

A) Case Study Summary Information

1. Title of case study: “NGN Solution for Serving the Rural Areas in Sumatera-Indonesia”

2. Details of the person preparing the case study:

Name and title of persons preparing the case study: Wiseto Agung, S.Susatyo and Zulkifli Mahdi

- Organization submitting the case study: PT TELEKOMUNIKASI INDONESIA R&D Centre, PT TELEKOMUNIKASI INDONESIA Regional Division I and PT TKD

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3. Status of project(s):

Operational

Completed

4. Location and population of the project area

Location (village, district, etc.) Panyabungan, Ajamu, Tanjung Beringin (villages in North Sumatera), Tuapejat, Sikakap, Sioban (villages in Mentawai Islands, West Sumatera) and Pante Bidari, Madat, Simpang Ulim (villages in Aceh), Indonesia

Population of the project area _____

Panyabungan: around 100,000.

Ajamu: around 31,000.

Tanjung Beringin: around 10,000.

Pante Bidari: n/a.

Madat: n/a.

Simpang Ulim: n/a.

Tuapejat: around 6,000.

Sikakap: about 4,000

Sioban: approximately 9,000.

5. Types of projects

- Pilots (trials)
- Licensed or authorized
- Projects funded by USF
- Others

6. Type of application / service (check one or more boxes)

- Public voice services
- Radio or TV broadcasting
- E-governance, e-administration
- Support for small business, e-business
- E-health
- Tele-education, e-learning
- ICT training
- Disaster preparedness / emergency support / disaster mitigation
- Environmental monitoring / protection
- Others (please specify) Facsimile, Internet Access

7. Type of technology (Check one or more boxes)

- Wired local loop: Copper, optical fibre, etc. (customers' loop)
- Wireless local loop (customers' loop)
- Fixed wireless access (long distance)

- Mobile wireless access
- Satellite two-way communications: VSAT, etc.
- Wireless LANS and IP-based related networks
- Terrestrial voice, data, sound or television broadcasting
- Satellite voice, data, sound or television broadcasting
- Hybrid or combined technologies
- Others (please specify) IP Radio

8. Organizations involved in implementing the project:

- [LOCAL GOVERNMENTS](#)
- [PT TRANS KOMUNIKASI DATANET \(TKD\)](#)
- [PT INDUSTRI TELEKOMUNIKASI INDONESIA \(INTI\)](#)
- [PT TELEKOMUNIKASI INDONESIA, Regional Division I](#)

9. -150 word summary of the project indicating its expected social /economic impacts

Currently, there are about 216 million people in Indonesia and the fixed phone (incl. FWA/ Fixed Wireless Access) density is 6.6% (14.2 millions lines) whereas mobile telephone density is 21.9% (47.3millions).

With the new regulation of decentralization, the local governments have an authorization for managing their areas and improving their infrastructure including telecommunication facilities.

Started in 2004, the local governments of West Sumatera (Kabupaten Mentawai) and Aceh (Kabupaten East Aceh) took this opportunity to fund the development of telecommunication infrastructure in their areas. In West Sumatera, the local government made a partnership with PT. Industri Telekomunikasi Indonesia (INTI) as a contractor while Aceh local government made a partnership directly with PT TELEKOMUNIKASI INDONESIA (TELKOM).

In North Sumatera, the deployment was funded by 2 (two) local private companies which made a partnership with TELKOM in a revenue sharing scheme. All of the network equipment is supplied by PT TRANS KOMUNIKASI DATANET (TKD), a national softswitch developer which took a role as system integrator. The network is then interconnected to PT TELEKOMUNIKASI INDONESIA existing network.

The efficient and future proof technology i.e. softswitch-based NGN with media gateways is applied in this project. By developing the infrastructure, around 160,000 people in these rural areas are served.

B) Detailed project description and analysis

Please address each of the 7 elements indicated below, providing 1-2 single space pages for each, and treating separately each sub-element (e.g. 1.a.) which is appropriate. Preferably, please provide the description and analysis in electronic format.

1. Overview of project's targets, objectives and financing

- a. *(Brief description of the country/region: geography, terrain, climate, demographics, socio-economic situation,)*

Currently, there are about 216 million people in Indonesia and the fixed phone (incl. FWA/ Fixed Wireless Access) density is 6.6% (14.2 millions lines) whereas mobile telephone density is 21.9% (47.3millions). The fixed phone density in major cities is around 10-25% and in rural areas is less than 0.2%, where 60% of villages without phone at all.

The project was conducted in villages of 3 (three) provinces i.e. North Sumatera, Aceh and West Sumatera.

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In West Sumatera case, the local government made a partnership with PT. Industri Telekomunikasi Indonesia (INTI) as a contractor.

