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Rural ICT Policy Advocacy, Knowledge Sharing, and Capacity Building

Country Case Study

Indonesia

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Chapter 1 Country Overview

This information covers general national statistics and descriptions of the country, in sufficient detail to allow for in-depth understanding of the conditions and trends that may influence rural ICT development. Information is sought both at the national level, and in particular for regional and rural areas. Official documents and reports that cover the key information should also be collected and provided.

1.1 National geographic, demographic status

- Provide an overview of the country's geographic and demographic status and trends:
- Population, by major cities and regions, age, gender, house hold size

Population of Indonesia is concentrated in Java and Western Part of Indonesia). In general gender proportion in slightly above 100 % (male over female). Average life expectancy is 70.6 year. The pyramid of ages shows that the predominant age of populations are within 15 to 24 year. The household size during past 4 decade has been changes from about 6 to 4. A strict family planning program on eighties strongly recommended each parent to have maximum 2 children. After governance and political reforms there is a trend for a middle and high income family for having 3 to 4 children. It increased the average of house hold size from 3.9 in 2000 into 4 in 2006. However in general, The population growth in Indonesia is declined rapidly starting from year 1980, that is 1,97% during 1980-1990 period and became 1,45% per year during 1990-2000 period, then declined again to 1,34% per year during 2000-2006. Currently in 2009, the population growth in Indonesia is estimated about 1.136%. .

- Maps showing political divisions and topography

After political reform, decentralize process began. It results a growing number of province and regency from 27 in 1998 to 33. Indonesia is country of archipelago with 13,000 of island. Population is distributed in big island but mainly concentrated in Sumatra, Java and Bali;

- Recent trends in population growth, by region, over at least the past 5 years.

In general, from the average of household size, the trend of growth is in regions outside for Java. Those area commonly has the household size is above 4, while in Java is below 4.

1.2 Socio-Economic status and indicators

- Provide the following socio-economic indicators for the country over at least the past 5 years:
- GDP and GDP per capita (crisis, reforms, decentralized);

The GDP of Indonesia that was considerably stable in several decade before 1998, suddenly hit by crisis and decreased dramatically to 2.76 percent. Fortunately, by 2005 the rate of national income growth per household was increase back to 3.76 percent, at the level of 11.2 million rupiah per capita.

- Employment (and unemployment) (increasing unemployment?);

The unemployment rate is considerably high. In 2006, the estimate number of population under productive age is about 160.81 million. Most of them were living in Java. Out of ten workforces, only 1 person is under employment.

- Household income levels, distribution (Gini?);

Household income level is below 1200 USD/year. The Gini index had been increase from 34.3 to 37.4. It indicate that the decentralized policy have not produced more equitable distribution.

- National poverty index;

Since 1976 to 1996, the poverty level reduced from 40,01 % to 11,30 %. Economic crisis in Asia increased the poverty level to 24,23 % in 1998. In 2008, the poverty incident was15,42% or about 34,96 million population.

- Literacy and education levels;

Level of literacy in 2007 was 95.22 and 88.62 for male and female respectively. The average education level on basic education was 8.0 for male and 7.0 for female. It indicates unequal of opportunity to education between gender in Indonesia.

- Structure of the economy: key industries, sectors, exports, resources.

The main industry in Indonesia is manufacturing industry. The share in 2007 was 27,01 % followed by agriculture sector with share of 13,83 %.

1.3 Scope and status of rural areas, population

- Provide the following information relative to rural areas of the country:
- Official Government definition of “rural” areas (if any), by population density or other criteria;

According to Government Regulation Number 72 Year 2005 on Village, stated that Village is the unity of legal community who have territorial boundaries and have the authority to regulate and to manage the interests of local communities, based on the

origin and local customs recognized and respected in the system of State Government of Republic of Indonesia. Indonesia has 75.666 villages in 33 Provinces; the 33, 24% or 25,154 villages are located in Java Island.

- Population, income, poverty, employment, education, and other available demographic data for rural regions, including trends for at least the last 5 years.

The proportion of poor population between urban and rural areas is relatively stable. In March 2007, the majority (63.52 percent) of poor residents are in rural areas. In March 2008 the percentage was almost the same, which is 63.47 percent.

1.4 Conclusion:

Considering to the given research framework, the Indonesian national geographic, demographic, and socio-economic indicates very critical status of future rural ITC development. With 13.000 islands, and less density and poorer population outside Java, Indonesia might predominantly by the area of “access gap”.

Chapter 2 National ICT Industry Status of Indonesia

2.1 ICT Market Background of Indonesia

Different with several other countries, where liberalization and competition in ICT sector is implemented when telecommunication penetration and coverage is high enough, Indonesian ICT industry competition has been started where penetration and coverage is still inadequate and small. In this condition, it is very difficult for many companies to compete and somehow a bad competition exists. This condition is fragile enough that the government has to set the regulatory and the rule more carefully. [1]

Indonesian ICT (Information and Telecommunication Technology) service development is put or at least concentrated more in the development of Telecommunication service in Indonesia. Dominancy of Telecommunication Service in Indonesia is owned by PT. Telekomunikasi Indonesia as one of State-owned Enterprise in ICT. That dominancy in telecommunication service existed since the independent of Indonesia. The dominancy covers many industry related to ICT service, namely basic wired telephony service (PSTN), internet, wireless telephony, satellite, multimedia, international telephony, etc. PT. Telekomunikasi Indonesia (hereinafter called PT. Telkom) is also dominating by the ownership of stocks in several ICT companies including its derivative companies such as PT. Telkomsel, Komselindo, and others.

It was 20 years ago, in 1989. Based on Telecommunication Act No. 3/1989, two main telecommunication companies in Indonesia were PT. Telkom and PT. Indosat. Those two companies were categorized as State-owned Enterprise. Concisely, that Act regulates several issues on Structure and Scope of Cooperation which are:

Private company may build basic telecommunication services through joint-cooperation, operational cooperation, and management contract with PT. Telkom and PT. Indosat in these several terms [2]:

[1] Source: Cetak Biru Telekomunikasi MASTEL (2005)

[2] Source: Paper,"Trend Industri Telekomunikasi Indonesia", M. Siroth & Nur M. Amin, Fakultas Ekonomi UI (1998)

- International Telecommunication services which previously were monopolized by PT. Indosat, it then became a duopoly business between PT. Indosat and PT. Satelindo
- Domestic telecommunication services which previously were monopolized by PT. Telkom, it was then divided into 7 areas, where 5 from 7 areas were operated by private company in Operational Cooperation with PT.Telkom.
- For basic telecommunication services, i.e. PSTN (Public Switch Telephone Network), there were two main business player, Telkom and Retelindo, which was basically dominated by Telkom in its stocks and its networks.
- Non-basic services may be completely run by private company.
- GMPCS (Global mobile personal communication by Satelindo) services will be well configured so that private companies can also take part on it.

The fundamental reason why the telecommunication development was conducted in monopoly system is because telecommunication business covers the interest of massive people in Indonesia. It is the main belief in Indonesia constitution that all services which impact massive people of Indonesia must be controlled by government. It is also conducted in electricity and petroleum provision for instance. The main expectation is that all business policy can be controlled in order to prioritize the society needs instead of the profit orientation. Therefore, under this scheme, responsibility of Universal Service Obligation is completely on the hand of PT. Telkom. Though unfortunately, PT. Telkom can not fulfill a satisfied result in completing the USO program in this scheme.

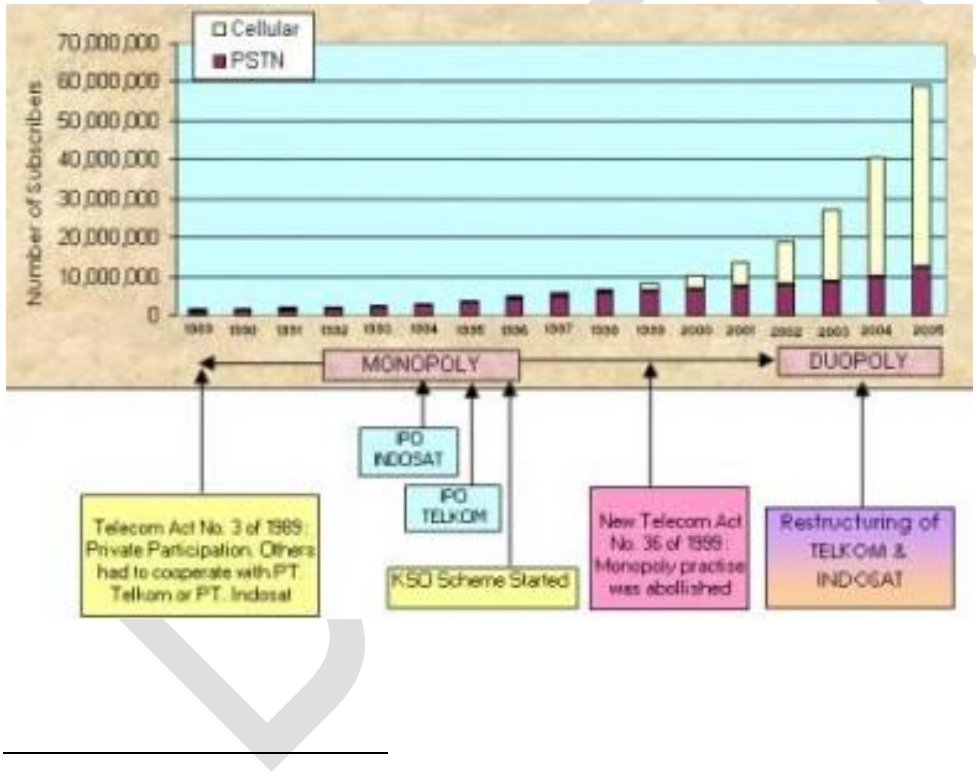
Through several study and research, it was concluded that monopoly in telecommunication business did not bring efficiency and enough capability of the incumbent company to fulfill its obligation, such as providing telecommunication for all people, all place, and all condition. Obviously, it did not bring satisfaction to society as it was expected before. Under this scheme, there was no differentiation either in the functional parts necessary in telecommunication business. Function of policy maker, regulatory maker, and operational executor were owned by single authorization, i.e. The Government. Therefore, business competition was so unstable, not profitable for both society and company.

Indonesia then realized that telecommunication business needs a natural competition. Even if there will be a monopoly, it is a natural monopoly. After several years, the above functions were separated in several bodies. In this situation,

Telecommunication Act No. 36/1999 set new rules of ICT business by conducting duopoly.

Telecommunication Act No. 3/1989 divides telecommunication provision into two, namely basic telecommunication service provision and non-basic telecommunication service provision. In telecommunication Act No. 36/1999, it gives additional three points, namely telecommunication network provision, telecommunication service provision, and special telecommunication services.[3]

Based on this law scheme, domestic telecommunication service is operated by PT. Telkom and international telecommunication service is operated by PT. Indosat. Other company owned by private may operate non-basic telecommunication service. For operating basic telecommunication service, private company has to cooperate with PT.Telkom or PT.Indosat which is controlled by Government Rule No. 8 year 1993.



[3] Source: Paper, “Benang Kusut Transisi Kebijakan Sektor Telekomunikasi", Mukhlis Ifransah, S.H., (2002)

Figure 2.1 Progression Graph In term of monopoly and duopoly era of telecommunication.

(Source: Nathan &Atmitra (2006))

Telecommunication Act No. 36 year 1999 system is known as the ICT Blueprint of 1999. Concisely, the blueprint is assumed to initiate a good market competition in telecommunication business. By this law, opportunity for private company to organize business competitively starts to open widely. Monopoly scheme is substituted with competition scheme. The law opens big opportunity for communication, internet, informatics and multimedia business to compete in the market. Through the years, many regulation, law and rule were also set to revise and to complete the whole system. The competition brings advantage for the society as the consumer. Competition of quality, price, and work field force the company to innovate more. But, the Blueprint of 1999 does not arrange yet any system about ICT research, education, training and manufacturing industry both for hardware and software. It focuses more on ICT services.

2.2 ICT Regulatory Body[4]

Based on the differentiation of ICT functional bodies, an Independent Regulatory Body (IRB) is build to protect public right and interest (customer interest), to support and to protect telecommunication business competition for its efficiency, healthy and stock attraction. In July 2003, Badan Regulasi Telekomunikasi Indonesia (Telecommunication Regulatory Body of Indonesia, BRTI) was built and was expected as the independent regulatory body of Indonesia. But actually, BRTI is a semi-independent body, because of the fact that it is still under control of the government.

By the pressure of public to make BRTI independent, government made a new rule in Ministry Resolution No.67 year 2003 which prohibits executive authorization in BRTI. It means that BRTI has to focus on regulation for accompanying the competition of the business without any link or pressure to the executive authorization i.e. the government. However, the fact still says that BRTI is still influenced majorly by the government.

[4] Source: Laporan Tahunan (Annual Report) of BTIP (2008)

Since telecommunication regulation is the main scope of work of BRTI, BRTI has tasks to trigger telecommunication industry development by a good competition and to protect the needs of public in de facto and de jure way.

2.3 ICT Industry Role for Indonesian Economy

ICT industry contribution towards economy condition of Indonesia through output approach can be shown by the role of Communication and Post Industry in setting the National Gross Domestic Product (GDP). In the range of 2003 to the third three-month-period of 2008, based on the business sector, telecommunication sector is increased as the increase of GDP happens.[5]

LAPANGAN USAHA	2003	2004	2005	2006	2007	Q3 2008
1. Pertanian	15,19%	14,34%	13,13%	12,97%	13,83%	13,35%
2. Pertambangan dan Penggalian	8,32%	8,94%	11,14%	10,97%	11,14%	11,08%
3. Industri Pengolahan	28,25%	28,07%	27,41%	27,54%	27,01%	27,29%
4. Listrik, Gas Air & Bersih	0,95%	1,03%	0,96%	0,91%	0,88%	0,91%
5. Bangunan	6,22%	6,59%	7,03%	7,52%	7,71%	7,46%
6. Perdagangan Hotel & Restoran	16,64%	16,05%	15,56%	15,02%	14,93%	15,13%
7. Pengangkutan dan Komunikasi	5,91%	6,20%	6,51%	6,94%	6,70%	6,73%
- Pengangkutan	3,95%	3,85%	3,97%	4,28%	3,79%	4,00%
- Komunikasi	1,96%	2,35%	2,54%	2,67%	2,91%	2,73%
* Pos dan Telekomunikasi	1,74%	2,11%	2,29%	2,39%	2,61%	2,44%
* Jasa Penunjang Komunikasi	0,21%	0,25%	0,25%	0,28%	0,30%	0,28%
8. Keuangan, Persewaan & Jasa Perusahaan	8,64%	8,47%	8,31%	8,06%	7,71%	7,99%
9. Jasa-Jasa	9,87%	10,32%	9,96%	10,07%	10,09%	10,05%

Table 2.1 Post and Telecommunication Industry role towards Gross Domestic Product (2003 – ¾ of 2008)

Source : Statistic Data of Directorate General of Post and Telecommunication (2009)

Through above statistic table, it is shown that there is a significant increasing point of communication industry role for Indonesian GDP. Communication Industry increases

[5] Source: Statistic Data of Directorate General of Post and Telecommunication (2009)

its contribution from 1.96% in 2003 into 2.73% in the third three-month-period of 2008.

The other statistic data can show the growth velocity of Telecommunication Sector in Indonesia compared to the other sector's growth.

LAPANGAN USAHA	2004	2005	2006	2007
1. Pertanian	2,82%	2,72%	3,36%	3,50%
2. Pertambangan dan Penggalian	-4,48%	3,20%	1,70%	1,98%
3. Industri Pengolahan	6,38%	4,60%	4,59%	4,66%
4. Listrik, Gas Air & Bersih	5,30%	6,30%	5,76%	10,40%
5. Bangunan	7,49%	7,54%	8,34%	8,61%
6. Perdagangan Hotel & Restoran	5,70%	8,30%	6,42%	8,46%
7. Pengangkutan dan Komunikasi	13,38%	12,76%	14,38%	14,38%
a. Pengangkutan	8,76%	6,25%	6,63%	2,78%
b. Komunikasi	22,88%	24,58%	26,39%	29,54%
1. Pos dan Telekomunikasi	23,61%	25,29%	25,82%	29,44%
2. Jasa Penunjang Komunikasi	16,94%	18,49%	31,61%	30,41%
8. Keuangan, Persewaan & Jasa Perusahaan	7,66%	6,70%	5,47%	7,99%
9. Jasa-Jasa	5,38%	5,16%	6,16%	6,60%
PDB	5,03%	5,69%	5,51%	6,32%
PDB Tanpa Migas	5,97%	6,57%	6,13%	6,92%

Table 2.2 Sector Growth Velocity in Setting PDB Value (2003 – ¾ of 2008)

Source : Statistic Data of Directorate General of Post and Telecommunication (2009)

According to table 2302, it is shown that the highest growth velocity is owned by transportation and communication sector as much as 14.38% where transportation only owns 2.78% of the growth. It shows that telecommunication sector growth in Indonesia has a good and promising value to be taken care.

2.4 Telecommunication Industry Status

Fact that Indonesia has a big number of people and a very wide area brings a potential market for telecommunication industry. Therefore, number of telecommunication provider is increasing as well as the increasing support from government's policy which stimulates many investments happen in telecommunication sector. The table below shows the number of telecommunication provider based on each category. It shows that in every category an increasing number of telecommunication provider n exists from 2008 to 2009. Totally, in one last year, telecommunication provider number increases as much as 2.2% from 365 into 373 providers.

No	Jenis-Jenis Penyelenggaraan	2008	2009*
I	Penyelenggara Jaringan Tetap	**65**	**72**
	1. Penyelenggara jaringan tetap lokal		
	- Circuit Switch + Jasa Teleponi dasar	16	6
	- Packet Switch		14
	2. Penyelenggara jaringan tetap jarak jauh (SLJJ)	2	2
	3. Penyelenggara jaringan tetap Internasional (SLI)	2	3
	4. Penyelenggara jaringan tetap tertutup	44	47
II	Penyelenggara Jaringan Bergerak	**15**	**17**
	1. Penyelenggara jaringan bergerak terrestrial radio trunking	6	8
	2. Penyelenggara jaringan bergerak selular	8	8
	3. Penyelenggara jaringan bergerak satelit	1	1
III	Penyelenggara Jasa	**271**	**269**
	1. Penyelenggara jasa nilai tambah teleponi (Calling Card, Premium Call dan Call Center)	58	29
	2. Penyelenggara jasa ISP	150	169
	3. Penyelenggara jasa NAP	32	39
	4. Penyelenggara jasa ITKP	25	25
	5. Penyelenggara jasa Siskomdat	6	7
IV	Penyelenggara Telekomunikasi Khusus	**14**	**17**

*) Sampai Juni 2009

Table 2.3 Number of Telecommunication Provider (2008-2009)

Source : Statistic Data of Directorate General of Post and Telecommunication (2009)

The highest growth belongs to the fixed network provider which increases its number as much as 8 from 2008. Service provider has the biggest number than any other telecommunication provider. From the beginning, mobile telecommunication industry is different with wire line network i.e. PSTN which is monopolized by PT. Telkom. There is no significant obstacle to enter the mobile telecommunication market of Indonesia so that the market be very competitive. It is recorded that there are 17 providers for mobile telecommunication.

In telephony service provider or telephony service operator, there are 15 operators working in Indonesia where 8 of them belongs to the cellular industry. Based on the table 2402 below, PT. Telkom and PT. Indosat are still dominating by existing in all 3 kinds of telephony services.

No	Jenis Penyelenggaraan	Nama Operator	Jumlah
1	Telepon Tetap Kabel	PT. Telekomunikasi Indonesia (Telkom)	3
		PT. Indosat	
		PT. Batam Bintan Telekomunikasi (BBT)	
2	Telepon Tetap Nirkabel	PT. Telkom	4
		PT. Indosat	
		PT. Bakrie Telecom	
		PT. Mobile-8	
3	Telepon Bergerak	PT. Telkomsel	8
		PT. Indosat	
		PT. Excelkomindo	
		PT. Mobile-8	
		PT. Sampoerna Telekomunikasi Indonesia (STI)	
		PT. Natrindo Telepon Seluler (NTS)	
		PT. Hutchison CP Telecommunication	
		PT. Smart Telecom	

Table 2.4 Telephony Service Operators in Indonesia (2008-2009)

Source : Statistic Data of Directorate General of Post and Telecommunication (2009)

Commercial telecommunication infrastructure also has several obligations to obey. Based on the Decree of Minister of Communication No. 21/2001 about PSTN Provision, it is mentioned that all PSTN providers have to allocate 3% of their capacity to build public telephones[6]. According to statistic data from two top companies in PSTN Indonesia, proportion of installed public telephone is 2.09% from whole line-in-service subscribers. The public telephones consist of 86.95% for Warung Telefon (Telephone Café) and 13.05% for Public Telephone with Card or Coin.

[6] Source: ICT Indicator 2008, The Agency for the Assessment and Application on Technology, Indonesia (2008)

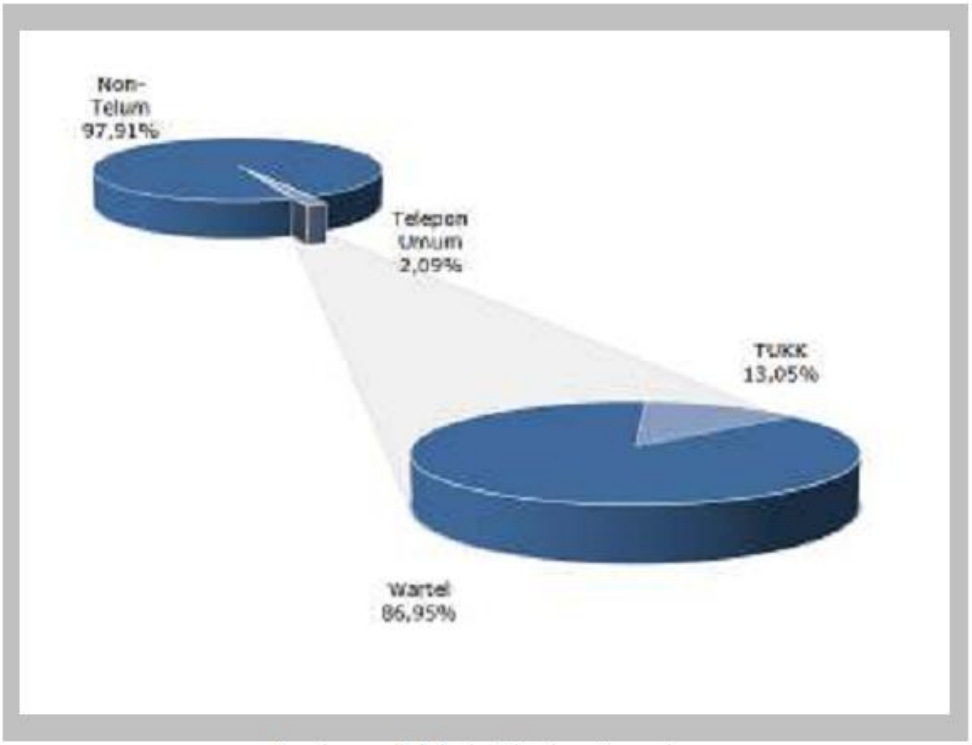


Figure 2.2 Public Telephone proportion in Indonesia (2007)

Source: ICT Indicator 2008, The Agency for the Assessment and Application on Technology, Indonesia (2008)

A very strong competition does exist in cellular telecommunication industry. It stimulates various services, pricing, networks, and coverage for the sake of competition. The competition itself brings advantage for the society as the customer. Several parameters can be used to express the market condition of telecommunication industry in Indonesia. Those parameters include indicators of network capacity, subscriber growth, and tele-density.

2.4.1 Network Capacity among Providers

A Fixed Telephony Capacity

Growth of network capacity is caused by the growth of subscribers among people. It happens in all sectors of communication, wireless or wired. For fixed wireless telephony, the network capacity is increased in the last three years with the biggest growth. There is 156.2% growth in 2008. This big growth mostly belongs to the growth of Bakrie network capacity (518%) and Telkom network capacity (112.7%).

But in contrast, for fixed wired telephony (PSTN), the network experiences a decreasing capacity as much as 1.4% which is mostly caused by 16% decreasing in 2007. Decreasing in network capacity is experienced by all PSTN operators. By quantity, the worst one belongs to PT. Telkom which dominates the PSTN provision.

But, by the level of decreasing, the worst one belongs to Indosat which loses 56% of its capacity in 2007 though it increases 12.9% again in 2008.

Jenis Penyelenggaraan	Operator	2006		2007		2008	
		Kapasitas	Tersambung	Kapasitas	Tersambung	Kapasitas	Tersambung
Tetap Kabel	Telkom	10.254.145	8.709.211	8.684.888	8.685.000	9.839.000	8.629.783
	Indosat	186.576	26.632	80.880	30.478	91.290	42.145
	BBT	5.388	2.500	5.404	2.393	5.404	2.300
Jumlah		10.446.109	8.738.343	8.771.172	8.717.871	9.935.694	8.674.228
Tetap Wireless	Telkom	7.698.039	4.175.853	9.383.924	6.363.000	19.861.324	13.305.181
	Indosat	2.365.000	358.980	3.403.900	627.934	3.771.400	761.589
	Bakrie	2.141.667	1.479.198	7.200.000	3.820.701	13.251.700	7.304.543
	Mobile 8					1.497.600	332.530
Jumlah		12.204.706	6.014.031	19.987.824	10.811.635	38.382.024	21.703.843

Table 2.5 Installed Capacity and Connected Capacity in Fixed Telephony (wireless and wired), 2006-2008

Source: Statistic Data of Directorate General of Post and Telecommunication (2009)

Increases and decreases in the installed capacity are related to the increases and decreases of the connected capacity utilization. It can be seen clearly the domination of PT. Telkom in PSTN network capacity and the utilization of the network.

