

PROMOTING INFORMATION AND COMMUNICATIONS TECHNOLOGY IN INDONESIA

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PROMOTING INFORMATION AND COMMUNICATIONS TECHNOLOGY IN INDONESIA (JANUARY 2014)

EXECUTIVE SUMMARY

ICT has a special role to play in Indonesia because of the nation's unique geographic and socio-economic characteristics. Indonesia is an archipelago country comprising some 17,508 islands, of which 6,000 are populated, and has a population of 252 million persons residing in 34 different provinces. With a geographic area of 1.9 million square kilometers, Indonesia is the world's 15th largest country in terms of land area and the world's 7th largest country in terms of combined sea and land area.

Indonesia's youth are leading Indonesia's telecommunication's revolution. The average age of population in Indonesia is 24 years of which 60% are under 39¹. Indonesia's young population and especially those in the rapidly growing urban middle class are early and avid adopters of mobile telephony and internet technology. This, in turn, has fueled rapid growth in the telecommunications sector. Between 2000 and 2013, the average growth rate of Indonesia's telecommunications sector was 23% per year.

Telecommunications are particularly important as an enabler, or catalyst for other sectors, and as a means of promoting greater transparency in and access to government services. Since privatizations following the Telecommunication Law in 1999, the sector has attracted \$17 billion in foreign direct investment, and mobile telecommunications penetration has increased from 3% in 1999 to over 100% in 2013. Internet penetration is on the rise in Indonesia. In 2000, fewer than 5 million Indonesians used the Internet. By 2014, there were over 70 million users. The mobile network is more widespread compared to fixed lines and therefore the majority of Internet users in Indonesia use mobile access.

If Indonesia can put the necessary enabling environment in place, it could harness the power of new technology to drive productivity improvements, combat corruption and substantially improve delivery of public services. Mobile banking could help to expand financial inclusion. Telemedicine could help in delivering health care services to remote areas, and digital learning tools could be used to improve the quality of education and teacher training across the archipelago. Use of ICT to collect and analyze big data, to draw on networks of sensors embedded in objects that connect via the internet (i.e. the internet of things), and leveraging on cloud computing could substantially boost productivity in many sectors of the Indonesian economy. Linking small businesses to e-commerce opportunities could import access to markets, technology and business partners.

In September 2014, the government launched a \$27 billion Indonesia Broadband Plan (IBP) which is to be implemented between 2015 and 2019. Under this plan, the government aims to provide fixed broadband access to all government offices, hospitals, schools and public facilities throughout all of Indonesia by 2019, and with an Internet connection speed of at least 2 megabytes per second. The plan also aims to bring broadband access to 80% of all rural institutions, half of all rural households and to 71% of all urban households by 2019. The Indonesia Broadband Plan identifies initiatives needed to improve the supply of ICT infrastructure and to enhance the government's use of ICT for e-governance, e-education, e-health, e-procurement and e-logistics. The plan is aimed at contributing to economic growth and competitiveness, building human capacity and providing services to under-served regions.

¹ See: <http://www4.bkpm.go.id/contents/general/8/demographics#.VI58qKb5Lu0>

In order to implement the IBP, there will need to be a range of legal, policy, regulatory, technical and administrative reforms. Details of how the plan will be implemented also need to be fleshed out through action plans, regulatory reform blueprints and intervention roadmaps.

The IBP recognizes that one of the barriers to broadband deployment has been a lack of infrastructure sharing. Operators have constructed their own facilities such as towers for mobile phone antennas and ducts for laying fiber optic cable, resulting in inefficient and duplicate investment. Smaller operators may not have the capital to construct their own infrastructure sites and have to lease such facilities often at high cost. At the same time, property owners and local governments may charge high prices for using their locations to deploy ICT equipment in private and public locations. They may also limit use of the property to a single operator. These practices have constrained competition, limited rollout of fixed broadband infrastructure and inhibited infrastructure investment in rural areas.

Another dimension to infrastructure sharing is the availability of ICT infrastructure among electrical utilities and transport related companies that have their own fiber optic networks. The fiber optic cables could be leased to telecommunications operators, increasing capacity and lowering costs. Though this practice exists to some extent in Indonesia—for example the national electrical utility PT PLN (Persero) leases its fiber optic cables to telecommunication operators through its Icon+ subsidiary—it could be more widely extended. Further, the rights of way which are already negotiated by utilities could be utilized to lay fiber along electrical towers, railways and roads.

A related issue is the principle of *open access* where all operators should be able to access key facilities at cost-based prices. Currently the major operators own large facilities such as international and domestic submarine cable networks, traffic exchanges, ducts and towers. These facilities are expensive to replicate. In the absence of regulatory controls, the owners can charge prices well above cost to access these facilities, particularly if they are involved in both wholesale and retail markets, or may limit the way other operators can access these facilities or may not allow access to them at all.

In order to encourage infrastructure sharing and promote open access, new policies, regulations and institutional arrangements will need to be developed. This includes *ex ante* regulations requiring owners of key infrastructure facilities to provide open access to their networks detailing where operators can interconnect their networks and place their equipment, technical specifications identifying interoperable equipment and rules on access to facilities for maintenance and repair. Rules for rights of way are needed to ensure that operators are not constrained by unrealistic and complicated procedures for locating their equipment on private and public property. Wholesale tariffs for using facilities such as towers and fiber optic networks will need to be determined. These should be cost-based including provisions to ensure that operators involved in both wholesale and retail markets do not resort to anti-competitive practices. Some countries have enforced this by requiring such operators to separate their wholesale and retail operations.

Licensing procedures also need to be streamlined. Currently operators require a range of licenses depending on the type of services they provide. This system is cumbersome and is not suited to the rapid evolution of the ICT sector where technologies are changing and new business models are emerging all the time. Best practice calls for generic, technology neutral licenses that allow any type of network to be constructed and service to be provided with spectrum requirements treated as a separate allocation issue.

Local government will be a critical partner in the IBP. They are a strategic player since telecom infrastructure such as fiber optic ducts use public rights of way along streets and utility towers.

Municipalities should facilitate access for using public rights of way. A good example is Jakarta, where the local government is establishing a company to lay ducting throughout the city for operators to access at cost-based prices. Local governments can also benefit since municipalities can lower access costs for citizens including the provision of municipal Wi-Fi networks as well as improved ICT infrastructure in public administration.

Indonesia's rapid mobile communications growth and large number of operators is stretching the capacity of wireless networks. Users are downloading a growing volume of video contents over mobile networks due to the low penetration of fixed broadband. This is hampering network quality and inhibiting deployment of mobile broadband into rural areas because of the shortage of radio frequency spectrums. The mobile operators need additional spectrums to handle this surge in traffic, estimated at up to an additional 500 MHz of bandwidth. Spectrum management needs to be improved to squeeze out more frequency and re-allocate frequencies that are no longer used. The government also needs to ensure that there is no slippage in its target of transitioning to digital broadcasting scheduled for 2018 since that will free up a large amount of frequency that can be used for mobile broadband networks (referred to as the "digital dividend"). The lower band frequency (700 MHz) released from transitioning to digital broadcasting is ideal for rural areas since it has a wider coverage radius than high band frequencies.

Government's universal service obligation (USO) program also needs to be reformed to have a more significant impact. This includes aligning it to the goals of Indonesia Broadband Plan and transforming it to strengthen the broadband ecosystem. This would involve using the fund to provide infrastructure in rural areas as well as to stimulate demand side factors such as digital literacy, inexpensive access devices (smartphones, tablets) and developing appealing content.