In Aceh local government made a partnership directly with PT TELEKOMUNIKASI INDONESIA (TELKOM). All of the network equipment is supplied by PT TRANS KOMUNIKASI DATANET (TKD), a national softswitch developer which took a role as system integrator. The network is then interconnected to PT TELEKOMUNIKASI INDONESIA existing network.

In North Sumatera case, the deployment was funded by 2 (two) local private companies which made a partnership with TELKOM in a revenue sharing scheme.



Figure-1: Map of Indonesia

The province of North Sumatera stretches across the island of Sumatra between the Indian Ocean and the Strait Malacca. It borders Aceh province on the northwest. North Sumatera has an area of 70787 km² and level of population at around 12 millions.

Panyabungan is a new regency in North Sumatera Province, consisting 58 villages with 3 urban villages and total area around 1,012 km² with the population of around 110,000.

Another location, Tanjung Beringin which is closed to the east coast of Sumatra has around 10,000 of population where the majority is fishermen and farmers.

Aceh province has an area of 57,365.57 km² and level of population at around 4 millions. Aceh province is subdivided into 17 regencies (kabupaten) and 4 cities (kota). In Aceh, this project was carried out in Pante Bidari, Madat, Simpang Ulim villages of East Aceh regency.

Mentawai Islands is a group of islands in India Ocean, about 100-125 miles off the coast of Sumatra. It consists of 4 main islands (Siberut, Sipora, North Pagai, and South Pagai) with the total area of about 7,000 km² and level of population at 64,235. The capital city of Mentawai is Tuapejat in Sipora Island with the population of around 6,000.

The Pagais have a total land area of 1,675 km² (approximately 775 km² for North Pagai and 900 km² for South Pagai) and make up over 25% of the total Mentawai land mass. The human population is approximately 22,000, with about 4,000 in the main town of Sikakap (and its immediate area) and the remaining population spread throughout 47 small villages.

Siberut, at 845 km², is the third largest Mentawai Island. The human population is approximately 9,000 inhabitants living in one large town (Sioban) and numerous villages throughout the island.

Most of the Mentawai people are farmers and fishermen. Forestry sector dominated the economic structure of Mentawai, which was contributed around 25% from the total economics scale of USD 40 millions in the year of 2005.

- b. *(Objectives and implementation details of the project applications (basic telephony, e-business, e-administration, e-education, e-health, ICT training etc),)*

The objective of this project is to provide telecommunication infrastructure for the local people in rural areas which mostly have not been served, in order to encourage economic and social development.

The services are voice, fax and access to the internet using wire-line approach with softswitch-based technology. Thru the internet, people in these rural areas are facilitated to have an access into global network, which will develop their skills and knowledge that should increase their opportunities to get a job, to setup a business and improve their quality of life in the long run.

- c. *(Consideration of indigenous communities, isolated and poorly served areas, small islands and their particular needs and situations.)*

Among the areas of these projects, the Mentawai islands are more isolated, where the boats are not operated daily.

- d. *(New technologies deployed for providing reduced cost capital and operating cost solutions.)*

As the IP based technology promising efficiency, this project utilizes Softswitch based NGN in conjunction with optical fiber, terrestrial IP Radio and VSAT in its network. The summary of the network is as follows:

North Sumatera:

- Host: Redundant Softswitch (MGC) located in Pematangsiantar

- PSTN Inter-connection: Trunk Gateway 3x 1 E1
- Signaling: R2
- Access Nodes:
 - Tanjung Beringin
 - Panyabungan
 - Ajamu.
- Core Network: WAN Sumatera (Multimedia Network)
- Approach Link: IP Radio – radio E1

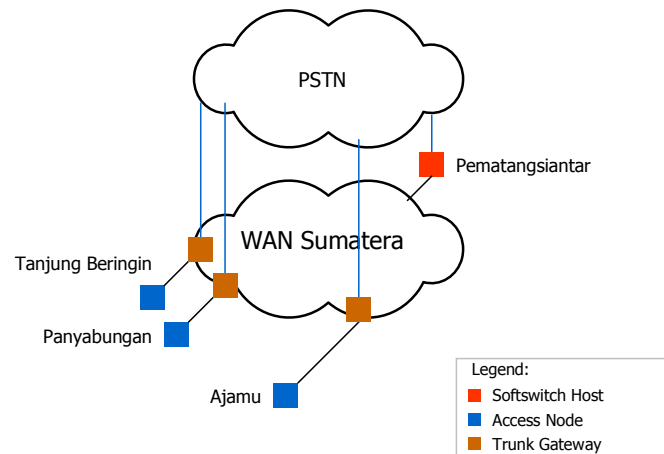


Figure-2: North Sumatera Initial Network Configuration

Aceh:

