

Development of the Information and Communication Technology Service Industry in Indonesia

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Abstract:

The Indonesian government is committed to achieve the Millennium Development Goals which are mainly aimed to improve quality of life. One of the most significant ways is by empowering Information and Communication Technology (ICT). Due to this fact, ICT developments in Indonesia have been growing rapidly.

The developments of ICT Infrastructure have gone through several stages. At the beginning, the ICT backbones were developed with the support from the Government. Then the liberalisation of the ICT Service Industries was implemented in order to encourage private companies to develop ICT businesses. This was further followed by subsidising ICT services in selected areas where these services are not financially feasible. In addition, along with the growth of democracy in Indonesia, application and content are also liberalised, resulting in the fast growth of application and content providers. These factors have made contributions to the development of ICT Infrastructures set up by private companies.

This paper lays out the development of ICT service Industries in Indonesia. It contains the history of the development, the policies, and the description of the current situation and the future plan of ICT development. A more in-depth explanation is dedicated to the telecommunications sector.

Keywords: Indonesian ICT Governance, Telecommunications Governance, Internet Governance, Broadcasting Governance, Palapa Ring.

Introduction

In Indonesia the terminology ICT covers Telecommunications, Internet, Application and Content which includes the Radio and Television sectors. This paper reviews the development of the ICT sectors in Indonesia with special emphasis on the telecommunications sector.

This paper starts with a brief description of the history of the development of ICT in Indonesia, starting from the transition from analogue fixed line telecommunications system to the digital system. This transition to the digital system gave rise to the development of ICT industries such as digital switching, transmission systems and other related industries, by using one particular technology: the EWSD of Siemens, Germany. Next is the description of the development of domestic satellite Palapa used for telecommunications and TV transmission, and the industrial development to produce local TV transmitters, satellite receivers and others. This is followed by the development of wireless systems using almost all available technologies, such as AMPS, PHS, CDMA, GSM and other technologies. This is popularly known as the neutral technology policy. It is shown that during this period, since there was no policy which commands the use of one selected technology to be used throughout Indonesia, telecommunications industries that previously had already had strong capabilities to produce ICT, including telecommunications products, were diminishing. At the same time, the policy to enable telecommunications service industries to carry out managed service operations was issued. Subsequently WiMax technology was introduced.

Along with the development of Wimax technology, a policy for standardising WiMax products for Indonesia was selected and this had a direct impact on the strengthening of local ICT industries. This policy however was terminated and all operators were allowed to use any technologies available. As mentioned above, this was referred to as the neutral technology policy.

A similar policy to adopt neutral technology was also used when GSM was making a rapid global progress. The ICT service industries were free to use any systems and products for their licensed operations areas.

While considerable developments of ICT are taking place across Indonesia, it is shown that several less developed areas in the country, such as remote islands and some isolated places in the eastern parts of Indonesia, which are considered to be not profitable, are given priorities. Next is a discussion on the problems facing the ICT activities in Indonesia especially those related to content. It has to be emphasised that currently, a national effort is being carried out to reduce false information that has caused a lot of social problems and is

even considered endangering the country. Finally, the near future plan of ICT development in Indonesia is briefly described.

It is expected that this paper may provide information on the development of Indonesian ICT services, and the most likely development that will take place in the near future. It is obvious that although ICT service industries and markets have enjoyed a progressive development, the ICT industries have not developed at similar rates. This results in the scarcity of some ICT, and therefore Indonesia has resorted to importing more and more ICT products. In light of the revision of *Act Number 36 Year 1999* on Telecommunications and *Act Number 32 Year 2002* on Broadcasting, it is expected that this paper will serve as one of the main sources for CIT and the stakeholders to benefit from, in order that they could focus on the efforts to develop the telecommunications sector.

A Brief History

Organisations and Regulations

The emergence of ICT service industries started on 27 September 1945, when the 'Post and Telecommunication Youth Organisation' took over the Post and Telecommunication Government operator from the Japanese government. This was followed by the establishment of the new 'Post and Telecommunication Institution' to operate the Postal and Telecommunication infrastructure and services in Indonesia.

From 1945 to 1966, the 'Post and Telecommunication Institution' experienced several changes. The operational activities of the institution were separated. The institution was renamed 'Directorate General of Post and Telecommunication' (DG Postel) and placed under the Ministry of Transport. With all the changes, the legal entity of the Telecommunication Government Operator was changed to 'State-Owned Telecommunication Service Industry' (Telkom) and the DG Postel, which is the regulator.

Since 1961, telecommunications services in Indonesia have been carried out by Telkom ([Soewandi & Soedarmadi, 1976](#) ; [Telkom, 2009](#)). As is the case in other developing countries, the development and modernisation of telecommunications infrastructure play an important role in the development of the national economy in general. Furthermore, the large population and rapid economic growth have driven a high demand for telecommunications services.

The government regulates the telecommunications sector, particularly through the DG Postel. It has given Telkom the monopoly over telecommunications services in Indonesia. The telecommunications reform in 1999 has created a regulatory framework that encourages

competition and accelerates the development of telecommunications services and infrastructure. The next regulatory reform in September 2000, was intended

- to increase competition by removing monopolies,
- to increase transparency and certainty for the regulatory framework in order to create opportunities for strategic alliances with foreign partners and
- to facilitate the entry of new players in the telecommunications service industry.

It has to be noted that Telkom, under several telecommunications Acts, operates a type of monopoly for telecommunications services.

In 1999, a new *Telecommunications Act Number 36 Year 1999* was issued to replace the previous *Telecommunications Act Number 3 Year 1989* (Telecommunications Act, 1999). Although the previous Act gave Telkom the authority to monopolise, the new Act, which took effect in September 2000, had caused big changes. It liberalised the telecommunications sector in Indonesia. This Act has been implemented through several government decrees (Government Decree, 2000).

Firstly, the fixed line service is also given to two other companies that operate fixed wireless telephone. Wireless communications based on several technologies were introduced and operated by several private companies as well as by Telkom ([Telkom, 2009](#)). Another big change took place on the regulatory side. The *Act Number 36 Year 1999* requires the setting up of an independent Indonesian Regulation Telecommunications Agency (BRTI – Badan Regulasi Telekomunikasi Indonesia) ([MCIT, 2008](#)). The Agency was manned by government officers as well as officers from the public, including business players and academicians. The Minister of Transport selects the members of the Agency and in turn the Agency reports to the Minister of Transport.

To regulate the fast development of internet, the DG Postel issued licences to Internet operators based on several government decrees, which were derived from the *Telecommunications Act Number 36 Year 1999*. In the broadcasting sector, Radio and TV service industries were regulated by the Directorate General of Radio, TV and Films (DG RTF) under the Ministry of Information. The DG RTF, however, only regulated the businesses and the contents, while the frequencies used for Radio and TV were still regulated by DG Postel. Several changes were made to the regulation of Radio and TV Broadcasting and it was finally regulated by *Act Number 32 Year 2002* on Broadcasting. This law not only provided liberalisation to the broadcasting service industries, but also facilitated the establishment of a new independent regulator, called the Indonesian Broadcasting Agency (KPI – Komite Penyiaran Indonesia). The members of the agency were selected by the

Parliament. However, the agency’s responsibility was only to control the content, while the business licence was still regulated by the Government.

To accommodate the rapid development of ICT in Indonesia, in 2001 a new Ministry was formed to regulate the ICT sector ([Presidential Decree, 2001](#)). In 2004 the Ministry was empowered and named Ministry of ICT. The Ministry then integrated DG Postel and DG for Radio and TV, excluding Films, into one Ministry. The DG that regulated Radio and TV was named DG SKDI (Sistem Komunikasi dan Diseminasi Informasi-Communication and Information Dissemination). The Government also set up a new DG to control Internet Application and Content; the DG for Informatics Application (DG Aplikasi Telematika was renamed DG Aplikasi Informatika in 2010), abbreviated as DG Aptika.

In 2008 a new Act on Internet application and content was promulgated namely *Act Number 11 Year 2008* on Electronic Information and Transaction ([EIT Law, 2008](#)). This law was later revised in *Act Number 19 Year 2016*. In order to ensure security in the operations of telecommunications and internet infrastructure in Indonesia, the Government formed the Indonesia Security Incident Response Team on Internet Infrastructure (Id-SIRTII) based on Ministerial Decree Number 26 Year 2007 on Security Telecommunications Network Utilisation-Based Internet Protocol. This was later revised through Ministerial Decree Number 29 Year 2010. It is a team assigned to the Minister of ICT, to help monitor the security of internet protocol based telecommunications networks ([Setiawan & Sastrosubroto, 2016](#)).