Using ICT to improve the delivery of public services is critical to the government's efforts to reform governance, foster inclusion and bolster competitiveness. In 2009, a government decree on e-government was issued laying out a national e-government roadmap which focuses on initiatives aimed at fostering standardization of services across government, online service delivery, infrastructure integration, and service interconnection and integration. Indonesia's e-government strategy calls for utilizing ICT as the basis for reengineering government administration at a central, provincial and local level to deliver government services and to build a modern ICT enabled administration that will deliver world class information and services to all Indonesian citizens.

Much of the e-governance efforts to date have focused on improvements in public administration and other back-office services with limited business process reform. Most e-government applications have been developed on a silo-base, with HR, infrastructure, applications and databases specific to central government, province and kabupaten agencies. Since most of the focus was on digitalizing back-office functions, public awareness of progress registered through e-governance has been limited. In addition, a "silo" approach to development e-governance applications has wasted investment resources and has complicated the sharing of data across the government and has also made it more difficult to safeguard government data. In response, the Indonesia Broadband Plan calls for policy reforms to: (i) suspend new development of government data centers in order to encourage migration to a consolidated data center; (ii) to foster greater infrastructure sharing and the use of generic or common e-governance applications; (iii) greater attention to data security; and (iv) an obligation to use the "go.id" email account for government communications.

There is a need to foster more coordinated, standardized and better-integrated ICT services across the government. This would lead to gains in efficiency by sharing resources, by reducing risks of data loss, and by encouraging adoption of good practice applications. Areas of common e-government infrastructure include:

A. Government Network: As the government increases the use of ICT for public services, a government network is going to be a critical aspect of e-government infrastructure, both for ensuring that the back-office functions of the government are undertaken efficiently and to improve the quality of on-line public services. The government network could also be used for last mile connectivity to rural and remote areas, by connecting central and local governments to post offices, schools, healthcare posts etc. Indonesia does not have a formal government network, and as broadband capabilities are enhanced, such a network could be established. For example, the government network could be developed as a physically separated network or it could draw on facilities that are rented from the private sector, or a combination of both.

B. Government Data Center: The national broadband plan calls for a moratorium on the establishment of separate data centers and a gradual shift to government-wide data centers. Currently many government agencies including local governments have their own data centers. However, it is very difficult for each organization to maintain these at a high level of quality and security. The consolidation of government IT systems can be an effective measure to address both service quality and improve IT management including data back-up, disaster recovery and data protection. This will require supporting regulations and detailed plans for migrating from agency-specific to consolidated data centers.

C. Information Sharing: Many databases have already been developed for the core functions of government, at a central and local level. To provide better public services using ICT, it is critical to integrate these databases, and draw on existing ones that best serve citizens' needs. Information sharing mechanism and relevant institutional arrangements need to be developed across government agencies linking their applications and databases, both for internal and external use. This will require the government to address many issues including data security and to reform data collection and reporting processes.

D. Cyber Security and Privacy: As the Internet becomes increasingly used to deliver public services, cyber security will be a growing concern. Government systems are becoming more vulnerable to cyber-attacks as they produce, accumulate and exchange data for administrative purposes as well as for delivery of online services. Policies, regulations and technical mechanism need to be prepared to protect personal data and ensure that privacy is clearly defined and guarded in cyber space.

E. Common Software Components. All government agencies need to use some standard software components for their application. These are necessary to support the interoperability of ICT systems among government agencies. This includes directory systems for users and information resources, public key infrastructure (PKI) for authentication, communication, document management and exchange systems. These common software components should be prepared and distributed in a centralized and standardized manner to reduce redundancy, lower development and maintenance costs, and to guarantee interoperability, service quality, and performance of complex government information systems.

F. ICT Human Resource Development: Development of a network of ICT professionals from the key central and local government agencies will be needed if integrated (rather than agency silo) ICT solutions are to be adopted. This will require the appointment of designated ICT focal points (e.g., chief technology or information officers) for all government agencies. Networks of ICT officers will subsequently need to be developed to promote information sharing and to encourage adoption of common approaches.

The Indonesia Broadband Plan (IBP) is a timely response to remedy many of the factors plaguing the country's ICT infrastructure development. The plan is also strategic in that it recognizes that ICT is critical for improving the country's competitiveness, reforming governance and improving the well-being of its citizens. The IBP can also have a significant impact on Indonesia's ICT sector itself, particularly demand side actions to enhance human capacity and encourage the IT software and services sector. The Plan has support at the highest levels of government and is linked to the country's medium and long-term development plans as well as the international agenda for poverty reduction and ICT development. The MCIT has created a special directorate to oversee implementation of the plan. Specific measures to assist the ministry implement the IPB could, include:

- **Detailed Implementation Planning.** Implementation of the IBP will require a series of detailed blueprints and roadmaps as well as significant regulatory changes. This will be a major undertaking considering the scope of the plan and the size of the country. Specific actions for carrying out the different activities identified in the plan need to be spelled out in detail. Extensive knowledge including familiarity with international experiences will be critical to ensure that the processes and procedures for implementing the plan are realistic and successful.
- **Infrastructure Sharing and Licensing Reform.** Numerous changes to the regulatory landscape are required to enable the open access and infrastructure sharing goals of the plan. This will require deep knowledge of how to implement efficient, fair and transparent rules for interconnecting networks, enabling open access and facilitating rights of way and infrastructure sharing. The wholesale price of access to networks and facilities is a critical dimension requiring strong technical and accounting skills to ensure that prices are cost-based. In addition, the licensing processes will need to be streamlined with a view to moving towards a generic, technology-neutral regime. Implementing regulatory best practices from within the region and globally would assist in meeting these challenges.
- **Spectrum Management Reform.** Efficient management of the country's radio frequency spectrum is essential for ensuring the targets established in the IBP for mobile broadband are met. The country's transition to digital broadcasting in 2018 will free up large amounts of frequency in lower frequency bands that is ideally suited for wide coverage of 4G mobile broadband. An efficient spectrum management system could usefully be developed to help ensure a smooth transition to digital broadcasting by the target date.
- **USO Reform.** Success of the IBP will require the right mix of supply and demand side factors in the broadband ecosystem. The country's USO fund has mainly been used on the supply side to rollout ICT in rural areas through different schemes but with limited success. Funding allocation has been hampered by political and administrative factors with the result that some US\$ 7 billion has not been disbursed. Redesigning the USO fund so that it can effectively and efficiently support the IBP including use of the fund to stimulate demand in rural areas through initiatives such as massive digital literacy training and development of relevant citizen-oriented e-services would facilitate improvement.
- **Scaling-up E-governance.** Adopting more systematic (rather than silo) approaches to e-government will require major policy, regulatory and institutional reforms. This would include through policy, regulatory and technical changes to develop core e-governance

infrastructure---i.e. common government networks, data centers, information sharing, cyber security, common application components.

- **Monitoring and Evaluation.** Proper monitoring and evaluation will be crucial to track the multiple dimensions of infrastructure supply and demand to business, citizens and government. Tools such as dashboards and GIS will need to be integrated with locations of infrastructure facilities and indicators to monitor evolution of broadband deployment. Functionality should include multiple layers enabling monitoring at national, provincial, district, sub-district levels and down to census enumeration areas.

ICT'S ROLE IN INDONESIA'S SOCIO-ECONOMIC DEVELOPMENT

1. ICT is a means to an end, or a set of interventions, which, if effectively deployed, could contribute to the efficient, effective, and sustainable realization of the goals and objectives of Indonesia's medium-term development plan.