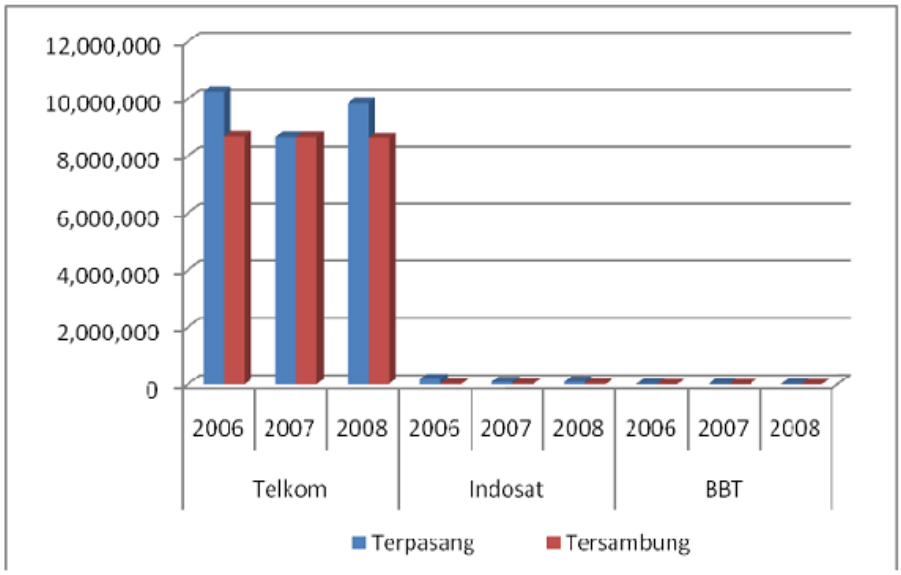
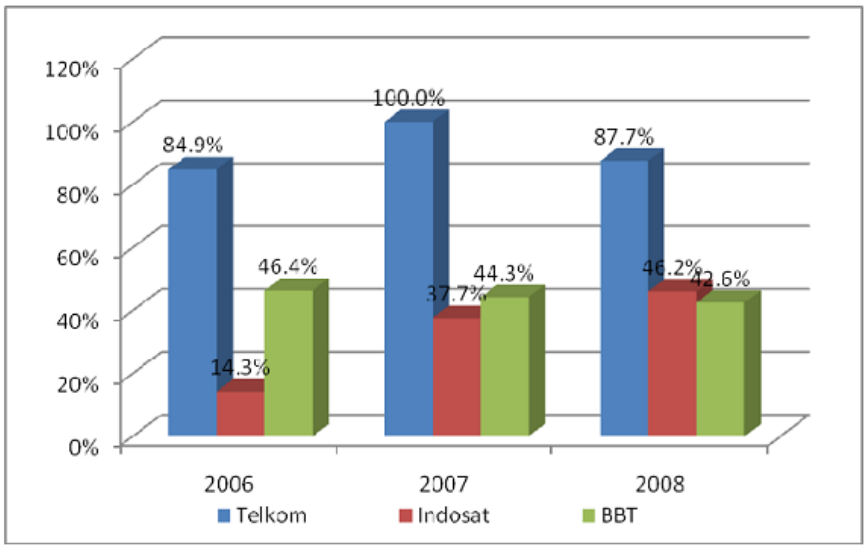


Figure 2.3 Chart of PSTN Network Capacity 2006 – 2008

Source: Statistic Data of Directorate General of Post and Telecommunication (2009)

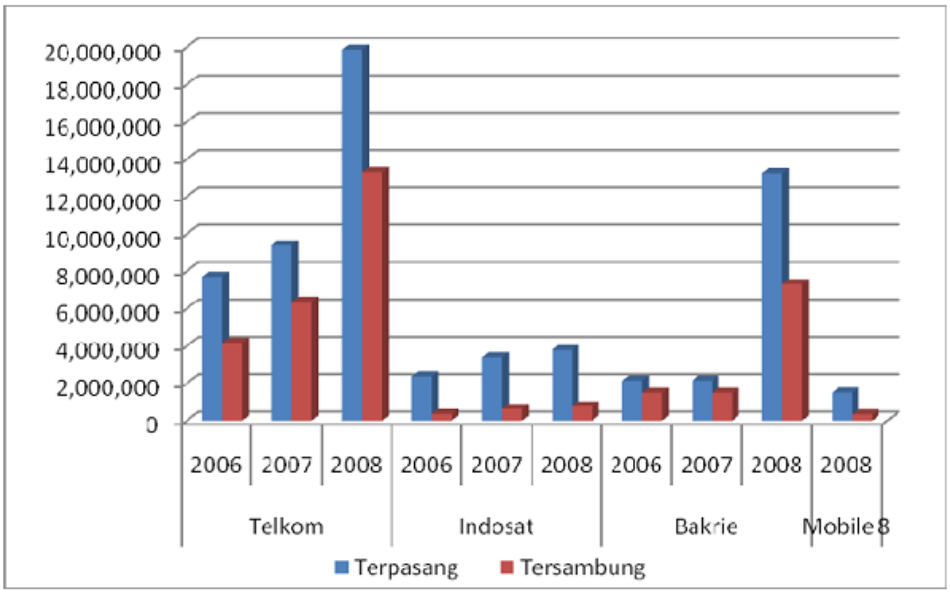


Picture 2403. Chart of Utilization level of PSTN Network Capacity (2006 – 2008)

Source: Statistic Data of Directorate General of Post and Telecommunication (2009)

The utilization level of network capacity is dominated with PT. Telkom with its remarkable score. Even in 2007, PT. Telkom can touch 100% of network utilization level. In other hand, PT. Indosat also shows a significant increase of its utilization level from 2006 – 2008.

Then in other hand, in fixed wireless telephony, installed capacity in the network is much higher than the connected capacity for every operator of provider. Even the incumbent domination, PT. Telkom can not meet its connected capacity with the installed capacity in 2008 when PT. Telkom reaches the high number of connected capacity. The same thing is also experienced by PT. Bakrie Telecom as a big competitor for PT. Telkom in Fixed-Wireless-Telephony.

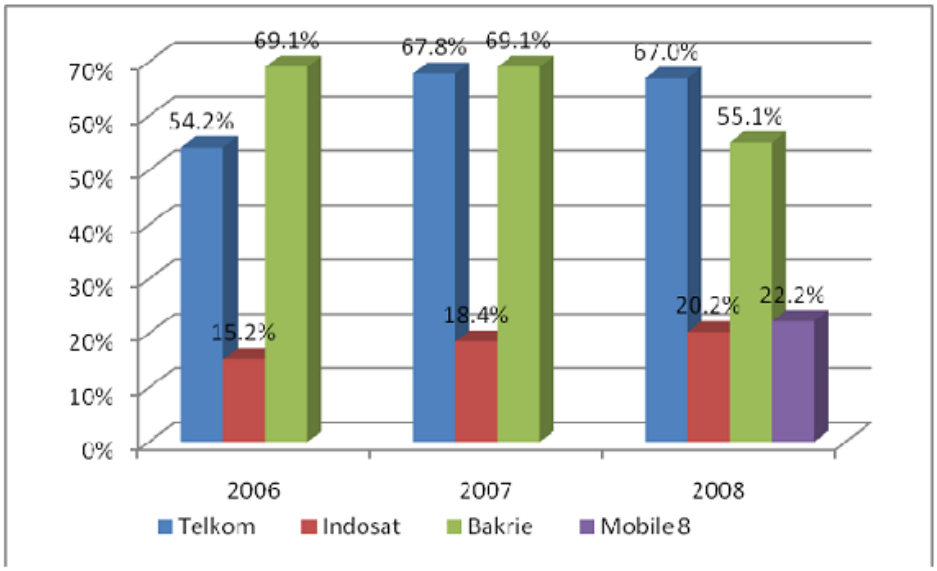


Picture 2404. Comparison chart between Installed and Connected Capacity in Fixed Wireless Telephony

2006 – 2008

Source: Statistic Data of Directorate General of Post and Telecommunication (2009)

Utilization level of network capacity shows a high level of network capacity utilization. High untilization level does not only belong to PT. Telkom but also belongs to PT. Bakrie Telecom. Capacity level of Bakrie is higher than PT. Telkom is because the capacity of PT. Telkom is much higher than what Bakrie has.



Picture 2405. Utilization level of capacity in Fixed Wireless Telephony (2006 – 2008)

Source: Statistic Data of Directorate General of Post and Telecommunication (2009)

B Mobile Wireless Telephony Capacity

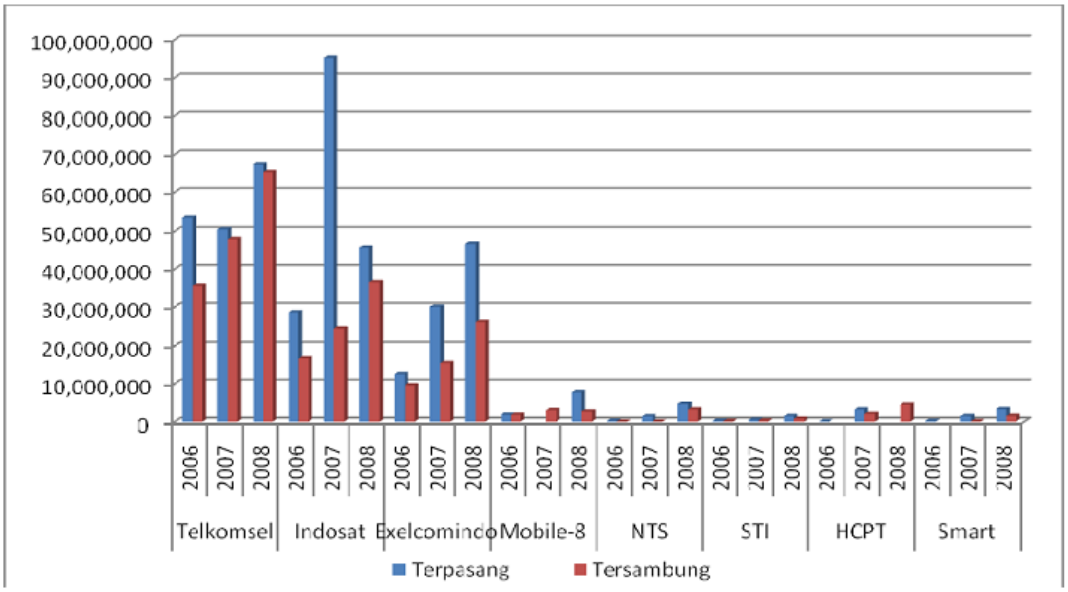
For mobile wireless telephony provision, there are 3 main providers which have bigger network capacity than the other providers. Those three providers are Tekomsel (derivative of PT. Telkom), Indosat, and Excelcomindo where their capacity can touch more than 45 thousands connections in 2008. Whereas, the others providers only touch less than 10 thousands connections.

The growth of network capacity also shows its significant increase, especially by those three big operators. But, Indosat experiences almost 50% decrease in its capacity growth from 2007 to 2008. It causes total installed capacity decreases 3.1% in 2008. In average, the installed capacity growth of mobile wireless telephony can touch 42.5% while its connected capacity growth reaches 48.5%. therefore, it can be said that there is an increase in capacity utilization.

Operator	2006		2007		2008	
	Kapasitas	Tersambung	Kapasitas	Tersambung	Kapasitas	Tersambung
Telkomsel	53.300.000	35.597.000	50.500.000	47.890.000	67.300.000	65.299.991
Indosat	28.557.254	16.704.729	95.230.280	24.545.422	45.651.920	36.510.246
Excelcomindo	12.520.054	9.527.970	30.045.325	15.469.000	46.645.061	26.015.517
Mobile-8	1.825.888	1.825.888		3.012.801	7.748.400	2.701.914
Natrindo Telepon Seluler	257.481	12.715	1.451.085	4.788	4.719.107	3.234.800
STI	241.500	134.713	488.000	310.464	1.494.134	784.343
Hutchison CP Telecommuni-cation	132.600		3.250.000	2.039.406		4.500.609
Smart Telecom	200.000		1.470.000	115.000	3.300.000	1.530.823
Jumlah	97.034.777	63.803.015	182.434.690	93.386.881	176.858.622	140.578.243

Table 2404. Installed capacity and Connected capacity growth in Mobile Wireless Telephony (2006 – 2008)

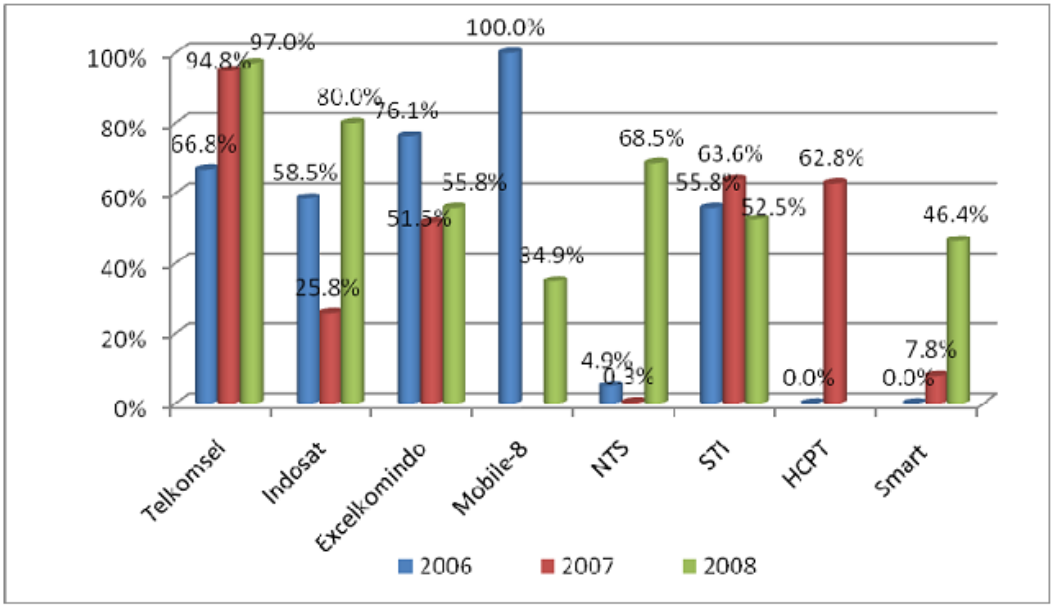
Source: Statistic Data of Directorate General of Post and Telecommunication (2009)



Picture 2406. Chart of Installed capacity and Connected capacity growth in Mobile Wireless Telephony (2006 – 2008)

Source: Statistic Data of Directorate General of Post and Telecommunication (2009)

Based on the chart below, it can be seen that capacity utilization of Telkomsel is high enough and increased significantly in 2008. Whereas, Indosat has a very low capacity utilization in 2007 which cause Indosat to decrease its capacity in 2008 in order to correct its capacity utilization. Relatively good capacity utilization is also experienced by Excelcomindo. The other small operators show good utilization level which is more that 60%. Smart Telecom also shows its significant growth from less that 10% in 2007 to 46.4% in 2008.



Picture 2407. Chart of Capacity Utilization Level and Growth in Mobile Wireless Telephony (2006 – 2008)

Source: Statistic Data of Directorate General of Post and Telecommunication (2009)

2.4.2 Subscriber Growth

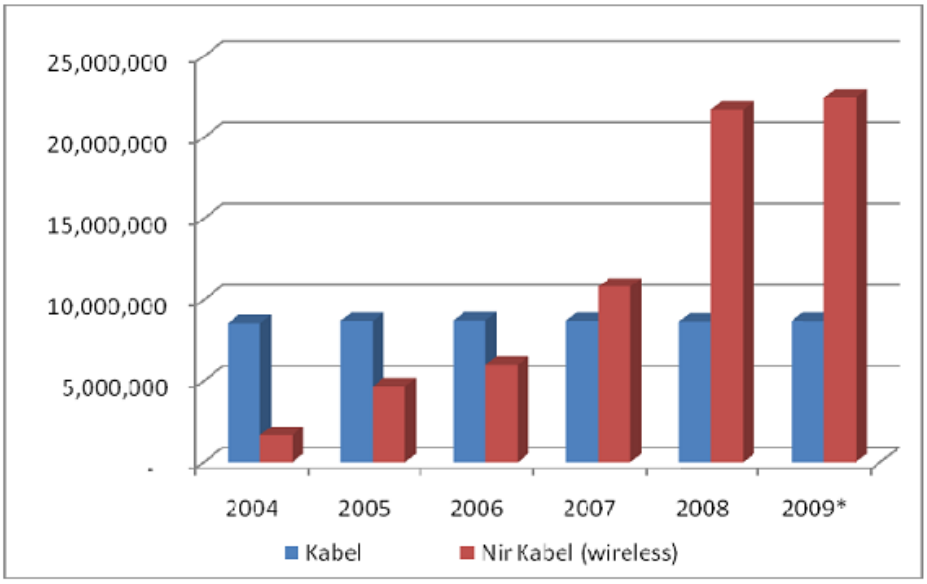
A Fixed Telephony Subscriber

Subscriber number in a fixed telephony shows its significant increase in 2008 which is mostly dominated by the fixed wireless telephony. For the fixed wired telephony (PSTN), actually it does not show any significant growth. PSTN shows a fluctuation trend which is mostly a decreasing growth of subscriber. One of the reasons is that it has to compete hard with the wireless one.

Meanwhile, fixed wireless telephony subscriber number shows its rapid growth. In the last 5 years, from 2004 to March 2009, its subscriber number grows 5 times than before. In average, it grows 97% per year. The most rapid growth comes from two big operator, which are Telkom (with Telkom Flexi as the Product) and Bakrie Telecom. Telkom grows 87.1% per year in last 5 years. Bakrie Telecom grows 160.5% per year in last 5 years.

No	Jenis Infrastruktur	2005	2006	2007	2008	2009*
A	**Kabel**	**8.710.385**	**8.738.343**	**8.717.872**	**8.674.228**	**8.701.445**
1	PT. Telkom	8.686.131	8.709.211	8.685.000	8.629.783	8.657.000
2	PT Indosat I-Phone	21.724	26.632	30.479	42.145	42.145
3	PT. BBT	2.530	2.500	2.393	2.300	2.300
B	**Nir Kabel (wireless)**	**4.683.363**	**6.014.031**	**10.811.635**	**21.703.843**	**22.460.425**
1	PT Telkom Flexi	4.061.800	4.175.853	6.363.000	13.305.181	13.399.000
	Prabayar	3.240.500	3.381.426	5.535.000	12.568.620	12.715.000
	Pasca bayar	821.300	794.427	828.000	736.561	684.000
2	PT. Indosat StarOne	249.434	358.980	627.934	761.589	698.774
	Prabayar	229.726	338.435	594.203	681.362	621.529
	Pasca bayar	19.708	20.545	33.731	80.227	77.245
3	PT. Bakrie Tel- Esia	372.129	1.479.198	3.820.701	7.304.543	8.030.121
	Prabayar	351.826	1.414.920	3.695.817	7.196.518	7.931.221
	Pasca bayar	20.303	64.278	124.884	108.025	98.900
4	PT. Mobile-8				332.530	332.530
	Prabayar					
	Pasca bayar					
	Jumlah	**13.393.748**	**14.752.374**	**19.529.507**	**30.378.071**	**31.161.870**

Table 2405. Subscriber Growth in Fixed Telephony (2005 – 2009)
Source: Statistic Data of Directorate General of Post and Telecommunication (2009)



*) Sampai Maret 2009

Picture 2408. Comparison of Subscriber Growth in Fixed Telephony (2004 – 2009)

Source: Statistic Data of Directorate General of Post and Telecommunication (2009)

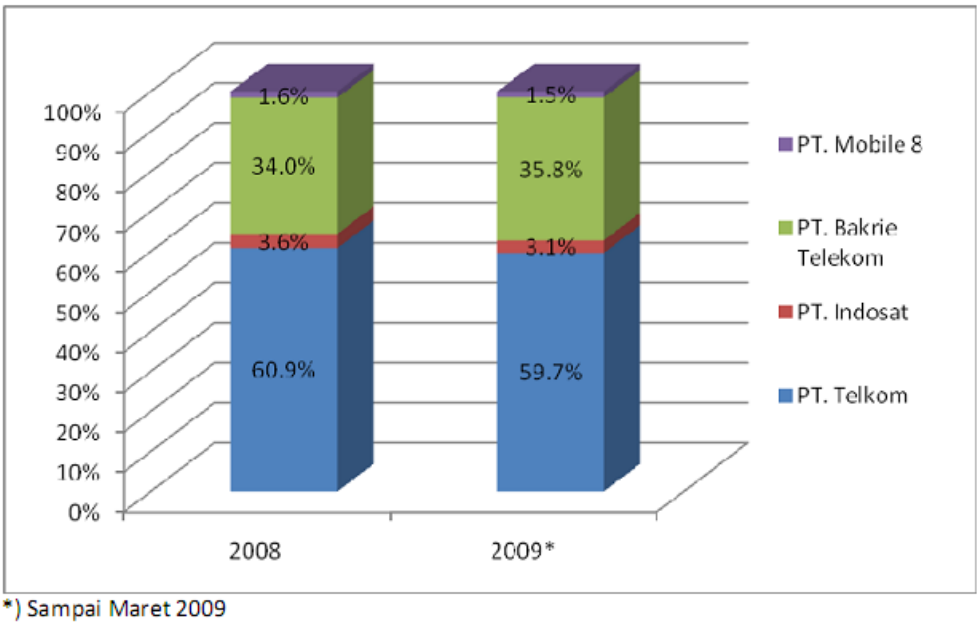
From the number of subscriber, provision of fixed wireless telephony is highly dominated by two main operators, PT. Telkom and Bakrie Telecom. Based on statistic data, it is recorded until March 2009 that both of them have 12.4 million subscriber and 8.03 million subscriber for each where the total of them cover more than 95% of market in fixed wireless telephony in Indonesia.

No	Operator	Produk	Tahun Mulai Operasi	2008		2009*	
				Jumlah Pelanggan	Pangsa Pasar	Jumlah Pelanggan	Pangsa Pasar
1	PT. Telkom	Telkom Flexi	2002	13.051.181	61,8%	13.399.000	60,6%
2	PT. Indosat	StarOne	2004	761.589	3,6%	698.774	3,2%
3	PT. Bakrie Telekom	Esia	2003	7.302.543	34,6%	8.030.121	36,3%
4.	PT. Mobile 8	Hepi	2008	332.530	1,6%	332.530	1,5%

*) Sampai Maret 2009

Table 2406. Subscriber and Market Share in Fixed Wireless Telephony (2008 – 2009)

Source: Statistic Data of Directorate General of Post and Telecommunication (2009)



*) Sampai Maret 2009

Picture 2409. Chart of Subscriber and Market Share in Fixed Wireless Telephony (2008 – 2009)

Source: Statistic Data of Directorate General of Post and Telecommunication (2009)

B Mobile Telephony Subscriber

In the market of cellular mobile telephony, there is also subscriber growth especially since from 2005. Until March 2009, subscriber number of mobile telephony reaches more than 140 million subscribers which comes from 8 operators of cellular mobile telephony. The significant subscriber growth comes from the growth of operator number, from 4 operators in 2004 into 8 operators in 2009 and comes from subscriber increasing in each operator by their own marketing strategy. Most of the subscribers use pre-paid system which reaches 97.5% proportion in total subscriber in mobile telephony.

No	Operator	2004	2005	2006	2007	2008	2009*
1	Telkomsel	16.291.000	24.269.000	35.597.000	47.890.000	65.299.991	72.133.000
	Prabayar	14.963.000	22.798.000	33.935.000	45.977.000	63.359.619	70.179.000
	Pasca bayar	1.328.000	1.471.000	1.662.000	1.913.000	1.940.372	1.954.000
2	Indosat	9.754.607	14.512.453	16.704.729	24.545.422	36.510.246	33.266.296
	Prabayar	9.214.663	13.836.046	15.878.870	23.945.431	35.591.033	32.267.029
	Pasca bayar	539.944	676.407	825.859	599.991	919.213	999.267
3	Excelcomindo	3.791.000	6.978.519	9.527.970	15.469.000	26.015.517	24.892.000
	Prabayar	3.743.000	6.802.325	9.141.331	14.988.000	25.599.297	24.500.000
	Pasca bayar	48.000	176.194	386.639	481.000	416.220	392.000
4	Mobile 8	500.000	1.200.000	1.825.888	3.012.801	2.701.914	2.701.914
	Prabayar		1.150.000	1.778.200	2.920.213	2.552.975	2.552.975
	Pasca bayar		50.000	47.688	92.588	148.939	148.939
5	STI		10.609	134.713	310.464	784.343	784.343
	Prabayar			133.746	310.176	784.129	784.129
	Pasca bayar			967	288	214	214
6	Natrindo		21.537	12.715	4.788	3.234.800	3.234.800
	Prabayar			10.155	4.788	3.234.800	3.234.800
	Pasca bayar			2.560	-	-	-
7	Hutchison		-	-	2.039.406	4.500.609	4.500.609
	Prabayar				2.036.202	4.490.202	4.490.202
	Pasca bayar				3.204	10.407	10.407
8	Smart Telecom		-	-	115.000	1.530.823	1.530.823
	Prabayar					1.456.372	1.456.372
	Pasca bayar					74.451	74.451
	Jumlah	**30.336.607**	**46.992.118**	**63.803.015**	**93.386.881**	**140.578.243**	**143.043.785**

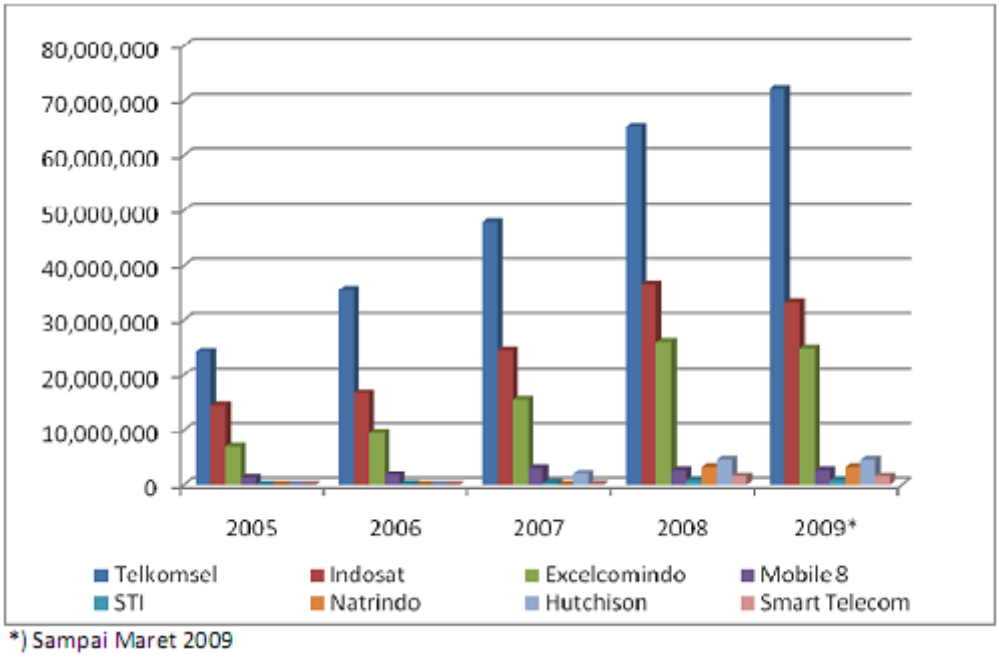
*) Sampai Maret 2009

Table 2407. Subscriber Growth in Mobile Wireless Telephony (2004 – 2009)

Source: Statistic Data of Directorate General of Post and Telecommunication (2009)

The picture below shows the growth of subscriber in each mobile telephony operator which shows an increasing trend in almost all of the operators proportionally. From

2004 to March 2009, mobile telephony subscriber increases as much as 371.5% with average growth 37.9% per year. The highest subscriber growth is experienced by Excelcomindo and Mobile-8 which grow 49.4% per year. From the chart, it can be seen that the market is dominated by three main operators, Telkomsel, Indosat, and Excelcomindo which have been existed in the market in the first time.

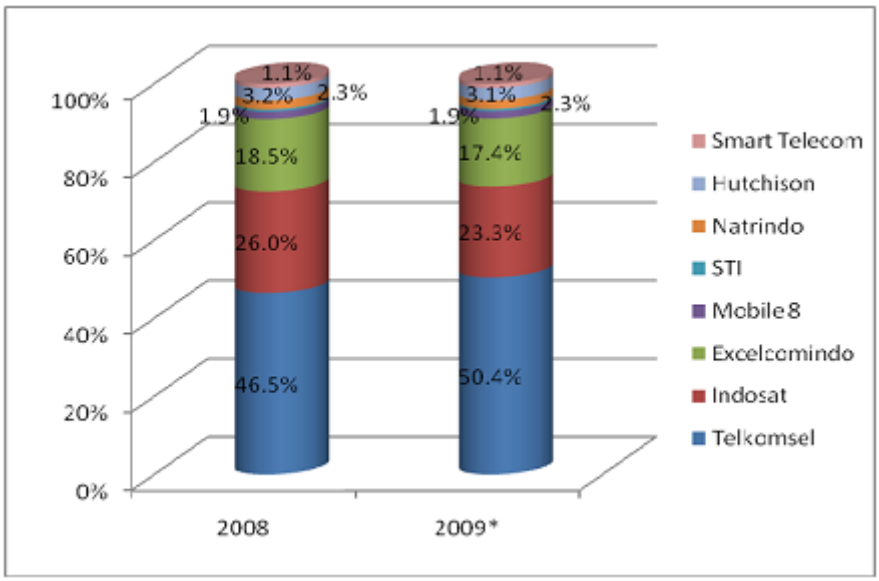


Picture 2410. Chart of Subscriber Growth in Mobile Wireless Telephony (2005 – 2009)

Source: Statistic Data of Directorate General of Post and Telecommunication (2009)

Mobile Telephony market is highly dominated by three main operators, Telkomsel, Indosat and Excelcomindo which cover 91.1% of the whole market. Subscriber number growth of Telkomsel from 2008 to 2009 causes market change in mobile wireless telephony. Telkomsel market grows from 46.5% into 50.4% in 2009. This growth is caused by the decrease in the market of Indosat and Excelcomindo from 26% and 18.5% into 23.3% and 17.4% in 2009.

