Internet Development in Indonesia: A Preview and Perception

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For first time I would like to introduce my self, my name is Ferry Astika Saputra, I work at Electrical Engineering Polytechnic Institute of Surabaya located at East Java Indonesia. Since October 2nd 2002, I have been studying at Computer and Network Center under supervision of Prof Shin-ichi Tadaki. My current research subject is the IPv6 migration strategy. In this article I will discuss about the internet development in my country generally, starting from the history, the development process and current status.

An introduction to Indonesia

Before describing technical issues, it is better to make a brief introduction to Indonesia. Indonesia is composed of seventeen thousand islands that stretch over five thousand miles along the equator. The Malay Peninsula and Indochina are situated to the north-west, and the continent of Australia lies due south. The Philippines and Micronesia lie northward. Because consisting of thousands islands, Indonesia is the world's largest archipelago. Its constellation of islands straddles the divide between the Asian and Australian continental plates. As a result, the islands offer a stunning variety of topographies and ecologies: Mist-shrouded volcanoes and mountains, unexplored rain forests, thousands of miles of beaches, and endless offshore reefs support a dazzling abundance of wildlife. Those make Indonesia an ideal destination for adventure and eco-travel. Maybe some of you know the islands named BALI, one of most beautiful place in the world.

There are five main islands, Java, Kalimantan (Borneo), Sulawesi, Sumatra and Papua. Among the five main islands, Java is the most populated, and also with many activities concentrated in this island including the capital city of Indonesia, Jakarta.

History of Indonesian Internet Development

Like other developing countries, internet development in Indonesia just begun in the early

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of 1990. It was a same time with neighbor countries: Malaysia, Singapore, Filipina and Thailand. But in Indonesia internet development story was different from theirs. It was very unique. Because it was not started by government but started from little community called Paguyuban Network (Paguyuban Net). In Indonesian, *Paguyuban* means group. This group was initiated by Indonesian students who studied in Canada and members of the Indonesian Amateur Radio Association. The connection used the radio frequency at 2 meter wavelength, and only used "store and forward" emails and bulletin board systems. One of the pioneer, Dr. Onno Purbo said, "At that time we only used PC/XT as gateway for communication between Indonesia and Canada and the domain was named ampr.org". After that many projects established to connect Indonesia to the world. Some project called JASIPAKTA and IPTEKNET was developed by the government. JASIPAKTA sponsored by LAPAN (Indonesian Aeronautics and Space Institute), was connecting the LAPAN and DLR (Germany Aeronautics and Space) via radio frequency with 70cm wavelength. IPTEKNET sponsored by BPPT was also connected to DLR but through X.25 protocol.

Then in the middle of 1994, *IndoNet*, the first commercial Internet Service Provider, was established at Jakarta. At that time IndoNet only had a dial up connection to the upper stream provider abroad. Maybe we can imagine how costly it was. But as the first commercial ISP, IndoNet was success to introduce new technologies and to get new internet user for few years.

Figure 1: Indonesian Internet Gateway in February 1996[5]

Table 1: List of Indonesian internet gateway in 1996[5]

Name	Location	Connection	Speed
IPTEK-NET	Jakarta	6 other cities	256Kbps
ITB	Bandung	-	2000Kbps
IndoNet	Jakarta	5 other cities	256Kbps
RadNet	Jakarta	2 other cities	512Kbps
Sistelindo	Jakarta	2 other cities	768Kbps
IdOLA-Net	Jakarta	17 cities 2Mbps	512Kbps
CBN-Net	Jakarta	-	256Kbps
Sisfo-Net	Bandung	-	128Kbps
Wasantara-Net	Bandung	22 other cities	128Kbps VSAT
Melsa-Net	Bandung	-	128Kbps
Total Bandwidth			**3432 Kbps**

Network Infrastructure

The topology of Indonesian internet gateway in 1996 is shown in Figure 1. According the table(Table 1), the highest speed connection was through ITB (Bandung Institute of Technology). It is connected from AI3 (Asia Internet Interconnection Initiatives) WIDE Project Japan. The ground station and its peripherals for satellite data communications had built and been ready to operate in October 1996. It was link to the JSAT Ku-Band satellite and connected to the ground station at Nara Institute of Science and Technology (NAIST). NAIST has worked as AIII Net Hub in Satellite Network which interconnecting its members in several Asian countries. This joint project also initiated as the first Indonesia educational backbone which inter-connecting several universities and research institute.