2. Advances in information and communication technology (ICT) are creating tremendous opportunities to improve service delivery and to expand economic opportunities worldwide. ICT has a special role to play in Indonesia because of the nation's unique geographic and socio-economic characteristics. Indonesia is an archipelago country comprising some 17,508 islands, of which 6,000 are populated, and has a population of 252 million persons residing in 34 different provinces. With a geographic area of 1.9 million square kilometers, Indonesia is the world's 15th largest country in terms of land area and the world's 7th largest country in terms of combined sea and land area.

3. Indonesia is also the 16th largest economy in the world and the biggest economy in the Association of Southeast Asian Nations (ASEAN). The country has recorded strong economic growth over the last 6 years and has made significant strides in reducing the incidence of poverty. Indonesia is a middle-income country, with a per capita GDP of \$3,468 in 2013 and aims to be an upper-middle-income country by 2020. Use of ICT has an important role to play in boosting productivity and competitiveness, and has a special role to play in enhancing governance and improving the quality of public services.

4. While Indonesia's economic growth averaged 5.8% over the past decade, it has been below the 7%-8% rate recorded before the Asian Financial Crisis. Growth has been driven by the services sector, while manufacturing performance has been lackluster. Higher rates of productivity growth will be required to bolster competitiveness and to put the country back on a higher economic growth trajectory. Indonesia's new government has pledged to accelerate infrastructure development and enhance the country's competitiveness through improved human resource development and bureaucratic reforms.

5. Before the year 2000, Indonesia had one of the most highly centralized governments in all of Asia-Pacific. Since then, the country has embarked on a major fiscal and administrative decentralization effort with responsibilities for the bulk of public services allocated to 34 provinces, 511 Kabupatens (i.e. regencies), 92 cities and 80,714 villages. Decentralization has been a challenging process because of coordination challenges, skill and capacity constraints, imbalances between local resource mobilization options and expenditure requirements, and differences in local policies, regulations and practices. Governance is also constrained by corruption, gaps in the legal framework and variation in the quality of public services.

6. Indonesia's youth are leading Indonesia's telecommunication's revolution. The average age in Indonesia is 24 years and 60% of the population are under 39 years of age.² Indonesia's young population, and especially those in the rapidly growing urban middle class, are early and avid adopters of mobile telephony and internet technology. This, in turn, has fueled rapid growth in the telecommunications sector. From 2000 to 2013, the average growth rate of Indonesia's

² See: <http://www4.bkpm.go.id/contents/general/8/demographics#.VI58qKb5Lu0>

telecommunications sector was 23% per year (in current prices). There was only one sector that grew faster: air transport at 25% per annum growth.

7. Telecommunications are particularly important as an enabler, or catalyst for other sectors, and as a means of promoting greater transparency in and access to government services. Since privatizations following the Telecommunication Law in 1999 the sector has attracted \$17 billion in foreign direct investment and mobile telecommunications penetration has increased from 3% in 1999 to over 100% in 2013. Greater competition has resulted in improved services and a 40% reduction in domestic tariffs. Spending on telecommunications in Indonesia is dominated by voice services, but consumption of data services is likely to drive future growth.

8. According to the national statistics office (BPS) value added of the communications sector (telecommunications and posts) in 2013 was Rp 292,403 (US\$28) billion (in current prices) or 3.2% of GDP (up from 2.4% in 2004). The wider ICT sector includes equipment, software and IT services. This was worth US\$6.6 billion in sales in 2013 with hardware accounting for 71% of the total.³ The ICT sector is forecast to grow around 9% a year through 2016.

9. There is considerable scope for enhancing the IT software and services sector. In India for example, the domestic market for IT software and services was US\$19 billion in 2013⁴, which is 10 times higher than in Indonesia even though India's population is only five times higher. Furthermore, India exported some US\$75 billion in software and services in 2013, compared to negligible software exports from Indonesia.

10. Internet penetration is on the rise in Indonesia. In 2000, fewer than 5 million Indonesians used the Internet. By 2014, there were over 70 million users⁵. The mobile network is more widespread compared to fixed lines and therefore the majority of Internet users in Indonesia use mobile access. While smartphones are contributing to increased internet penetration, the figure remains low at 11% of mobile users and is heavily concentrated in Jakarta and the country's secondary cities in Java and Sumatra. Fixed broadband connections accounted for just 2.2% of total Internet usage. Poor broadband Internet infrastructure is due to lack of investment and also due to the obstacles faced when laying fiber optic cables due to Indonesia's geography as an archipelago. A major problem is that the heavy reliance on mobile networks for Internet access is straining capacity and is adversely affecting internet and telephony quality.

11. If Indonesia can put the necessary enabling environment in place, it could harness the power of new technology to drive productivity improvements, combat corruption and substantially improve delivery of public services. Mobile banking could help to expand financial inclusion. Telemedicine could help in delivering health care to remote areas, and digital learning tools could be used to improve the quality of education and teacher training across the archipelago. Use of ICT to collect and analyze big data, to draw on networks of sensors embedded in objects that connect via the internet (i.e. the internet of things), and leveraging on cloud computing could substantially boost productivity in many sectors of the Indonesian

³ <http://www.asiancenturyinstitute.com/economy/360-indonesia-s-booming-ict-outlook>

⁴ <http://www.escindia.in/uploads/soft%202013.pdf>

⁵ Facebook, for example, has an estimated 69 million Indonesian users. See: <http://blogs.wsj.com/digits/2014/06/27/facebook-users-in-indonesia-rise-to-69-million/>

economy. Linking small businesses to e-commerce opportunities found on the internet could import access to markets, technology and business partners.

12. In September 2014, the government launched a \$27 billion Indonesia Broadband Plan (IBP) which is to be implemented between 2014 and 2019. Under this plan, the government aims to provide fixed broadband access to all government offices, hospitals, schools and public facilities throughout all of Indonesia by 2019, and with an internet connection speed of at least 2 megabytes per second. The plan also aims to bring broadband access to 80% of all rural institutions, half of all rural households and to 71% of all urban households by 2019. The Indonesia Broadband Plan identifies initiatives needed to improve the supply of ICT infrastructure and to enhance government's use of ICT for e-governance, e-education, e-health, e-procurement and e-logistics. The plan is aimed at contributing to economic growth and competitiveness, building human capacity and providing services to under-served regions.

CORE ICT INFRASTRUCTURE DEVELOPMENT: THE POLICY AGENDA

13. This section reviews the availability, quality and demand for ICT infrastructure and services in Indonesia (i.e., "ICT Readiness"), the legal and regulatory environment and new government-led policy initiatives for the sector.

Policy, regulatory and market dimensions

14. The Indonesian telecommunications market has been progressively liberalized with steps to reform the sector beginning in 1999. The incumbent fixed line operator, *PT Telekomunikasi Indonesia* ("Telekom") and international operator *PT Indosat* ("Indosat") have been partly privatized and face varying degrees of competition in different market sectors. Ongoing liberalization has however created a degree of complexity and uncertainty due to frequent regulatory changes. In addition, the government retains significant influence over the industry. It has a controlling stake of 53% in PT Telekom as well as a so-called "Dwiwarna" (i.e. golden) share, with special voting rights and veto over certain matters, including the election and removal of Directors and Commissioners. The Government also has a 14% equity stake in PT Indosat as well as a "Dwiwarna" share.

15. The telecommunications sector is primarily governed by Law No.36 of 1999, supplemented by a number of government regulations and decrees over the years. In February 2005, responsibility for regulation of the telecommunications industry was given to the newly established Ministry of Communication and Information Technology (MCIT). In October 2010, licensing and regulatory responsibility was assigned to different units within the ministry, the Directorate General of Posts and Informatics Resources and Equipment ("DGRE") and Directorate General of Post and Informatics ("DGPI"). DGPI was made responsible for licensing, numbering, interconnection, universal service and competition while radio frequency spectrum and standardization of telecommunications equipment became the responsibility of DGRE.