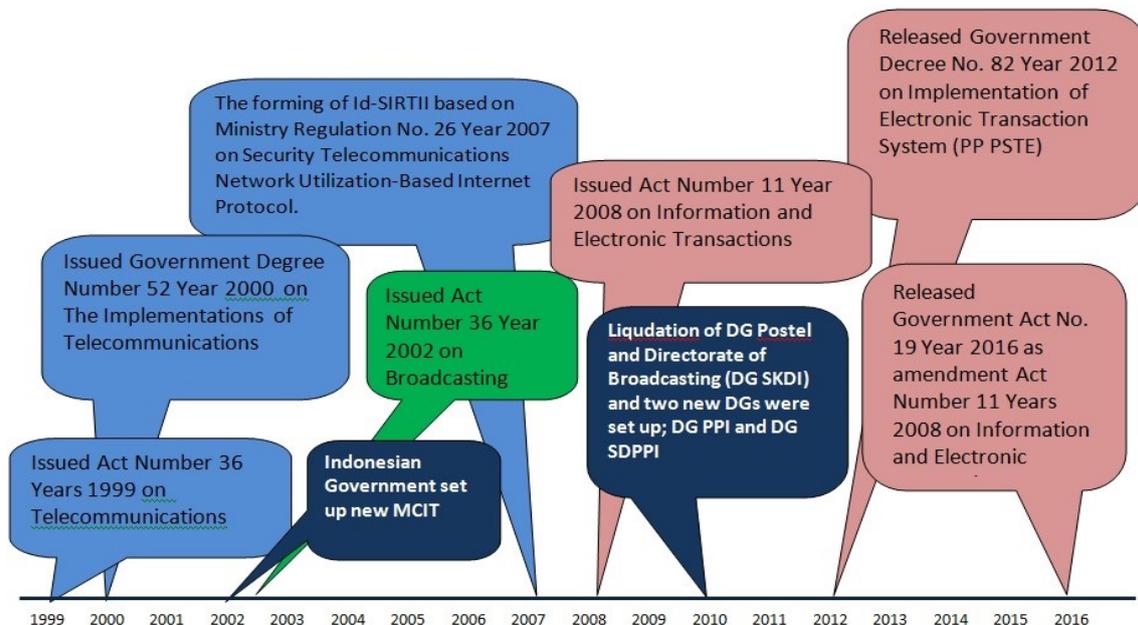


Figure 1: Time Line of the Brief History of ICT Regulations.
[\(Setiawan & Sastrosubroto, 2016\)](#)

Figure 1 shows a brief history of ICT regulations, depicting developments from 1999 to 2016. Due to these changes, the ICT sectors in Indonesia have been rearranged as follows:

- Telecommunication sector: Regulated by DG Postel and BRTI, and operated by several companies. This sector also includes Internet Operators.
- Broadcasting sector: Regulated by DG SKDI; content is controlled by KPI, and operated by many companies.
- Internet Application and Content sector: Regulated by DG Aptika, and operated by numerous companies.

It should be noted that the Internet Numbering such as IP and AS Numbers is operated by Indonesian Internet Operators Association (APJII – Asosiasi Pengusaha Jasa Internet Indonesia) while the DNS for [.id] is operated by a non-profit organisation, the Indonesian Domain Name Organiser (PANDI - Pengelola Nama Domain Indonesia). They basically act as partners of ICANN (the Internet Corporation for Assigned Names and Numbers) to distribute internet resources. As regulated in *Act Number 11 Year 2008*, internet resources are allowed to be operated by a non-Government Organisation ([EIT Law, 2008](#)).

In 2009, DG Postel and DG SKDI were liquidated, and two new DGs were set up. The DG of Post and Informatics Operation (PPI – Penyelenggaraan Pos dan Informatika) regulates all licences for Telecommunications, Internet and Broadcasting Operators. The DG of Post and Informatics Infrastructures and Resources (SDPPI – Sumber Daya dan Perangkat Pos dan Informatika) controls all resources, such as Frequency, Standard and other resources.

BRTI and KPI however, still hold the same functions. With the latest developments on illegal content in the internet, where content has become more and more important for the whole nation of Indonesia, the Ministry has set up an independent team to review Application and Content in the Internet, to make a decision on whether an item has to be blocked. The team was established based on the Ministerial Decree Number 19 Year 2014. It has to be emphasised that as stipulated in *Act Number 11 Year 2008* and other Acts such as *Pornography Act Number 44 Year 2008*, illegal content must be blocked. Recently, *Act Number 11 Year 2008* has been revised in *Act Number 19 Year 2016* which gives a firm legal basis for the government to block illegal contents including false contents that have caused serious social conflicts.

It must be emphasised that the Indonesian Government strongly supports the UN summit in promoting Millennium Development Goals (MDGs). In addition, the setting up of the World Summit on the Information Society (WSIS) demonstrates that ICT is promoted to support most of the actions to achieve the MDGs. It goes without saying; that Indonesia also supports

the WSIS action plans. The Minister of ICT represented Indonesia in the WSIS ([MCIT, 2005](#)) and also in the International Telecommunication Union (ITU), where Indonesia was elected as a member of the ITU Council. Hence, it is obvious that the Ministry fully supports the development of ICT in Indonesia to achieve the WSIS goals. The President even issued instructions to Ministers and local governments to develop e-Government ([Presidential Instruction, 2003](#)) followed by indexation of e-Government for Ministries and regional governments ([MCIT, 2011](#)). It should be noted here that Indonesia consists of many autonomous regional governments ([Indonesian Act, 2004](#)). The participation of Indonesia in supporting WSIS is evident when Indonesia hosted the 8th Internet Governance Forum (IGF) in Bali, including the High Level Leaders meeting, the theme of which was to enhance global cooperations for Cybersecurity based on Cyberethics ([MCIT, 2013](#); [Sastrosubroto, 2014](#)).

In line with the ITU system, Indonesia also set up the Universal Service Obligation (USO) system for promoting ICT in areas where, from the business point of view, ICT services were not feasible. Under the USO scheme, based on Presidential Decree Number 45 Year 2012, all telecommunications operators have to provide a fund of 1.25% of their revenues. The fund is then utilised by the government to provide ICT services in the above mentioned areas. The Ministry also represented Indonesia in the ASEAN Telecommunications Ministerial meeting and is the Indonesian focal point in the development of the ASEAN ICT Masterplan (AIM). The Indonesian ICT master plan – a five-year development plan – is a compulsory reference for the Ministry in developing ICT in Indonesia. Also it has to be in line with AIM.

The government has just established a new agency for strengthening cyber security. It is called the National Cyber and Cryptographic Agency (BSSN, which stands for Badan Siber dan Sandi Nasional) and is the integration of the National Cryptographic Institution (Lembaga Sandi Negara abbreviated as LSN) and cyber security units in the MCIT. BSSN was formed through Presidential Decree Number 53 Year 2017 on the National Cyber and Cryptographic Agency, in the context of achieving national security, since the field of cyber security is one of the areas of the government that needs to be encouraged and strengthened ([Presidential Decree, 2017](#)). The arrangement of LSN to be BSSN was done to ensure the implementation of government policies and programs in the field of cyber security.

Infrastructure Development

The Telecommunications infrastructure acquired from the Japanese government on 27 September 1945 was only the fixed-line telephone infrastructure. At that time, this fixed line telephone was already available in the main cities in Indonesia. However, recognising the huge area of Indonesia, in 1976 Indonesia launched its first Domestic Communication

Satellite called Palapa. This satellite was mainly used for telephone connection and TV Broadcast transmission. During that period of time, Telkom, which still held the monopoly in Indonesia, changed from analogue switching to digital switching. With these two main programs, almost all areas in Indonesia were therefore covered by telephone service. In addition, TV broadcasts could also be received in most parts of Indonesia. This infrastructure development was integrated with a program to develop village telephone and TV so that most of the villages in Indonesia are connected. It has to be underlined that in 1976, TV broadcasting was still monopolised by the state TV station (TVRI).