Nowadays Indonesia has 670 Mbps bandwidth (incoming=170 Mbps, outgoing=500Mbps) for international connection as a whole. This indicates that the internet traffic increases almost 200 times in the period from 1996 to 2002. It is not a small number for a new internet comer like Indonesia. The high increment of bandwidth was caused by high demands from

internet subscribers, many Dotcoms companies established, and government instances, universities trying to connect to internet.
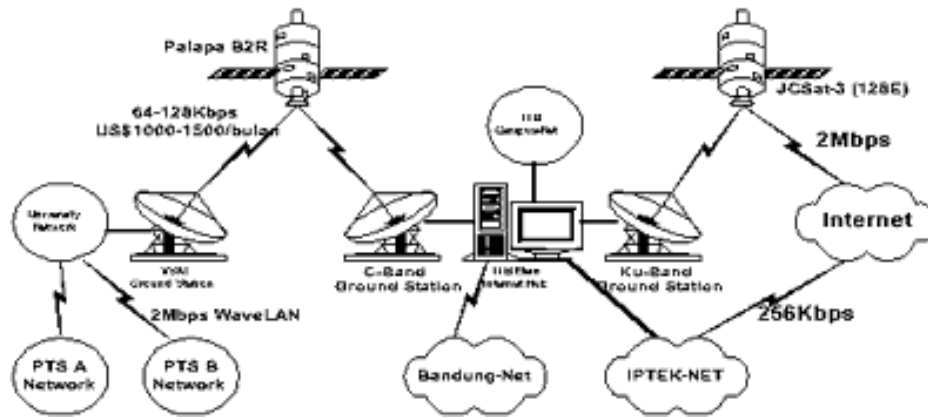

Figure 2 : Indonesian University Network by AI3-ITB[5]

About the Internet backbone, also in 1996, PT. Telekomunikasi Indonesia, Tbk, the biggest telecommunication company in Indonesia started to build the biggest internet backbone with 2 Mbps using ATM technology and B-ISDN over 48 cities. It was followed by PT. Aplikanusa Lintasarta who built an internet backbone with 2 Mbps using the frame-relay technology over 17 cities.

Both two main backbones located only in Java and Bali. The backbone in other islands was using Palapa satellite B series (owned by PT. Telekomunikasi Indonesia, Tbk). According the press release in January 2002, PT. Telekomunikasi Indonesia, Tbk will build the new backbone using MPLS (Multi Protocol Layering Switch) technology with 155 Mbps over 130 points in more than 90 cities across the archipelago. This project started at July 2002 and will finish at 2007**.**

In a line of infrastructure availability the number of ISP also increase significantly, from 10 ISP at the end of 1996 to 50 in the end of 1999, then still increase 179 at 2002(Table 2). And also for IP addresses and AS number demand, it indicates a high growth almost seven times from 1999 to 2002(Table 3)..

Table 2 : Number of ISP 1999-2002[1]

	1999	2000	2001	2002*
ISP	50	139	172	179

Table 3: IP Address and AS Number Demand in period 1999-2002[1]

	IPAddress (in Class C Block)	AS Number
1999	256	3
2000	1072	16
2001	1553	29
2002*	1649	34

For internet exchange technology for efficient routing in regional area, Indonesia Internet Exchange started to develop at 1998 by peering 3 biggest ISP internet exchanges, IndosatNet, TelkomNet and Satelindo. Figure 3 shows the current network map of IIX logically.