16. The Telecommunications Law called for the establishment of an independent regulatory body but this was later revoked and subsequently reintroduced in 2011 with the *Badan Regulasi Telekomunikasi Indonesia* (BRTI, Indonesian Telecommunication Regulatory Authority) assigned the authority to regulate the industry. The BRTI is chaired by the Director General of DGPI and consists of nine members, including six public members and three selected by the government (appointed by DGRE, DGPI and the Minister of Communication and Information).

Given the influence of the line ministry in the composition of the BRTI, the government continues to exert an important influence on the regulator.

17. Several regulations relate to Universal Service Obligations (USO) including requiring operators to contribute 1.25% of gross revenue to a USO fund. The USO fund is used for various purposes such as reducing the digital divide through efforts to improve the equitable distribution and development of communications and information technology infrastructure across the country.

Access to ICTs

18. P.T. Telkom controls virtual all of the fixed telephone lines in the country. Penetration is low. In 2013, only 5.9% of households had a fixed telephone line; in rural areas, the figure was just 2.2%.⁶ This is a significant constraint for increasing fixed broadband services through landlines using ADSL technology. Low usage of landlines is also an issue for businesses that require always-on high speed Internet access for websites. Further broadband access using ADSL is attractive for SMEs compared to more expensive fiber optic or leased line options.

19. The Indonesian cellular market is competitive with seven operators; the top three: Telkomsel (partly owned by P.T. Telkom), Indosat and Axiata account for 80% of the market. There were 310 million subscribers at the end of 2013, a 12% increase over the previous year. By 2010, there were more mobile phone subscriptions than people in Indonesia and at the end of 2013, penetration was 122 subscriptions per 100 people. These figures are somewhat misleading since they include people with multiple SIM cards, lapsed subscriptions and machine-machine subscriptions. According to Telkomsel, Indonesia's leading mobile operator and 7th largest in the world, 95% of the country's population lived within signal range of its 2G GSM network in 2012.⁷ A 2013 household survey found that 78% of individuals interviewed aged 18 and older owned a mobile phone. According to the ITU, a monthly basket of mobile services (voice calls and text messages) cost US\$6.86 in 2013 or 2.3% of per capita income. Basic handsets are inexpensive, particularly used cellphones and are widely available in small phone shops.

20. Indonesia's mobile internet market is moderately competitive, with a small number of Internet Service Providers (ISPs) in operation. However, P.T. Telkom dominates the fixed broadband market due to its large landline network and with limited regulatory obligation to open its network to competitors. Therefore most ISPs use wireless solutions. P.T. Telkom offers fixed broadband via its Speedy service (ADSL and fiber optic). Speedy passed some 8 million homes in December 2013 with 3.3 million subscriptions in September 2014 (1.3% of the population). P.T. Telkom is progressively pushing fiber closer to the end user. At the end of 2013 there was almost two million premises passed by optical fiber. First Media operates a cable television network largely confined to urban areas. It passed 1.4 million homes and had 372,000 subscribers to its cable modem broadband service in September 2014. Broadband networks are also being developed by the electricity and gas distribution companies and by various government services.

21. A monthly entry-level fixed broadband subscription (512 kb/s download) costs Rp 190,000 (US\$ 15.7) or 6.2% of per capita income. For those in rural areas, the costs of broadband access are prohibitive, at more than 20% of average rural incomes. According to the

⁶ http://www.bps.go.id/eng/tab_sub/view.php?kat=2&tabel=1&daftar=1&id_subyek=02¬ab=4

⁷ Telkomsel, 2014. *Annual Report 2013*.

ITU, Indonesia ranks 113 in the world in fixed broadband pricing (1 is the lowest) which suggests that there is significant scope to bring down costs through greater competition and improved broadband infrastructure.

Broadband

22. There were some 75 million *mobile* broadband subscriptions in 2013⁸, around a quarter of all cellphone subscriptions for a penetration of around 30% of the population. All of the main operators have launched 3G mobile while one fixed wireless operator has launched 4G LTE and Axiata, a mobile operator, launched Long Term Evolution (LTE)⁹ in October 2014. Coverage of 3G mobile broadband networks is not as extensive as 2G. Some 44% of Telkom's base stations were 3G capable in September 2014 while Indosat's 3G network was available in some 190 cities in mid-2013. Subscribers not within the range of 3G signal would theoretically be able to use low-speed 2G mobile Internet (i.e., GPRS, EDGE) for Internet access. According to the ITU a mobile broadband (3G) package with 500 MB of data per month costs US\$2.39 equivalent to 0.8% of per capita income, placing the country 28th in global rankings. Therefore access to mobile broadband is more of an availability than an affordability issue.

23. Internet penetration was just over a fifth of the adult population in 2013 (21%) a growth of 62% from 2011.¹⁰ According to the 2010 census, only 5.9% of households had Internet access in their homes¹¹, so most Internet users' access from work, Internet cafes or using their cellphones. Business adoption of ICTs is low, particularly among SMEs. According to a World Bank survey of 1,444 Indonesian firms in 2009, only 6% had a website and just 13% used email to interact with suppliers and clients, which is well below regional and world averages.¹²

24. A US\$100 million universal service program was launched several years ago in an effort to enhance access to the Internet, particularly in rural areas. The *Pusat Layanan Internet Kecamatan* (PLIK, "Sub District Internet Service Center") calls for installing telecentres at over 5,000 sub-districts financed from the USO fund. The program has been troubled due to the complexity of connecting so many locations and coordination between various partners. The Indonesian Telecommunications Users Group (IDTUG) found a number of PLIKs to be damaged, abandoned and some converted into commercial cafes run by individuals.¹³

25. The Broadband Commission for Digital Development¹⁴ has identified four targets relating to high-speed communications for achievement by 2015.¹⁵ Indonesia has yet to achieve targets relating to affordability and household and individual access. A monthly fixed broadband subscription is 6.2% of per capita income compared to the Broadband Commission target of five percent; six percent of households had Internet access at home in 2010 compared to the target

⁸ GSMA Intelligence.

⁹ LTE, an [abbreviation](#) for Long-Term Evolution, or better known as 4G LTE, is a standard for [wireless](#) communication of high-speed data for mobile phones and data terminals. It is based on the [GSM/EDGE](#) and [UMTS/HSPA](#) network technologies, increasing the capacity and speed using a different radio interface together with core network improvement.

¹⁰ Based on a nationally representative survey carried out among adults 18+ in March 2013. See: Pew Research Center. 2014. *Emerging Nations Embrace Internet, Mobile Technology*.

¹¹ <http://sp2010.bps.go.id/index.php/site/tabel?wid=0000000000&tid=308&fi1=588&fi2=>

¹² <http://www.enterprisesurveys.org/data/exploreconomies/2009/indonesia#innovation-and-technology>

¹³ <http://www.majalahict.com/berita-200-plikmplik-memang-kurang-optimal.html>

¹⁴ <http://www.broadbandcommission.org>

¹⁵ <http://www.broadbandcommission.org/slider/targets.aspx>

of 40 percent; and Internet penetration was 21% of the population in 2013 compared to the target of 50%.

Indonesia Broadband Plan

26. In 2014, the government announced the Indonesia Broadband Plan (IBP), which aims to provide fixed broadband access to all government offices, hospitals, and schools with a speed of at least 2 Mb/s by 2019. The Rp 278 trillion (US\$27 billion¹⁶) plan targets 100 percent coverage of buildings and some 70% of houses in urban areas and 80% of buildings and about half of all homes in rural areas.