The rest market which is less than 10% is shared by the other 5 operators where the biggest market share is owned by Hutchison which owns 3.1% of the market. This subscriber number is phenomenal, since Hutchison is a new operator.

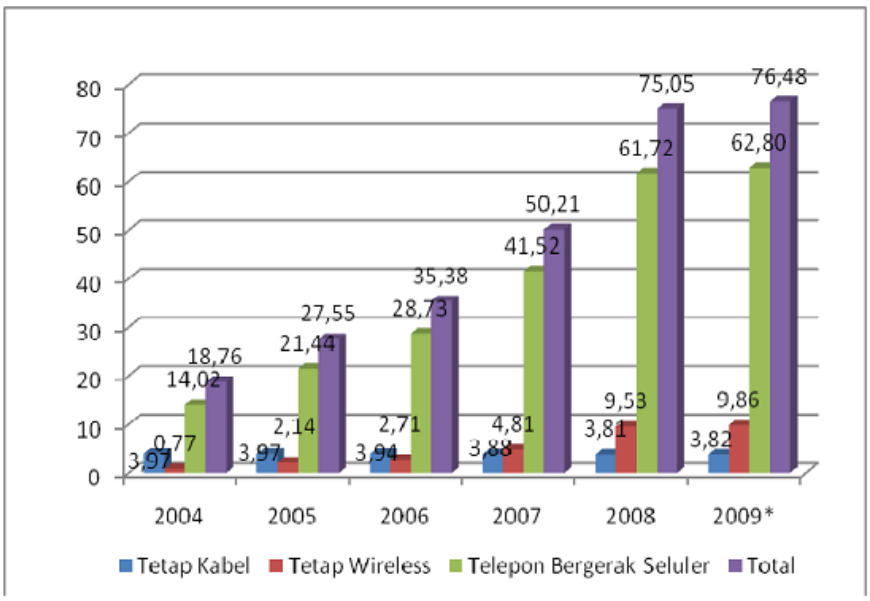


Picture 2411. Chart of Market Dynamics in Mobile Wireless Telephony (2005 – 2009)

Source: Statistic Data of Directorate General of Post and Telecommunication (2009)

2.4.3 Tele-density

Expressing telecommunication industry penetration can be brought by using the tele-density indicator. Tele-density, telecommunication density, is a sort of indicator which describes number of subscriber (in hundreds) that can be served by one telephone connection unit. In 2009, tele-density of fixed telephony in Indonesia reaches 3.82% which means that 4 telephony connection units have to serve 100 people. This tele-density number can be categorized as the low one, compared with several developed countries. But, if it is looked based on utilization of all telephony service including mobile wireless telephony and fixed wireless telephony, Indonesia tele-density has reached 76.48% which can be categorized as a high tele-density.



Picture 2412 : Chart of Tele-density Growth in Indonesia (2005 – 2009)

Source: Statistic Data of Directorate General of Post and Telecommunication (2009)

From the chart above, tele-density increases significantly in last 5 years as well as the growth of mobile wireless telephony tele-density. Tele-density of fixed wireless telephony actually does not give any significant growth either. Tele-density in both fixed-telephony does not have any significant growth as what the mobile telephony has. Therefore, it can be said that the total tele-density is mostly influenced by mobile telephony tele-density.

2.4.4 Telecommunication Operators Income

For assessing the performance of telecommunication operator's income, 3 indicators can be used as well. Those three indicators are :

- Operational Income
- EBITDA (Earning Before Interest Tax Depreciation and Ammortization)
- ARPU (Average Revenue Per Unit)

A Operational Income

Operational income of all telecommunication provider in the last three years is inclined to increase except for Mobile-8. Operator income describes the total income earned by each provider in operating its telecommunication service business for the consumer. The table below shows the growth of wireless telephony operational income (both fixed and mobile). The data shows that the bigger its income value the lower its income growth. Telkom Group company (Telkomsel and Telkom Flexi), in 2008 records its income more than Rp 60 trillion, with its income growth values only

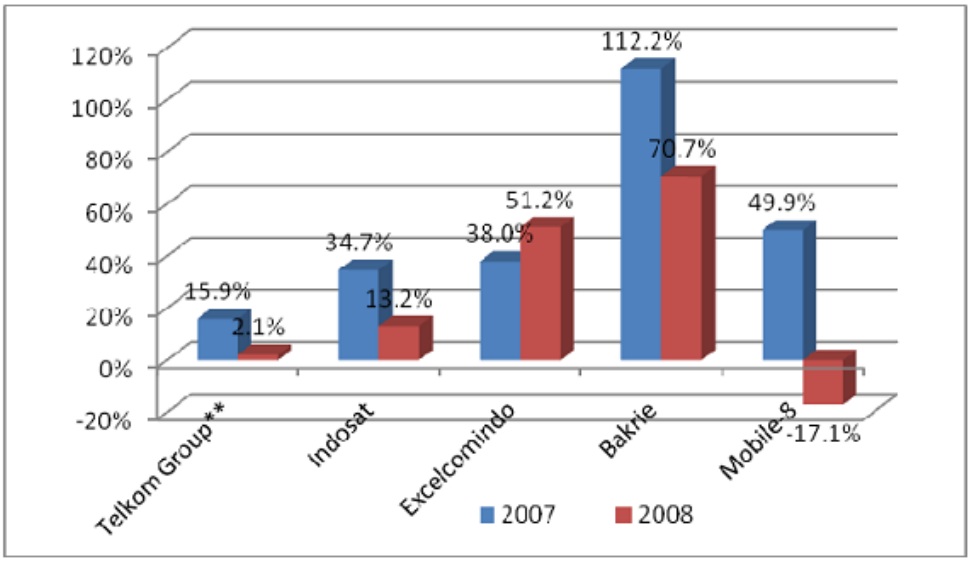
2.1%. While Bakrie Telecom which only earns operational income as much as Rp 2.2 trillion in 2008, records its income growth values 70.7%.

No	Operator	2006	2007	2008
1	Telkom Group**	51.294	59.440	60.689
3	Indosat	12.239	16.488	18.659
4	Excelcomindo	4.682	6.460	9.765
5	Bakrie	608	1.290	2.202
6	Mobile-8	589	883	732

**) mencakup seluruh operator telekomunikasi yang berada dalam group PT. TELKOM

Table 2408. Wireless cellular telephony operational income for each ompany (2006 – 2008)

Source: Statistic Data of Directorate General of Post and Telecommunication (2009)



Picture 2413. Chart of Wireless cellular telephony operational income growth (2006 – 2008)

Source: Statistic Data of Directorate General of Post and Telecommunication (2009)

Operational income growth shows a declining trend from 2007 to 2008 as what it shows from the chart above. Mobile-8 experiences a declining operational income up to 17.1% after it gets an increase almost 50%. Increase in operational income is only experienced by Excelcomindo which gets 51.2% increase in 2008. Declining tendency in operational income happens by a threshold phenomenon among the market which affects the subscriber growth. Moreover, this income growth is really influenced by the marketing strategy of each operator.

B EBITDA (Earning Before Interest Tax Depreciation and Ammortization)

EBITDA is income approach which is calculated from operator's income before it is substracted by interest, tax, depreciation and amortization. The table below shows EBITDA value for 5 main operators in wireless telephony, including fixed and mobile. Based on the data, the EBITDA of Telkom Group, including Telkomsel (mobile) and Telkom-Flexi (fixed wireless), shows very high value compared to the other operators. But generally, EBITDA in wireless telephony shows an increasing trend.

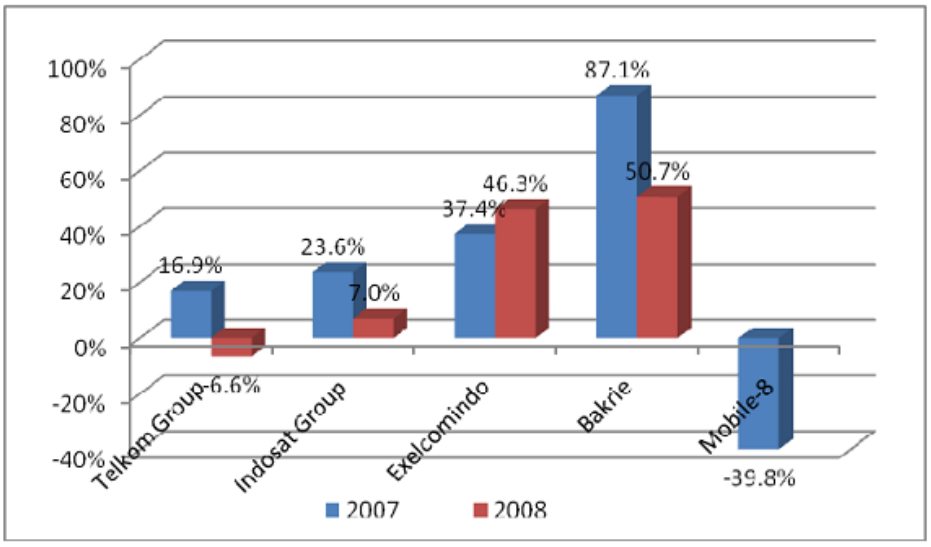
However, according to the growth tendency, the chart below shows that EBITDA declining is experienced by the biggest operators i.e. Telkom Group. After 16.9% increasing in 2007, Telkom group EBITDA decreases 6.6% in 2008. Decreasing in EBITDA of Telkom Group in 2008 is considered to be realted to the big capacity increase which is done in 2008 and implicates to the increase of depreciation cost and others. Meanwhile, Excelcomindo's EBITDA shows its rising growth from 2007 to 2008 as well as a rising growth of its operational income.

In other hand, Bakrie Telecom shows the highest EBITDA growth compared to any other operators. This EBITDA growth is related to the expansion done by Bakrie Telecom with several product innovation which causes increase in subscriber number.

No	Operator	2006	2007	2008
1	Telkom Group	31.716	37.067	34.621
2	Indosat Group	7.051	8.714	9.321
3	Exelcomindo	2.554	3.509	5.132
4	Bakrie	292	545	822
5	Mobile-8	397	239	N.A

Table 2409. EBITDA of wireless (fixed and mobile) telephony operators (2006 – 2008)

Source: Statistic Data of Directorate General of Post and Telecommunication (2009)



Picture 2414. Chart of EBITDA of wireless (fixed and mobile) telephony operators (2007 – 2008)

Source: Statistic Data of Directorate General of Post and Telecommunication (2009)

C ARPU (Average Revenue per User)

ARPU (average revenue per user) describes the average revenue gotten by an operator from one subscriber who uses its product. It means that though an operator has a few subscribers, it may have a big ARPU in condition that the subscribers doing intensive usage of the product. Generally, there is a significant decrease of ARPU growth in the last 5 years. Bakrie Telecom experiences a decrease in ARPU from Rp 500,953 per user in 2004 into Rp 39,000 per user.

ARPU decrease from 2004 to 2009 is estimated to range from 53% to 92% where the biggest decrease is experienced by Bakrie Telecom which its ARPU decreases 92.2% from 2004 to 2008. In average, ARPU decrease in wireless telephony is ranged from 14% to 41.8% per year. the decrease in ARPU is assessed to be caused by market threshold and big number of telecommunication operators which causes the subscribers do not use certain product intensively. It is logical because of the fact that most of Indonesian subscribers use more than one product from certain operator. It is easy to change from one subscribed number to another number.

Operator	2004	2005	2006	2007	2008	2009*
Telkom FWA	60.000	47.000	54.000	53.000	31.335	23.000
Telkomsel	102.000	87.000	84.000	80.000	59.000	47.000
Indosat	89.489	67.113	60.023	52.828	38.282	30.625
Indosat FWA	N/A	N/A	45.905	34.641	22.858	25.601
Excelcom	70.000	60.000	46.000	47.000	37.000	N.A
Bakrie	500.935	116.913	70.891	48.315	39.000	N.A
Mobile 8	107.273	62.332	48.013	39.791	17.621	N.A
Hutchinson				14.971	11.414	N.A
STI				37.147	23.857	

*) Sampai Kwartal I 2009

Table 2410. ARPU growth among wireless telephony operators (2004 – 2009)

Source: Statistic Data of Directorate General of Post and Telecommunication (2009)

Based on ARPU data of wireless telephony as shown below, it can be shown that ARPU decrease happens significantly in the pre-paid subscription. That decrease is even experienced by top and familiar wireless telephony operators such as Telkomsel, Indosat, and Excelcomindo. ARPU decrease in pre-paid subscription of Excelcomindo from 2006 to 2008 reaches 79.7% with average decrease 46.8% per year. Whereas, ARPU decrease in pre-paid subscription of Telkomsel and Indosat reaches 28.4% and 34.3% respectively with average decrease 43% and 17% per year respectively. This ARPU decrease is assessed to be caused by a strict market competition which leads into easiness of subscriber to change its subscription from one operator to other operator.

For the post-paid subscription, ARPU of wireless telephony does not show significant tendency to decrease. In the statistic data below, the ARPU of post-paid system even gains significant growth from 2006 to 2007 as what happens to Excelcomindo and especially new operators such as Hutchison,STI and Smart Telecom. Even though, it then goes lower again in 2008. Then, for the old player like Telkomsel and Indosat, they show a tendency to decrease the ARPU in the last three years but without significant decrease.

ARPU of Telkom as the main provider of telephony still shows a little decrease tendency. ARPU decrease for the fixed wired telephony of Telkom in the last three years only reaches 3.5% per year, meanwhile for the pre-paid fixed wireless access and the post-paid one only show 8% and 9.5% decrease per year. a significant decrease only happens in the blended fixed wireless telephony (blend of pre-paid and post-paid) which shows 21.8% decrease per year. Small decrease of ARPU in fixed wired telephony (PSTN) is caused by a special characteristic of PSTN where subscriber is not easy to move to other operator. It is also because of the fact that Telkom is the main operator for PSTN in Indonesia. PSTN functionality for government and office need can not be substituted by wireless telephony.

No	Nama Operator	2006			2007			2008		
		Pra-bayar	Pasca bayar	Blen-ded	Pra-bayar	Pasca bayar	Blend ed	Pra-bayar	Pasca bayar	Blend ed
1	STI	49.800	55.000	51.500	37.000	196.000	37.147	23.813	186.483	210.296
2	Excelcomindo	172.000	42.000	46.000	43.000	155.000	47.000	35.000	152.000	37.000
3	Natrindo Telepon Selular	93.159	29.027	56.128	36.124	48.351	41.666	6.500	0	6.500
4	Hutchison CPT	-	-	-	14.829	114.049	14.971	11.161	128.928	11.414
5	Mobile 8 Tel	30.803	100.899	32.838	37.218	115.312	39.791	14.495	73.963	17.621
6	Smart Telecom	-	-	-	25.000	110.000	45.000	24.000	55.000	26.000
7	Telkomsel	74.000	274.000	84.000	71.086	264.000	80.000	53.000	216.000	59.000
8	Indosat Tbk	52.713	194.761	60.023	47.028	182.682	52.828	34.654	182.147	38.282

Table 2411. ARPU growth among mobile wireless telephony operators (2006 – 2008)

Source: Statistic Data of Directorate General of Post and Telecommunication (2009)

No	Operator	Tahun	Kabel	Nirkabel Prabayar	Nirkabel Pascabayar	Nirkabel Blended
1	PT. Telkom	2006	179.330	34.745	135.278	54.464
		2007	186.000	45.000	114.000	53.000
		2008	166.131	24.509	110.314	31.335
2	PT. Bakrie Telecom	2006	121.410	57.396	190.973	63.200
		2007	-	45.326	131.329	48.315
		2008	0	39.000	130.000	39.000
3	PT. Batam Bintan Telekomunikasi	2006	1.023.000			
		2007	856.000	-	-	-
		2008	776.198	0	0	0
4	PT. Indosat	2006	278.029	25.333	211.875	40.083
		2007	316.965	26.590	170.160	34.641
		2008	797	17.955	94.955	22.858

Table 2412. ARPU growth among fixed telephony operators (2006 – 2008)

Source: Statistic Data of Directorate General of Post and Telecommunication (2009)

2.4.5 Operational Cost of Telecommunication Provider

Cost of telecommunication provision by operators can be described by the operational cost. From statistic data below, it can be shown that there is an increasing tendency of operational cost. This growth is caused by the increase of

network capacity as elaborated before. Operational cost of Telkom group is the highest compared to the other operators.

Operator	2004	2005	2006	2007	2008
Telkom Group	19.360	24.636	29.701	32.967	NA
Telkomsel	6.745	8.771	12.836	16.792	20.425
Indosat	7.232	7.938	8.841	11.969	13.925
Excelcom	1.507	2.055	3.224	4.480	4.600
Bakrie	229	344	469	972	1.270
Mobile 8	N.A	530	560	715	1.119
Hutchinson					2.054
STI					344

Table 2413. Operational cost growth among wireless telephony operators (fixed and mobile) (2006 – 2008)

Source: Statistic Data of Directorate General of Post and Telecommunication (2009)

2.4.6 Telecommunication Operator Employment

Fast subscriber number growth and network capacity increase which are done by telecommunication operator, in fact, do not actually affect to the growth of employment. In the last 5 years, Telkomsel's employee only increases 5.5% per year. Highest employment growth belongs to Bakrie Telecom which averagely increases 43.4% per year. Meanwhile, Telkom employment decreases 14% from 2004 to 2008 with average decrease 3.9% per year.

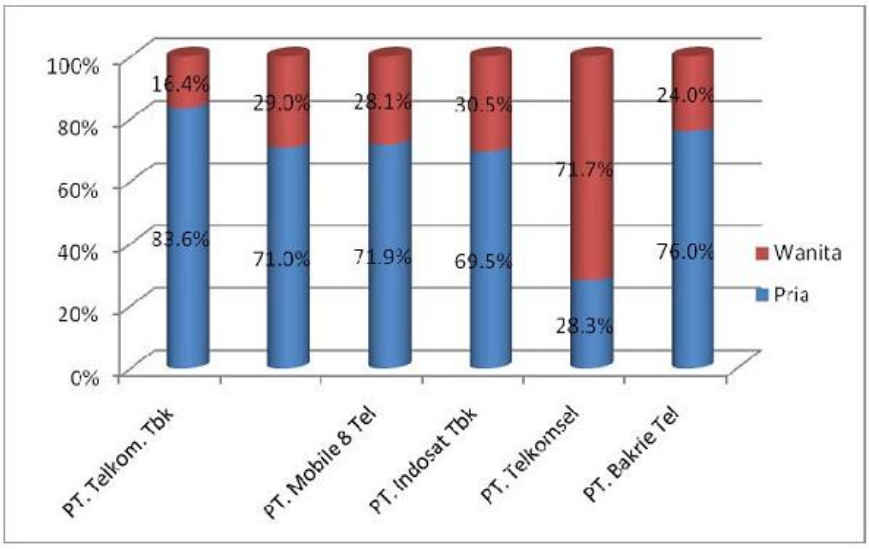
Operator	2004	2005	2006	2007	2008
Telkom*	29.375	28.179	27.658	25.361	25.016
Telkomsel	3.331	3.566	3.797	4.080	4.129
Indosat	7.820	8.137	7.786	7.645	7.700
Excelcom	1.543	1.867	2.042	2.136	2.114
Bakrie	437	544	743	1.485	1.671
Mobile 8	873	846	790	867	865
Hutchinson					N.A
STI					N.A

Table 2414. Employee number growth among wireless telephony operators (fixed and mobile) (2004 – 2008)

Source: Statistic Data of Directorate General of Post and Telecommunication (2009)

From the proportion of the employee, almost all operators have more male employee than the female one. Totally, from 6 main operators, male employee proportion reaches 74.8% and the female one reaches 25.2%. Highest proportion of male

employee belongs to Telkom which owns 83.6% of male employee. In other hand, high proportion of female employee belongs to Telkomsel which reaches 71.7%.



Picture 2415. Employee's gender proportion among wireless telephony operators (fixed and mobile) (2008)

Source: Statistic Data of Directorate General of Post and Telecommunication (2009)

2.5 Computer and Internet in Indonesia

Information and Communication Technology status is also strongly influenced by the existence and utilization of computer, both hardware and software, and internet. The more usage of Computer and Internet means the better penetration of ICT.

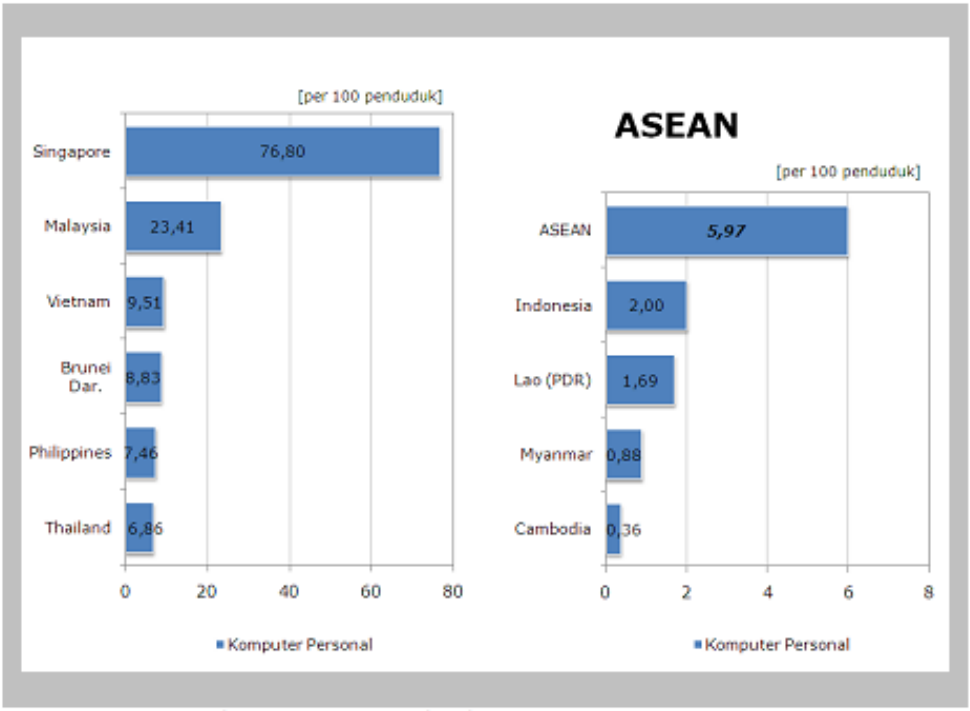
Computer, based on ITU[7], includes Personal Computer (PC), laptop and notebook. It does not include minicomputer, smart phone, and PDA (Personal Data Assistant). Computer and internet usage penetration among people can be described from the density indicator which means a comparison between computer and internet user to the total number of people. Number of internet user can also be defined into two kinds. Internet subscriber is those who subscribe and pay for internet service

[7] Source: ICT Indicator 2008, The Agency for the Assessment and Application on Technology, Indonesia (2008)

provision. Meanwhile, internet user is those who utilize internet regardless they subscribe or not.

2.5.1 Computer Utilization in Indonesia

Computer-density, which describes the ratio between computer number to the people number, in ASEAN is averagely about 5.97% or 5.97 computers per 100 people. It can be shown from the graphic below that Singapore has the highest computer-density number as much as 76.80%, meanwhile Indonesia has only 2% computer-density or 2 computers per 100 people. Indonesian computer usage penetration is on the 7th position among 10 ASEAN countries. The table below shows the computer-density of ASEAN countries based on statistic data compiled from 2005 to 2007.



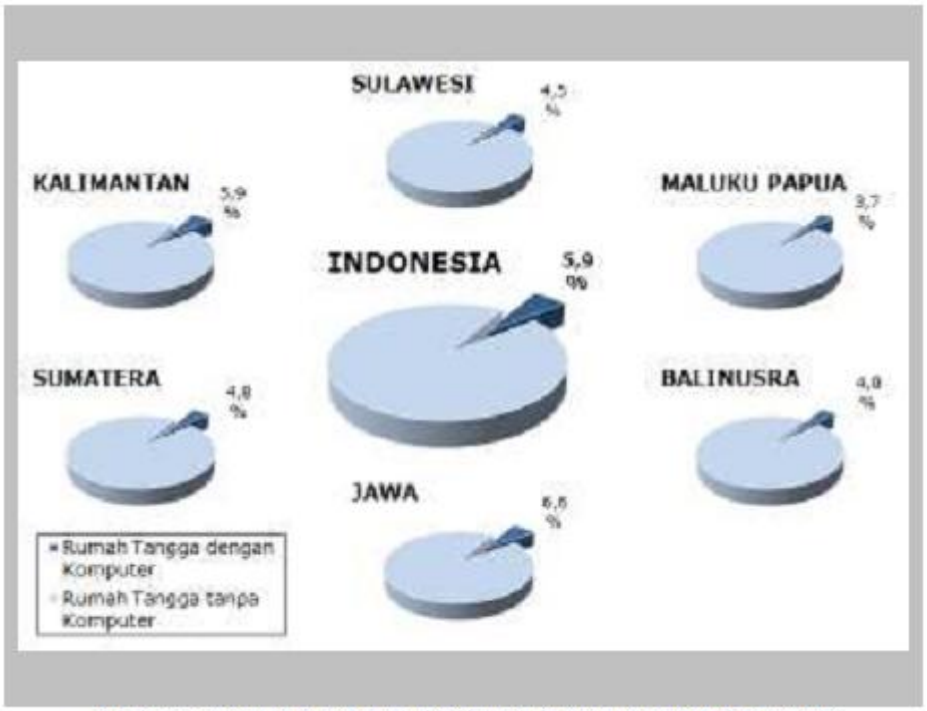
Sumber : International Telecommunication Union, 2007

Picture 2501. Computer-density of ASEAN countries (2007)

Source: ICT Indicator 2008, The Agency for the Assessment and Application on Technology, Indonesia (2008)

Computer usage penetration can also be described by the ownership data of computer in households of certain area. Based on Center of Statistic Body (Badan Pusat Statistik/BPS), in 2007 5.9% of Indonesian households have computer facility already[8].

Based on the graphic below, highest number of computer ownership belongs to the households in Java island which is 6.6%. Meanwhile, the lowest number belongs to Maluku Papua area which has 3.7% of total households. In more detail, computer ownership percentage is higher in urban area rather than in rural area. Generally, there are 11.5% of urban households own computer and only 1.6% of rural households own computer.