During this time, the program to launch domestic satellites, which was operated by an appointed company Satelindo, and the program to transform analogue to digital telecommunications, carried out by Telkom, were also used to develop local ICT industrial capabilities. Several state-owned and private enterprises were appointed to carry out this development of technology. To enable these capabilities to develop, several particular technologies from international companies were selected. INTI was appointed to produce digital switching in cooperation with Siemens Germany while LEN was appointed to produce the transmission product as well as TV transmitters. INTI, LEN and several other private companies were also appointed to produce hundreds of satellite receivers throughout Indonesia. The combination of all these have enabled the local industries which produce telecommunications products to cover almost all areas in Indonesia. The appointed industries were also asked to develop their own products, normally smaller products with a simpler technology.

Satellite-based communications flourished after the liberalisation, and today there is a large number of satellite communication operators. To facilitate the technology development in this field, optical communication was established as the new system of telecommunications. The government started the program with the Fibre Optic (FO) backbone development program called Nusantara 21, which was launched in 1997. Nusantara is the cultural name of Indonesia, hence the program is to connect the whole Nusantara, that is, all the main islands of Indonesia with FO which is then integrated with the satellite backbone.

Since the cost to develop this FO backbone is extremely high, the government invited private sectors to jointly develop the backbone. However, only Telkom took part in the venture. The Nusantara 21 program has undergone several changes and is currently known as the Palapa Ring Program. The technical program however is similar: that is, to connect all main islands of Indonesia with FO ([TARHRD, 2013](#)). Figures 2 and 3 show the Indonesian archipelago with the satellite coverage and FO ring. It can be seen that due to the vastness of the archipelago, the FO Palapa Ring program and the domestic satellite are an absolute necessity.

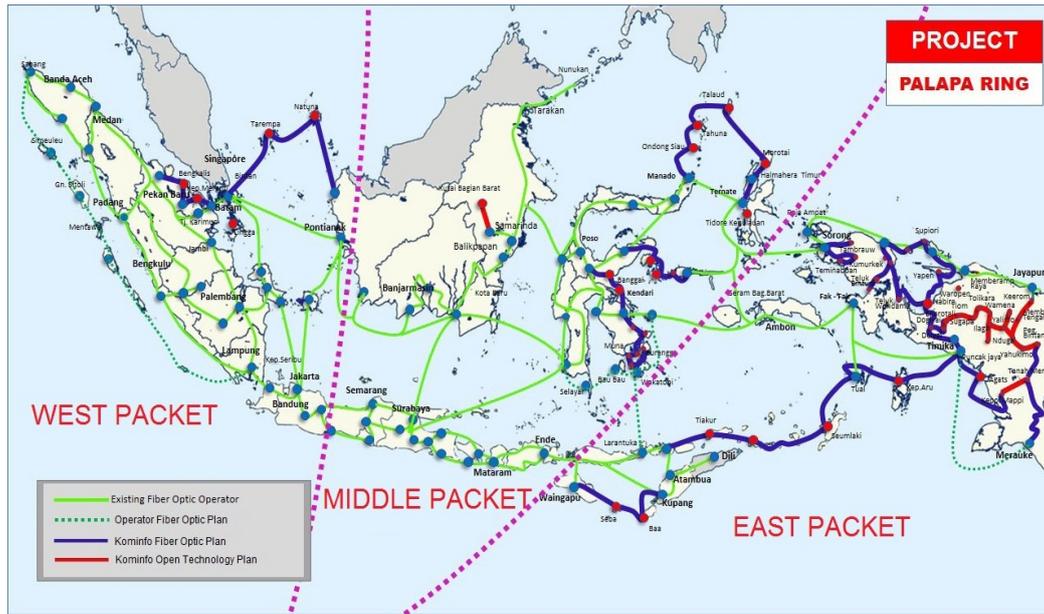


Figure 2: FO Backbone Program (TARHRD, 2013)



Figure 3 : Satellite Coverage (TARHRD, 2013)

As discussed previously, with the enactment of the *Telecommunications Act 36/1999*, the telecommunications sector was liberalised. This liberalisation happened only about one year after a significant political change in Indonesia in 1998: President Soeharto, who had been in power for 32 years, stepped down, followed by a national general election.

The liberalisation has had a very significant effect on the Indonesian telecommunications infrastructure development. Two other fixed wireless operators were appointed: Indosat (a

new name for Satelindo after the share was transferred to the government). The liberalisation also covered the technology aspect. Instead of implementing selected technologies, now all kinds of technologies can be used. As a result, several new private companies offering wireless communication services using various technologies were formed. Almost all wireless technologies were implemented in Indonesia such as AMPS, CDMA, PHS, GSM and others which are operated by various companies. At almost the same time, the Government Decrees Numbers 52 and 53 Year 2000 were issued to support the liberalisation.

Telecommunication service industries may also assign managed service of the operations of their licence to other companies, generally to foreign ICT industries. Under this scheme, ICT product producers are given the opportunity to be partners in operating a particular area. This policy enables global ICT producers to operate as telecommunications services industries on behalf of the local ones. It has to be emphasised that this liberalisation had caused local industries which previously produced telecommunication products for Telkom to stop their activities, since the industries which obtained managed service contract used their own products.

The GSM system was later proved to be the most competitive technology in Indonesia, and a new restructuring of industries was carried out. Telkom set up a new company operating GSM called Telkomsel. Several other companies were established and they all operated GSM wireless telecommunications. Similar to the previous policy of neutral technology, GSM operators are allowed to use any suppliers as their partners to operate their GSM licences.

To facilitate the development of internet technology, Indonesia has developed the internet infrastructure. Basically, the main program consists of developing the Indonesian Internet Gateways as well as arranging the Internet Resources management. The main development is to legalise and support the development of Voice over Internet Protocol (VoIP) services followed by other Internet-based additional infrastructures such as Government Data Centers and others.

The Palapa Ring program facilitates access to telecommunication services in the eastern part of Indonesia (MCIT, 2015). The government has been developing a huge FO network, thousands of kilometers long, called the East Package Palapa Ring project. The FO will stretch from East Nusa Tenggara, Maluku and Papua. The Palapa Ring Project is targeting four provinces in the eastern region of Papua, West Papua, Maluku and East Nusa Tenggara. This network will be built in 35 new districts and will be connected with the 11 districts that already had a FO network. The inauguration of the construction of this package was carried out on February 23, 2017 by the ICT Minister. The total length of the FO that will be installed is around 8454 kilometres with an investment of 5.1 trillion Rupiahs, from the total

construction cost of 20 trillion Rupiahs (1 USD is about 14000 Rupiahs). In the West Papua province, FO networks will be built in seven districts, which will be connected with two districts that already have networks.

The Palapa Ring network would eventually become the foundation of all operators and users of telecommunication services in Indonesia. This network will also be integrated with existing network-owned by telecommunications operators. This project will open up access to the internet at a speed up to 10 megabytes per second, and if used positively will increase Indonesia's competitiveness in world affairs. The huge development of FO in the eastern part of Indonesia also clearly demonstrates the Government's commitment to prioritise the development in the eastern part of Indonesia.

Another program to develop local industrial capability using a selected technology was carried out again during 2006-2007. To facilitate the development of WiMax technology, a particular standard was selected and this has a direct impact on the strengthening of local ICT Industries. With the expectation that ICT industries capable of producing WiMax based products will be able to increase their market shares, a research fund was provided to universities which cooperate with local ICT Industries to produce local WiMax products. Despite the fact that local WiMax products have been produced and used by some industries, this effort was terminated due to the change from the policy of requiring the use of one selected technology to the policy of allowing the use of any technologies available.

With all the above mentioned developments, Indonesia now has several GSM operators in addition to Telkom as the fixed line operators.

Regulation of the Industries

As previously mentioned, the telecommunications, broadcasting and internet sectors were integrated in one Ministry, the MCIT, in 2005. The Ministry then introduced regulations to cover those sectors. Based on previous Acts, the Ministry set up a new Act in 2008 covering application and content. In addition, several government decrees were issued and/or modified in order to integrate these sectors. Figure 4 below shows the concept of the integration of those regulations.

