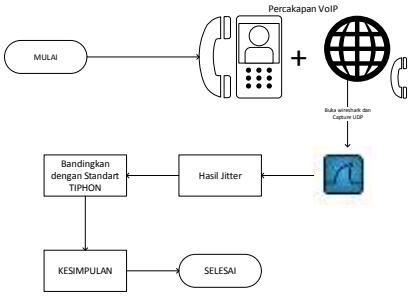
Gambar **Error! No text of specified style in document.**.5 Kerangka Throughput

2. Measurement delay
measurement done with make any using two softphone namely linphone and eyebeam then communication on capture both wireshark further delay obtained value .With 9 times result of measuring (3 times in masing-masing hours measurement) then sought value rata-rata (the number of divided many observation) .Then based on the table 2.1 sought appropriate services .But penjesalan above , can be described as in a picture 3.6



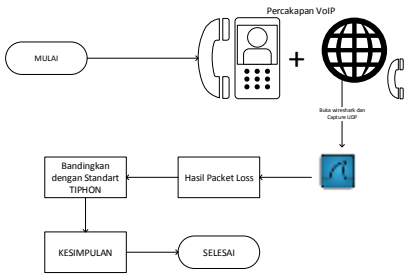
Gambar **Error! No text of specified style in document.**.6 Kerangka Delay

Measurement of measurement jitter done with make a call using two softphone namely eyebeam linphone and then communications in both wireshark capture which later acquired its mean value jitter .With 9 times measurement result (3 times in each hour of measurement) then sought average value of (the divided many observations) .Then based table 2.2 sought rank appropriate services .Now the penjesalan above , can be described as in a picture 3.7



Gambar **Error! No text of specified style in document.**.7 Kerangka Jitter

Measurement packet loss measurement done with make any using two softphone namely linphone and eyebeam then communication on capture both wireshark then got parameter data packets sent and and data packets missing .With 9 times result of measuring (3 times in masing-masing hours measurement) then sought value rata-rata (the number of divided many observation) .With both formula on similarities 2.3 obtained value for the packet losses .Then based on the table 2.4 sought appropriate services .But penjesalan above , can be described as in a picture 3.8



Gambar **Error! No text of specified style in document.**.8 Kerangka Packet Loss

2.5 Factor that influences performansi

1. Through measurement and obtained yield to solution get a necessary factor analysis affecting the results from measurement.Then factors affect the measurement of parameter qos consisting of bandwidth, troughput, delay, packet losses, and jitter in tissue intenet corporate is: 1.Damping, namely the fall of strong signal for extra distance in the medium of transmission.Every the medium of transmission of having damping that berbeda-beda, hanging from material used.Strength of signals transmitted could get kelem ahan due to the long distance any on medium.It is associated with converter ethernet election.The converter ethernet mengconvert utp to fiber optics many its kind.This certainly adapted to the distance from pop to their customers..
2. 2 .Distortion , namely the phenomenon caused variety speed propagation due to differences in the bandwidth
3. .3 .Noise (interruption) , namely the signal that additional undesired who enters anywhere in between trans the contents of the sender and recipient at the time of making measurements of the parameters of qos on the net coorporate .Noise this is going to lower the value qos on central jaringa the internet coorporate and very dangerous , because if it is too large will change real data that is sent Waktu pengukuran dan banyaknya pengguna.

   Of measuring time was made during peak hours office in which many the offices employees who uses the internet.The number of who wears the internet and division bandwidth any room or floor is in of buildings is also affect speed internet or value parameter qos.4.Connection electricity electricity sometimes unstable and the power outages severally of pln affect performansi performance internet service that uses technology broadband over powerline.Because the network used electric power, automatic electricity stable is a very important matter.

2.6 measurement result

1. Troughput

Nama Perusahaan	Hasil (%)
ICON+	199
Per. A	87
Per.B	30
Per.C	43
Per.D	124
Per.E	91
Per.F	160

2. Delay

Nama Perusahaan	Hasil (ms)
ICON+	57.2
Per. A	221
Per.B	53.24
Per.C	93.26
Per.D	57.2
Per.E	68.92
Per.F	50.66

3. Packet Loss

Nama Perusahaan	Hasil (%)
ICON+	0
Per. A	42
Per.B	6.5
Per.C	22.7
Per.D	0
Per.E	0
Per.F	0

4. Jitter

Nama Perusahaan	Hasil (%)
ICON+	8.82
Per. A	84462.18
Per.B	8.13
Per.C	9.87
Per.D	8.95
Per.E	9.47
Per.F	7.53

Of the measurement result , after conducted analysis so obtained factors affecting the

measurement of , for it at penilitian is given several recommendations solution to icon + as providers .Recommendations solution the first is election converter eternet proper .Converter ethernet adapted to the distance from pop to the customer adapted to electric pole that pass through it .Converter ethernet consisted of 1 core and 2 core .1 core as for the types of converter ethernet is 20 , 40 , 60 .While 2 core the types of converter ethernet is 30 , 50 , 70 100 , 120 Then he damaged overcome noise this can be approached some way as keep the medium of transmission of from a source noise as electric and magnetic fields , give the distance between a cord or have cable isolated .Alternative can be used as a solution increase the value of qos the internet corporate is by the provision of utility tissue , with prioritise any information in accordance with their characteristics .Altenatif solution will not do is adds to the value of the bandwidth to increase the speed internet .To add bandwidth , providers usually provide solutions that is based on traffic value of internet use.

3 PENUTUP

Of the results of the analysis in chapter previous to 7 company can be concluded the outcome of several the end as follows: of all the measurement of if than 7 company was collected conclusion that the company a in that it has value lower / worse than 6th any other company .For that there are several alternative given solution into the company icon + namely by adjust conventer ethernet to the distance from customers into pop .Then alternative can be used as a solution increase the value of qos the internet corporate is by the provision of utility tissue , with prioritise any information in accordance with their characteristics .And last for customers adjusted to the needs of can have adaptable to the needs of that is

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