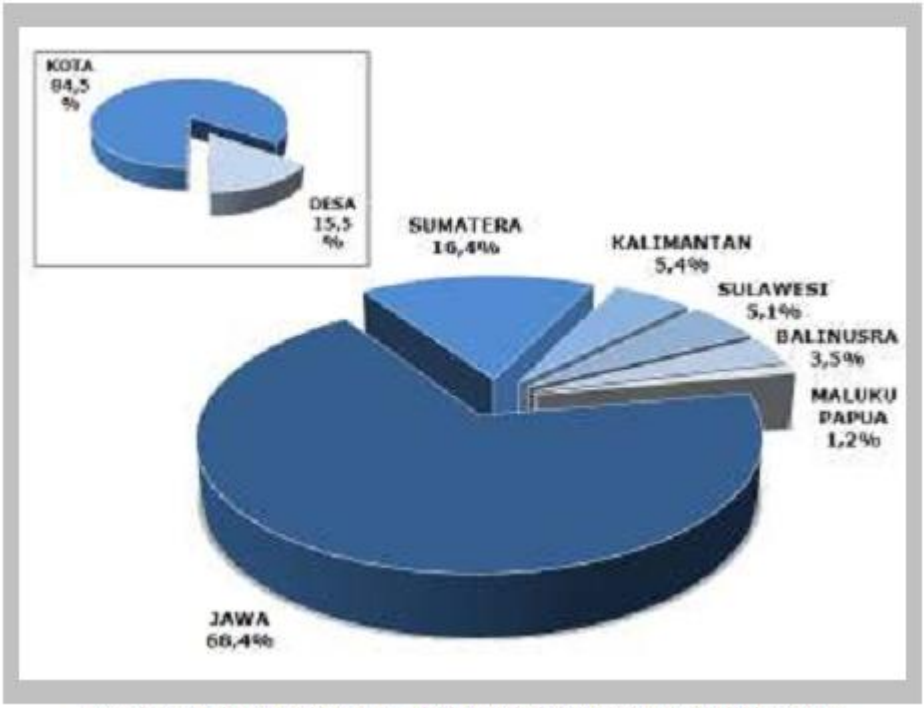


Sumber : Susenas 2007 BPS, diolah untuk kepentingan Indikator TIK

Picture 2502. Computer ownership percentage in Indonesia households (2007)

Source: ICT Indicator 2008, The Agency for the Assessment and Application on Technology, Indonesia (2008)

[8] Source: Badan Pusat Statistik (2007)



Picture 2503. Computer ownership distribution in Indonesia (2007)

Source: ICT Indicator 2008, The Agency for the Assessment and Application on Technology, Indonesia (2008)

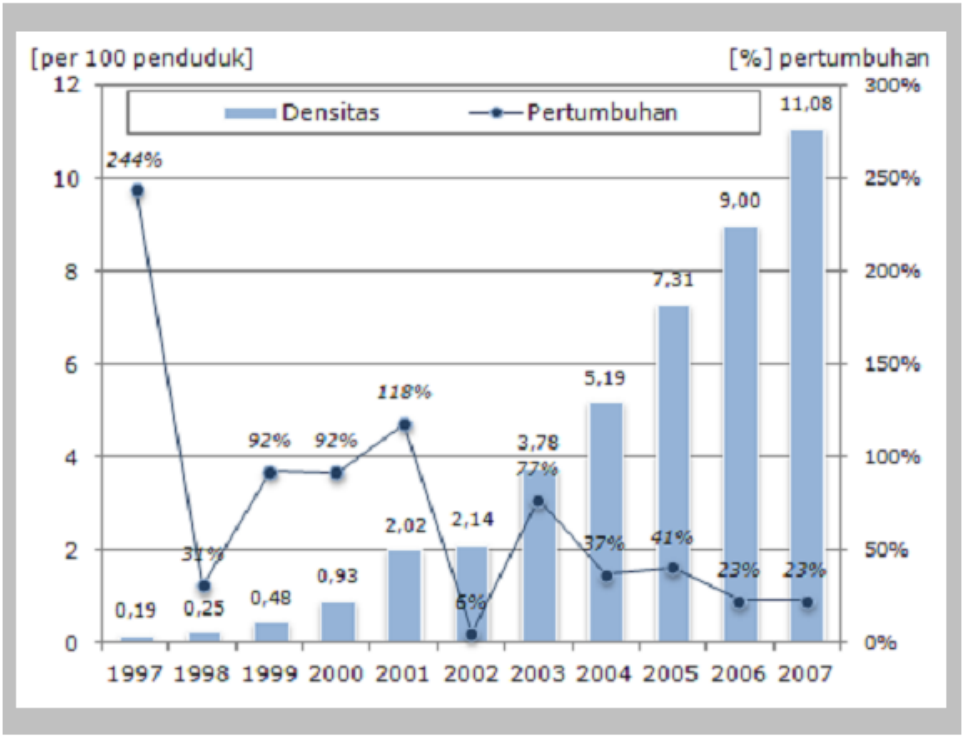
Based on BPS in 2007, there is only 5.9% of Indonesian households who own computer. From those number, most of them or 84.5% of them are households in urban area and the rest or 15.5% are households in rural area. Household distribution of computer ownership is variable, with the biggest proportion 68.4% comes from households in Java Island.

Description of computer distribution per household above is different with the computer density number. Computer distribution of households is calculated from the number of household which own at least one computer. In other hand, computer density is calculated from the number of computer per number of population.

2.5.2 Internet Utilization in Indonesia

Density of internet user, which is internet user number per 100 people of Indonesia, indicates more optimistic profile than before. That indicator is estimated by APJII (Asosiasi Penyedia Jasa Internet Indonesia / Indonesia Internet Service Provider Association). In the first development in 1997, the density number of internet user is estimated to be 0.19%. in 2007, there are 11.08 internet user per 100 people of Indonesia which means the density is 11.08%. the density growth is estimated to be

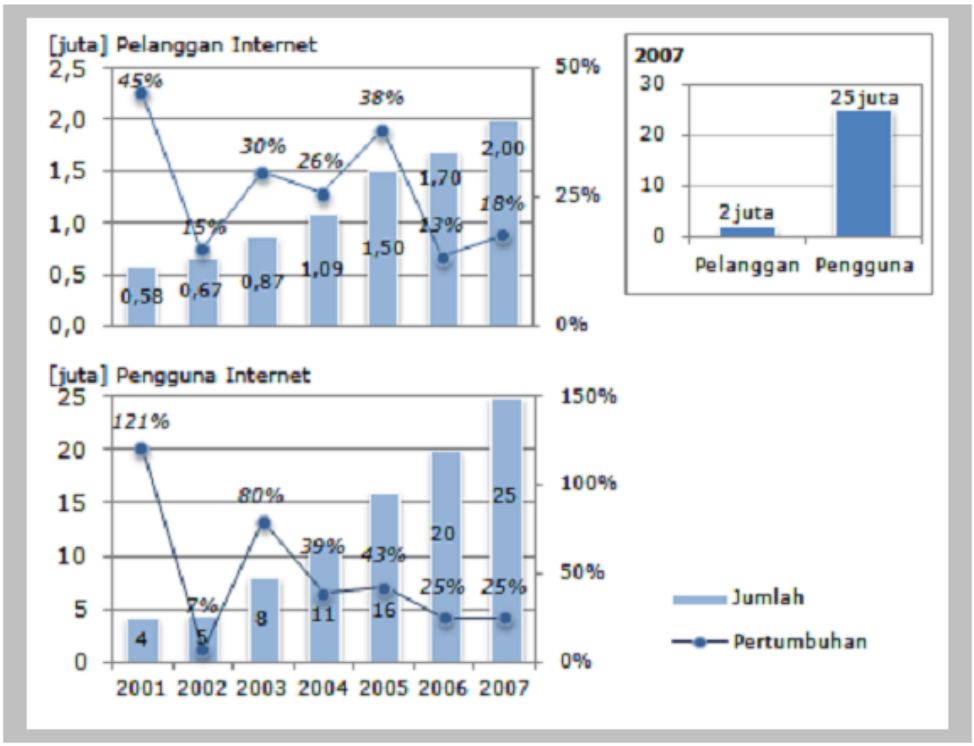
23% in 2007 compared to one year before. Average growth of internet user in Indonesia is about 40% per year from 2003 till 2007.



Sumber : Asosiasi Penyelenggara Jasa Internet Indonesia (APJII), Badan Pusat Statistik (BPS)

Picture 2504. Internet user density growth in Indonesia (1997 - 2007)

Source: ICT Indicator 2008, The Agency for the Assessment and Application on Technology, Indonesia (2008)



Sumber : APJII, 2007

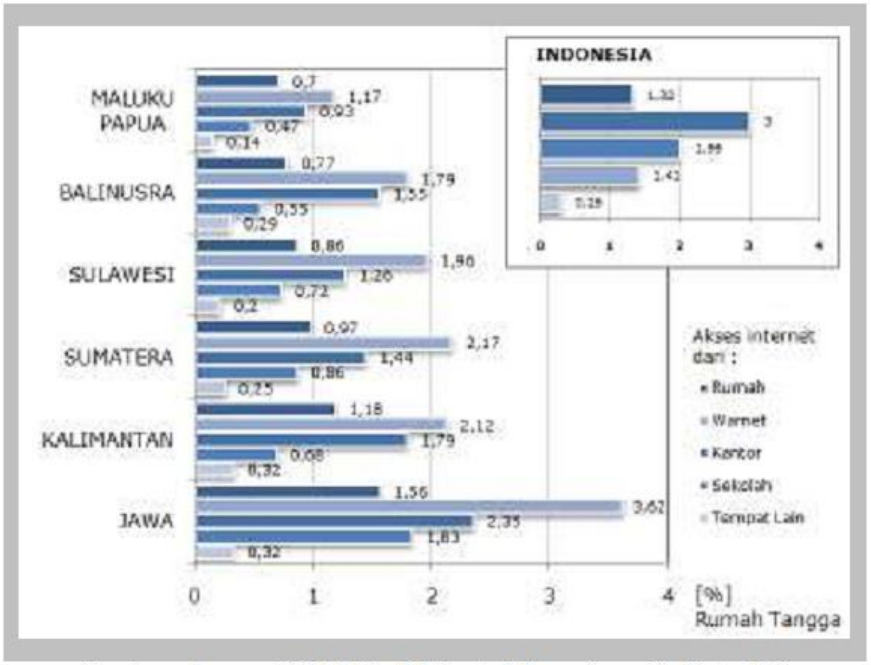
Picture 2505. Internet user and Internet subscriber number in Indonesia (2001 - 2007)

Source: ICT Indicator 2008, The Agency for the Assessment and Application on Technology, Indonesia (2008)

Internet subscriber number is the minimal number of internet user in a certain area, where the subscriber is a person or organization who spend certain expenses to subscribe internet service. Whereas, internet user is a person who does not or does not have to spend any expense for using internet. In other words, internet user number should be bigger than internet subscriber number.

Internet user number growth in Indonesia since the beginning of internet usage in 1995 until 2007 shows more increase compared to the internet subscriber number growth. From 1996 to 2000, internet subscriber number is 20% of the total internet user. While in 2007, internet subscriber number is only 8% of the total internet user.

Furthermore, internet utilization is closely related to the access easiness of internet which is affected by several factors. Those factors mainly include the provision of infrastructure and the capability of people. From infrastructure provisioning, internet access for households member can be home access, and outside home, such as office, internet café, school, etc.

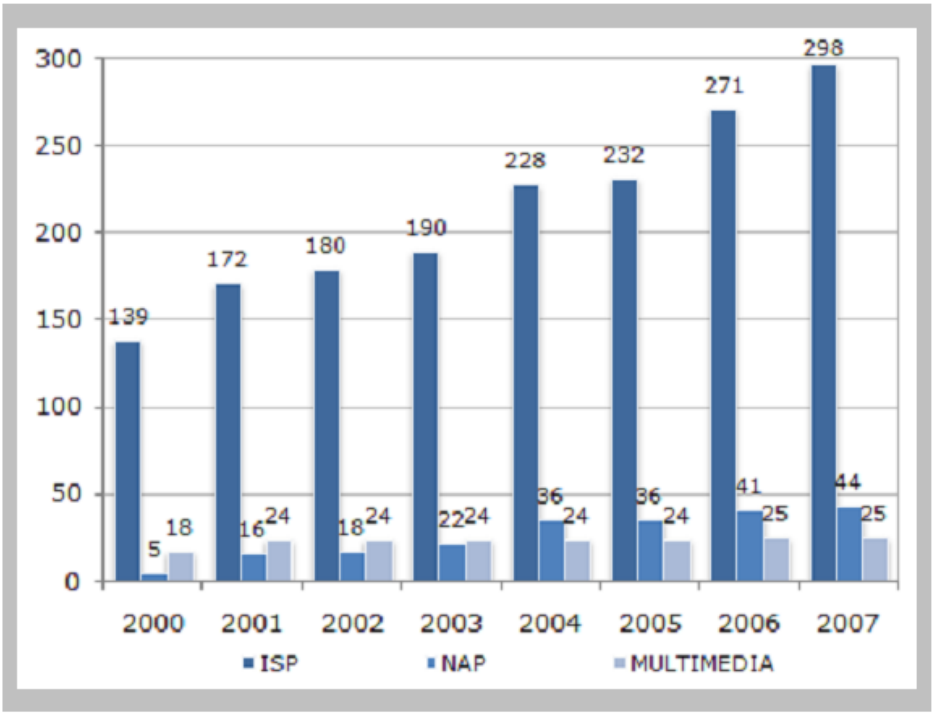


Sumber : Susenas 2007 BPS, diolah untuk kepentingan Indikator TIK

Picture 2506. Percentage of people who access internet, inside home or outside home in Indonesia (2001 - 2007)

Source: ICT Indicator 2008, The Agency for the Assessment and Application on Technology, Indonesia (2008)

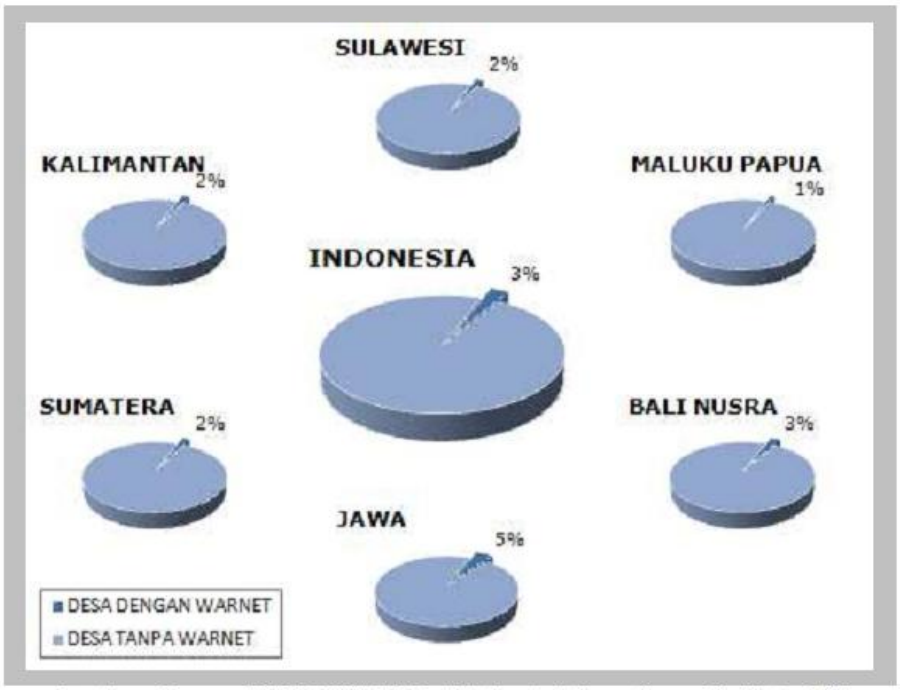
Internet development is also closely related to the infrastructure provision such as the existence of Internet Service Provider (ISP) which is functioned as the link between internet user with Global ISP and NAD (Network Access Point) as the backbone internet. Based on APJII (Association of Indonesia Internet Service Proveder), issued license from Directorate General of Post and Telecommunication for Internet Provision in 2007 is 298 for ISP, 44 for NAP and 25 for multimedia. It can be seen from the graphic below that the ISP license is intended to increase through the years.



Sumber : APJII, 2007

Picture 2507. Total license for ISP in Indonesia (2000 - 2007)

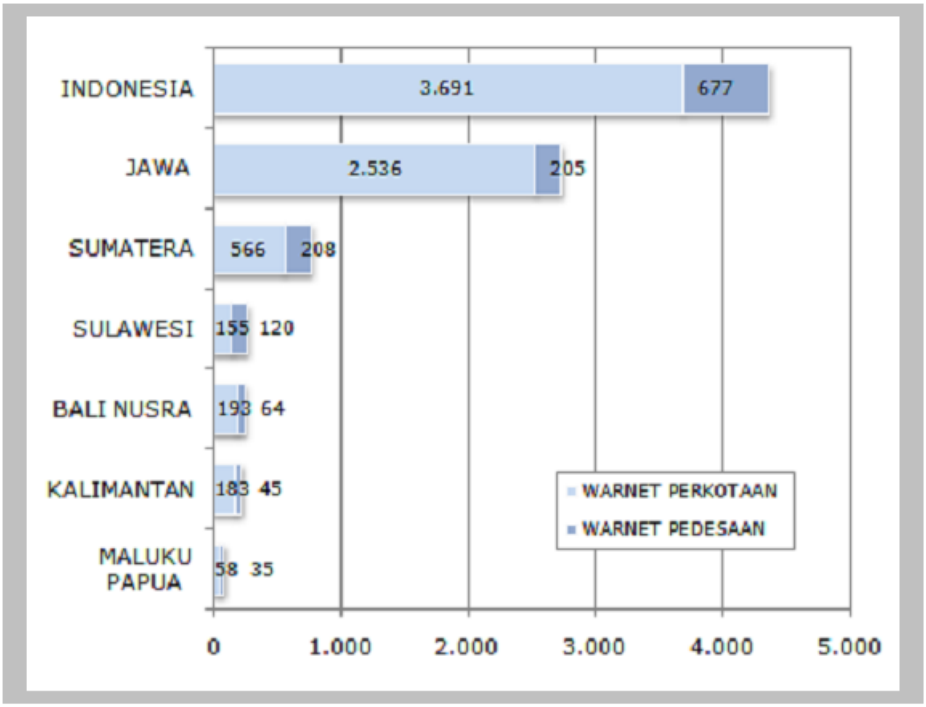
Source: ICT Indicator 2008, The Agency for the Assessment and Application on Technology, Indonesia (2008)



Sumber : Sensus PODES 2005 BPS, diolah untuk kepentingan Indikator TIK

Picture 2508. Percentage of Internet Cafe Total in Indonesa.(2005)

Source: ICT Indicator 2008, The Agency for the Assessment and Application on Technology, Indonesia (2008)



Sumber : Sensus PODES 2005 BPS, diolah untuk kepentingan Indikator TIK

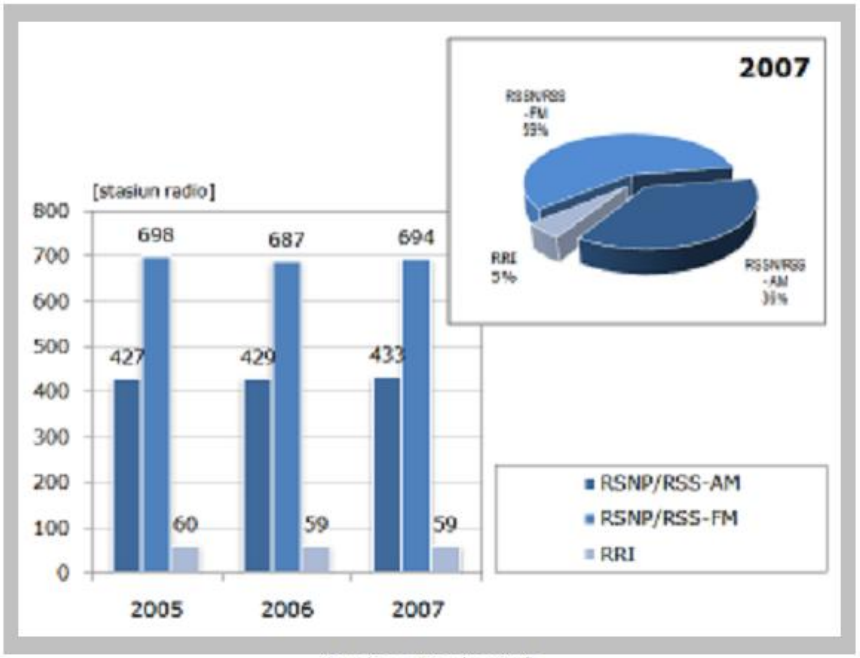
Picture 2509. Total and distribution of Internet Cafe in Indonesa.(2005)

Source: ICT Indicator 2008, The Agency for the Assessment and Application on Technology, Indonesia (2008)

2.6 Television and Radio

Radio is one of electronic broadcasting media which is an effective tool in information spreading or broadcasting. In 2004, more than half households in Indonesia owned television and radio already. In 2007, proportion of Radio Broadcasting did not get any significant change compared to two years before. 95% of 1,186 radio broadcast in Indonesia belongs to private radio broadcasting. The rest 5% belongs to Government Radio broadcast which is RRI (Radio Republik Indonesia).

Furthermore, 59% of private radio broadcast operates in FM (Frequency Modulation). The rest 37% works in MW/AM (Amplitude Modulation). RRI operates in SW, MW/AM and FM and owns 59 stations in Indonesia.

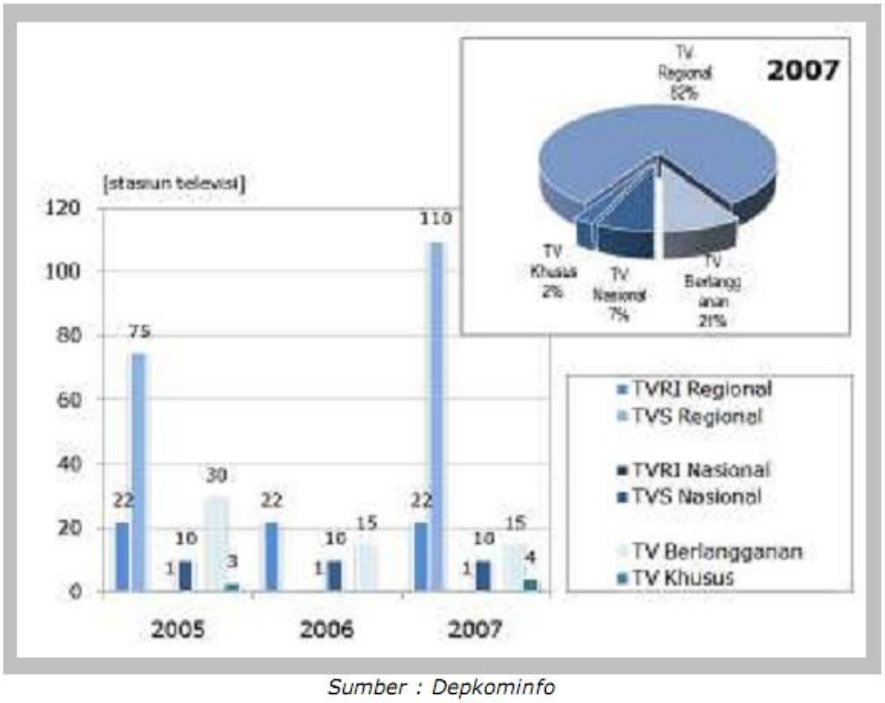


Sumber : Depkominfo

Picture 2601. Media of radio broadcasting in Indonesa.(2005-2007)

Source: ICT Indicator 2008, The Agency for the Assessment and Application on Technology, Indonesia (2008)

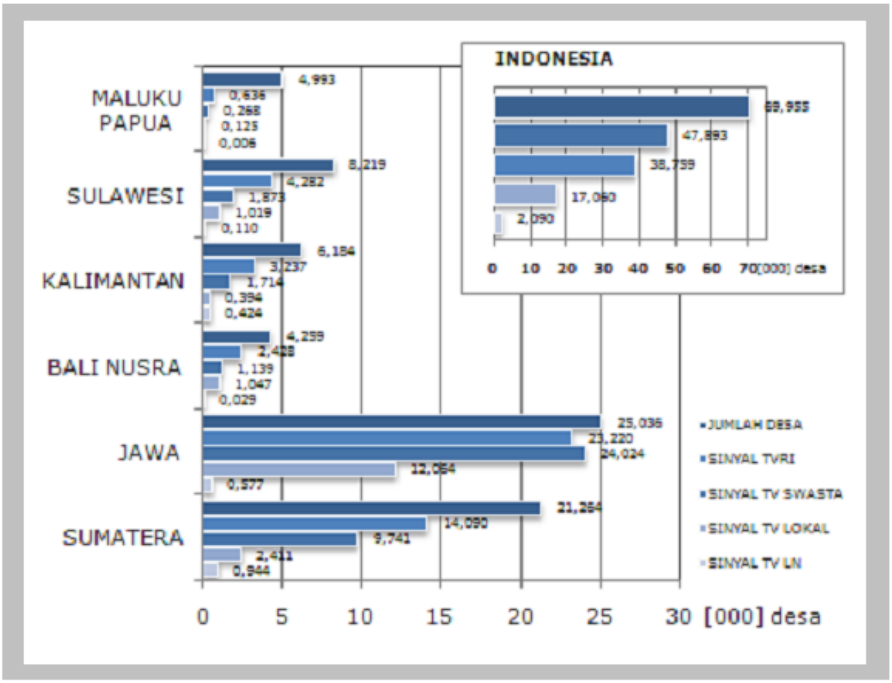
Television, as an electronic broadcasting media in Indonesia, in 2007 has 11 TV stations which operates under national license. All stations are placed in Jakarta with 180 relay stations are spread over Indonesia. One of the 11 stations belongs to Government which is TVRI (Televisi Republik Indonesia), and the rest 10 stations belongs to private television. Special Television service in 2007 has 4 stations, which have special program such as Education Television, politics channel, and executive channel.



Sumber : Depkominfo

Picture 2602. Media of television broadcasting in Indonesa.(2005-2007)

Source: ICT Indicator 2008, The Agency for the Assessment and Application on Technology, Indonesia (2008)



Sumber : Sensus PODES 2005 BPS, diolah untuk kepentingan Indikator TIK

Picture 2603. Television signal existence in Indonesa.(2005)

Source: ICT Indicator 2008, The Agency for the Assessment and Application on Technology, Indonesia (2008)

2.7 Existing Technology in Indonesia

As a country with high population and archipelagic land, Information and Telecommunication Technology existing in Indonesia is set to match the condition requirement of Indonesia. The condition requirement includes many aspects of society, education, politic, economic, geographic, and regulation.