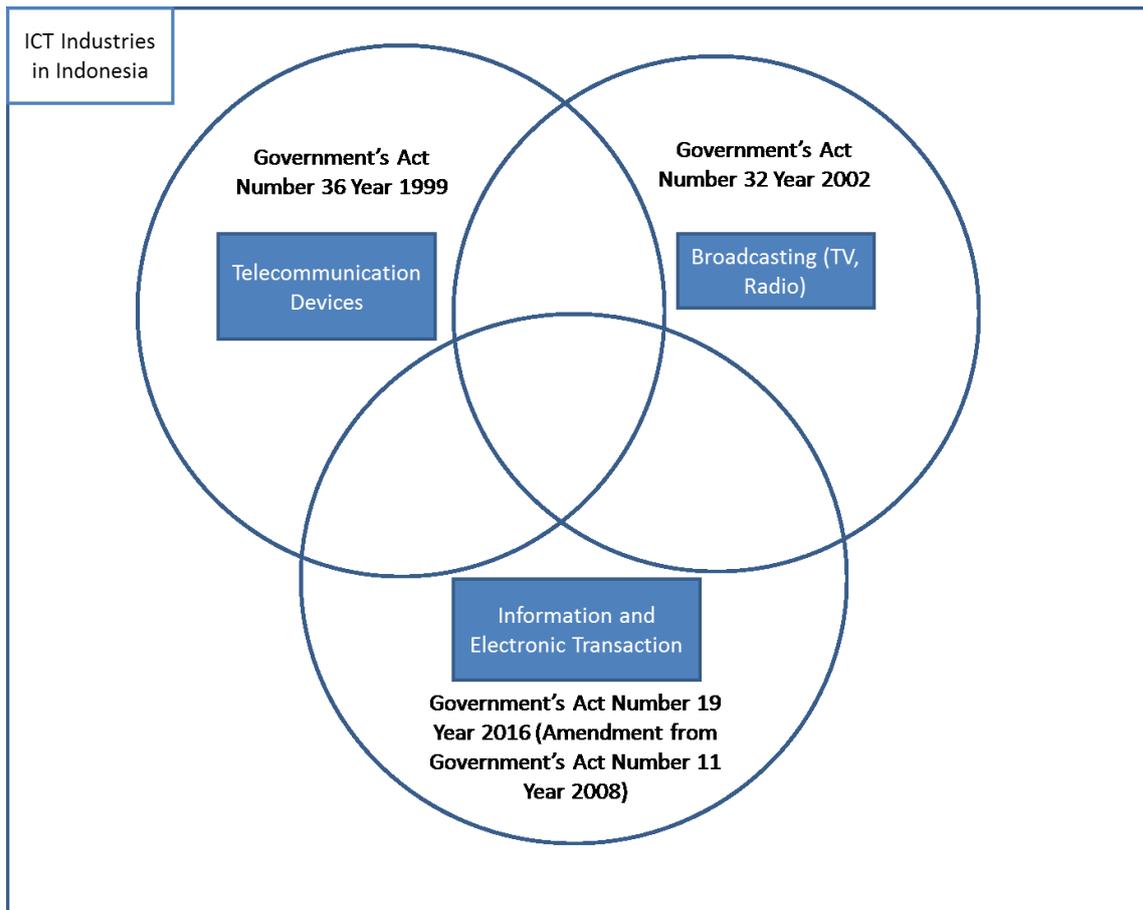


Figure 4: Regulations of ICT Industries in Indonesia
(TARHRD, 2013)

Telecommunications Act Number 36 Year 1999

The development of telecommunications in Indonesia experienced significant changes as a result of the enactment of *Act Number 36 Year 1999* on Telecommunications on September 8, 2000. This Act can be regarded as an attempt to synergise the agreement contained in the General Agreement on Trade in Services (GATS) and the Annex of Telecommunications. The Act was a key guideline for reform in the telecommunications industry, including the liberalisation of the industry, the requirement for new organisers and the effort to increase the competitive structure of the industry (Nababan & Darwanto, 2015). There are substantial differences between the *Telecommunications Act Number 3 Year 1989* and the *Telecommunications Act Number 36 Year 1999* as shown in Table 1 below.

Table 1 : Comparison of Material Content between the Telecommunications Acts 3/1989 and 36/ 1999

(Budhijanto, 2010)

Telecommunications Act Number 36 Year 1999	Telecommunications Act Number 3 Year 1989	Material Content
State-owned enterprises; Regional owned enterprises; private and cooperative	The government through the Agency Operator	Telecommunications Providers
Telecommunications Network; Telecommunications Services; Specific Telecommunications	Basic Telecommunications Services, Telecommunications Services Non-Primary and Specific Telecommunications	Telecommunications Services Category
The mechanisms of the common business	Joint Venture, Operation and Contract Management	Forms of Cooperation
Based on the ability of the business	Through the cooperation with the Agency Operator/Telkom	Venture Capital
Exclusive rights are retained according to the schedule. Acceleration is possible with the termination of the payment of compensation by the government	Exclusive rights are owned by the Operating Body /Telkom	Exclusive rights of the telecommunications
Determined by providers based on a formula set by the government per the recommendation from BRTI	Determined by the government	Tariff
The government together with BRTI	Government	Regulator

Telecommunications Act Number 36 Year 1999 declared that Telecommunications is defined as an organisation engaged in activities of transmitting and receiving information in the forms of signs, signals, writings, images, sounds and sounds by wire, optical, radio or/and other electromagnetic systems. Based on the Act, the government set up two main government decrees. The first is Government Decree Number 52 Year 2000 on telecommunications operations including licensing system, and the second is Government Decree Number 53 Year 2000 on the Use of Radio Frequency Spectrum and Satellite Orbit.

First, all telecommunications operations in Indonesia can only operate after obtaining permission from the Minister by completing a simple procedure. It is a transparent, fair, non-discriminatory and fast process. The Government sets the composition of the network tariff and telecommunication services, including the structure and types of tariff. The tariff is set using a formula based on a market mechanism and the cost of investment which is determined by the types of cost, operations and maintenance, network development, factors

of inflation, purchasing power and efficiency. The tariff structure of the telecommunications network consists of access fees, usage fees and the cost of universal service contribution.

Telecommunications equipments which are traded, manufactured, assembled, imported or used in the territory of the Republic of Indonesia shall take into account the technical requirements and must be based on the licence in accordance with the legislation in force. In addition, all equipments should also bear government licences.

In accordance with the procedure in the two decrees, permission must be obtained for the use of radio frequency spectrum and satellite orbit in order to make sure that there is no frequency interference. Planning includes the use of radio frequency spectrum band plan and channelling plan. A permit is also compulsory for the use of radio frequency spectrum for telecommunications operations. The permit specifies the use of radio frequency spectrum in each frequency band or channel. Permission to use a particular radio frequency spectrum is granted based on radio frequency allocation and determination of the use of radio frequencies.

All users of the radio frequency spectrum for telecommunications operations are required to pay the fee for radio frequency spectrum, which is determined by a formula that takes into account various components, such as the type of radio frequency bandwidth or radio frequency channels, broad scope, location as well as market interests.

Broadcasting Act Number 32 Year 2002

As mentioned before, broadcasting is part of ICT. Previously, broadcasting was regulated by Government Decree Number 55 Year 1970 on Non Government Radio Broadcasting and Minister of Information Decree Number 111 Year 1990 on Television Broadcasting. These decrees were replaced by the *Broadcasting Act Number 24 Year 1997* which was considered to be highly repressive and was viewed as an implication that the government does not have any other implementing regulations. This situation was abused by the public to develop illegal private radio and TV broadcastings. The Indonesian political reform in 1998 called for press freedom including freedom of content in broadcasting. A new law was passed and a new *Act Number 32 Year 2002* was promulgated in December 28, 2002. The new Act basically guarantees the freedom of Broadcasting content for all broadcasters, irrespective of the status of the operator, whether it is government, private or community. The content is controlled only by the independent KPI.

Figure 4 above shows several Acts that regulate the ICT sector in Indonesia. It has to be taken into account that due to the use of ICT in almost all sectors, *Act Number 11 Year 2008* and its amendment in *Act Number 19 Year 2016* are also used as the basis for many other

regulations in those sectors. This Act, for example, also regulates Information, Documents, and Electronic Signature that can be used as legal evidence. This also means that electronic information, document and signature have been legally acknowledged as evidence and hence should be used properly. This includes e-Commerce transactions which is a fast growing business in Indonesia.

The Current Situation and Recent Developments

Telecommunications Sector

Prior to the development of the Internet legal structure, Indonesia used *Act Number 36 Year 1999* on Telecommunications as the legal basis. In that law, any activity running on the telecommunications network was defined as telecommunications services; this is detailed in Government Decree Number 52 Year 2000 on Telecommunications Operation.

To ensure transparency in the regulatory process, under the *Telecommunications Act* in July 2003, BRTI was established as an independent body to set up regulations, monitor and control the telecommunications industry. Previously, BRTI was chaired by the Director General of the DG Postel. After the reorganisation of the Ministry took place, BRTI is currently chaired by Director General of PPI and Director General of SDPPI as the Vice Chair.