- Host: Redundant Softswitch (MGC) located in Langsa
- PSTN Inter-connection: Trunk Gateway 1 E1
- Signaling: R2
- Access Nodes:
 - Simpang Ulim
 - Pante Bidari
 - Madat
- Approach Link: Fiber Optic

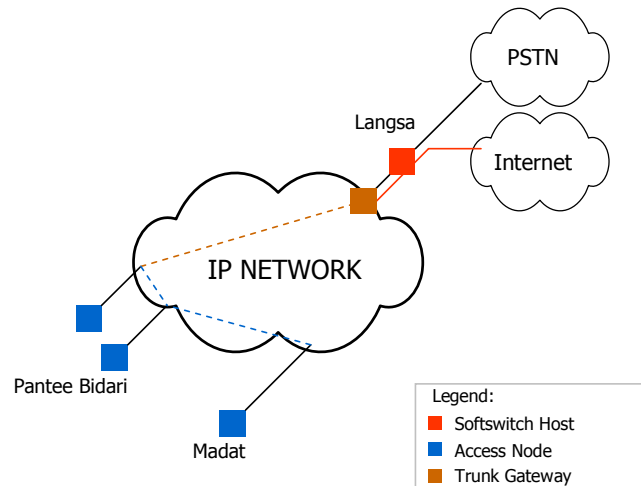


Figure-3: Aceh Network Configuration

Mentawai Islands – West Sumatera:

- Host: Redundant Softswitch (MGC) located in Padang
- PSTN Inter-connection: Trunk Gateway 4 E1
- Signaling: SS7 Signaling Gateway 2 E1
- Access Nodes:
 - Tuapejat
 - Sioban
 - Sikakap
- Internet Access: RAS at 64KB managed
- Approach Link: Satellite and Fiber Optics

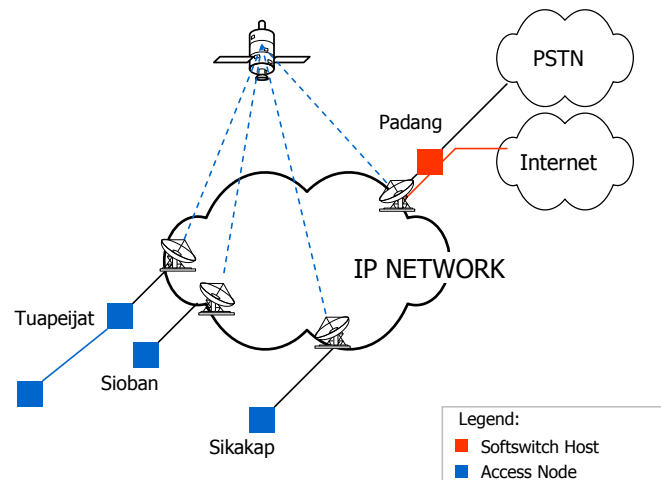


Figure-4: West Sumatera Network Configuration

- e. *(Financing and partnership aspects of the project, including the estimated total cost of the project and the types of funders (e.g. sponsors' contribution, charitable donations and subsidies from USF).)*

East Aceh: The project is fully financed by *local government*, partnership with TELKOM. The developed network consists of: *softswitch, trunk media gateway, access gateways, SDH radio-link transmission, fibre-optics, including out-side plant of copper-wire installation (660 line units)*. The local government used funds from their budget (RAPBD), as part of national budget (RAPBN).

North Sumatera: The project is fully financed by *local private companies*, partnership with TELKOM. The developed network consists of: *softswitch, trunk media gateways, access media gateways, IP radio-link transmission, including out-side plant of copper-wire installation (880 line units)*.

Mentawai: The project is fully financed by *local government*, partnership with TELKOM. The developed network consists of: *softswitch, trunk media gateway, signaling gateway, access media gateways, satellite-link transmission, fibre-optics, including out-side plant of copper-wire installation (1260 line units)*. The local government used funds from their budget (RAPBD), as part of national budget (RAPBN).

- f. *(Decision-making process to determine the project)*

Firstly, TELKOM conducted market development assessment and demand was identified in those areas. Next, business case study was carried out and then offered to partners (local governments and local investors).

It should be noted that for local governments the objectives are mainly for community development mission by developing telecommunication infrastructure and opening isolated area.