For telecommunication service provided in Indonesia[9], generally it can be categorized into:

[9] Source: Seminar Paper, Basuki Yusuf Iskandar, Director General of Post and Telecommunication (2007)

- Fixed Telephony
- Fixed Wireless Access (WLL using CDMA)
- Fixed Wired Access (PSTN)
- Mobile Telephony
- GSM Access (2G, GPRS, EDGE, 3G, 3.5G, HSPA)
- CDMA (IS-95, 2000-1x, EV-DO, EV-DV)
- Internet
- Broadband

The telecommunication access technology can be listed as below:

Jaringan Akses

	Operators	Technology	Coverage	Total Subscriber (Dec. 2006)
PSTN	Telkom, Indosat, BatamBintan	Copper	National, Regional	~ 8,7 millions
Seluler	Telkomsel; Indosat; Excelcomindo; Sampoerna Tel; Mobile8; Natrindo; HCI; Smart Telekom	GSM, CDMA450, cdma20001x, WCDMA	National; Regional (Bakrie)	~ 63 millions
FWA	Bakrie(Esia); Telkom (Flexy); Indosat (Starone)	cdma20001x	Per area code	~ 5.75 millions
BWA	Many operators (SME majority)	Freq hopping, spread spectrum	Regional	~ 500 millions
Satelit	-PSN (ACeS), Satelit Garuda-1 -Amalgam (Iridium)	- Digital - Digital	- Asia Pacific - Worldwide	

Table 2701. Telecommunication access type in Indonesa.(2007)

Source: Seminar Paper, Basuki Yusuf Iskandar, Director General of Post and Telecommunication (2007)

The telecommunication transmission in Indonesia by using the Backbone is divided into International Backbone and Domestic Backbone. Indonesia uses Satellite and Submarine Cable Network for International Backbone. Indonesia also uses Satellite, Fiber Optic and Microwave Link for Domestic Backbone. International Backbone is handled by Telkom and Indosat as two State-Owned Enterprises of Indonesia. Domestic Backbone is handled by Telkom, Indosat, Excelcomindo, Icon+, and PSN.

Table 2702. International backbone propotion in Indonesa.(2007)

Source: Seminar Paper, Basuki Yusuf Iskandar, Director General of Post and Telecommunication (2007)

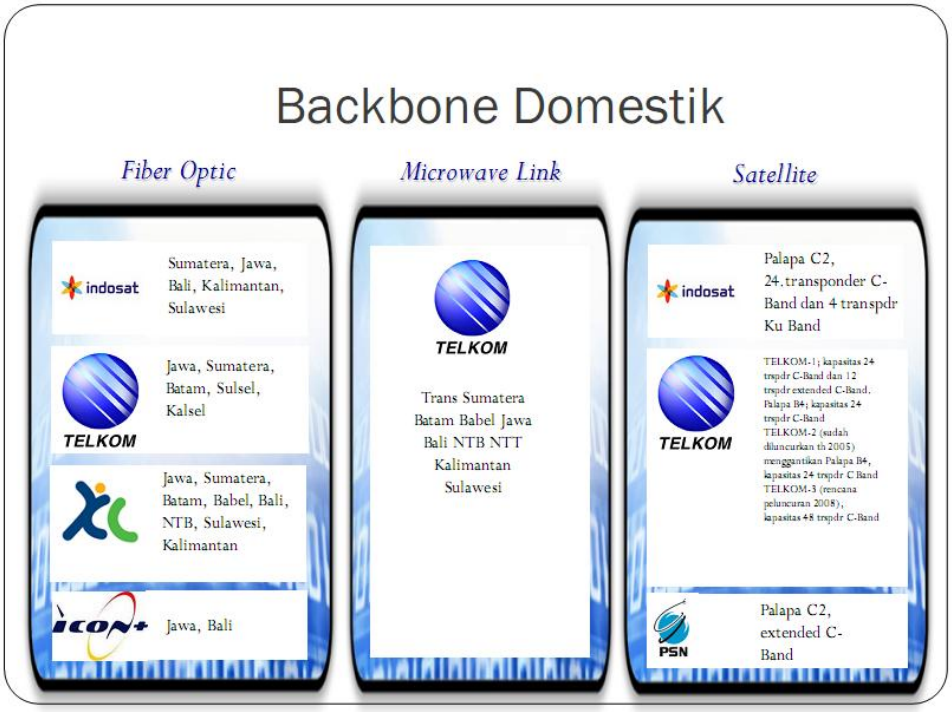


Table 2703. Domestic backbone propotion in Indonesa.(2007)

Source: Seminar Paper, Basuki Yusuf Iskandar, Director General of Post and Telecommunication (2007)

Chapter 3 Status of Rural ICT in Indonesia

3.1 Between Rural Area and ICT in Indonesia

Most of Indonesian people recently live in the rural area. It is about 60% of total people of Indonesia. Rural area is described with its low economic productivity, high poverty, and low quality of settlement in rural. In other hand, poverty level of in rural areas is so high based on statistic indicator. In 2003, there are 37.3 million of poor people in Indonesia (17.4% of total people). It consists of 20.2% in rural area and 13.6% in urban area. It is shown that the rural areas have more percentage of poverty than the urban area has. [1]

Through the growth of rural areas, telecommunication industry grows rapidly, but without equal distribution of infrastructure and services. Thus, there are still so many rural areas which do not get any telecommunication service yet. In 2009, there are still 31,824 villages which were not touched yet by any telecommunication service. Telecommunication access demand is going step by step which was firstly focused on public telephone provision. The growth of the demand is increased as the economic condition increases due to telecommunication industry.

Telecommunication gap is really happens among one area to the other areas in Indonesia. Until 2008, most of the telecommunication infrastructure (86%) exists in Sumatera, Java and Bali only. Only 14% of total telecommunication infrastructure exists in Eastern Indonesia. Telecommunication gap also exists between rural area and urban area. Tele-density of Jakarta, Bogor, Tangerang, Depok, Bekasi and other urban area has reach 35% or at least 11-25%. Meanwhile, tele-density in rural areas only reaches 0.25%. Until 2009, there were already 43,000 villages (64% of total villages) which had telecommunication access at least only one single public telephone. [2]

Indonesia is an archipelagic country which possesses a very diverse geographic characteristic and resources. There are many regions with good economical potency which require infrastructure support especially telecommunication infrastructure. The main problem in establishing rural ICT is the very high cost of investment and operation. Meanwhile the income earned from the service is low. Therefore, investment in rural areas, isolated areas, and border areas is not commercially viable. In this case, government arranges the Universal Service Obligation program to provide rural ICT.[3]

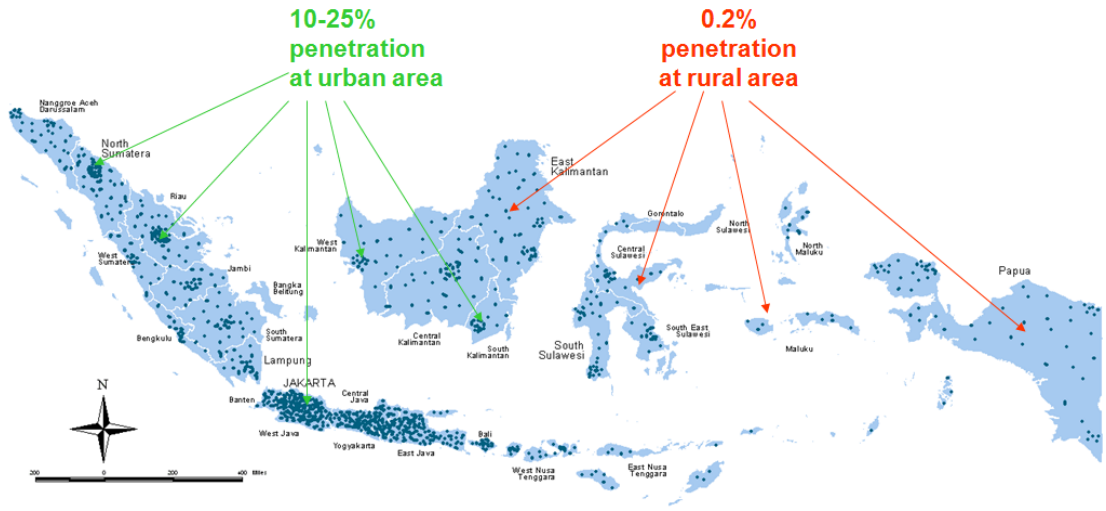
3.2 ICT Penetration in Rural Area in Indonesia

Indonesia is a high populated country which demands a big use of information and communication technology. The demand of ICT is massively large already. But in contrast, the economic condition of Indonesia brings limitation of ICT utilization in society. By the end of 2006, telecommunication access infrastructure in Indonesia consisted of 14.6 million fixed lines, where 8.7 million was fixed line and 5.9 million was fixed wireless access, and 63 million cellular infrastructures. [4]

Based on the philosophy of telecommunication, there is such a willing from the government of Indonesia to build ICT infrastructure in the whole area of Indonesia. It is also encouraged from a fact that ICT provision of information plays a significant role in educating and enhancing the economical welfare of people. The first approach has been taken through motivating several remote and rural areas to utilize ICT service for their life. This approach faced many obstacles where the ICT services are not affordable enough for the rural people. [2]

In the early condition, rural area in Indonesia almost has not any contact with Information and Communication Technology. There is not any internet or telephony service. The only media people rely on is only postal service. Information and Communication Technology is only well-penetrating the urban area. A significant gap of information between urban and rural area is so far so that leads more significant gap of economic condition between urban and rural area. As the world biggest archipelagic country, Indonesia has so many villages, forest, and remotes areas. Those rural characteristic of Indonesia give certain challenge on how to establish universal service of telecommunication.

Recently, there is about 25% penetration of ICT in urban areas. While in rural areas, ICT penetration values only 0.2% [4]. Telecommunication penetration in urban is 125 times bigger than what exists in rural. The ICT penetration of Indonesia can be briefly described as follows:



Picture 3201. Penetration map of telecommunication in rural and urban area of Indonesia [4]

So far, Indonesian rural ICT development focuses more on provision of public telephone access. Later, it also initiates to provide internet access for rural areas. Until 2009, two main provisions of Indonesian rural ICT development are “desa berdering” and “desa pinter” program. Those two programs dominantly set the condition and status of rural ICT till recent condition. Desa Berdering means Ringing

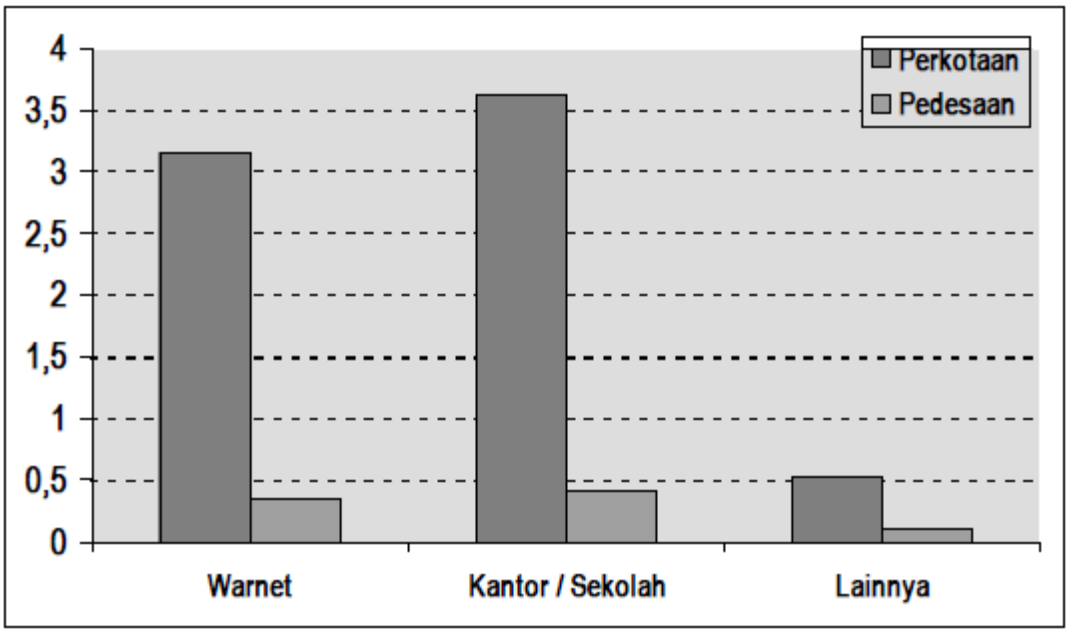
Village. This program is about public telephony provision in rural area (the villages). While, Desa Pinter ,which stands for Desa Punya Internet (Village Has Internet), literally means Smart Village. This program is about public internet provision in rural area (the villages). Therefore, until now, rural ICT status is still about developing telephony and internet access only. [2]

Indonesia has more rural and remote areas (villages) than urban areas (metropolitan city) [1]. Those facts bring certain difficulty to let whole people be able to access ICT services. People capability in accessing telecommunication services really depends on the economical capability of the people to own ICT set. In Indonesia villages, there are no more than 3% of total households who own telephony set. There are also only 0.2% of total households in villages who own computer [5]. In mobile telephony service, low utilization of phone number resources indicates that the service is not affordable yet for the rural customer. The statistic data which can describe the ICT facilities owned by Indonesian households is shown as follow. This data can also be used to describe the ICT status among rural households.

Uraian	Perkotaan		Pedesaan		Perkotaan + Pedesaan	
	Jumlah	%	Jumlah	%	Jumlah	%
Jumlah rumahtangga (juta)						
- seluruhnya	25,460	x	33,304	x	58,764	x
- memiliki telepon	6,577	25,83	1,128	3,39	7,705	13,11
- memiliki HP	8,998	35,34	2,731	8,20	11,729	19,96
- memiliki telepon dan HP	4,592	18,04	0,533	1,60	5,125	8,72
- memilki komputer	1,952	7,67	0,209	0,63	2,161	3,68
Jumlah rumahtangga pemi-						
lik HP (juta)	8,998	100,0	2,731	100,0	11,729	100,0
- punya 1 nomor HP	5,676	63,08	2,102	76,95	7,777	66,31
- punya 2-4 nomor HP	2,907	32,31	0,454	16,63	3,362	28,66
- punya 5 nomor HP	0,415	4,61	0,175	6,42	0,590	5,03

Table 3201. Ownership of Telephone set, Mobile Phone and Computer in 2005 (in million) [5].

People's interest in using internet access can be seen by the number of access through outside of home. Internet access outside of home shows the interest of people in utilizing internet access even though they do not have internet in their home [5]. The statistic below shows that the urban households still has more utilization and interest in using internet access compared to the rural households.



Picture 3202. Percentage of households that access internet outside of home in 2005 [5]

ICT illiteracy in Indonesia is always decreased at least in the last one year. in 2007, it was recorded that there are 38,471 villages without telecommunication access. In 2008, the number was decreased into 31,824 villages. This development can be reach by the work of government via Universal Service Obligation program [6].

NO	PROPINSI | PROVINCE	Sisa Desa WPUT *Rest of Villages subject to Telecommunication Universal Service Areas*
1	NANGGROE ACEH DARUSSALAM	3,611
2	SUMATERA UTARA | North Sumatera	2,809
3	SUMATERA BARAT | West Sumatera	1,695
4	RIAU	701
5	JAMBI	751
6	SUMATERA SELATAN | South Sumatera	1,752
7	BENGKULU	969
8	LAMPUNG	793
9	BANGKA BELITUNG	141
10	KEPULAUAN RIAU | Riau Islands	90
11	JAWA BARAT | West Java	1,038

12	JAWA TENGAH | Central Java	1,551
13	D.I. YOGYAKARTA	19
14	JAWA TIMUR | East Java	1,436
15	BANTEN	530
16	BALI	139
17	NUSA TENGGARA BARAT | West Nusa Tenggara	198
18	NUSA TENGGARA TIMUR | East Nusa Tenggara	2,031
19	KALIMANTAN BARAT | West Kalimantan	954
20	KALIMANTAN TENGAH | Central Kalimantan	1,131
21	KALIMANTAN SELATAN | South Kalimantan	914
22	KALIMANTAN TIMUR | East Kalimantan	798
23	SULAWESI UTARA | North Sulawesi	474
24	SULAWESI TENGAH | Central Sulawesi	744
25	SULAWESI SELATAN | South Sulawesi	905
26	SULAWESI BARAT | West Sulawesi	236
27	SULAWESI TENGGARA | South East Sulawesi	929
28	GORONTALO	184
29	MALUKU	710
30	MALUKU UTARA | North Maluku	576
31	PAPUA	2,247
32	IRIAN JAYA BARAT | West Irian Jaya	768
JUMLAH | TOTAL		**31,824**

Table 3202. Villages without telecommunication access in 2008 [6]

Picture 3203. Rural area blocks which would be targeted as USO Program in 2008 [6]

3.3 Technology Utilization of Rural IC in Indonesia

In 2004, Government built telephony access in several villages in 27 provinces of Indonesia. The telephony access was built with various concept and technology due to each regional characteristic. There are at least five technologies used in rural telephony namely Radio Based, cellular with CDMA 450Hz (CDMA IS-95), Satellite based (VSAT), PFS (Portable Fixed Terminal), and IP Based (NGN) [3]. Telephony access is mostly made as a public access. The statistic data below describes the overall usage of telephony technology. From the statistic below, it also can be seen that almost all telecommunication provision only stands for 1 unit of telephone connection for one village. The unit is public telephone for sure.

NO	PROPINSI	TAHUN 2004									
		TEKNOLOGI									
		RADIO		SELULER		VSAT		IP BASED		PFS	
		DESA	SST	DESA	SST	DESA	SST	DESA	SST	DESA	SST
1	BANTEN	0	0	0	0	0	0	0	0	40	40
2	JAWA BARAT	0	0	0	0	0	0	0	0	2	2
3	JAWA TENGAH	0	0	0	0	0	0	0	0	45	45
4	BABEL	0	0	0	0	0	0	0	0	0	0
5	BENGKULU	19	19	0	0	0	0	0	0	0	0
6	JAMBI	11	11	0	0	0	0	0	0	0	0
7	LAMPUNG	0	0	314	314	0	0	0	0	0	0
8	NAD	62	62	0	0	0	0	0	0	0	0
9	RIAU	58	58	0	0	0	0	0	0	0	0
10	SUMBAR	21	21	0	0	0	0	0	0	0	0
11	SUMSEL	103	103	0	0	0	0	0	0	0	0
12	SUMUT	112	112	0	0	0	0	0	0	0	0
13	GORONTALO	0	0	0	0	0	0	0	0	32	32
14	MALUKU	0	0	0	0	0	0	0	0	40	40
15	MALUKU UTARA	0	0	0	0	0	0	0	0	16	16
16	NTB	0	0	0	0	0	0	0	0	124	124
17	NTT	0	0	0	0	10	20	0	0	71	71
18	PAPUA	0	0	0	0	5	10	0	0	268	268
19	PAPUA BARAT	0	0	0	0	0	0	0	0	0	0
20	SULSEL	0	0	0	0	0	0	9	288	311	311
21	SULTENG	0	0	0	0	0	0	0	0	286	286
22	SULTRA	0	0	0	0	0	0	0	0	145	145
23	SULUT	0	0	0	0	0	0	0	0	58	58
24	KALBAR	0	0	0	0	0	0	0	0	97	97
25	KALSEL	0	0	0	0	0	0	0	0	42	42
26	KALTENG	0	0	0	0	0	0	0	0	27	27
27	KALTIM	0	0	0	0	0	0	0	0	13	13
SUB TOTAL		**386**	**386**	**314**	**314**	**15**	**30**	**9**	**288**	**1.617**	**1.617**
TOTAL DESA		**2.341**									
TOTAL SST		**2.635**									

Table 3301. Statistic data on telephony technology usage in rural area of each province[3]

References

[1] ”Indonesian National Census 2000”

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Chapter 4 Rural ICT Policies, Programs, Initiatives

4.1 Background

In Indonesia the rural ICT policies, programs and initiatives come from many institution. Government, Private and community groups have also intiative for obtaining and providing ICT access for rural area.

This chapter focuses only on the initiative that significant is scale, sustainable organization and regulatory support. Other initiative who implemented under ad-hoc basis, pilot project or small scale deployment are discussed in Chapter 5.

The initiative that meets the terms is Universal Service Obligation (USO) Program managed by Ministry of ICT.

Universal Service Obligation is a scheme that Indonesia runs for providing the universal telecommunication access in rural and remote areas. With USO scheme, Indonesia still puts more focus on telephony access and then later also on internet access.

USO scheme is intended to answer the challenges of rural ICT development, especially the financial issues as the main challenge. It is a fact that investment on fixed line for rural IC in remote areas needs high capital with low Return of Investment (RoI). Development of ICT in rural area is much more expensive. That condition brings very less attraction in business point of view. On the other hand, affordable and user friendly technology and service are also required for the characteristic of rural people. Therefore, in order to face those challenges USO scheme is meant to make the efficient ICT development for rural areas where the business and the universal telecommunication philosophy can meet.

4.2 Short History in Approaching USO

Telecommunication sector in Indonesia has been growing rapidly in the last 15 years. There are already numerous policy and regulation to stimulate the growth of tele-density and the telecommunication market. Successful policy reform in stimulating national tele-density growth was initiated by implementing KSO (Operational Cooperation) strategy in 1994. That success was shown by installing 3.1 million telephone connection units in period of 1993 to 1997. That was a great result since in 1992 there were only 1.5 million telephone connection units. However, the KSO scheme could not be continued because of economy crisis in 1997/1998 so that the installation target cannot be reached. Then, government decides to liberalize telecommunication sector and accelerate the transition to full competition.[1]. Then, the Government arranged the 1999 Law Number 36 about telecommunication which one of the contents is to apply new concept of rural telecommunication provision. The

concept is USO (Universal Service Obligation). It says that USO is the obligation of all telecommunication providers where the rule is stated by the Government. [2].

Generally, the main problem in telecommunication development of Indonesia is the limited funding capability of Government and Private. Hence, the infrastructure development cannot meet the demand. Classical factor why there is unwilling among telecommunication industry to provide service access in remote and rural areas is because a perception that those areas is not profitable. Actually, market potency in remote and rural area has a big opportunity if it is taken care with universal access and universal service development strategy. That strategy is implemented through USO program.

In principle, USO is program of subsidy. Numerous business players of telecommunication have been focusing in the urban areas with earning big revenue. In USO scheme, part of urban telecommunication revenue subsidizes the rural telecommunication cost with its low revenue. This is to ensure that the telecommunication service can be universally provided. Practically, at the first time the USO fund was 0.75% of Telco revenue. [3]

4.3 USO Overview

Based on Government Regulation No.52/2000, it is mentioned that definition of USO in telecommunication sector is accessibility provision for areas or part of people which are not covered yet by any network or telecommunication service.

USO scheme provides the cost sharing in rural ICT development. Part of urban revenues will be used to subsidize in providing the rural ICT. In this scheme, the cost sharing exists among the operators and the government.

Till the end of 1990s, in monopoly regime, Indonesia required 20% investment for providing telecommunication service in rural and remote area. For that reason, the Government generated “KSO” (Operational Cooperation) between incumbent operator (PT.Telkom) and vendor or closed network satellite operator. The main target of Indonesia was and is providing basic telephone access to whole area of Indonesia including the rural and remote ones. But unfortunately, the program failed to accomplish the target due to economic crisis in 1998. [4]

In 2000’s, during the transition period from monopoly to full competition, the Government took the necessary actions to strengthen the basis for competition e.g. USO pilot project. In this time, government targeted to reach 1 basic telephone for 1 village. [4]

In 2003, Indonesian Government had built initial telecommunication infrastructure at rural areas. 3051 telephone connection units were built in 3013 villages. In 2004, 2635 telephone connection units were built in 2341 villages. Based on the field evaluation, telecommunication facilities were not well-occupied yet and many aspects in management policy were not clearly regulated yet by Ministry Decree No.: 34 year 2004 about Universal Service Obligation. Therefore, the infrastructure building was not to give significant result which can be used sustainably by the society. [4]

Based on that problem, Ministry of Communication and Informatics has reformed the policy for re-designing the planning and scheme of USO development, which are: [4]

- Item Procurement Scheme was reformed into Service Procurement Scheme by Rental Concept
- Operation and Maintenance was separated and then integrated with Facilities Procurement
- There was service sustainability guarantee by the service provider
- Operational risk was responsibility of operator
- Financing was in earmark concept
- Contact period at lasts for 1 year

Contract was changed to Performance Based Contract

Now, rural ICT development program was divided into three terms: [4]

- Short term: In 2009, there will be 31,824 ringing villages (villages with telephone access) in Indonesia.
- Middle term: In 2015, there will be smart villages (desa pinter), internet-served villages (desa punya internet) in Indonesia, by providing information access in every districts.
- Long term: There will be so-called information society in 2025 by organizing focused-training, information access occupancy, developing TV broadcast based on society needs and any other information services.

4.4 Legal Reference of USO Program

Implementation of USO program in order to provide universal access and service of telecommunication in rural and remote areas is based on several law and act. The legal references in implementing USO program are: [2]

- Law Number 36 Year 1999 about Telecommunication
- Government Regulation No.53 Year 2000 about Telecommunication Provision
- Ministerial Regulation No.4 Year 2001 about Fundamental National Technical Plan 2000 in National Telecommunication Development
- Ministerial Regulation No.34 Year 2004 about USO Implementation
- Ministry of Telecommunication and Informatics' Regulation No.11/Per/M.Kominfo/04/2007 about Telecommunication USO Provision
- Ministry of Telecommunication and Informatics' Regulation No.38/Per/M.Kominfo/09/2007 about Revision of Regulation No.11/Per/M.Kominfo/04/2007

- In this regulation, government gives support for the success of USO program through:
- Giving permission for Regional Local Fixed Network with frequency 2.3 GHz.
- Support for Domestic Telecommunication Industry development by domestic level of 35% for CAPEX and 20% for 2.3 GHz devices
- Ministry of Telecommunication and Informatics' Decree No. 145/Kep/M.Kominfo/4/2007 about Determining USO Service Area
- Ministry of Telecommunication and Informatics' Decree No. 418/Kep/M.Kominfo/9/2007 about Revision of Annex in Ministry of Telecommunication and Informatics' Decree No. 145/Kep/M.Kominfo/4/2007
- Director General of Post and Telecommunication's Regulation No. 247/DIRJEN/2008 about Categorizing 31,824 USO Service Areas into 11 Blocks in 7 Project Packages.

4.5 USO Funding

Funding in rural ICT development is obtained from Contribution for USO (KKPU) of all telecommunication operators and service providers which get license form Department of Communication and Informatics. Contribution from the operator is 0.75% of the company gross revenue, which is collected in the end of every 3 months to BTIP Rural Telecommunication and Informatics Body. [3]

Contribution for Universal Service Obligation is based on regulations below:

- Government Regulation No. 28 year 2005 about tariff for Company's non-tax revenue. In this resolution, it is stated that the amount of the contribution is 0.75% of the revenue.
- Ministry of Communication and Informatics' Regulation No. 05/PER/M.KOMIFO/2/2007 about operational guidance of tariff management in USO.

In the process of compiling the government's regulation which specifically regulates USO, several problems in financial substances occured. Due to that problem, in 2006 Department of Finance recommended a formation of finance manager body for USO.