The above regulations direct the requirements for issuing a licence for each category of telecommunications service as shown briefly below. A telecommunications network provider is licensed to provide and/or operate a telecommunications network.

A telecommunications service provider is licensed to provide services by leasing network capacity from other network providers. Special telecommunications licences are required for private telecommunications service providers to carry out broadcasting content.

To regulate the licences, several Ministerial decrees were issued.

- Ministerial Decree Number 1 Year 2010 on the Licensing of Telecommunications Network.
- Ministerial Decree Number 21 Year 2001, later replaced by Ministerial Decree 31 Year 2008 on Telecommunications service industries.
- Ministerial Decrees Numbers 7 and 31 Year 2008, to implement the *Telecommunications Act* regarding the new categories of telecommunications network and service operations.

The growth in the number and users of telecommunications services is an indicator which shows the state of progress of access to ICT in the society. Indonesia is a developing country with a population of about 250 million spread over five major islands and thousands of small islands. One of the challenges in the implementation of ICT Indonesia is the geographical conditions that contribute to the uneven development of ICT infrastructure.

Users of telecommunications services in Indonesia are divided into users of mobile cellular and fixed telephone users. Customer-specific fixed telephone services are also divided into two areas: Fixed Wireless Access (FWA) and the Public Switched Telephone Network (PSTN). The number of cellular subscribers in Indonesia tends to increase every year. This is due to the availability of wide selection of mobile devices at an affordable price combined with related infrastructure development and regulations that provide healthy competition among all players. In 2010 the number of cellular mobile users was around 211.3 million and it continued to rise. In 2014, the number of mobile subscribers was recorded at around 325 million, as shown in Figure 6. This number exceeded the total population in Indonesia and this was caused by dual ownership, where there were many people who had more than one telephone number.

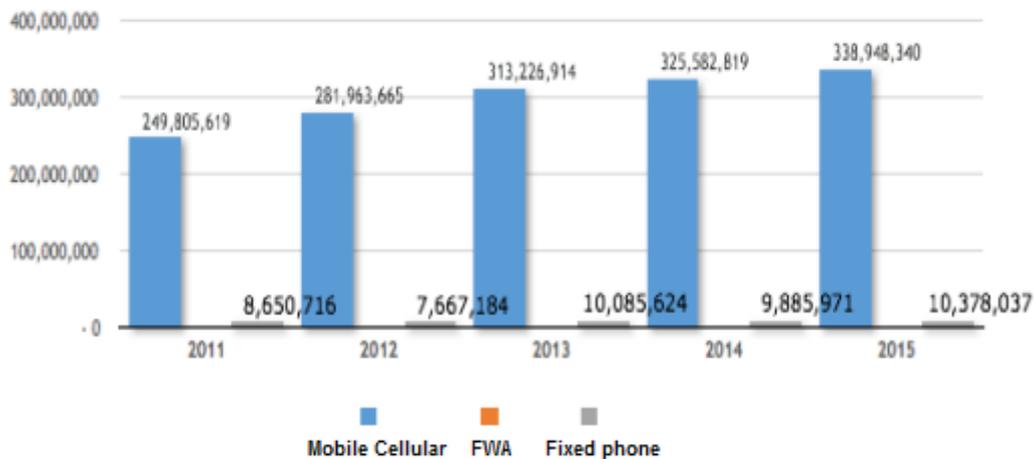


Figure 5: The Number of Telephone Subscribers in Indonesia
(TARHRD, 2015)

The number of PSTN subscribers in Indonesia did not change significantly from 2013 to 2014, while the number of FWA subscribers had decreased since 2012. In 2010 the number of FWA subscribers was 32 million; it continued to decline and in 2014 the number fell to 16 million. Due to the limited area of coverage and the decrease in the number of subscribers, the popularity of FWA CDMA technology adopted by the FWA operator had lessened in Indonesia. As a consequence, the government decided to stop the entire FWA services through Ministerial Decree Number 30 Year 2014 on the Settlement of Radio Frequency

Band of 800 MHz for the Purpose of Mobile Cellular Network. This is implemented by asserting FWA licence revocation on the spectrum (ATSI, 2015; TARHRD, 2014).

Another important aspect is the types of payments for different mobile phone services, including prepaid and postpaid services.

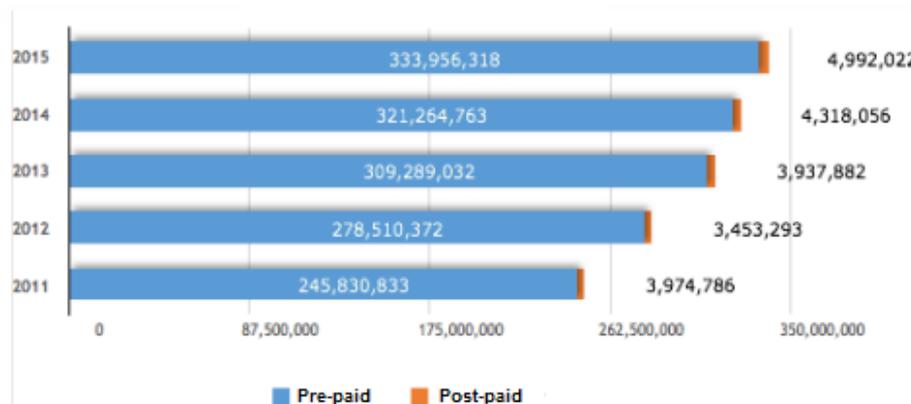


Figure 6: The Growth of the Number of Mobile Cellular Subscribers Based on Types of Services (TARHRD, 2015)

Figure 6 above demonstrates that from 2011 to 2015, the number of cellular subscribers in Indonesia experienced growth every year, with the highest percentage rise recorded in 2012 amounting to 12.87%. This increase also applied to the number of prepaid and postpaid subscribers. The postpaid customers increased since 2012 after having previously decreased to around 13.12%. In Indonesia, the number of prepaid subscribers is always much higher than that of postpaid customers. It is evident that the customers prefer the prepaid type since the telephone cost is easier to control.

Internet Sector

The increase in the number of mobile phone users has also boosted the growth of the number of internet users. The borderless internet connection has now almost become an integral part of community activities in all sectors. These conditions also drive the growth of the Internet Service Providers (ISP), which can be either an ISP only or Telecommunications operator that extends their services from SMS and Voice to ISP.

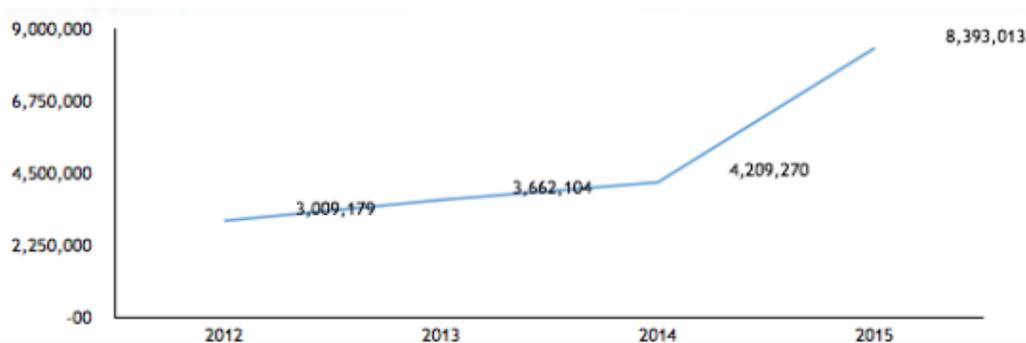


Figure 7: The Growth in the Number of ISP Subscribers
([TARHRD, 2015](#))

Figure 7 above shows that from 2012 to 2015 the number of Internet subscribers grew consistently, although in 2012 and 2013 the growth was not too significant. The highest increase was in 2015 amounting to 99.39%. With this increase, the number of subscribers in 2015 was almost double the number in 2014. The number of ISP subscribers by the end of 2015 reached more than 8 million subscribers. It has to be understood that the number of Internet users was certainly much higher, since many internet users could use similar ISP subscriptions, using dynamic IP addresses. Since all smart phones can be used to get Internet Access, the Number of Internet Users should be close to the number of Cellular users. It is noteworthy that Internet kiosks are spread across Indonesia and this enables people who do not have smart mobiles to be internet users, causing a higher number of users of the internet ([TARHRD, 2015](#)). The Indonesian Association of Internet Service Providers survey in 2016 predicted that the number of Internet users in Indonesia would reach 132.7 million people. The same survey in 2014 shows the number to be around 88 million people.