27. The IBP aims to leverage broadband as a general-purpose technology to improve national competitiveness, strengthen public service delivery and enhance social development. The plan is aligned with both national and international policy agendas, including the National Long-Term Development Plan (RPJPN) 2005-2025, and was approved on 15 September 2014 by then President Yudhoyono through Presidential Decree 96¹⁷ issued on 15 September 2014. Four government agencies play a key role in coordinating IBP: BAPPENAS, charged with overall responsibility for the plan; MCIT responsible for infrastructure aspects; Ministry of Administrative Reform and Bureaucratic Reform (PAN Kemeneg) handling e-government aspects and Ministry of Home Affairs for coordination with local government.

28. In order to implement the IBP, there will need to be a range of legal, policy, regulatory, technical and administrative modifications. Details of how the plan will be implemented also need to be fleshed out through action plans, regulatory reform blueprints and roadmaps. The MCIT has established a directorate to lead the implementation, monitor and report on progress registered in implementing the IBP. Government institutions will be involved at both the national and local level including BAPPENAS, line ministries and municipal governments. The country's telecommunication operators are fundamental to success of the plan as they are expected to finance a significant portion of the capital works and are to be provided various incentives and obligations.

29. **Towards Open Access and Sharing.** The IBP recognizes that one of the barriers to broadband deployment has been a lack of infrastructure sharing. Operators have constructed their own facilities such as towers for mobile phone antennas and ducts for laying fiber optic cable, resulting in inefficient and duplicate investment. Smaller operators may not have the capital to construct their own infrastructure sites and have to lease such facilities often at high cost. At the same time, property owners and local governments may charge high prices for using their locations to deploy ICT equipment in private and public locations. They may also limit use of the property to a single operator. These practices have constrained competition, limited rollout of fixed broadband infrastructure and inhibited infrastructure investment in rural areas.

30. Another dimension to infrastructure sharing is the availability of ICT infrastructure among electrical utilities and transport related companies that have their own fiber optic networks. The fiber could be leased to telecommunications operators, increasing capacity and lowering costs.

¹⁶ Based on the 2013 annual average exchange rate reported by the World Bank: See: <http://data.worldbank.org/indicator/PA.NUS.FCRF>

¹⁷ Bappenas. 2014. "Peraturan Presiden Republik Indonesia No. 96 Tahun 2014 Tentang Rencana Pitalebar Indonesia 2014-2019." September 22. <http://www.bappenas.go.id/index.php?cID=4848>.

Though this practice exists to some extent in Indonesia—for example the national electrical utility PT PLN (Persero) leases fiber to telecommunication operators through its Icon+ subsidiary—it could be more widely extended. Further, the rights of way already negotiated by utilities could be utilized to lay fiber along electrical towers, railways and roads.

31. A related issue is the principle of *open access* where all operators should be able to access key facilities at cost-based prices. Currently the major operators own large facilities such as international and domestic submarine cable networks, traffic exchanges, ducts and towers. These facilities are expensive to replicate. In the absence of regulatory controls, the owners can charge prices well above cost to access these facilities, particularly if they are involved in both wholesale and retail markets, or may limit the way other operators can access these facilities or may not allow access to them at all.

32. In order to encourage infrastructure sharing and promote open access, new policies, regulations and institutional arrangements will need to be developed. This includes *ex ante* regulations requiring owners of key infrastructure facilities to provide open access to their networks detailing where operators can interconnect their networks and place their equipment, technical specifications identifying interoperable equipment and rules on access to facilities for maintenance and repair. Rules for rights of way are needed to ensure that operators are not constrained by unrealistic and complicated procedures for locating their equipment on private and public property. Wholesale tariffs for using facilities such as towers and fiber optic networks will need to be determined. These should be cost-based including provisions to ensure that operators involved in both wholesale and retail markets do not resort to anti-competitive practices. Some countries have enforced this by requiring such operators to separate their wholesale and retail operations.

33. Licensing procedures also need to be **streamlined**. Currently operators require a range of licenses depending on the type of services they provide. This system is cumbersome and is not suited to the rapid evolution of the ICT sector where the nature and technology used to provide services is changing all the time. Best practice calls for generic, technology neutral licenses that allow any type of network to be constructed and service to be provided with spectrum requirements treated as a separate allocation issue.

34. Local government will be a critical partner in the IBP. They are a strategic player given that telecom infrastructure such as fiber optic ducts use public rights of way along streets and utility towers. Municipalities should facilitate access for using public rights of way. A good example is Jakarta, where the local government is establishing a company to lay ducting throughout the city for operators to access at cost-based prices. Local governments can also benefit since by facilitating infrastructure deployment municipalities can lower access costs for citizens including the provision of municipal Wi-Fi networks as well as improve ICT infrastructure in public administration. In Jakarta, operators that utilize the city's rights of way are encouraged to provide free Wi-Fi at bus stops, parks and other locations. Facilitating the installation of ICT equipment also creates a good foundation for the development of *Smart Cities* where networks are connected to devices such as CCTV, traffic signals and temperature sensors to improve safety, transport and energy efficiency.

35. **Spectrum Crisis.** Indonesia's rapid mobile communications growth and large number of operators is stretching the capacity of wireless networks. Users are downloading a growing volume of video content over mobile networks due to the low penetration of fixed broadband. This is hampering network quality and inhibiting deployment of mobile broadband into rural areas because of radio frequency spectrum shortages. The mobile operators need additional

spectrum to handle this surge in traffic, estimated at up to an additional 500 MHz of bandwidth. Spectrum management needs to be improved to squeeze out more frequency and re-allocate frequencies that are no longer used. The government also needs to ensure that there is no slippage in its target of transitioning to digital broadcasting scheduled for 2018 since that will free up a large amount of frequency that can be used for mobile broadband networks (referred to as the "digital dividend"). The lower band frequency (700 MHz) released from transitioning to digital broadcasting is ideal for rural areas since it has a wider coverage radius than high band frequencies.

36. **Closing the Digital Divide.** The Indonesian government has various programs providing support to bring Internet and communications access to all parts of the country. The Government's Universal Service Obligation is covered under Law Number 36 in 1999 mandating that telecommunications access be provided on a principle of fair and equitable access. Proceeds from the Universal Service Obligation fund have been used to finance a number of rural access programs, including the Ringing Village, Smart Village, Internet Service Center for District (PLIK), Mobile-Internet Service Center, for District (M-PLIK), National Internet Exchange (NIX), IIX, Wi-Fi for District.¹⁸

37. One of the largest programs is the Ringing Village (Desa Berdering) Program aimed at establishing basic telephony services in each of the country's 73,000 villages. As of 2013, that program had already reached 30,400 villages nationwide. Further to this, the Pusat Informasi Masyarakat (PIM) or the Community Access Point (CAP) scheme aims to extend ICT access across Indonesia by setting up Internet Community Centers, a total of 5,700 of which were developed by 2012. This is complimented by a network of approximately 1,000 mobile Internet centers. Such programs are expected to have a far-reaching impact on everyday lives by opening up access to information in a way that was previously out of reach for the majority of Indonesia's rural population.

38. The various programs for reaching rural communities have suffered, however, from slow implementation, limited effectiveness and difficulties in sustaining operations. The government has Rp. 7 trillion in accumulated Universal Service Access Fees which it has been unable to disburse in the different rural access programs, and this sum is increasing over time. In addition, the government has tended to adopt uniform approaches to improving ICT access in all rural and remote parts of the country, although geographic, cultural and socio-economic conditions vary considerably by region.

39. The Indonesia Broadband Plan envisages a shift from a national approach to providing rural access to more of a bottom-up competitive program effort to enhance rural ICT access. This would involve local communities and service providers submitting plans and proposals that are tailored to the varying needs of different parts of the country. Service providers would be allowed to retain a portion of the universal service payment that they would then use for rural access projects. It is also planned to use some of the proceeds of the universal service fund for part of the government's infrastructure development portion of the Indonesia Broadband Plan.