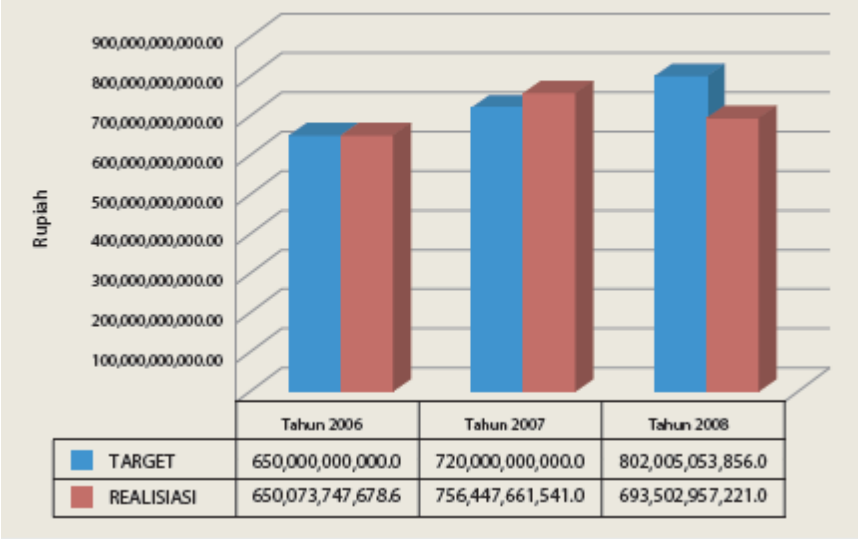
Temporary financial body was established by Directorate General of Post and Telecommunication. Several years after it, through Ministerial Regulation No. 35/PER/M.Kominfo/11/2006, a financial organization for USO was built with name Balai Telekomunikasi dan Informatika Perdesaan (BTIP, Rural Telecommunication and Informatics Body). The task of the body is to manage the flow of USO funding. [3]

The contribution from telecommunication service provider is an obligation which is stated in government law. USO Contribution (hereinafter called KKPU) is paid to BTIP and categorized as the non-tax government income. In this scheme, the

management of the fund is done by BTIP. BTIP controls the use of fund and issue a financial report to government and public. Furthermore, the calculation of obliged KKPU is assessed by each company (self assessment). But, BTIP also does some annual check to each company's financial report. All companies must be audited by public auditor. USO funding is based on Annual State Budget scheme where gives certain challenges in USO implementation. [4]

No	Layanan Telekomunikasi	Jumlah Penyelenggara	% Kontribusi
1.	PSTN	4	25%
2.	Fixed Wireless	4	1,3%
3.	Sellular	8	60%
4.	Data Communication	6	
5.	Network	20	
6.	Network Access Provider	32	13,2%
7.	Internet Service Provider	154	
8.	Voice Over IP	24	
	Total	**252**	**100%**

Table 4501. List of Telecommunication Service Provider obliged to pay KKPU [3]



Picture 4501. Comparison between targeted and realized funding for USO [3]

4.6 USO General Scheme

In implementing its mechanism, Universal Service Obligation program in Indonesia has certain scheme to be concerned. This scheme is stated under Ministerial Regulation No. 32/ PER/M.KOMINFO/10/2008 about Universal Service Obligation. [5]

4.6.1 Type of Service

While the funding scheme is already described above, USO Implementation core business is provision of telecommunication access and service in remote and rural area. In Indonesia USO scheme, rural and remote area which must be concerned to be served with USO is called Wilayah Pelayanan Universal Telekomunikasi (WPUT, Universal Telecommunication Service Area). The telecommunication service meant by the USO program is about giving access and service of basic telephony, short message service (SMS/Text), and internet access.

The basic telephony and SMS provision include in Desa Berdering program (Ringing Village). Then, the internet access provision includes in Desa Pinter program (Smart Village), where Desa Pinter also stands for Desa Punya Internet (Village having internet). For Internet access provision, Government, through USO program, states several requirements to meet, which are:

- Minimum data transfer rate is 56 kbps, estimated from CPE to USO device.
- Maximum Latency is 750 ms, estimated from CPE to Indonesia Internet Exchange (IIX)
- Maximum Packet loss is 2%, estimated from CPE to Indonesia Internet Exchange (IIX)

Any other type of USO service proposed by any institution must meet the criteria of government regulation. [5]

4.6.2 USO Operator

USO Operator is any Telecommunication Service Operator which is licensed by the Government. USO Operator operates the USO service based on contract with BTIP. In this scheme, foreign investment in USO service is limited no more than 49%. USO operator can only develop the telecommunication access and service in their each assigned WPUT area. [5]

USO operators have privileges for: [5]

- Freedom to choose any telecommunication technology based on its compatibility to the demand, target and characteristic of area.
- Having interconnection with any other network provider
- Having Numbering resources as far as it is necessary
- Using frequency 2390 MHz – 2400 MHz only in the assigned WPUT area
- Continue the telecommunication network service commercially after the contract period ends (under certain regulation)
- Build certain configuration based on the WPUT area's characteristic

USO operators have obligation for: [5]

- Paying Operation Right Cost based on valid government regulation.

- Paying Radio Frequency Spectrum Usage Right Cost based on valid government regulation.
- Paying KKPU for USO based on valid government regulation.
- Using tools and devices which are certified already by the government
- Issuing maximum USO tariff based on the Ministerial Regulation No. 32/ PER/M.KOMINFO/10/2008 about Universal Service Obligation
- Issuing their own Financial Report and Bookkeeping
- Using domestic product as stated under Ministerial Regulation
- Providing USO quality service as stated on the contract
- Assuring interoperability system with any other provider system
- Doing bookkeeping for all sales and revenue, then reporting it to BTIP periodically
- Issuing Call Detail Record from each USO terminal to BTIP
- Using Capital Expenditure as less as 35% for procuring domestic product
- Assuring that at least 20% tools and devices in utilizing 2390 MHz – 2400 MHz frequency are domestic product
- Providing, Operating and Doing Maintenance the USO network and service.
- Building whole telecommunication network access in the assigned WPUT area.
- Assuring to build at least one service connection unit in the assigned area

USO operators are chosen by the government through auction process held by BTIP. USO implementation is divided into 7 project packages which cover 11 WPUT blocks. Each WPUT block covers several villages. In the auction process, each auction participant can apply more than one project package with each company financial consideration. And one auction participant can win more than one project package. The main basic factor to win the auction are at least: [5]

- USO Implementation Cost
- Quality of operation and maintenance of USO Network and Service.

4.6.3 License

License for those who win the auction process in order to conduct the USO service is given by the Minister of Telecommunication and Informatics Indonesia. The license is given by two steps. The first step is Operation Principle License. And the last step is Operation License. Minister issues the Operation Principle License at least 14 days after the contract is signed. The Operation Principle License is valid for 6 months. The licensed will be continued based on quality assessment by Directorate General of Post and Telecommunication. [5]

Operation license is issued at least after 10% of service connection units are ready to operate in each assigned WPUT and after the operator obtains Proper Operation Letter already. The evaluation of the operation can be done by sampling method. The Operation License is valid until the contract period is over. [5]

4.6.4 USO Criteria

USO Operation has to meet several basic principles:

- Neutral Technology
- Quality of Service
- Affordable tariff for rural

Neutral technology means that in the operation, the USO operators can assure that the technology can be sustainably applied to the operation for long time duration. Quality of service means that the service must meet the quality criteria based on the contract. Then, the affordable tariff is meant to enable the rural people to use the telecommunication service. [5]

4.6.5 Numbering

USO service numbering uses numbering system which is allocated already to the assigned operator. For operators which have no numbering allocation yet, numbering scheme is given by Directorate General of Post and Telecommunication. The routing for numbering has to reach the least cost routing or the most efficient routing. [5]

4.6.6 Interconnection

Every single telecommunication operator has to provide interconnection to the USO operators. Cooperation treaty in interconnection must be finished in less than 20 days since the day interconnection is proposed. USO operator may use internet protocol (IP) in interconnecting with any other telecommunication operator. [5]

Every single telecommunication operator has to prioritize the interconnection of USO operator. USO operator has to operate the service for incoming and outgoing not less than 8 hours based on the WPUT area's characteristic.

4.6.7 Contract

USO operation contract is multi-year contract for period of 5 years. The contract can be continued based on the result of evaluation. The USO operator has right to obtain the USO fund. The USO fund provided is based on the functional readiness and performance based of:

- Access provision process
- Telecommunication service
- Operation
- Maintenance

The USO operator deserves to obtain the whole sales income from the USO provision. The USO operator also has to be responsible for any risk of the sales income. In operating and maintenance, the USO operator can cooperate with surrounding people or small business unit among the people. People involvement in USO is done under written cooperation agreement with people. [5]

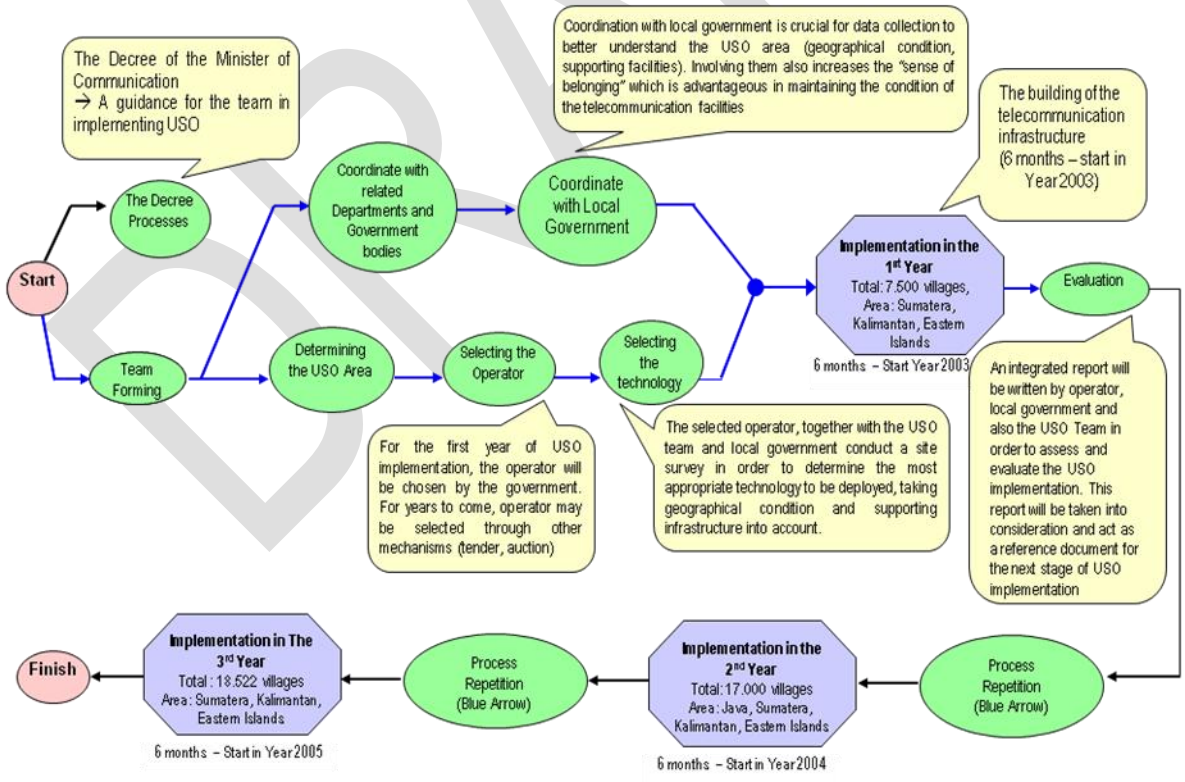
4.6.8 Evaluation and Monitoring

BTIP has a right to monitor and to evaluate the USO operation of each operator. In case that the USO operation does not meet the obligation stated on the contract, several sanctions can be applied:

- Contract discontinue
- License discontinue
- Fine based on the contract

[5]

Target of development in ICT access through USO scheme can be shown concisely by several tables and charts below:



Picture 4601. USO Scheme Flowchart [4]

4.7 Rural ICT Deployment and WPUT area

Indonesia is a big archipelagic country which needs focus share to develop every single area. This map below describes the USO projects deployment in Indonesia which is developed by the government. [3]

Picture 4701. USO Deployment Map of Indonesia [3]

The deployment areas are divided into several project packages:

Package 1

- WPUT 1 / AREA 1 (NAD, SUMUT DAN SUMBAR)

Package 2

- WPUT 2 / AREA 2 (JAMBI, RIAU, KEPRI, KEPALUAN BANGKA BELITUNG)
- WPUT 3 / AREA 3 (BENGKULU, SUMATERA SELATAN DAN LAMPUNG)

Package 3

- WPUT 4 / AREA 4 (KALBAR DAN KALTENG)
- WPUT 5 / AREA 5 (KALTIM DAN KALSEL)

Package 4

- WPUT 6 / AREA 6 (SULAWESI UTARA, GORONTALO DAN SULAWESI TENGAH)

- WPUT 7 / AREA 7 (SULAWESI BARAT, SULAWESI SEL;ATAN DAN SULAWESI TENGGARA)
- WPUT 9 / AREA 8 (MALUKU DAN MALUKU UTARA)

Package 5

- WPUT 8 / AREA 9 (PAPUA DAN IRIAN JAYA BARAT)

Package 6

- WPUT 10 / AREA 10 (BALI, NTB DAN NTT)

Package 7

- WPUT 11 / AREA 11 (BANTEN, JAWA BARAT, JAWA TENGAH, YOGYA DAN JAWA TIMUR)

(WPUT = Wilayah Pelayanan Universal Telekomunikasi, Universal Telecommunication Service Area)

NO	PROPINSI	Sisa Desa WPUT
1	NANGGROE ACEH DARUSSALAM	3,611
2	SUMATERA UTARA	2,809
3	SUMATERA BARAT	1,695
4	RIAU	701
5	JAMBI	751
6	SUMATERA SELATAN	1,752
7	BENGKULU	969
8	LAMPUNG	793
9	BANGKA BELITUNG	141
10	KEPULAUAN RIAU	90
11	JAWA BARAT	1,038
12	JAWA TENGAH	1,551
13	D.I. YOGYAKARTA	19
14	JAWA TIMUR	1,436
15	BANTEN	530
16	BALI	139
17	NUSA TENGGARA BARAT	198
18	NUSA TENGGARA TIMUR	2,031
19	KALIMANTAN BARAT	954
20	KALIMANTAN TENGAH	1,131
21	KALIMANTAN SELATAN	914
22	KALIMANTAN TIMUR	798
23	SULAWESI UTARA	474
24	SULAWESI TENGAH	744
25	SULAWESI SELATAN	905
26	SULAWESI BARAT	236
27	SULAWESI TENGGARA	929

.

Table 4701. Remaining Universal Telecommunication Service Area should be developed by Government [5]

NO	PROPINSI	TAHUN 2004									
		TEKNOLOGI									
		RADIO		SELULER		VSAT		IP BASED		PFS	
		DESA	SST	DESA	SST	DESA	SST	DESA	SST	DESA	SST
1	BANTEN	0	0	0	0	0	0	0	0	40	40
2	JAWA BARAT	0	0	0	0	0	0	0	0	2	2
3	JAWA TENGAH	0	0	0	0	0	0	0	0	45	45
4	BABEL	0	0	0	0	0	0	0	0	0	0
5	BENGKULU	19	19	0	0	0	0	0	0	0	0
6	JAMBI	11	11	0	0	0	0	0	0	0	0
7	LAMPUNG	0	0	314	314	0	0	0	0	0	0
8	NAD	62	62	0	0	0	0	0	0	0	0
9	RIAU	58	58	0	0	0	0	0	0	0	0
10	SUMBAR	21	21	0	0	0	0	0	0	0	0
11	SUMSEL	103	103	0	0	0	0	0	0	0	0
12	SUMUT	112	112	0	0	0	0	0	0	0	0
13	GORONTALO	0	0	0	0	0	0	0	0	32	32
14	MALUKU	0	0	0	0	0	0	0	0	40	40
15	MALUKU UTARA	0	0	0	0	0	0	0	0	16	16
16	NTB	0	0	0	0	0	0	0	0	124	124
17	NTT	0	0	0	0	10	20	0	0	71	71
18	PAPUA	0	0	0	0	5	10	0	0	268	268
19	PAPUA BARAT	0	0	0	0	0	0	0	0	0	0
20	SULSEL	0	0	0	0	0	0	9	288	311	311
21	SULTENG	0	0	0	0	0	0	0	0	286	286
22	SULTRA	0	0	0	0	0	0	0	0	145	145
23	SULUT	0	0	0	0	0	0	0	0	58	58
24	KALBAR	0	0	0	0	0	0	0	0	97	97
25	KALSEL	0	0	0	0	0	0	0	0	42	42
26	KALTENG	0	0	0	0	0	0	0	0	27	27
27	KALTIM	0	0	0	0	0	0	0	0	13	13
SUB TOTAL		**386**	**386**	**314**	**314**	**15**	**30**	**9**	**288**	**1.617**	**1.617**
TOTAL DESA		**2.341**									
TOTAL SST		**2.635**									

Table 4702. Technology usage and developed villages by USO projects [5]

4.8 USO Implementation Challenge

In implementing USO service, Indonesian Government faces several challenge from many aspects. The challenges come from the nature of the USO general scheme.[4]

USO Scheme uses open tender in auction for operator. In procurement aspect, this case give several challenges. The capex (capital expenditure) given by USO funds does not attract operator. But it more attracts telecommunication vendor or

contractor. Therefore, in this case the government tries to make join cooperation between vendor and operator. The vendor is so attracted bu the profit gained from equipment procurement. Then, it is often that traffic does not become the main interest for the bidder in the auction. [4]

Recall the funding scheme of USO which uses the State Budget scheme, in this case any procured equipment status is government assets. Therefore, the maintenance of the equipment has to obey the State Budget system. It limits the access of maintenance and brings it to slow maintenance.

Maintenance is also a difficult thing to do. The operator has lack of human resources at local level to do maintenance. The condition is more severed by the fact that certain level of damaged equipment can only be repaired in the capital city of country (Jakarta). Even for Radio point to point technology, the repaired equipment has to be removed from both central unit and remote unit.

In finance, it often happens that the generated revenues insufficient to cover maintenance. Maintenance contract from the government only covers the 1st year of deployment. Therefore, new maintenance contract has to be created every year. Due to the Annual State Budget scheme, the allocation for maintenance lead to time lags between the date of fund availability and the required time for repairing the equipment.

In the actual operation, there is a limited access to pre-paid account outlet which lead the customers often stop to utilize the service. When the post-paid scheme is applied, bad debt among the customer leads to difficult revenue collection. From whole problem, it is often that the traffic of service usage decreases through the time. Low traffic with same operational cost will not lead into good sales margin. Then there is no incentive for the operator to sustain the service. Then, the maintenance problem above will severe the condition where many telecommunication equipments cannot run their function.[4]

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[5] *“*Ministerial Regulation No. 32/ PER/M.KOMINFO/10/2008 about Universal Service Obligation*”*

Chapter 5 Case Examples of successful and innovative rural ICT projects

This aspect of data collection will involve detailed study of at least two specific rural ICT projects that have been implemented within the country, following one or more of the policies, programs, or other initiatives that have been identified in the previous sections. The purpose will be to describe in depth the scope and parameters of the projects, as representative examples of effective practices to promote rural ICT development. Information on each project case example will be based upon in-person review of the project operations, as well as study of the related policy implementation activities, funding and other financial data, and oversight and follow-up by the implementing agency. The national consultant will work closely with the international consultant to select, refine, and execute the case example research. Among the goals for information to be collected for each project will be the following:

5.1 Case 1: Local Government Initiative for E-Gov, Regency of Sragen

Regency of Sragen is one of regional government pioneered in the utilization of the Internet to support public service. The Regency of Sragen has famous with its optimized using the information of technology in Indonesia and at the same time become e-government icon at the national level.

5.1.1 Geographic locations, populations, and political divisions served by the project;

Sragen region is the third largest district in Solo region, covering an area of 941.55 square km. It consist of 20 sub districts, 12 kelurahan (smaller areas within each sub-district), and 196 villages.

The region is bordering Grobogan district in the north, Karanganyar in the south, Boyolali in the west, and Ngawi in the east. It has direct access to East Java Province (only 2 km to the east), and Surakarta city in (27 km southeast of Sragen). Its geographic area consists of fertile volcanic soil, particularly in the south of the Bengawan Solo River.

Sragen population remained quite constant over the last two years with 855,244 inhabitants and the population density of 908 per square km. About 412,206 people (48% of the total population) are employed in agricultural sector (51%), services sectors (19%), and hotel, trade & restaurants (13%). The education level is approximately 17.97% graduated from elementary school and 29% graduated from high school. Its population has access to educational institutions of two Universities, 27 Senior High Schools and 83 Junior High Schools.

The regional GDP is IDR 835,005.58 million with per capita income of IDR 929,230.79 (constant) with the growth rate of 4.83% (actual) and 10.77% (contrant GDP). The agricultural sector gives a quite high contribution to the total RGDP with 34.46%. Sragen benefits from fertile soils supported by good irrigation which makes it a main producer of wetland rice.

Regency of Sragen is served by infrastructure within and surrounding the region. The access to international airports with flights to Singapore, Kuala Lumpur, Jakarta, etc is about 27 km to Adi Sumarmo Airport, Solo; 100 km to Adi Sucipto Airport, Yogyakarta and 121 km to Ahmad Yani Airport, Semarang.

Access to railway stations connecting the southern part of Central Java with Jakarta, Bandung, Yogyakarta, Surakarta and Surabaya is about 30 km to Balapan Train Station, Solo and 100 km to Tugu Train Station, Yogyakarta. The access to major ports is 129 km to Tanjung Emas Port, Semarang 291 km to Tanjung Intan Port, Cilacap. The region has 31.15 km of national road, 87.45 km of provincial road, and 992.20 km district road. About 90% of them are asphalted.

In telecommunication sector, about 9,000 fixed phone lines are provided by PT Telkom. The mobile line is provided by cellular phone providers such as Excelcomindo, Komselindo, Indosat, Mobisel, Lippo Telecom, PSN, Satelindo, and Telkomsel.

The water service in the region is provided 20.65% by PDAM (local water company), consist of 29,718 customers. The rest of populations (61.15%) obtain the water through drilled wells and 18.2% through pump wells. Total electricity usage 160,945,022 kw/h, with 173,207 customers.

Sragen is well known as the pioneer of organic rice in the region and has already cooperated with domestic and foreign companies for its marketing. The share of the industrial sector in the RGDP is lower than agriculture; however it demonstrates steadily increasing growth rates over the past 3 years. A high number of businesses are commonly start-ups with dynamic and innovative characteristics. Aside from textile, the food and agro-processing industry also remains important and is dominated by SMEs.

The region has one of the most well-known tourism sites in Sragen is the Archaeological Pre-Historic Museum or the Sangiran Museum listed as a UNESCO world heritage site. Other attractions are the tomb of Prince Samodra in Mount Kemukus and Kedung Ombo, surrounded by beautiful sceneries offering potentials for eco-tourism and outdoor activities. Sragen is also renowned as one of the pioneer districts in developing the One Stop Services (OSS). This district has received an award from the Indonesian President for its achievement in efficient public service. The central government has even appointed Sragen as the national best practice model.

5.1.2 Institutional and stakeholder arrangements involved in project planning, design, financing, implementation, and oversight;

The ICT implemention in Sragen Regency is a local government initiative, therefore it financed by local government budget. The Research and Development & Electronic

Data Processing Division (Bagian Balitbang & PDE) was the institution responsible to develop the information technology network based on internet and intranet as the step toward the Regency of Sragen to become Cyber Regency.

The development stages of the network was begun from the development of the internal network in the Regional Secretariat's Office during 2001 as far as external that could covered the Agencies during 2002. However it's finishing just during 2004, including the development of the network in the sub-district offices. All the construction activity of the network was just finished during 2005.

In 2010 network utilization will be expanded into the integration of all the information systems and the databased, included Geographical Information Systems (GIS), Financial Information Systems (KIK), Regional Asset Information Systems (SIMBADA), the Citizen Information Systems (SIMDUK) and the Employee Information Systems (SIMPEG).

5.1.3 Local participation in project development, operation, ownership;

With the limitation of human resources, Sragen Regency hired profesional (outsource). To manage user or subscriber of the systems, Sragen Regency established memorandum of understanding (MoU) with private company (Time-Exelindo). Re-sales activity in term of ISP co-operation with the school and public community.

5.1.4 Technology platforms, infrastructure, and facilities deployed; quantities and capacity of network and services provided;

The main network development is rely on wireless network on the frequency of 5.8 GHz (5,782 Hz) in channel 9. The local area network (LAN) has enabled the Regency of Sragen to apply intranet of the Virtual Office (Kantor Maya/Kantaya). The capacity of 3 MBps bandwidth for whole systems was provided.

The Regional Secretariat Office, the Bodies, Offices, Agencies and Regional Owned Enterprises (BUMD) and the sub-district offices become clients/subscribers to the online wireless networks.

Every subscriber had the right to manage arrange the LAN in accordance with the requirement with the permission from the Team of the Information Technology Management of the Regencies Government of Sragen. The Team was an ad-hoc institution under The Research and Development & Electronic Data Processing Division.

5.1.5 Services provided, including public and private access; volumes and capacity of services made available;

The main service is E-government. Several activities included are the development of on-line wireless network for office subscriber and public acces via free Wifi service in certain spots, teleconference operation in sub-district office, civil demographic data electronics and e-election of head of the village.

5.1.6 Degree of demand and utilization, including growth over time;

The virtual office application to work efficiently by support of availability of the electronics offficial letter, the electronics work agenda, the cupboard of the dat of the work unit and personal, project agenda, the address book, the forum and email facilities. It enable each work unit to provide report on daily basis quickly.

5.1.7 Project financials: investment and operating costs; subsidies (if any); revenues; profit and loss and ROI, as appropriate;

To obtain additional project financials support in order to cover investment and operating cost, the Regency of Sragen provides tutorial service for other regions. The Regency obtained the profit by expanding the cooperation network with the other regions.

5.1.8 Scope and nature of information applications and content included in the project, including target users, sources of support and development;

Among other applications, the Electronic Civil Registry Data with Single Identity Number (SIN) is considered the widest applications in term of benefit distribution. The success of implementation become a model replicated in other regencies in Indonesia.

5.1.9 Training, public awareness, and other public relations and support;

The Regency of Sragen is considered as unique in a way to operate outsource business and hire experts. Instead of operating full outsourcing, to get direct benefit of systems developments, the outsouring process requires involvent of in-house engineer or staff during the project excution.

As the result at the end of the project, capacity building can be held effectively. Currently, with its capacity The Regency of Sragen capable to provide tutorial service on E-Government for other regions.

The success story of this regency and its publicity has became indirect activity for many leveraging activity both related with E-Government or other sectors of development.

5.1.10 Ongoing technical assistance, maintenance and repair support;

With pioneering E-Government, the Sragen Regency has successfully improve its capacity to manage technical solution. The capacity of in-house engineer combined with the unique outsourcing mechanism as well as the cooperation with profesional enable them not only for self-sustaining suppport but also providing service for other regions.

5.1.11 Monitoring and evaluation framework, including any reports or studies on project effectiveness;

With it status as national icon of E-Government, many visits, studies and observation has been conducted. Most of study concluded that region leadership is the most

important key-success factors comparing with other technical and managerial aspect of E-Government.

5.1.12 Community and user impacts, reactions, perceptions of the project's value, sustainability, replicability.

In general, optimistic reaction has been shown by the stakeholder who utilised the systems. Many other regencies have replicated the systems.

In addition, to understand the equitable distribution impact of the systems to the community, it is still necessary to evaluate the impact and distribution of benefits for different social economic status as sectors of activity.

5.2 Case 2: Central Government Infrastructure Provision: USO Program

This case represents a central government ICT infrastructure provision under USO Program. The USO program in Indonesia is managed by BTIP. This section explains the general information on the national USO program, some finding on visited locations, including discussion and lesson learn obtained from relevant documents.

5.2.1 Geographic locations, populations, and political divisions served by the project;

The geographic location of USO Program is nation wide. In general BTIP categories the targeted villages as (a) villages that have very limited infrastructure (b) villages with basic infrastructure and potential with economic activity interaction (c) villages with infrastructure enriched with economic activity interaction and (d) villages which relatively mature behavior on telecommunication.

The total number of targeted village is 31,824 villages with 100 villages with Internet connection. For the field visit, we interested to visit the villages within category (c) and (d). Specific observation was focused on the utilization of the facility for public access and services. The expected lesson-learnt was the use of public access in the "grey-area" between commercially feasible and subsidiary-required public-faciilty.