2. Infrastructure and regulatory environment

- a. *(Infrastructure components: Pre-existing telecommunication facilities, transport access, electricity supply, distance to the nearest local exchange and/or IP network, human resources, security,)*

This project was deployed with the following approaches;

1. Optimizing the existing infrastructure such as:

- Sumatera WAN as IP backbone, which previously used for the NMS and OSS only
- Other existing transmission and exchanges for interconnection
- Existing powerline

2. Developing a new infrastructure such as:

- VSAT link to connect the host in Padang (West Sumatera) and Mentawai islands, which then using fiber optics in the islands as approach links to the access gateways.
- SDH Radio link to connect the host in Langsa (East Aceh) and Simpang Ulim, which then using fiber optics as approach links to the other access gateways in Pante Bidari and Madat.
- IP Radio deployment in North Sumatera as approach links to the access gateways in Panyabungan, Tanjung Beringin and Ajamu.

For softswitches / hosts which are located in the existing exchanges in city areas, they use the existing powerline which are quite stable. However, for several AGs locations, the additional gensets and batteries are needed.

- b. *(Regulatory components: Universal service obligations, licensing conditions, frequency availability (for radio-based projects), other regulatory issues,)*

As this network is deployed and operated in cooperation with PT Telekomunikasi Indonesia, there is no licensing issue.

- c. *(Other factors which influenced the operating environment (manufacturers, standards etc).)*

All of the equipment is QA approved and tested by PT Telekomunikasi Indonesia.

3. Technical description and services provided

- a. *(Architecture, type of systems, main technical characteristics, frequencies (for radio-based projects), power consumption, performances (capacity, reliability, quality of service), network management, etc.,)*

Architecture: based on Next Generation Network (NGN)

Type of systems: Softswitch-based network

Main technical characteristics: IP-Packet technology, MGCP/MEGACO protocols for MGs; trunk media gateway and signaling gateway for inter-working, and access media gateway for POTS facilities.

Power consumption:

- Softswitches: 220VAC no-break system or -48VDC
- Access Gateways: -48VDC with 8 hours battery backup

Performances: Capacity of 100K subscribers; redundant configuration and hot-swappable capability, quality of service.

Network management: Provides FCAPS functions of web-based NMS with GUI to interact remotely with the network.

- b. *(Installation and deployment: network planning, subscriber management, etc.,)*

Subscriber management: each subscriber number created and managed by Subscriber Module in each Softswitch, conformed with TELKOM numbering plan. The CDRs created in Softswitch are then forwarded to TELKOM's billing systems in AMA format.

- c. *(Interconnection to national networks/backbones,)*

Interconnection to national network/backbones is done by using trunk media gateway and SS7 signaling gateway (when applicable) through the nearest existing switches, and the rest of the routing is handled by TELKOM's network.

- d. *(For each service delivered (POTS, "IP telephony", etc.): mode (data type and bit rate) and quality (voice quality and bit error rate).)*

POTS are converted by the access media gateway into IP-Packet in the network using voice-coder.



Figure-5: Softswitch in Pematang Siantar



Figure-6: AGW in Sikakap



Figure-7: AGW Shelter in Madat

4. Cost aspects

- a. Cost of the equipment, cost per line and cost of the operation of the system*

Data not available

- b. Cost of each terminal and cost of the service for the user*

Data not available

5. Effectiveness and sustainability of the project

- a. Effectiveness and benefits of the project for the targeted user groups,*

The project is considered effective, since it is continue in operation and serving the local people.

- b. Profitability of the project and/or its contribution to local entrepreneurial activities,*

The project is profitable; the revenue is shared between the investors and the interconnected network operator.

- c. Specific strategies to respond to the needs of women, youth, handicapped, indigenous people and other marginalized or socially disadvantaged groups*

This project is aimed to provide the telecom services for all of the people in the areas which formerly have no such telecom facilities.

- d. *Aspects of the project, which could be strengthened to enhance its effectiveness or sustainability maximizing the benefits of telecommunication infrastructure in rural and remote areas.*

6. Social and human development impacts

- a. *Overview of key social and human development needs of the population in the project area,*
- b. *Role and commitment of the project to addressing these needs,*
- c. *Socio-economic benefits for, and impacts on the community(ies) and/or at a wider level, including support for gender equity, promotion of community participation and the needs of marginalized and disadvantaged populations*
- d. *Means foreseen to enhance the project's future contributions to human and social development*

As the telecom facilities developed in this project are provided to the people that previously have no such telecom facilities, the impacts for the communities are significant.



Figure-8: Children in Madat: Young Generation Served by NGN

7. Other observations

a. Unexpected results and lessons learned,

During the operation, there were several malfunctions experienced, such as:

- VSAT IP and/or other equipment failure due to lightning and storm
- IP Radio and/or AGW failure due to AC power fluctuation

Those conditions were improved by fixing the lightning protection and setting up the power stabilizers and un-interruptible power supplies.

b. Anticipated near/long-term project challenges and reorientation.

c. Additional information considered useful