Along with the growth of internet penetration, the number of social media users is also growing. Through social media, anyone can easily socialise and interact with other users by means such as sharing photos, videos and messages over the Internet. The penetration of social media users in Indonesia in 2015 amounted to 31%, an increase of 6% from the previous year, making Indonesia the country with the highest number of users in ASEAN, which may be due to the high population. However, by percentage Indonesia is still below several ASEAN countries ([TARHRD, 2016](#)). This is shown in Figure 8.

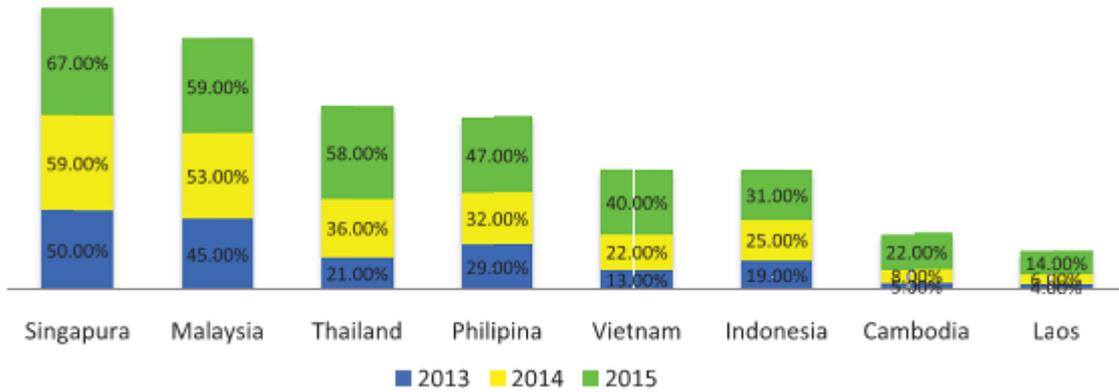


Figure 8: Comparison of Social Media Users in Indonesia and ASEAN Countries (TARHRD, 2016)

Facebook is the social medium most widely used in countries in Southeast Asia. Based on the number of users of Facebook by the count of active accounts (sign in) over the past three years, Indonesia was the country with the highest number of Facebook users, amounting to 79 million active users. Meanwhile, the Philippines ranked second with 48 million active accounts and Thailand was in the third place, with 38 million users. It is worth noting that in Singapore, the country with the highest teledensity, Facebook users were 67% of the population, amounting to 3.7 million as shown in Figure 9.

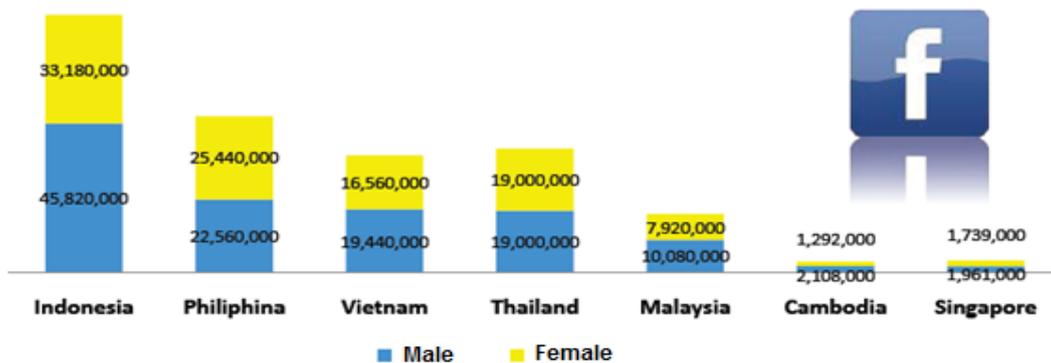


Figure 9: Comparison of Facebook Users in Indonesia and ASEAN Countries (TARHRD, 2016)

From the gender point of view, in 2016 Facebook users in the Southeast Asian region were dominated by males rather than females, with the exception of the Philippines where more Facebook users were female (53%). The percentage of male Facebook users in Indonesia is 56% (45.82 million accounts), while the percentage of female users is 44%, equivalent to 33.18 million active accounts (TARHRD, 2016).

This high number of social media users in Indonesia has caused politicians, political parties, NGOs and even Government organisations to use the media to spread information. At the same time, false information, hate speech, and misleading statements among others are also spread in social media, causing the Indonesian Government to set up a movement against these negative waves of content.

Broadcasting Sector

The Indonesian TV broadcasting market is characterised by a large number of national public, commercial and non-commercial TV services and a wide range of choices of TV platforms such as analogue terrestrial TV, digital satellite TV, analogue and digital cable. The TV market in Indonesia is mainly Free-To-Air (FTA) terrestrial with 419 broadcasters currently in operation. The 419 TV broadcasters comprise one nationwide public TV broadcaster, 297 commercial TV broadcasters, 8 local public TV broadcasters and 113 community TV broadcasters (ITU, 2013). It is estimated that there were 50 million TV households in 2012.

Currently, Indonesia's Gross Domestic Product (GDP) per capita was in the range of USD 2500 - 2900. This relatively low GDP figure and the very competitive TV market is one of the greatest challenges for the digital switch-over (DSO) process. DSO can only be successful if the costs for the government, the broadcasters and the viewers are kept low. The government can achieve more efficient use of the frequency spectrum and may allocate part of the broadcasting band to other communication services.

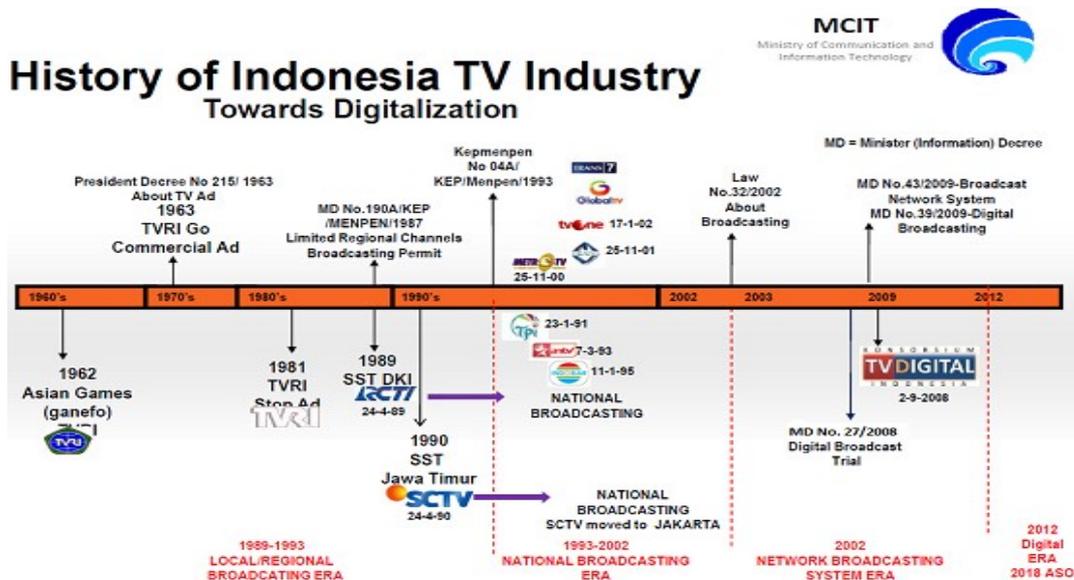


Figure 10 : The History of the Indonesian TV Industry (ITU, 2013)

The duration of the transition process from analogue to digital television is specified in the Ministerial Decree Number 2 Year 2011, which covers the implementation of digital

terrestrial TV broadcasting and implementation of simulcast.

In August 2009, MCIT issued Ministerial Decree Number 30 Year 2009 regarding the implementation of Service-Based Internet Protocol Television (IPTV) in Indonesia. It imposes the requirements for providing IPTV service: an operator should have Telecommunication, Internet and Broadcasting licences. The clear regulations boosted the growth of IPTV services in Indonesia, both at the National level and even the local IPTV operator.

This number of IPTV users in Indonesia added to the previous number of free broadcast TV users, obviously increased the total number of TV users in Indonesia significantly.