For this purpose we visited three rural villages within Province of Special Region of Yogyakarta. Those villages (Kaligintung, Kalidengen, and Plumbon Village) are coveraged by mobile signal with limited number of subcriber but have no public access point for ICT service. One of the villages, Kaligintung is provided with public internet access.

On the other survey sites, which are Kaligintung, Kalidengen and Plumbon, rural ICT provisioning is established based on USO Technology Solution or ST. The convergences approached on those sites are based on access and network convergence. USO programs held on those sites are aimed to provide basic telephony and internet service via cellular access and network. Telephony services is handled by a wireless fixed phone set with GSM access and internet services is handled by PC and Modem with 3G access. All CPEs are made to be public CPEs.

Kaligintung and Kalidengen is similar in coverage quality. Near both villages, a serving BTS is present with a good signal quality. Therefore, both villages use ST1 configuration where it utilizes that existing BTS access.

Meanwhile, Plumbon has a low signal quality since the nearest existing BTS is present on a far distance from the village. Therefore, the village is equipped by ST2 configuration where a repeater is utilized to repair the signal quality. Though there is no convergent CPE and service, the GSM-3G access and network support convergent to serve multimedia IC service already.

Besided the observation on the above villages, to obtain more general evaluation on the USO program in Indonesia, we used other document and survey conducted by BTIP in other region consisting all types of targeted villages.

5.2.2 Institutional and stakeholder arrangements involved in project planning, design, financing, implementation, and oversight;

- Ministry/DGPT set master plan
- BTIP executing and develop roll out plan
- Project planning and design involve public participation (pricipal, industry, expert, academia)
- Industry contribute financial support through USO Fund
- BTIP implementing the project
- Operator bid for “playing” under performance based contract
- BTIP oversight the performance of the designated operator

5.2.3 Local participation in project development, operation, ownership;

- Local government participate in proposing location via bottom up process
- The proposal goes to Governor and Ministry of Internal Affair to be delivered to Ministry of Communication
- The bottom up process will be an input for Master Plan Development
- On operational stage, local/village level admintrative contibute basic infrastructure (space, electricity, water, access ect)
- All the ICT equiptment are operator properties. The supporting hardware may belong to local adminstrative.

5.2.4 Technology platforms, infrastructure, and facilities deployed; quantities and capacity of network and services provided;

In order to provide connection at remote areas which are considered as USO area, several technology solutions are used. Due to the criteria of the areas, USO areas are divided into three major types. It is well considered in Indonesia that wireless access network is spreading more rather than PSTN network. Thus, most nearly-remote areas have already been covered by cellular signal. Based on this fact, the

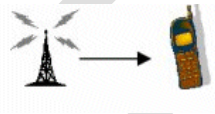
differentiation of three USO area types is based on the existence level of cellular phone signal. The first type is remote area which has strong enough signal level. The second one is remote which has low signal level. Then the third one is those which are not covered by any cellular signal.

Based on the social point of view, we can elaborate more about these three areas. In the first area, though it has good signal coverage, the rural area is considered as, at least, low-income-households and low educated. This fact brings certain access gap so that it is necessary to deploy the USO program at those areas. In the second areas, the areas are already well considered as low-income-households, low educated households, and far from signal coverage. The low level of signal coverage worsens the condition of access gap in that area. In other hand, in the third type of USO area, it is clear that with low income, low education, and no signal coverage, USO program is very necessary to be implemented.

Based on those three types, Universal Service Obligation is also conducted in to three types of technology solution for each type of area. Those technology solutions differ in their architecture. Those technologies are called as ST 1, ST 2, and ST 3, where ST stands for Technology Solution. ST 1 is used in area type 1 where it has relatively strong signal level. ST 2 is used in area type 2 where it has relatively low signal level. Then, ST 3 is used in area type 3 where it is uncovered by any signal. Furthermore, each ST is also categorized into two types based on its power supply. Type A is for those STs which use power supply for PLN (State-owned Electricity Company). Type B is for those STs which use power supply from Solar Power.

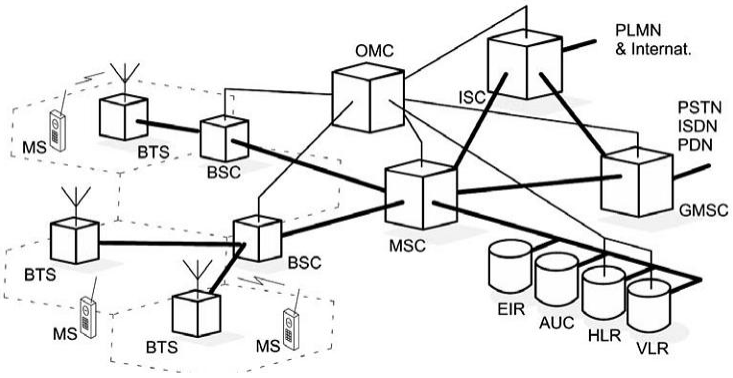
Technology platform differentiation among ST 1, 2 and 3 is mainly located to the access and transmission method towards the operator's central networks to be further delivered by the incumbent operator.

Therefore we can divide the whole network into three main objects, which are Access Line, Transmission Line, and Operator's Central network. In normal area, without USO, the cell is served by a BTS (Base Transceiver Station) which can has several channels as the access method between Mobile Station and BTS.



Picture 1 BTS provides access to a mobile station (handset)

Since the technology platform is GSM-based, therefore each BTS will be connected to BSC (Base Station Controller) and then go to the central network. The connection from BTS to BSC is called as transmission. The information transmission can be conducted via several transmission lines such as Radio Frequency (RF), Microwave, Fiber Optic or Satellite.

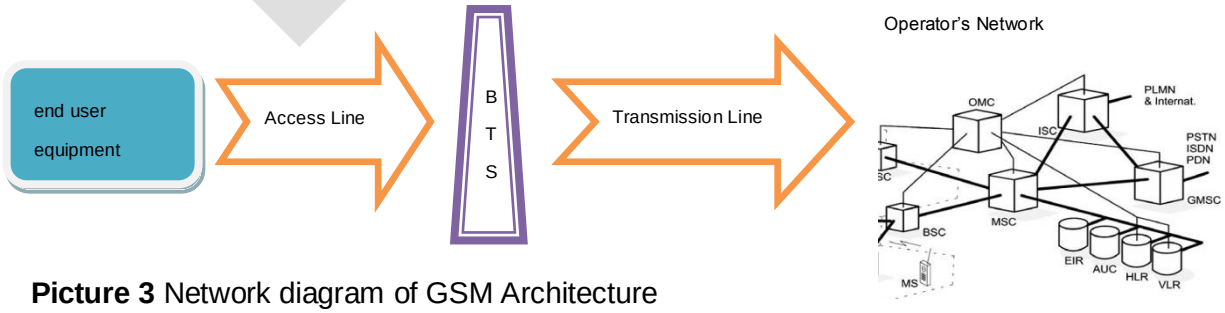


Picture 2 GSM Architecture shows the transmission link among MS-BTS-Operators' Transmission Central Network (BSC-MSC-ISDN, PSTN, IP)

The main problem which exists in the rural and remote areas is located on the existence access link and transmission link. Therefore, the technology solution is to meet the problem of access link and transmission link in order to connect the rural area to the central network. The differentiation of ST 1,2, and 3 will talk more on the access and transmission method. In Summary, the differentiation can be briefly described as follow:

Technology	Power Supply	Signal Level	Access
ST-1 A	PLN	Strong	Existing BTS
ST-1 B	Solar Cell	Strong	Existing BTS
ST-2 A	PLN	Weak	Repeater + Nearest BTS
ST-2 B	Solar Cell	Weak	Repeater + Nearest BTS
ST-3 A	PLN	No Signal	VSAT + Pico BTS
ST-3 B	Solar Cell	No Signal	VSAT + Pico BTS

Table 1 Types of Technology Solution



Picture 3 Network diagram of GSM Architecture

ST 1, Technology Solution 1

In ST 1 area, the rural area is already covered by cell. But the utilization of the cell is not yet explored by the local people since there is a market gap in that rural area. Even though, the existence of cellular communication signal is connectable already, the connection becomes unaffordable by too many low-income-households and low educated households. In ST 1, the technology solution is by providing end-user equipments, which are:

- Fixed Wireless Telephone (2 set, one for public and one for village office)
- Billing Display set
- Power Supply (PLN or Solar Power Supply)
- Personal Computer set
- Internet modem (GPRS, EDGE (2.5G), UMTS (3G), HSDPA (3.5G) Modem)

Since the main objective of USO telephone set is for public use, the village will also be given a set of billboard sign to indicate that the place of USO Public Phone and Internet.

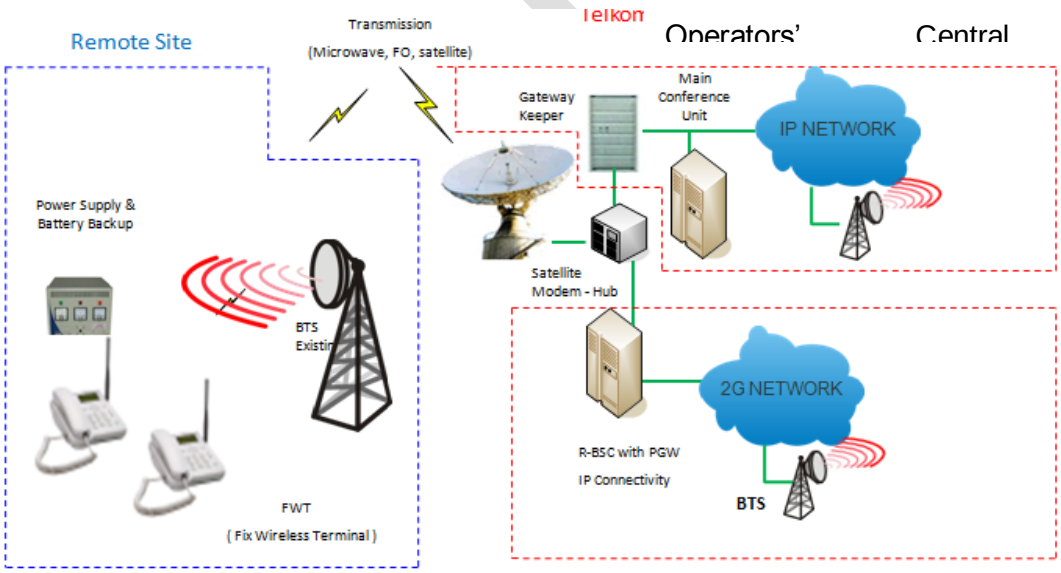
The access from the telephone set and PC to the operator's central network uses the existing BTS access. Voice telephony uses access via 2G connection of GSM. Internet connection uses access via existing access technology in the existing BTS. The internet connection line ranges from GPRS to HSPA based on the existing BTS. Then, from the BTS to the operator's central networks, the connection uses several transmission line depends on transmission line the BTS has already used. The transmission line can be fiber optic, satellite, microwave and others. In the operator's central networks, the information then can connects to IP networks, PSTN, ISDN, and any connection service the operator can give.

In every BTS, voice connection is provided already by the 2G connection. But in other hand, since the access line provided by the operator is based on the existing BTS of the operator, the internet service provided by the operator is also based on it. The higher throughput existing in access line, the higher service type it can provide. For GPRS and EDGE access type, the service it can provide is for general internet service such as text, chat, picture, and downloading sound and video with extra effort. For UMTS or WCDMA and HSPA (HSDPA/HSUPA) access line, the internet service can provide real time video conversation and video streaming.

Access Technology	Max Data Rate
GPRS (General Packet Radio Access)	48 kbps
EDGE (Enhanced Data Rate for GSM Evolution)	384 kbps
UMTS (Universal Mobile Telecommunication System)	2 Mbps
HSPA (High Speed Packet Access)	5.8 Mbps Upload
	14 Mbps Download

Table 2 Offered data rate from various access technology

Generally the ST1 architecture can be described by Picture 4.



Picture 4 General ST 1 Network Configuration

ST 2, Technology Solution 2

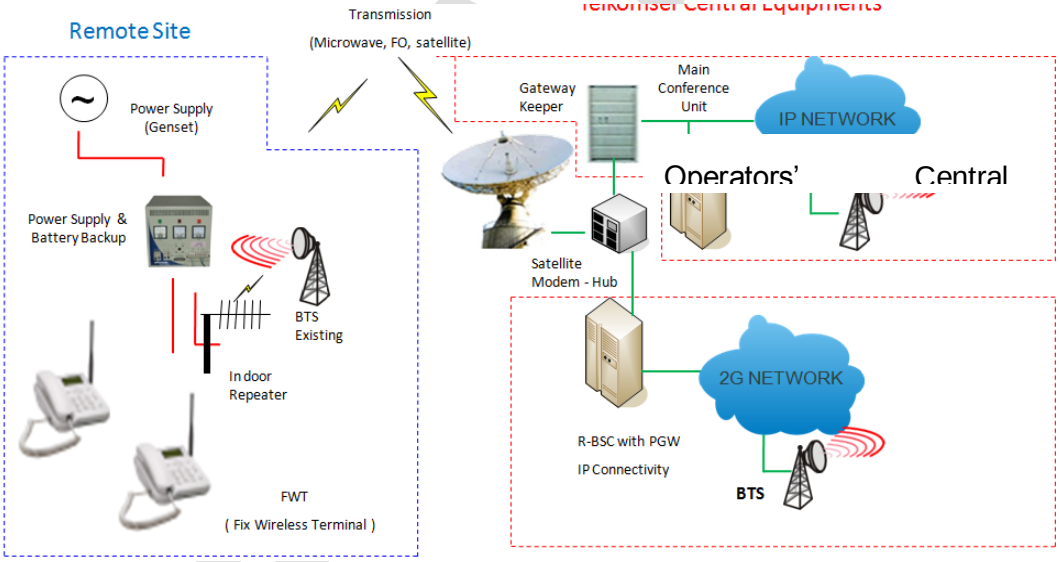
It is already known before that ST 2 area has low signal level. It means that the area is relatively far from the operator's BTS. Therefore actually it has the similar access and transmission method with ST 1. Access line is depends on the existing BTS's access line. It can be GSM 2G for voice traffic and GPRS or EDGE or UMTS or HSPA for data traffic. That dependent access line offers dependence on offered service like what already mentioned before. Transmission line from the existing BTS to central networks is also variable. It can be via fiber optic, microwave or satellite.

After its similarity with ST 1 technology, ST 2 use signal repeater as its difference from ST 1 technology. Repeater is a tool that can receive and transmit signal, and capable to amplify the signal. The repeater existence means to amplify the weak signal in order to be able to be used by the phone in the weak-signal area. ST 2 uses indoor repeater which is yagi antenna. The repeater's task is just to bring the weak and far signal to come closer and stronger.

In summary, ST 2 provides end-user equipments, which are:

- Fixed Wireless Telephone (2 set, one for public and one for village office)
- Billing Display set
- Power Supply (PLN or Solar Power Supply)
- Personal Computer set
- Internet modem (GPRS, EDGE (2.5G), UMTS (3G), HSDPA (3.5G) Modem)
- Indoor repeater (Yagi Antenna)
- Billboard sign

Generally, ST 2 architecture can be described by Picture 5.



Picture 5 General ST 2 Network Configuration

ST 3, Technology Solution 3

In ST 3 area, there is no existence of available connection. Even it is has no cellular signal coverage. In order to overcome this obstacle, ST 3 uses satellite technology as the substitute the transmission line from BTS to BSC. It provides transmission line to connect it to nearest BSC (Base Station Controller). BSC is part of network which controls several BTS. BSC is connected to the central network which provides services (IP, ISDN, PSTN, etc).

ST 3 uses VSAT to connect through satellite. VSAT, Very Small Aperture Terminal, is a transceiver (transmitter and receiver) station to communicate with geostationary satellite. The transmission system uses TDMA (Time Division Multiple Access) method, which means it is time based channel. VSAT components consist of Outdoor Unit (ODU) and Indoor Unit (IDU).

Outdoor Unit (ODU) consists of:

- Dish/Parabolic Antenna, installed on roof, ground or wall.
- BUC (Block Up Converter), as the transmitter
- LNB (Low Noise Block Up), as the receiver

Indoor Unit (IDU) consists of:

- Modem (Modulator/Demodulator)
- Internet Facility Link, connector between ODU and IDU

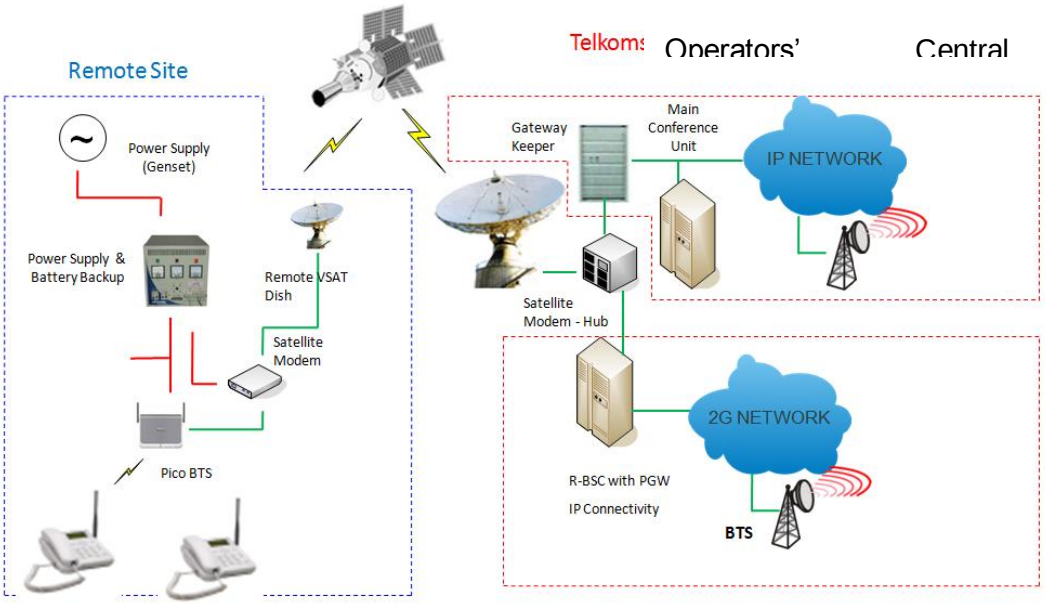
By using VSAT, ST 3 creates Pico cell to connect the phone set to the VSAT Modem. Pico cell or Pico BTS consists of one TRX (Transceiver Unit) just like a mini BTS. It substitutes the function of BTS since there is no BTS there. The access controller is the IP based BSC connected to operators MSC (Main Switching Center). The Pico cell provides access line from phone set to VSAT and vice versa. This network configuration can provide voice and data communication.

The advantages of using VSAT are that it can cover half of the earth surface, minimum SITAC, no tower, fast installation, low power, low capex, low opex, no dependencies on geography, and low cost transmission backhaul. The weakness is its latency and weather sensitive.

In summary, ST 3 provides end-user equipments, which are:

- Fixed Wireless Telephone (2 set, one for public and one for village office)
- Billing Display set
- Power Supply (PLN or Solar Power Supply)
- Personal Computer set
- VSAT set (ODU and IDU)
- Pico BTS set
- Billboard sign

Generally, ST 3 architecture can be described by Picture 6.



Picture 6 General ST 3 Network Configuration

5.2.5 Services provided, including public and private access; volumes and capacity of services made available;

- First Stage:
  - Serivice: communal access at village level (ringing village) and basic internet service (desa pinter)
  - Minimum one line at every village (public access within walking distance)
- On going:
  - Internet Service and Point of Presence:
  - Villages with internet kiosk with 5 pc

5.2.6 Degree of demand and utilization, including growth over time;

During this study, a survey had been conducted by BTIP to evaluate degree of demand and utilization of Rural ICT under USO Program. The survey were conducted on the deployment periods before official hand-over from the operator to BTIP.

Before the official handover is done between the operator and the government (via BTIP), several USO projects are done already in some rural and remote area. In that time, several surveys were accomplished over several project examples in Sumatera, Kalimantan, Java, Bali, Nusa Tenggara Barat, and Nusa Tenggara Timur. The summary of finding is described below.

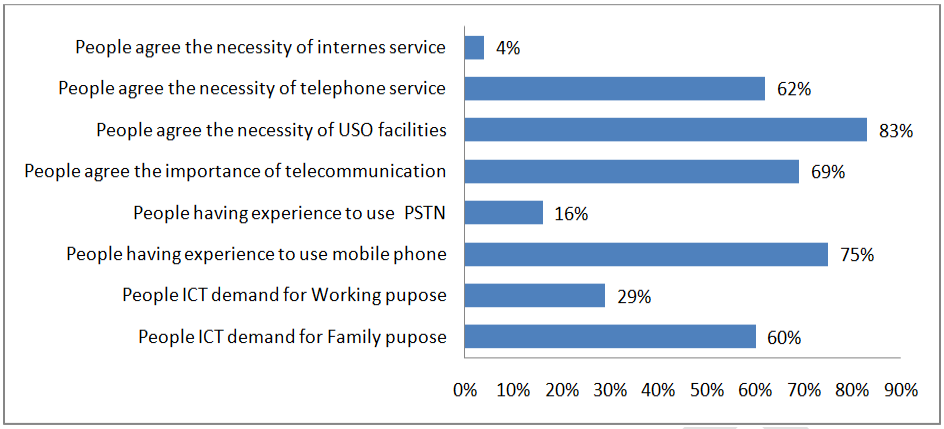
Case Study in Sumatera and Kalimantan [1]

Based on the field study in Sumatera and Kalimantan islands, several data could be obtained to describe how far the rural people demand telecommunication service and utilize the given service via USO project. Sumatera and Kalimantan people already understand the importance of telecommunication for their life. With the development of mobile phone set which is always going to be cheaper, mobile phone set existence penetrates in many areas already. From 2646 respondents, most of them, 75%, have had experience to use mobile phone. Whilst on the second popularity, only 16% have experience with PSTN. Those rural people mostly, 60% of respondents, utilize telephone services for family purpose. Then, 29% of the respondents use it for their professional purpose. [1]

It can be understood that people already aware about the function and advantage telecommunication services can provide for them. Telephone has a big portion for their working and family. Exchange of information is already considered as so important that 69% of the respondent declare that telephone service is important or very important for their life.

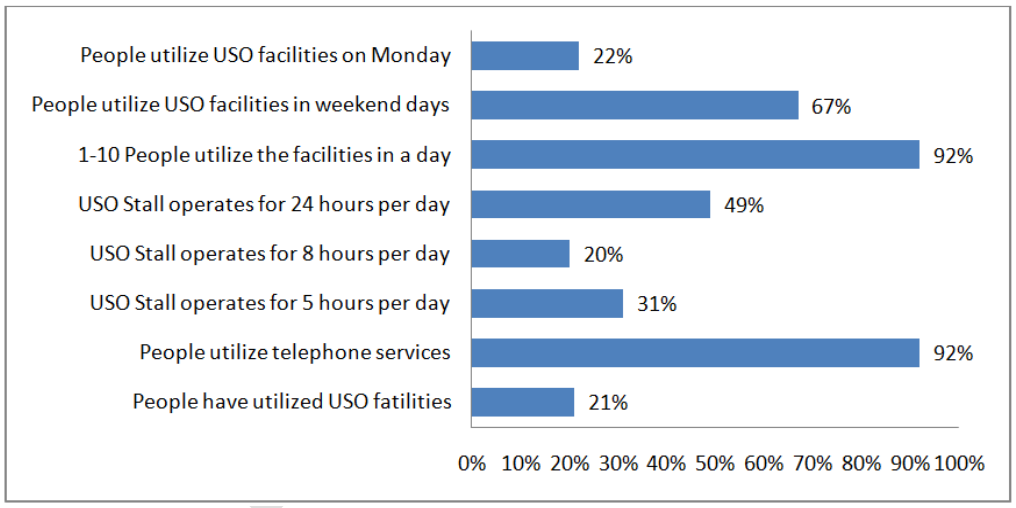
Even though the price of mobile phone set is going cheaper already, but affordability to purchase the facilities is still inadequate among the rural and remote people. Only small number of people who own the mobile set, most of people's communication lay from their kindness to share the phone. The needs of communication access is considered so much that 83% of respondents believe that it is important to get USO program come to their life. Certainty and hope of people believe that USO program can bring them betterment on communication. The better the communication, the better the business activity, education and local activity. That awareness of telecommunication also leads 4% of them to demand internet as well as telephone services which is demanded by 62% of respondent.

After the USO pilot project was deployed to the area, the demand is answered by a good enough utilization by the people. 21% of respondents admit that they have used the USO facilities. The USO facilities popularity is good since it can offer a good voice quality and cheaper tariff. But, the utilization cannot be said very good yet. It is caused by the weakness in its publication. It is very difficult to let everyone knows that the USO facilities is ready to use since villagers have far distance gap among neighbors. The most popular service is telephony compared to SMS and internet. 92% of respondents who are ever utilizing the USO service said that they use telephone service.



Picture 1 Percentage of respondent who answer the statement, the diagram can shows their actual demand of telecommunication

USO facilities should operate for 8 hours per day. In fact, there are 20% USO stalls which obey that operational duration. 31% are operating for 5 hours per day. Even, 49% or most of them are ready to use for 24 hours per day, since it is made real public. Most of the USO stalls have 1-10 users per day who utilize the facilities. Most of the users use facilities in the weekend and in Monday. People like to use the facilities while they are enjoying their weekend. They also use the facilities while they are starting their working and business on Monday. [1]

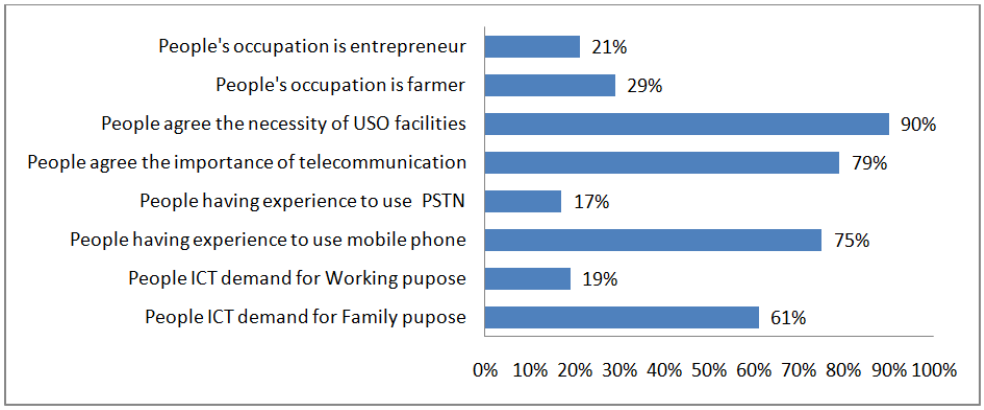


Picture 2 Percentage of respondent who answer the statement, the diagram can shows their actual utilization of telecommunication

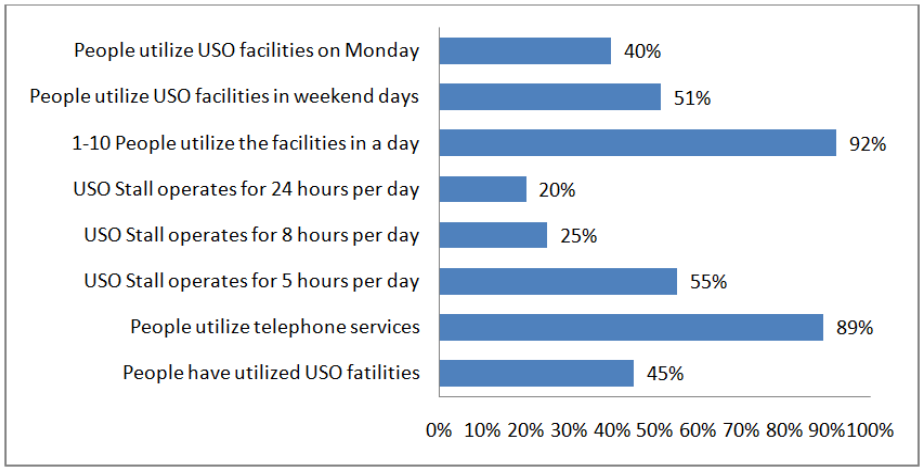
Case Study in Java, Bali, Nusa Tenggara Barat and Nusa Tenggara Timur [2]

Practically, the condition of demand and utilization in Java, Bali, Nusa Tenggara Barat and Nusa Tenggara Timur is quite similar with that in Sumatera and Kalimantan. Almost all facts in Sumatera and Kalimantan occur in these areas. The

people already understand the importance of telecommunication for their life. With the development of mobile phone set which is always going to be cheaper, mobile phone set existence penetrates in many areas already. It can be understood that people already aware about the function and advantage telecommunication services can provide for them. Telephone has a big portion for their working and family. Exchange of information is already considered as so important that 79% of the respondent declare that telephone service is important or very important for their life.