40. **Monitoring and Evaluation** will be critical to ensuring the success of the IBP. This includes regular performance reviews to identify slippages and revise targets. A reporting

¹⁸ Wismadi, Arif and David Townsend. 2010. *Rural ICT Policy Advocacy, Knowledge Sharing and Capacity building: Country Case Study Indonesia* (draft report) Manila.

mechanism will need to be developed to ensure that the required information is available. The government might consider developing a GIS-based dashboard showing the locations of facilities such as fiber optic networks, mobile base stations, and fixed broadband access as well as which companies provide services in different areas and the speeds on offer. Access to this tool should also be made available to the public so they are informed about the broadband options available in their localities. Several governments have developed such portals.¹⁹

Implementing the Indonesia Broadband Plan

41. The IBP is a timely response to remedy many of the factors plaguing the country's ICT infrastructure development. The plan is also strategic in that it recognizes that ICT is critical for improving the country's competitiveness, reforming governance and improving the well-being of its citizens.

42. **Detailed Implementation Planning.** Implementation of the IBP will require a series of detailed blueprints and roadmaps as well as significant regulatory changes. This will be a major undertaking considering the scope of the plan and the size of the country. Specific actions for carrying out the different activities identified in the plan need to be spelled out in detail. Extensive knowledge including familiarity with international experiences will be critical to ensure that the processes and procedures for implementing the plan are realistic and successful.

43. **Policy and Regulatory Reform.** Numerous changes to the regulatory landscape are required to enable the open access and infrastructure sharing goals of the plan. This will require deep knowledge of how to implement efficient, fair and transparent rules for interconnecting networks, enabling open access and facilitating rights of way and infrastructure sharing. The wholesale price of access to networks and facilities is a critical dimension requiring strong technical and accounting skills to ensure that prices are cost-based. In addition, the licensing processes will need to be streamlined with a view to moving towards a generic, technology-neutral regime.

44. **Spectrum Management.** Efficient management of the country's radio frequency spectrum is essential for ensuring the targets established in the IBP for mobile broadband are met. The rapid jump in access to mobile communications in Indonesia and the use of mobile devices as the main method for accessing the Internet is placing an enormous strain on network capacity. The shortage of frequency is already being felt through poor quality and inability to extend mobile broadband networks into rural areas. Spectrum allocation will need to be enhanced to make available unused frequencies. The country's transition to digital broadcasting in 2018 will free up large amounts of frequency in lower frequency bands that is ideally suited for wide coverage of 4G mobile broadband.

45. **USO Reform.** The USO needs to be reformed to have a more significant impact. This includes aligning it to the IBP goals and transforming it to strengthen the broadband ecosystem consisting of both supply and demand factors. This would use the fund to provide infrastructure in rural areas as well as stimulate demand side factors such as digital literacy, inexpensive access devices (smartphones, tablets) and developing appealing content. The country's USO fund has mainly been used on the supply side to rollout ICTs in rural areas through different

¹⁹ In the United States, the National Broadband Map developed by the telecommunications regulatory authority allows users to search, analyze and map broadband availability across the country down to census tract levels. See: <http://www.broadbandmap.gov>. The United Kingdom also has such a tool where users enter a postal code to visualize broadband availability. See: <http://infrastructure.ofcom.org.uk>

schemes with limited success. Funding allocation has been hampered by political and administrative factors with the result that some Rp. 7 trillion has not been disbursed.

46. **Monitoring and Evaluation.** The IBP is ambitious in scope particularly given the scale and geography of Indonesia. The complexity of the country will inevitably affect implementation of the plan, requiring adjustments over time. Proper monitoring and evaluation will be crucial to track the multiple dimensions of infrastructure supply and demand to business, citizens and government. Tools such as dashboards and GIS will need to be integrated with locations of infrastructure facilities and indicators to monitor evolution of broadband deployment. Functionality should include multiple layers enabling monitoring at national, provincial, district, sub-district levels and down to census enumeration areas. The tool should be made available to all stakeholders and open data provided through Application Programming Interfaces (APIs).

47. **Private Sector Opportunities.** Improvements in the ICT policy environment envisaged in the IBP are expected to foster competition and create more scope for private investment in broadband networks and ICT applications. More accessible and affordable broadband services will create scope for deploying new disruptive technologies, including mobile internet, the internet of things, automation of work, big data, and cloud-applications. McKinsey (2014) estimates that deploying disruptive technologies in ASEAN could add from \$220 to \$625 billion in GDP a year in Southeast Asia by 2030.²⁰ The private sector can help to pioneer the introduction of new disruptive ICT technologies once broadband access is improved. More accessible broadband will also create new possibilities for peer-to-peer banking and use of mobile money. In this area, innovative financial market interventions could support best-practice e-banking service providers to help foster improved financial inclusion. Looking ahead, e-commerce and Indonesian-language net-based services should also take off. Indonesian firms partnering with regional and global e-commerce and internet applications firms could bring such innovations to Indonesia. Private vocational training may also be required to meet the demands posed by a rapidly growing e-commerce market.

ICT APPLICATIONS TO IMPROVE PUBLIC SERVICES: THE E-GOVERNMENT AGENDA

48. Using ICT to make public services more accessible and efficient can play an important role in boosting government productivity and fostering inclusive growth. This section discusses needed developments in ICT for key areas of e-governance, which are high priorities under the Indonesia Broadband Plan and have been reaffirmed as priorities of Indonesia's new administration.

e-Governance

49. In Indonesia, the term e-government was officially introduced to public administration through the Presidential Instruction No.6/2001 that established the Ministry of Communications and Information Technology. Presidential Instruction Number 3 in 2003 on e-governance sets out a framework for improving the quality and integrity of public services through: (a) development of a reliable and trustworthy services and affordable by the public, (b) restructuring of management systems and work processes of central and regional governments, (c) optimal utilization of information technology, (d) improving participation of the business sectors and development of ICT industries, (e) development of human resources in the government offices and improving e-literacy of communities, and (f) development of e-government by a whole-of

²⁰ McKinsey Global Institute. 2014. *Southeast Asia at the crossroads: Three roads to prosperity*. Washington D.C.

government systematic approach. Under the auspices of various e-government initiatives, a number of applications have been introduced by the public sector.²¹ The main ones include:

- E-procurement: which reaches 34 Ministries, 85 non-ministry government institutions, 507 local governments, 7 SOEs and 36 state education institutions;
- Government one-stop (business registration and permit) services, which have been implemented in 85% of central government agencies to increase transparency and reduce opportunities for corruption;
- siMAYA, for office management, which is a virtual office administration system using cloud computing system used to improve office administration, with and combines integrated modules for eOffice, Message secure internet phone, secure video conference, employee performance management, government finance, and asset management;
- Indonesia National Single Window for trade which combines e-payment, e-licensing, e-tax, e-port and e-customs services which was first introduced in December 2007 at Jakarta's Tanjung Priok Port to allow for single submission and synchronous processing of data and information, and single decision-making for custom's clearance and cargo release;
- Online Tax---all payments can be made via the banking or postal system. For tax purposes, there are separate online systems for registration, filing, billing, payment of specific taxes and VAT refunds;
- A central e-learning portal called study room ("rumah belajar"), with a media catalogue, broken into primary, secondary, and higher education;
- An electronic identify card (eKTP) for all Indonesian citizens which contains security codes and electronic records. This was first launched in August 2011 and was used as the voter database for the 2014 elections; and
- Social welfare smart cards: This includes the healthy Indonesia card for basic health insurance, the smart Indonesia card for basic education, and the prosperous family card for social welfare services.