Recent Significant Telecommunication Developments

Telecommunications Business Competition

Although the monopoly of Telkom has been terminated, the government does not prohibit or prevent any operator from maintaining a dominant position in the business telecommunications services. However, the government will ban an operator found abusing its dominant position. In March 2004, the Ministry of Transportation (formerly the institution that regulated DG Postel) issued a Ministerial Decree Number 33 Year 2004 which is the implementation of *Act Number 5 Year 1999* on antitrust and unfair competition. The decree imposed restrictions on the abuse of a dominant position for network and service providers. Dominant providers are determined based on a number of factors such as business scope, coverage area of services and market control.

The decree specifically prohibits a dominant provider from practices such as price dumping (highly reduced price), arbitrary pricing and especially cross-subsidy. Cross subsidy happens when the cost for mobile phone calls between different operators is arranged to be much higher than when it is done within a single operator, forcing customers to use the other services of the provider and therefore hampering mandatory interconnection (including discrimination against certain service providers).

The enactment of BRTI Regulation Number 1 Year 2009 on Early Notification Regarding Merger, Consolidation and Acquisition, is expected to provide more legal certainty in the business environment in Indonesia, especially for those companies which have the intention to undertake Mergers and Acquisitions (M & A).

The regulation is intended to control M & A activities and thus the regulation can be viewed as anti-competitive. To overcome the problem, BRTI imposes their "notice-early" and "later notice" to them. Notification-early is voluntary and can be submitted prior to the merger,

while the notice-after is mandatory and must be submitted after the merger is done ([PT Telkom Indonesia, 2009](#)).

BRTI also has the authority to supervise foreign transactions that can give an unfavorable result to the Indonesian market, as stipulated by *Act Number 5 Year 1999*. This includes

- a) a merger of foreign companies operating in Indonesia,
- b) a merger between domestic companies and foreign companies (both operating in Indonesia), or
- c) any other form of mergers involving foreign parties.

The success story of the merger between two Telecommunications Operators – namely XL and Axis – demonstrates the implementation of the above regulation ([Tim PPM Manajemen, 2016](#)). While XL already has LTE (Long Term Evolution) networks operating in more than 35 main cities, Axis has sufficient frequency spectrum. The merger of the two resources will enable the merged company to develop data services faster and more efficiently using 4G technology than other telecommunication companies.

Telecommunication Consumer Protection

Based on the *Telecommunications Act Number 36 Year 1999*, each operator must provide guarantees for the protection of consumers in terms of quality of service, usage or service fees, compensation and other matters. Customers harmed by the negligence of the operator can claim their loss from the operators. As a great number of advances are taking place in telecommunications services, the operators should pay more attention to the quality of service. Such being the case, Consumer Protection Regulations in the field of telecommunications provide quality standards for telecommunications networks required for operators.

ICT Convergence

Digital technology is growing rapidly, resulting in convergence or integration of telecommunications services, data, information and broadcasting. This led to the issuing of several regulations that specifically incorporate some aspects of the convergence:

1. *Act Number 11 Year 2008* on Information and Electronic Transactions which also regulates financial transaction. This is followed by the issuance of *Act Number 3 Year 2011* on Fund Transfer and *Act Number 7 Year 2014* on Trading that includes e-commerce. These Acts definitely support the convergence of ICT and e-Commerce and e-Payment.

2. Ministerial Decree Number 30 Year 2009 on IPTV, as has been briefly described above, integrates Telecommunications Broadcasting and Internet services.

The convergence policies in the above sectors have been followed by almost all sectors such as Transportation that enable application-based Transportation, Accommodation that enables on line room bookings and many other kinds of applications. This had resulted in the necessity of more and more requirements for creative applications on ICT. Therefore in 2015 the government set up a new Agency to boost the development of Creative Industries including ICT, called The Indonesian Creative Economics Agency (Bekraf – Badan Ekonomi Kreatif Indonesia).

Some Significant Ongoing New Programs

National Internet Exchange

The interconnection of Internet networks in Indonesia is currently still concentrated in Java Island and the big cities, especially Jakarta. This means that other regions, especially in central and east Indonesia, are required to route their networks to Jakarta. This definitely causes high connection fees for these areas. The disparity in rates of internet service has become one of the problems that can hamper the growth of the national economy. On the other hand, in the era of the Internet of Things, content as well as an all-electronic system has become more important. This has driven the rise in demand for interconnected networks as well as data centres across Indonesia. It has to be emphasised that in accordance with Government Decree Number 82 Year 2012, Public Data must be stored in data centres located in Indonesia ([Bhaskoro, 2013](#); [OEIT, 2012](#) ; [Silaban, 2014](#)).

To accommodate this need, the government issued Ministerial Decree Number 21 Year 2010, which commands universal service NIX to be built in all regions throughout Indonesia ([TARHRD, 2010](#)). The MCIT then built Nusantara Internet Exchange (NIX) in 33 provincial capitals. NIX is the infrastructure aimed at providing a more equitable distribution of national Internet traffic across Indonesia. Moreover, this development is expected to promote local content. By the end of 2015, 27 NIX were completely developed. This program was continued as part of the Indonesian Broadband Plan Program.

Indonesia Broadband Plan

The implementation of national communication and information technology entered a new phase in the year 2000 where there was a shift in the pattern of telecommunications operations from monopoly to competition. In the same year the government executed the elimination of operating functions. Although the construction of telecommunications

infrastructure is dominated by enterprises, the government ensures fulfillment of the right of communication and access to information for everyone.

In 2014, due to the increasing internet content development, a Presidential decree Number 96 Year 2014 was issued. This decree arranged the plan to develop broadband access across Indonesia including enormous infrastructures and also raised several flagship programs as shown in Figure 12. This arrangement was expected to overcome the problem of fixed access. The access had been developed for many years across Indonesia and the spread was considered to be more or less equally distributed in big cities and remote regions. However the actuality seemed to fall short of the expectation.

In some countries, a similar regulation can still keep the telecommunications density fixed-access to more than 10% and even 20% in the early 1990s, while in Indonesia, the fixed-access current density could only reach about 4%. This low percentage may cause disparity of telecommunications access across the country, especially in some remote areas which were previously connected using fixed access. As a result, despite the current liberalisation policies introduced by *Law Number 36 Year 1999*, Indonesia still faces the issue of equalisation, namely telecommunications network development outside Java and underdeveloped rural areas. This may lead to a national telecommunications access gap between cities and rural areas, as well as between the western and eastern parts of Indonesia ([BAPPENAS, 2014](#)).

To overcome this problem, the development of communication and information in the period 2004-2009 brought into focus the following three agendas:

1. The development of information and communication services in the non-commercial areas to improve public accessibility.
2. The creation of equal competition (level playing field) and a supportive business climate.
3. The use and development of ICT to improve the ability of society and industry, as well as to realise the validity, security and legal protection of the use of ICT.

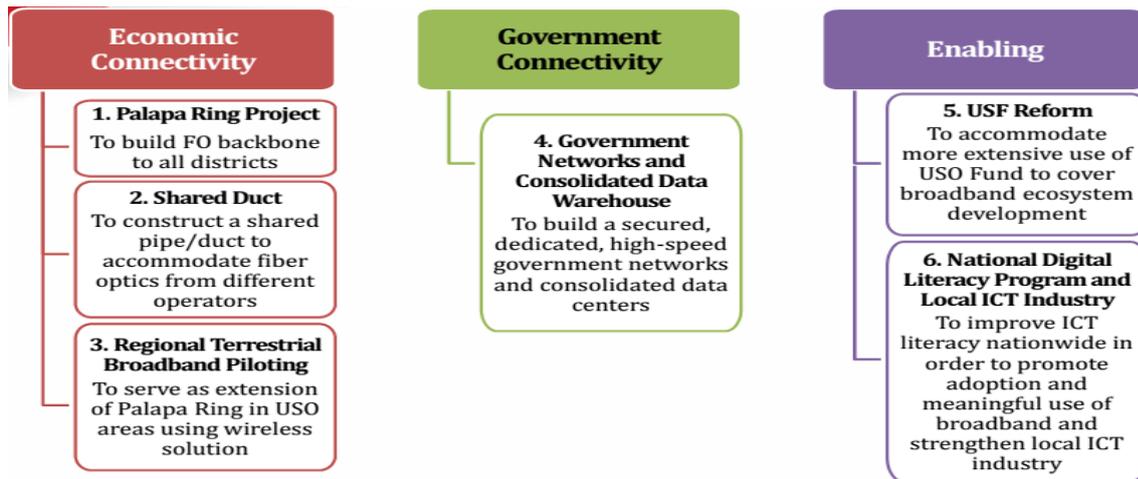


Figure 11 : Indonesia Broadband Plan Flagships ([BAPPENAS, 2014](#))

In continuing the above development agenda of the period 2004-2009, the developments in communication and informatics in the following period of 2010-2014 were more focused on strengthening national connectivity, covering economic connectivity between and within islands, as well as connectivity among government agencies. This program is popularly called ‘Indonesia Connected’. The direction of the development is detailed in three agendas, namely:

1. The reduction of the digital divide and areas not accessible by communication services and informatics (blank spot).
2. Increasing the availability of infrastructure and communication services and information that are secure and modern with good quality and reasonable price.
3. Improving the quality of provision and utilisation of information, and the use of ICT effectively and wisely in all aspects of life.