Picture 3 Percentage of Java, Bali, NTT & NTB respondent who answer the statement, the diagram can shows their actual demand of telecommunication



Picture 4 Percentage of Java, Bali, NTT & NTB respondent who answer the statement, the diagram can shows their actual utilization of telecommunication

5.2.7 Project financials: investment and operating costs; subsidies (if any); revenues; profit and loss and ROI, as appropriate;

- All financial support is provided from USO Fund
- Investment is provided by operator
- Government (BTIP) buy the service from the operator with performace based contract
- The price might includes return of investment and operating expenditure
- Revenue goes to opeator
- Risk on market and operation are managed by operator
- The lowest subsidy is the basic priciple for selecting operatior

5.2.8 Scope and nature of information applications and content included in the project, including target users, sources of support and development;

- Ringing Village program: voice and narrow data communication
- Village has Internet Program: voice, internet
- PLIK: internet kiosks with push content
- SIMMLIK: internet kiosks with push content and integrated monitoring systems

5.2.9 Training, public awareness, and other public relations and support;

- Training on operation and maintenance (limited to reporting for malfunction)
- Public awareness: local leader or local community organization

5.2.10 Ongoing technical assistance, maintenance and repair support;

- Performance based contract. Operator fully responsible for sustainability of service

5.2.11 Monitoring and evaluation framework, including any reports or studies on project effectiveness;

- Uji fungsi (functional assessment) before hand over.
- Monitoring and evaluation during deployment stages

5.2.12 Community and user impacts, reactions, perceptions of the project's value, sustainability, replicability.

From the survey in several regions, it can be found, people of rural and remote areas actually have a good demand and awareness about the function and importance of telecommunication services in their life. The necessity of USO to be deployed is high enough. When it is deployed already the rural people in Sumatera, Kalimantan, java,

Bali, Nusa Tenggara Timur and Nusa Tenggara Barat do shows that they utilize it optimally.

5.3 Case 3: Private Initiative Rural ICT Provision: Community ICT Center

Survey on a site of private initiative rural ICT provision was taken place on Joglo Abang community. Joglo Abang, which means The Red House, is a community of internet users in a village of Sleman, D.I. Yogyakarta. The community provides internet service which is used to empower the villagers with information exchange. The convergence of content becomes the main path on the community development.

5.3.1 Geographic locations, populations, and political divisions served by the project;

One of service convergence development example can be found in Joglo Abang Indonesia. Joglo Abang is located in a village where most of people are farmers. Microsoft in collaboration with ASEAN, built a CDC (Community Development Centre) program by providing ICT including CPEs and network connection for the village. The CDC has been successfully developing the people especially the teenagers in order to utilize many information resources. The CDC service has been successfully increase the value of information by using service convergence from internet such as tutorial, training, job vacancy, farming education and others.

5.3.2 Institutional and stakeholder arrangements involved in project planning, design, financing, implementation, and oversight;

- Case 3: Private initiative through CSR program
- Microsoft in collaboration with ASEAN, built a CDC (Community Development Centre). Project design was intended to provide ICT service for rural people, specifically farmer.
- Microsoft provides main financial support for CAPEX and OPEX for running the first year.
- The implementation invites NGOs which interested for conducting advocay service for ICT dissemination for rural people.
- The NGO is expected to provide in-kind support including space, electricity, tutor etc.
- Microsoft provides monitoring systems to evaluate number of subscriber or user, tutorial sessions, on-line acivities, user management etc.

5.3.3 Local participation in project development, operation, ownership;

- Case 3: Private initiative through CSR program: Development: Company + Community, operation: community, ownership: community
- NGOs or other local community organization that applied for CDC program is actually the main player of the program. Success and failiure is highly depend on their involment during operation and maintenance.

- Local community is expected to organized the group of user within its social networks
- The property of equipment to be transferred to designated NGO at the end of the contract.

5.3.4 Technology platforms, infrastructure, and facilities deployed; quantities and capacity of network and services provided;

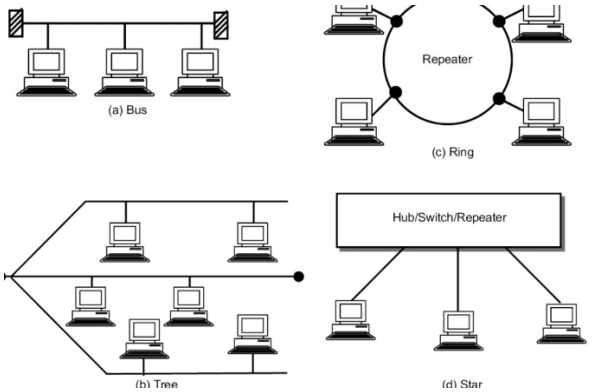
- Case 3: Private initiative through CSR program. Technology platforms: Internet, infrastructure: wireless internet, and facilities deployed: CTC, quantities: one PC for one community, capacity of network: and services provided: community development advocacy

Simply, Joglo Abang is a house having numerous IT CPEs (customer premises equipment) which can be used by the public. Each CPE is connected in LAN by cable and Wi-Fi. Thus, It can be seen that LAN and WLAN routers are occupied. The WLAN utilizes Wi-Fi 802.11 b/g.

For a LAN, the transmission medium can be twisted copper cable, coaxial cable, optical fiber, and radio. The topology, data rates, and medium access protocols will differ for the different media.

LANs can be broadly categorized as baseband LANs and broadband LANs. Broadband LANs can span larger distances up to tens of kilometers. Broadband LAN uses frequency division multiplexing, in which multiple channels are used for data, voice, and video. RF modems are required for communication. They operate in unidirectional mode because it is difficult to design amplifiers that pass signals of one frequency in both directions. To achieve full connectivity, two data paths are required—one frequency to transmit and one to receive.

A LAN can operate in the following topologies: bus, tree, ring, and star, as shown in **Picture 1.** Generally, Joglo Abang uses star topology. In star topology, there will be a central hub to which all the nodes are connected. The central node can operate in broadcast mode or as a switch. In star networks, addition and deletion of nodes is very easy; however, if the central hub fails, the entire network is down. The hub acts as a repeater—data transmitted by a station is received by all stations. Hence logically, this topology is equivalent to a bus.



Picture 1. LAN topologies.

The Institute of Electrical and Electronics Engineers (IEEE) set up a committee known as the 802 committee to develop various LAN standards. These standards together are known as IEEE 802 standards. These standards address only the physical and datalink layers of LANs. They specify the protocols to be used in MAC and LLC sublayers, the physical layer specifications, and the physical medium to be used.

Based on the popularity of Ethernet, IEEE released a compatible LAN standard that is specified in IEEE 802.3. LANs based on the 802.3 standard have the following characteristics:

- Topology: Bus, tree, or star
- MAC sublayer: CSMA/CD
- Physical layer can be one of the following:
- Baseband coaxial cable operating at 10Mbps
- Unshielded twisted pair operating at 10Mbps or 100Mbps
- Shielded twisted pair operating at 100Mbps
- Broadband coaxial cable operating at 10Mbps
- Optical fiber operating at 10Mbps

IEEE 802.3 operating at 10Mbps has six alternatives:

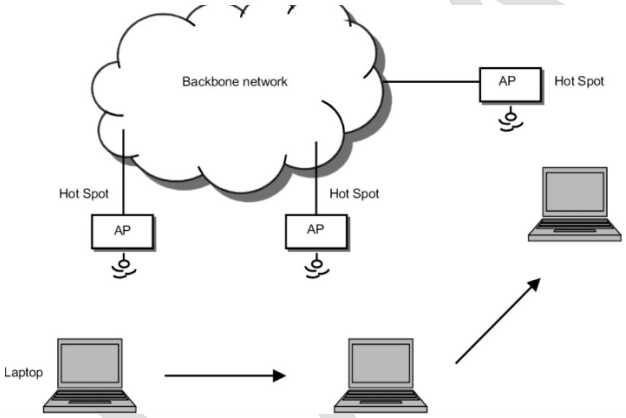
- 10 BASE 5: 10Mbps baseband 500 meter segment length
- 10 BASE 2: 10Mbps baseband, 200 meter segment length
- 10 BASE T: 10Mbps baseband, twisted pair
- 10 BROAD 36: 10Mbps broadband, 3600 meter end-to-end span (1800 meter segment)
- 10 BASE F: 10Mbps baseband, fiber

- 1 BASE T: 1Mbps baseband, twisted pair (now obsolete)

In addition, IEEE 802.3 specifies 100Mbps LAN (fast Ethernet) (known as 100 BASET). The format of the MAC frame in IEEE 802.3 standard is slightly different from that of the Ethernet frame.

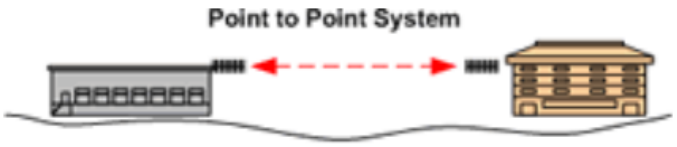
In the other hand, the utilization of Wi-Fi in Joglo Abang is purposed to build a wireless connection to villagers mobile CPE such as laptop or mobile phone. The wireless connection is also known as hot spot. The IEEE 802.11b standard is popularly known as "Wireless Fidelity" (or WiFi) in short. It has become widely popular for wireless LANs in office environments. Proponents of this technology consider it great competition to third generation wireless networks, which also provide high data rate mobile Internet access. WiFi can be used to provide broadband wireless Internet access as shown in **Picture 2.**

Utilization of Wi-Fi and broadband internet access is a purposed to create initial approach for people to get closer with information convergence in NGN. Wi-Fi access in the future will be developed more to become WiMAX. Therefore, when villagers are ready and accustomed enough with wireless broadband access and information convergence inside it, WiMAX installation in the future will get great result in empowering the villagers.



Picture 2. Broadband wireless access through wireless LAN.

While the CPE and software are supported by Microsoft, for the broadband service provider link, Joglo Abang subscribes broadband internet service on a local ISP (Internet Service Provider). Connection between Joglo Abang and ISP is built by utilizing point to point wireless connection. It means that there is an antenna, with its tower, installer on Joglo Abang in order to make a connection with ISP. For making point to point connection, omni-directional antenna of course is not used, but uni-directional antenna is used. Uni-directional antenna is used to maintain private connection between ISP and Joglo Abang. Directional antennas are Backfires, Yagi, Panel and dish type antennas. Illustration of point to point wireless connection is shown in **Picture 3.**



Picture 3. Point to point wireless connection.

5.3.5 Services provided, including public and private access; volumes and capacity of services made available;

- Case 3: Private initiative through CSR program: Services provided, including public and private access; volumes and capacity of services made available;

Being supported by ASEAN and Microsoft, Jogloabang posses a good network connection which is able to serve multimedia services. The network connection is shared through LAN and Wireless LAN access which are able to serve multimedia service and to be compatible with multi CPEs.

Jogloabang also uses CPE that can support multi ICT services in order to support the people's activity. ICT in Jogloabang is not just a regular information exchange. ICT services is approached in a convergent manner where a concrete additional value is present through CDC (Community Development Center) activity. Through CDC, people are developed by utilizing information exchange in a comprehensive manner. They create such a discussion group, a training forum, and such activity which is capable to utilize information exchange to be something more valuable.

5.3.6 Degree of demand and utilization, including growth over time;

In the project, there is a requirement to have about 20 new users/trainee around the village. From moth to the mouth and social networks facilitated with internet, until the end of the contract Jogloabang had user not only at surrounding village but also from other regencies.

5.3.7 Project financials: investment and operating costs; subsidies (if any); revenues; profit and loss and ROI, as appropriate;

Intital OPEX and CAPEX are provided by the project.

The appointed NGOs (institution) is allowed to manage the subscriber. During the first year, there is no subscrption fee, however later the NGO may apply subcriber fee to ensure the sustainability of service.

From the observation, in-kind support, especially the tutor is critical success factor. A dedicated person is required.

5.3.8 Scope and nature of information applications and content included in the project, including target users, sources of support and development;

Survey on Community was conduct with community centre called as Joglo Abang. Joglo Abang incorporating ICTs can aid in bridging the digital divide by providing access to information and facilities to indigent community inhabitants. As the survet result on **Figure** shown that community prefer in text media of information in daily activities.

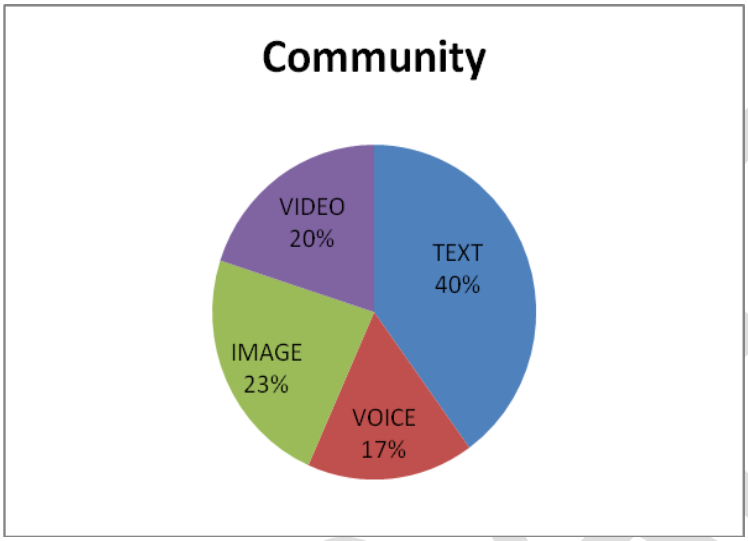


Figure. Demand On Type Information Media for Community Sector

Text more effective than using voice, image and video. Such centres can bring communities together to create a knowledgeable society, strengthening the population, and improving its ability.

5.3.9 Training, public awareness, and other public relations and support;

Joglo Abang is a highly technology information and service center. It is normally located in a rural area and run by dedicated volunteers. It gives local information and data processing services to community, companies and individuals. Its main sources are education and training of adults and children. It teaches use of telecommunications equipment and computers. It organizes seminars, workshops, consultations to businesspersons, based on local needs.

5.3.10 Ongoing technical assistance, maintenance and repair support;

In Jogloabang, we found extra ordinary dedicated person is working at daily basis, 24 hour patiently teaching the community. After series of compulsary training session required by the project, high demand for technical support is still require the availability of the tutor.

In Jogloabang, to keep the investment affordable to rural user, the propritary systems provided by project has been replaced with open source systems.

5.3.11 Monitoring and evaluation framework, including any reports or studies on project effectiveness;

Microsoft provide on-line system to monitor new users, training sessions, on-line activity ect. The appointed istitution is compulsory to update the database during period of project.

5.3.12 Community and user impacts, reactions, perceptions of the project's value, sustainability, replicability.

User and trainee are satiffied and provide very positive responses about the program. Jogloabang is considered successful to bring the rural community into global ICT society. Success story bring more visitor to Jogloabang. It inspire BTIP to deploy similar systems nation wide.

5.4 Case 4: Central Government Activity Based Infrastructure: E-Learning (Jardiknas)

The National Education Network (Jardiknas) is an infrastructure development program on National Wide Area Network which is developed by Ministry of National Education of the Republic of Indonesia in order to connect institutions and educational community all around Indonesia. Furthermore, Jardiknas is one of strategic programs on information and communication technology development dedicated for education sector in Indonesia. It is expected that the online network infrastructure will accelerate the integration of information and communication technology for government program on education sector.

5.4.1 Geographic locations, populations, and political divisions served by the project;

Jardiknas program has nation wide coverages. Site visit was conducted at rural Junior High Schools at rural village in DI Yogjakarta under Jardiknas program

E-education in can be found in SMP 3 Pengasih and SMP 2 Temon, where government, through Ministry of Education, provides CPE and network connection for rural school. The ICT provision is based on Jardiknas by Ministry of Education. The targeted expectation is to establish e-education in order to foster education development on rural areas. In this surveyed area, NGN is approached through premises convergence, access convergence and service convergence.

Overall, government supplies CPEs, wireless LAN access point, and internet access. Government has supplied 4-5 units of PC which are capable to provide multimedia services such as audio, voice, image, video and other internet based services. By providing wireless access point, it is expected that access convergence can be established where all CPEs inside the school can obtain instant internet connection. That wireless LAN connection is able to provide multimedia service towards any Wi-Fi-equipped-devices and CPEs.

5.4.2 Institutional and stakeholder arrangements involved in project planning, design, financing, implementation, and oversight;

- Case 4: Central Government intiative through multisectoral approach

The main initiator of the project is Ministry of Education. The planning aim to connect all school nation-wide with Internet. It is designed to support e-learning activity with cluster of five multi-media PCs connected to Internet. The main source of fund is coming from Ministry of Education. The available USO fund is not used for this project. Project implementation has been implemented with national procurement process, therefore project monitoring rely on national procurement monitoring process.

5.4.3 Local participation in project development, operation, ownership;

- Case 4: Central Government intiative through multisectoral approach. Development: Ministry of Education, operation: schools, ownership: school
- Local Participation from schools is conducted by providing in-kind support (room space, furniture, electricity etc) to support operation.
- The owenership is transferred to schools.
- The school provides OPEX.
- The school has freedom to use provided Internet connection or changing to other commercial ISP

5.4.4 Technology platforms, infrastructure, and facilities deployed; quantities and capacity of network and services provided;

5.4.5 Services provided, including public and private access; volumes and capacity of services made available;

The Jardiknas program covers four zones, i.e. Department Office Zone, Higher Education Zone, School Zone, and Personal Zone.

Department Office Zone

This zone covers offices of department of education in central, provincial and regional level. The Jardiknas in this zone mainly functions as a media to conduct online data transaction of administration information system and education management.

Higher Education Zone

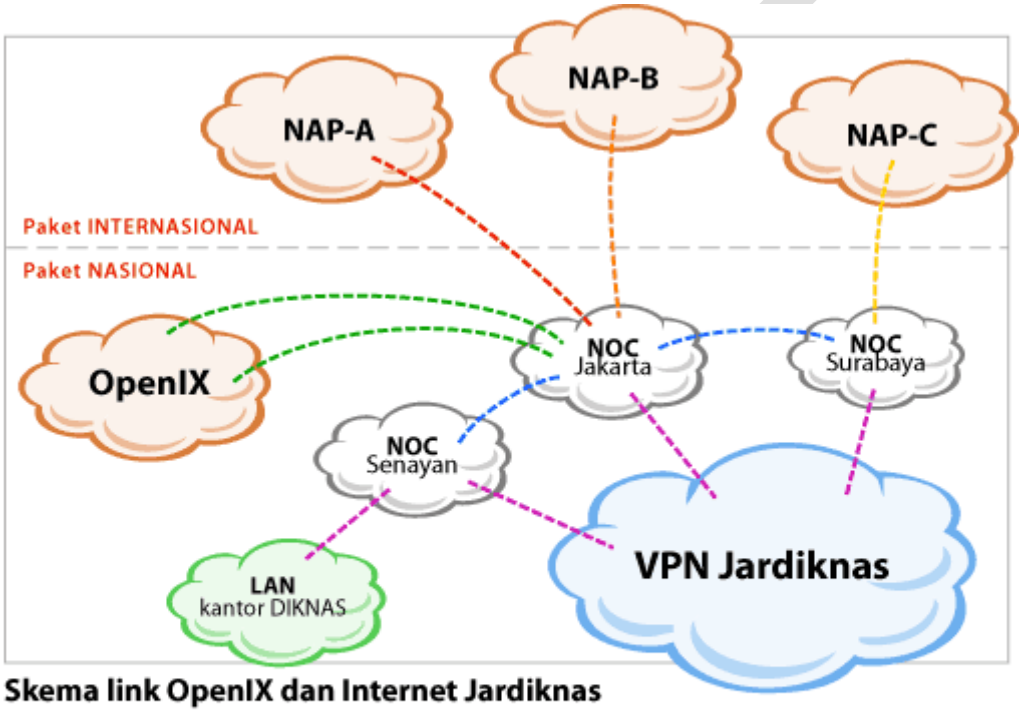
This zone covers all higher education institutions all over Indonesia, both state university and private university. The Jardiknas in this zone mainly functions as a media to conduct research, science and technology development and information and communication-based electronic learning.

School Zone

This zone covers all formal and non-formal schools, both state and private schools, in all education level (kindergarten, elementary school, secondary school, high school). The Jardiknas in this zone mainly functions as a media to access information and knowledge as well as communication and information technology-based electronic learning.

Personal Zone

This zone will cover personal access for teacher, lecturer, staff, faculty and students. Jardiknas mainly functions as communication media and education information access media.



Skema link OpenIX dan Internet Jardiknas

- Gateway Internet A (Singtel) 50 Mbps
- Gateway Internet B (UUNet USA) 100 Mbps
- Gateway Internet C (Hongkong) 50 Mbps
- OpenIX / IIX 2 x 100 Mbps
- NOC Senayan – NOC Jakarta 100 Mbps
- NOC Jakarta – NOC Surabaya 100 Mbps
- NOC Senayan – VPN Jardiknas 100 Mbps
- NOC Jakarta – VPN Jardiknas 100 Mbps
- NOC Surabaya – VPN Jardiknas 100 Mbps

NOC = Network Operation Center
VPN = Virtual Private Network

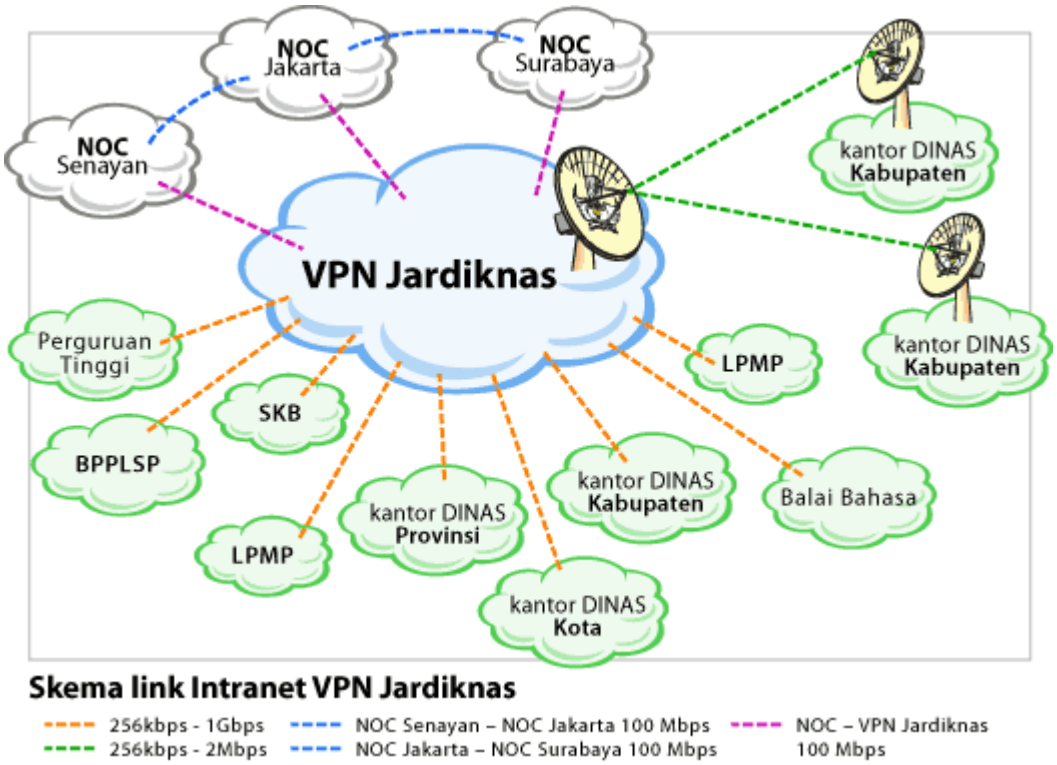


Figure . The 2007 Jardiknas Infrastructure Scheme

5.4.6 Degree of demand and utilization, including growth over time;

Related with Jardiknas program, an extensive content development has been produced by Ministry of Education. The content is one of main information source accessed by students and teachers. On line content is usefull to support learning process, however the proportion of number of accessible PC is still insufficent, especially in rural area where internet at school is only access that they can afford.

5.4.7 Project financials: investment and operating costs; subsidies (if any); revenues; profit and loss and ROI, as appropriate;

ICT related education sector in Indonesia implemented by Ministry of Education, Government of Indonesia. Education sector has funded infrastructure provision, and content development for ICT networks connecting all school.

The investment for Jardiknas is about 1% of National Education sector budget. By laws, annually minimum allocation for Education Sector is 20% of Indonesia State Budget. The investment is not the part of USO Fund available for USO program in Indonesia.

USO Fund in Indonesia which has been collected from 0.75 (in 2007) to 1.25 % (in 2009) of gross revenue of operators is currently dedicated for rural ICT development for more than 35.000 villages.

5.4.8 Scope and nature of information applications and content included in the project, including target users, sources of support and development;

Education essential resources are information. Therefore, Jardiknas program provides integrated services in convergent manner in order to enhance education with internet as a wide information source. There is activity of increasing information value in education by interactive content for training, educate, or giving tutorial. In this part, service convergence is approached by letting rural school get initiated to blend with education-related-multimedia service.

5.4.9 Training, public awareness, and other public relations and support;

Since there is no scheme for including long term training program in the procurement process, each school should arrange their training activity.

5.4.10 Ongoing technical assistance, maintenance and repair support;

From the field observation in Indonesia, we found that additional support for facility maintenance and capacity building program to achieve the best use of ICT in school is still necessary to be provided. Currently OPEX is provided from the budget as part of BOS (School Operational Expenditure) scheme.

5.4.11 Monitoring and evaluation framework, including any reports or studies on project effectiveness;

5.4.12 Community and user impacts, reactions, perceptions of the project's value, sustainability, replicability.

Target user reacts positively and appreciates the project value as a means for introducing to knowledge based society. Additional scheme for maintain sustainablity (eg. Training, maintenance, Internet access provision) might necessary to expand the benefit of the program.

Chapter 6 Lessons, Opportunities, Constraints

This section will highlight lessons learned, opportunities for further development of national rural ICT policy, and constraints that may impede such development. The analysis will be based on both the experiences and perspectives of stakeholders within the country studied, as well as regional and international experience. For each country, this section of the report will provide specific findings that can be transferred to other countries of the region, and potentially incorporated in toolkits and other resources.