50. Despite considerable progress registered in introducing e-government services, Indonesia is still ranked relatively low in international E-Government standings. In 2014, the UN ranked Indonesia 106 in E-Government development, far behind Malaysia (rank 52), Thailand (102), Singapore (3), and China (70). In Southeast Asia, only Cambodia (rank 130), Lao PDR (152) and Myanmar (175) had lower rankings.²²

²¹ Anggono, Bambang. 2014. *e-Government Implementation Strategies in Indonesia*. Ministry of Communications and Information Technology. Powerpoint Presentation, Jakarta.

²² United Nations. 2014. *E-Government Survey 2014. E-Government for the Future We Want*. United Nations Department of Economic and Social Affairs. New York.

51. Performance in e-government also varies considerably across government ministries and local governments. According to the MCIT 2012 ranking of e-government implementation across ministries, high scores were awarded to the Ministry of Finance, Ministry of Public Works, Ministry of Industry, and the Ministry of Education. By comparison, the Ministry of State Enterprises, Ministry of Maritime and Fisheries, Ministry of Environment, Ministry of Public Housing and Ministry for the Acceleration of the Development of Backward Regions scored quite low. Likewise, the 2011 E-Government Rating system (or PEGI) results from a survey of 152 districts and municipalities classified only six districts as “very good” in E-government. The rest of the districts were categorized as either “poor” or “very poor.” The six “best” districts include Surabaya City, Malang city, Lamongan District, Pekalongan District, Medan City and Surakarta City.

52. Much of the e-governance efforts to date have focused on improvements in public administration and back-office services. Existing procedures have been digitalized with limited business process reform. Many e-government applications have been developed in a silo, with technical staff, infrastructure, applications and databases specific to central government, province and kabupaten agencies, making data transfer and communications across agencies difficult. Most government agencies have various e-systems for finance, asset management, office management, education, human resource management, etc. The Ministry of Communications and Information Technology estimates that RP.14 trillion was allocated to e-government in 2013, of which 38% was for public and business services, and 62% for back office functions. Since most of the e-government effort was concentrated on digitalizing back-office functions, public awareness of the improvements that have been registered due to the use of ICT for public service management has been limited. In addition, the isolated approach to development of e-governance applications has wasted investment resources and complicated the sharing of data across government and also made it more difficult to safeguard government records. In response, the Indonesia Broadband plan calls for policy reforms to: (i) suspend new development of government data centers in order to encourage migration to a consolidated data center; (ii) to foster greater infrastructure sharing and the use of generic or common e-governance applications; (iii) greater attention to data security; and (iv) an obligation to use the “go.id” email account for government communications.

53. Public availability of data also remains a significant challenge. Many government departments have considerable quantities of data that is not widely disseminated or is of dubious quality. Irregularities in data sets, the use of different standards and a high level of aggregation are all challenges in using publicly available data. In addition, data is at times incomplete, inaccurate, not frequently updated, and difficult to process and understand. Even though the Law on Freedom of Information has been in place for five years and some ministries and agencies have made data available online, it is often difficult to obtain and make use of the data due to bureaucratic procedures, charging requirements, copyright restrictions or a general reluctance to provide access to government data to external users.²³

²³ Ford Foundation. 2013. *Open Government Data: Readiness Assessment Indonesia*. Jakarta.

Public Financial Management

54. ICT applications in public finance have played an important role in E-government efforts. In recent years, a suite of budgeting, procurement and audit applications were introduced to the Jakarta administration - introducing transaction traceability and automated financial controls for the first time. Application of automated budgeting and tax collection techniques doubled the city's revenues without raising tax rates. E-transactions, especially e-taxes, have reduced the need for businessmen to interact with bureaucrats, which cuts the scope for bribes and tax evasion.

55. Research on e-government applications in public finance finds that there is a sharp divide between local governments in Java and Bali, which are more advanced in their application of e-budget and other ICT public finance tools, and those in the outer islands. Moreover, in Java, city governments are more advanced in e-budgeting and other e-finance applications compared to district and local administrations.²⁴

E-Procurement

56. Public procurement reform is a central pillar in the government's ongoing efforts to improve governance and efficiency.²⁵ Establishment of the National Public Procurement Agency (NPPA) in 2007 has helped to provide leadership in procurement reform. The NPPA was mandated to consolidate and regulate the country's procurement system for: (i) development of a national procurement policy and strategy; (ii) development of systems to support procurement services; (iii) monitoring and evaluation of the performance of delivery of procurement services; (iv) development of an adequate supply of qualified human resources and certification of procurement staff; (v) development of the agency as the principal source of legal, professional and technical advice and support to practitioners on all procurement-related matters; and (vi) establishment of a procurement complaint handling and disputes resolution system.

57. In 2008, the Indonesian government created INAPROC, an e-procurement agency and e-proc, a national e-procurement system. Between 2008 and 2012, the system was rolled out to 731 user agencies in 33 provinces. In 2008, there were only 33 tenders using the e-proc system. This increased to 119,797 tenders in 2012.²⁶ In 2011, under Instruction Number 17, the President ordered that all government ministries and agencies must use e-proc for 75% of their purchases while local governments must use it for 40% of their purchases. In 2012, this was raised to 100% for central government and 40% for local governments. As of 2013, there were 1,176 e-procurement independent units throughout Indonesia consisting of 543 e-procurement system providers, 40 e-procurement service providers and 583 autonomous e-procurement systems serving 33 provinces and 731 agencies.²⁷

²⁴ Hermana, Budi et. al. 2012. *E-government implementation in Indonesia: Financial Transparency on the Web*. 2012 3rd International Conference on e-Education, e-Business, e-Management and e-Learning, IPEDR Vol. 27. Singapore.

²⁵ OECD. 2007. *Snapshot Assessment of Indonesia's Country Procurement System*. Paris.

²⁶ Nurmandi, Achmad. 2013. *E-Procurement in Indonesia: Policy and Its Implementation*. Korean Foundation for Advanced Studies. Seoul.

²⁷ Nurmandi, Achmad. 2013. *E-Procurement in Indonesia: Policy and Its Implementation*. Korean Foundation for Advanced Studies. Seoul.

58. Indonesia's e-procurement system is widely used and has won international recognition. In 2013, the value of tenders and purchases conducted online reached \$17.3 billion or roughly half of the value of all government procurement. The NPPA has made the e-procurement system more attractive to use by developing a single sign-on process so that any vendor can tender from any *Layanan Pengadaan Secara Elektronik* (LPSE) or official E-procurement site; by providing links to external systems; and by developing facilities for e-purchasing and e-catalogues. Steps have also been taken to strengthen system security for file exchange and storage of encrypted information.

59. The main challenge in e-procurement development is to continuously develop the existing system to automate the entire procurement cycle online, including bid evaluation and to expand the system's versatility by including additional modules to cover e-tendering, e-catalogue (a precursor to e-purchasing), e-contract management, a vendor management system, e-procurement planning, e-payment, e-asset management and systems integration with the e-audit system. Such efforts would allow for the use of data analysis through a procurement management information systems (PMIS). Once a fully automated e-procurement system is developed and the entire procurement process is conducted online, better data analysis could also be employed to measure the performance of procuring entities.