During this period, the Government also encouraged accelerated development of broadband via the Palapa Ring project in 51 districts/cities that are located in the non-commercial areas. The construction started in 2015 and the fund was derived from the USO fund. In addition, using company funds, Telkom carried out development in other 446 counties/cities.

Digital Broadcasting

In 2015, following the development of digital technology in broadcasting and the need to get more frequencies for the broadband plan, the government launched a plan to revise *Act Number 32 Year 2002* to accommodate digital broadcasting. From this program, the government will get a digital dividend – additional spectrum not used by the broadcasting sector, since the frequency required for digital broadcasting is less than for analogue broadcasting. The revised draft of the Act however is still under serious discussion due to the many different views on this program.

For the above implementation, MCIT issued Ministerial Decree Number 5 Year 2016 concerning Telecommunication Testing Technology, Information and Broadcasting. The regulation was carried out in the framework of research and policy direction setting the operations of telecommunications, information and broadcasting (Ministry of Communication and Information Technology, 2016). Several types of technologies were tested, including Open BTS (Base Transceiver Station), Google Loon, PPDR (Public Protection and Disaster Relief), 5G, digital TV method of SFN (Single Frequency Network) and MFN (Multi-Frequency Network).

Following the above digitalisation broadcasting program, a basic agreement was signed on June 9, 2016 between TVRI and more than 35 Content Providers on the trial to broadcast Terrestrial Digital Television. This was followed by six months of field testing in 20 locations, monitored closely by the KPI. The successful tests included analysis of various technical aspects such as the set-top box, the various services possible including data services, weather information, financial information, current traffic conditions, early warning information and other related aspects. Non- technical aspects such as possibilities of partnership, business model between content providers and broadcasting operators and others were also under study.

5G System

In 2016, several countries and telecommunications industries started to test the 5G system. MCIT also launched a program to prepare the country to migrate to the 5G system including IoT. The study was carried out by the MCIT Research Agency ([TARHRD, 2016a](#)) and the following are some of the significant results:

1. The implementation of this technology in Indonesia should consider various aspects such as business models, impacts, benefits, regulations, and even the ecosystem in order to really provide benefits for the industries and their consumers.

2. To support this migration, Broadband Infrastructure should be the priority to be developed.
3. New policies and regulations should be issued for 5G migration.

Based on the above-mentioned results of study, several scenarios have arisen for 5G implementation:

1. Enhanced Mobile Broadband can contribute to the improvement of performance and give users a better Quality of Experience (QoE). It ensures the coverage of a larger area without neglecting the quality of the connection from medium to high level of mobility.
2. Ultra-reliable and low latency communications to fulfill the requirements of throughput and availability of connectivity, especially for critical applications in the future such as self-driving cars.
3. Massive Machine-Type Communications connecting various kinds of tools and communication devices both in the home, office, or vehicle mounted.

The above scenarios call for the need to fulfil the requirements to achieve IMT-2020 (International Mobile Telecommunications for 2020 and beyond’).

Stratosphere Based HAPS

As previously described, despite the development of FO to connect main islands in the Palapa ring program, Indonesia still has many remote islands and places with no telecommunication access. Although satellite technology can overcome this problem, the cost is considered high.

During the Presidential visit to the US in 2015, the President initiated a basic agreement with several US companies to carry out a trial using a High Altitude Platform System (HAPS). HAPS is a vehicle in the form of a flying craft that is located at an altitude of 17 to 22 km above the earth's surface ([Chauhan, Agarwal, Purohit, & Kumar, 2013](#)). As a start, the HAPS which was tested was the one developed by Google, the Google Loon. Basically it is a balloon flying at an altitude of around 20 km and directly connected to the mobile devices using LTE technology. Currently, the test is still being carried out by Google and several Indonesian telecommunications operators. MCIT has also reviewed the feasibility of implementing HAPS from the regulatory side by using the Regulatory Impact Analysis from the aspects of frequency governance, information security and airspace. MCIT also gives recommendations for the preparation of new antecedents related to 900 MHz frequency governance for eNodeB LTE HAPS, telecommunications provider security standards for

space environments and the formulation of controlled balloon classification as unmanned aircraft ([TARHRD, 2016b](#)).

Improving Cyber Security

With the increasing use of internet across Indonesia, the information in the internet is highly used for many activities. To handle information security issues, MCIT introduced Index KAMI as a tool to assess the maturity level of institutions to meet the national information security management standard. A finding from a study in cyber security points out that most organisations were focused on technology, but ignored risk management and framework aspects ([Kautsarina & Gautama, 2014](#)). While the government has just launched a program to boost the Digital Economy, at the same time much false information also spreads in the Internet ([Setiawan, Syamsudin, & Sastrosubroto, 2015](#)). A number of studies have been conducted to improve the policy and requirements on Cyber Security in Indonesia. One of the studies reveals that the readiness of Cyber Security in Indonesia is at a low level compared to the five pillars of the Global Cybersecurity Agenda (GCA)'s ITU Framework ([Nugraha, Brown, & Sastrosubroto, 2015](#)). Moreover, the Indonesian Government's requirements for state self-defence should be formulated and issued in response to the reported secret intelligence collection by the Australian Signals Directorate (ASD) ([Brissenden, 2013](#); [Internet Governance Forum, 2014](#); [Lane, 2013](#); [Nugraha & Sastrosubroto, 2014](#)). Strict regulations and requirements are of paramount importance to protect and safeguard our national interests. To ensure the confidentiality of national sensitive data, a reasonable effort is to encrypt all the sensitive data for processing, transmission and storage ([Nugraha, Kautsarina, & Sastrosubroto, 2015](#)). A study in cooperation with Oxford University even proposed several recommendations to improve Cybersecurity ([Nugraha, Brown, Roberts, & Sastrosubroto, 2016](#)).

To overcome the above problems of cyber security, several actions have been taken. *Act Number 11/2008* on Electronic Transactions and Information has been revised to *Act Number 19 Year 2016* where by the Government is given the power to directly remove all illegal content from the Internet ([EIT Law, 2008](#)). For this purpose, all ISPs also support this program by blocking all content upon the request of the government. Mass socialisation against false informaton in the internet is also widely spread. At the same time, all institutions holding public data are requested to improve their security measures by adhering to Ministerial Decree Number 4 Year 2016 on Information Security Management, where Indonesian National Standard, SNI, which is based on the ISO 27001 standard is used as a reference ([Badan Standardisasi Nasional, 2014](#); [Direktorat Jenderal Aplikasi dan Informatika, 2011](#); [Ministry of Communication and Information Technology, 2016a](#)). This

EIT Law was amended in 2016 to take into account several inputs from the public, especially those related to Cybersecurity and sanctions against defamation ([EIT Law, 2016](#)).

Conclusions and Recommendations

The ICT infrastructure, consisting of Telecommunications, Internet and Broadcasting, is being rapidly developed, both by the Government and by private companies. Liberalisation in this sector, combined with strong monitoring and control, has resulted in lots of ICT service industries to flourish. This expansion is also supported by new Acts and other regulations.

However, the TV Digitalisation process is still being carried out and so are the frequencies that can be made available by this program which is known as the Digital Dividend. Similarly, the Indonesian broadband plan needs to be implemented at a faster pace.

With the policy to promote the digital economy, there is an urgent need to speed up the development of both the ICT infrastructure and various applications and contents. Of equal importance is ICT security, therefore improvement in this aspect is necessary as well.

It is important to note that while the ICT service industries are rapidly growing, reflecting the fast growing markets in Indonesia, this is not the case with ICT product industries. As described, these industries can only grow when a particular technology is selected so that the products can have initial significant domestic markets. This will ensure that the development and production of the products can be economically feasible.

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