Figure 3: Indonesia Internet Exchange Logical Network Map in 20023]

Internet User Demand

The Internet in 1999 still indicated high demand, although in that period Indonesia had economic crisis. This phenomenon is explained from users' as that internet and its applications are the cheapest way to communicate, comparing with traditional ways (e.g. telephone and mail).

Table 4: The increment of Indonesian Internet subscribers and Internet Users[1][2]

	subscriber	users
1998	134.000	512.000
1999	256.000	1.000.000
2000	400.000	1.900.000
2001	581.000	4.200.000
2002*	1.000.000	8.000.000

But the high demand, Indonesia is still low in the internet penetration level comparing with other ASEAN countries, the number of penetration is 0.09 %: the highest penetration is in Singapura 29.9%, followed by Malaysia 15.9%, Thailand 3.8%, and Filipina 2.6%. Vietnam, Cambodia, and Laos are still lower than Indonesia.

The number 0.09%, almost 80% internet user is in Java and Bali Islands, and for the five other islands the penetrations is only 0.0072 %. So the internet development is still a big challenge for Indonesia.

Current Project

In the middle of April 1996, Secretary General Department of Tourism, Post and Telecommunication invited government and private parties to arrange National Information Infrastructure concepts. The basis of this concept was available network that was telecommunication network and developed. Afterwards, there was appointed small team for formulating National Information Infrastructure. From this team, then appear the first Indonesian IT Project called NUSANTARA - 21. Nusantara means Indonesian archipelago , and 21 means 21st century. From infrastructure part, its early concept, NUSANTARA - 21 was found based on three main infrastructures : Archipelagic Super Highway, Multimedia

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[2] Internet subscribers mean a person who has internet connection to their home and use it for personally and internet users mean a person who only use the internet but doesn't have internet connection to their home, usually access internet from office, campus or internet café.

Cities and Nusantara Multimedia Community Access Center. First infrastructure, Archipelagic Super Highway, will connect all provinces central city in Indonesia with various backbone network facilities according to the need of real bandwidth. Beside that, Archipelagic Super Highway will covers information infrastructure in development areas such as SIJORI (Singapore-Johor-Riau), BIMP-EATA (Brunei Indonesia Malaysia Philippine East Asia Growth Area), IMT-GTb (Indonesia Malaysia Thailand Growth Triangle), and AIDA (Australia Indonesia Development Area). Second infrastructure, Multimedia Cities was the center of economic activities that has "Road" of reliable city information. Multimedia Cities will also providing complete access lines and including its supply. With those capabilities, citizens in the Multimedia Cities would able to carry out their productive activities faster through information transaction. Teleeducation applications, telemedic , electronics trading, and electronics banking were a part of general applications that would be implemented in Multimedia Cities. The last infrastructure, Nusantara Multimedia Community Access Center, could covers broadband payphone, broadband business centres, networked library, and multimedia community kiosks. With service point support owned by Telkom and Posindo that spread in entirely Indonesian archipelago, it was estimated in 2000 all mother cities of sub-district in entirely Indonesian archipelago have access to N-21 through Palapa Satellite, Telkom - 1, Garuda, or other satellite systems in Indonesia. Physically, N-21 was progressed by using "ring of rings" structure concept and technology varieties and in utilizing side, concept used was "network of network" and application varieties.

Unfortunately in early of 1997 Indonesia had an economic crisis, many projects was cancelled at that time, including N-21. But some of N-21 concept still exist and continue to develop, for example the development of Indonesian backbone over 90 cities using ATM until now still continue and will finish until 2007.

Conclusion

The Internet in Indonesia is still in development period and far from establishing. Good responses and attentions from the Indonesian government take big effects for Indonesian IT communities (Universities, research Institutes, ISPs) to improve the internet condition. And also there is still a big challenge to make 230 million people of Indonesia connecting to the world.

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