Priorities for

E-Governance Support

60. **E-Government Infrastructure.** The key challenge, going forward, is to foster more coordinated, standardized and better-integrated ICT services across the government. This would lead to gains in efficiency by sharing resources, by reducing risks of data loss, and by encouraging adoption of good practice applications. Areas for further reform support for common e-Government infrastructure could include:

1. **Government Network:** As the government increases the use of ICT for public services, a government network is going to be a critical aspect of e-government infrastructure, both for ensuring that the back-office functions of the government are undertaken efficiently and to improve the quality of on-line public services. The government network could also be used for last mile connectivity to rural and remote areas, by connecting central and local governments to post offices, schools, healthcare posts etc. Indonesia does not have a formal government network, and as broadband capabilities are enhanced, such a network could be established. For example, the government network could be developed as a physically separated network or it could draw on facilities that are rented from the private sector, or a combination of the two.
2. **Government Data Center:** The national broadband plan calls for a moratorium on the establishment of separate data centers and a gradual shift to government-wide data centers. Currently many government agencies including local governments have their own data centers. However, it is very difficult for each organization to maintain these at a high level of quality and security. The consolidation of government IT systems can be an effective measure to address both service quality and improve IT management including data back-up, disaster recovery and data protection. This will require supporting

regulations and detailed plans for migrating from agency-specific to consolidated data centers.

3. **Information Sharing:** Many databases have already been developed for the core functions of government, at a central and local level. To provide better public services using ICT, it is critical to integrate these databases, and draw on existing ones that best serve citizens' needs. Information sharing mechanism and relevant institutional arrangements need to be developed across government agencies linking their applications and databases, both for internal and external use. This will require the government to address many issues including data security and to reform data collection and reporting processes.
 4. **Cyber Security and Privacy:** As the Internet becomes increasingly used to deliver public services, cyber security will be a growing concern. Government systems are becoming more vulnerable to cyber-attacks as they produce, accumulate and exchange data for administrative purposes as well as for delivery of online services. Policies, regulations and technical mechanism need to be prepared to protect personal data and ensure that privacy is clearly defined and guarded in cyber space.
 5. **Common Software Components.** All government agencies need to use some standard software components for their application. These are necessary to support the inter-operability of ICT systems among government agencies. This includes directory systems for users and information resources, public key infrastructure (PKI) for authentication, communication, document management and exchange systems. These common software components should be prepared and distributed in a centralized and standardized manner to reduce redundancy, lower development and maintenance costs, and to guarantee inter-operability, service quality, and performance of complex government information systems.
 6. **ICT Human Resource Development:** Development of a network of ICT professionals from the key central and local government agencies will be needed if integrated (rather than agency silo) ICT solutions are to be adopted. This will require the appointment of designated ICT focal points (e.g., chief technology or information officers) for all government agencies. Networks of ICT officers will subsequently need to be developed to promote information sharing and to encourage adoption of common approaches.
61. **Key e-Government Applications.** Government agencies are developing their ICT capacities and are drawing on ICT to improve the planning, management and delivery of core public services. There will continue to be a need for ministries to introduce ICT solutions as a way of reforming business and management practices and to deliver services more efficiently and effectively. Support for reform of ICT in the key areas of public sector management which have the potential to make an important development impact while simultaneously boosting demand for high-speed connectivity include following areas:
1. **Financial Inclusion.** The spread of e-money and mobile banking will place heavy demands on the country's broadband infrastructure, and will also create new requirements for financial supervision and building financial literacy. Micro-finance and small-medium finance institutions will also need to improve their management

information and reporting systems as they adapt to the new ICT-based financing opportunities and as they are better integrated into government's financial supervision system.²⁸ Likewise, mobile phone operators and Internet service providers have not, to date, been involved in financial reporting, but the spread of e-money and mobile banking will require that they develop such capacities. New financing opportunities for financial inclusion offered by mobile banking and e-cash services (including peer-to-peer finance) supported through OJK regulations should be implemented in a prudentially sound and secure manner.

2. **Public Procurement.** Over the next five years, the government plans to extend e-procurement to all central and local government agencies. Efforts are underway to develop an e-catalogue system, starting in a few major cities and provinces. Development of an e-learning system for continuous staff training is also required. Other medium-term goals include the integration of the e-procurement system with the public finance information systems and further extension of the e-procurement system to cover the state-owned enterprises. Development of a national procurement law, vendor awareness building, expanding call centers and dispute resolution processes, and further development of institutional capacities to manage procurement processes within spending entities are likewise required. Further planning and design of the e-procurement system, and to work on specific components (i.e. e-learning) to support the system's expansion are needed. Efforts should also be made to promote more systematic ways to manage scattered e-procurement systems using common data centers and standard enterprise software.
3. **Urban Management.** There are many areas in which new ICT applications will need to be developed, piloted and applied. Towards this end, the government is attempting to encourage a small network of "smart cities" in which ICT would be utilized to enhance efficiency and reach of a large number of public services.

CONCLUSIONS

62. ICT is developing rapidly in Indonesia, driven by the country's young population, who are already active users of mobile telephony and internet services. Still, Indonesia's ICT access and utilization is lagging far behind many other countries in Asia-Pacific in broadband access, and this is a source of competitive disadvantage. Large parts of the countryside have either limited or very slow internet connections, which hampers efforts to use ICT for e-learning, tele-medicine and other public programs. Use of the internet for e-commerce is rising rapidly, although this is mainly limited to a few big cities in the western parts of the country. The ICT sector has been partly liberalized, and while this has succeeded in unleashing rapid growth in the telecommunications investment, the rural and remote areas of the country have not received sufficient investment, the mobile broadband spectrum are now congested and there is relatively little common infrastructure for sharing ICT infrastructure. Drawing on an industry fee, the government has tried to bring ICT facilities into the remote and rural areas, but progress in this area has been slow.

²⁸ The Government of Korea has indicated its interest in assisting SME and Microfinance organizations improve access to financing while strengthening their financial management and reporting capabilities (see KDI and KPMG. 2014, Indonesia KSP Interim Reporting: Improvement Measures on SME Policy Financing, 18 November 2014, Seoul).

63. Major efforts have been made to develop e-government systems as a way of combating corruption, improving access to public services and to improve public service quality. Solid efforts have been made to introduce back-office government applications, one-stop shop public services and e-procurement, and to introduce e-learning and e-health applications. While progress has been registered in all of these areas, these have tended to be developed as a silo which has hampered replication and made inter-operability and communications across government difficult.

64. In 2014, the President's office has issued Indonesia Broadband Plan, which includes an ambitious program for substantially improving access to broadband infrastructure nationwide by 2019. Some \$27 billion in new ICT investment will need to be made between 2014 and 2019 to implement the plan in full, of which some 80-90% should be provided by the private sector. The centerpiece of the Indonesia Broadband Plan is a series of reforms to spectrum management, to foster infrastructure sharing, to streamline telecommunications licensing and to make more efficient use of the USO fund. Support is also to be provided to scale-up the six priority e-government programs in ways that transition towards use of common government-networks and common data centers, enable greater inter-operability among e-government systems, draw on standardized software and improve security while combating cybercrime.

65. Timely and efficient implementation of the Indonesia Broadband Plan will allow Indonesia to make a quantum leap in broadband ICT access and in the transparent, efficient and effective delivery of its public services. Development partners, are well-positioned to assist the government implement the national broadband plan. Technical and financial support are needed to: (i) implement the policy and regulatory reforms, and to build the new institutional capacities needed to oversee the ICT sector, if the private investment envisaged for extending and expanding broadband capabilities is to be enabled; (ii) assist the government with the more detailed implementation planning, monitoring and evaluation of the various components of the Indonesia Broadband Plan; (iii) assist government through policy, regulatory and technical support to develop core e-governance infrastructure (i.e. common government networks, data centers, information sharing, cyber security, common application software and ICT networks); and (iv) continue to provide ICT development support in key areas such as financial inclusion, e-procurement and smart-cities.