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The Palapa Satellite: National And Regional Equalizer

By

Ir Sukarno Abdurachman
1. Foreword

Distinguished guests,
Ladies and gentlemen,

It is indeed an honour for the Directorate General of Posts and Telecommunications to be invited to present the PALAPA system and try to illustrate its capabilities and benefits in equalizing communications throughout the country and the region. I suggest that it is appropriate to use popular language for this presentation, without emphasizing hardware and software, but observing its capabilities as a means for information transfer.

2. Introduction.

Telecommunications are a means to transfer information, by way of converting audio-visual codes into electromagnetic (or electro-optical) waves to be transmitted through wire or space with the electronic speed, that is 300,000 km per second. At the destination end, those electro-magnetic signals are reconverted into the original audio-visual codes with minimum distortion. In this way, information can be transmitted instantly, virtually independent of distance, reaching all destinations, even to space. Popularly, telecommunications are understood by the
telephone and telegraph or telex services, but include radio and television broadcasts. These are means for both one-way and two-way communications.

The (global) telecommunications network is a wonderful "machine", frequently referred to as one of the most important achievement of mankind. Telecommunications channels are arranged in networks, and (almost) all local networks (serving a city and its surroundings) are part of their national networks. Notwithstanding the numerous technical standards adopted for the equipment, all national networks are linked together through certain points of interfaces to make up a world-wide network. Global and instant communication is thereby made possible.

I would think, that due to the capability in transferring a bulk of information instantly to various destinations, telecommunications will expand the communication circles, which in earlier times were confined to verbal or personal circles only to national, regional and global coverage. One can be "present" anywhere and anytime to communicate, without having to travel. One can organize a meeting without physically meeting the participants in one room. This makes it possible to organize development efforts involving many people, covering a very wide area, in fact the whole world.

PALAPA is a communication satellite, that is, a radio system located in the geostationary orbit, relaying radio signals from one place to another, within its service area. Its geographical
service coverage, however, is the Asean region (plus Papua New Guinea). Indonesia alone has almost 10 million square kilometers surface area, including the waters, and about 1000 of the more than 13000 islands (in total only 1.9 million square kilometers), are inhabited by some 160 million people. The Asean region, according to a rough estimate, has some 250 million people. Palapa lends itself very well to the archipelagic country and to the Asean region, due to its very large geographical coverage and its capacity to carry telecommunications traffic.

The following discussion will deal with how the system can serve the 250 million people in transferring information instantly from one place to another. What this could mean to people must be your topic of discussions, which I believe of paramount importance to the national as well as regional development, in the struggle within the world community.

2. The technical system capability

The present PALAPA-B has 24 "transponders" or radio channels, enabling it to carry some 20 000 telephone circuits and a number of radio and television channels simultaneously. This is a capacity equivalent to a maximum of some 2 billion bits of information transfer every second, sufficient to send the complete content of the Encyclopedia Americana over the entire area, 20 times every minute.
I wonder if we fully comprehend the implications of such information transfer on business, socio-economic development of a country or enhancing relations among countries. There was an expression popular to telecommunicators (or rather to economists): "Where information flows so does commerce." We, in Indonesia know that it is not only commerce that flows with information transfer, but includes almost all human activities in their development efforts, whether it is economic, social or cultural activities.

What is special about satellite systems compared to other "conventional" systems? The answer would be something like this. New technologies bring with them higher efficiencies and new capabilities. I have quoted before that the Palapa satellite has a very large geographical coverage. Information can then be transferred or exchanged instantly reaching vast distances, without stringing wires from place to place. The satellite is the one and single repeater for the whole area. Any communication link goes up from an earth station to the satellite, and thence directly to the destination (earth) station. The costs for transmission of information per volume units is thereby independent of distance.

Other advantages of the satellite system is its flexibility to adapt to varying needs of network and traffic capacity. Earth stations can be built with a few channels' capacity, installed almost anywhere directly at locations where service is required, and as demand develops, its capacity can easily be expanded,
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including introduction of new services. With the few channels available, the station can dial all other (earth) stations in the network (in turns), or dial several other stations to prepare a conference. Further, once the satellite is in orbit, additional earth stations can be installed without disturbing the whole network. Also if one of the operational stations failed, it does not affect the network as a whole.

In short, the Palapa satellite system is by far the most economical means to disseminate one-way information (radio and television broadcasts) over the very large Asean geographical area, but also economical in carrying "light traffic" two-way communications (telephone, telex and even data) spread throughout the vast area. This is to say that the satellite system has proven in our experience to be adapted for rural telephone service and for broadcasts applications, and promises to be so in the future. For other network applications, e.g. point-to-point heavy traffic, other systems, such as microwave and sub-marine cable are becoming competitive to satellite systems, even for long distances.

In fact, it is not only audio-visual codes like speech, telexes, graphics and "life" pictures that can be transmitted over distances. Computer processes are electronic processes, they therefore can be transmitted through telecommunications channels. Computers are sometimes referred to as "extending" man's brain due to the capability in calculating mathematical problems, se-
lection and orderly arranging necessary data, and storing a huge volume of data, all with electronic speed. Data networks are being established, in a similar way as a telephone network, but their terminals are computers. This is the kind of information exchange we are facing ahead in the coming years in Indonesia. Many advanced and industrialised countries have their networks already operational and expanding very fast.

While the PALAPA system supports the transmission network for long distances, linking main administrative and commercial centres, the local networks serving a city and its surroundings remains to be expanded. The total number of telephones terminals in Indonesia at present (end 1983) stand at 600,000, representing a density (or penetration) of 0.4 terminals per 100 people. This is among the lowests in the world, with the global average of 10 per 100 people and advanced industrialised countries having 50 to 60 terminals per 100 people. This national penetration must be understood that only cities are served while the rural is literally unserved. But, on the other hand, radio receivers are owned by a bigger percentage of the population. This imbalanced distribution is similar to the world distribution. At end 1982, there are around 600 million telephones (and 600 million TV-sets) in the world, but 90% of those are concentrated in 10 advanced countries, representing 10% of the world community. Tokyo alone has more telephones than the whole African continent with some 500 million people.
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It cannot be right that in the latter part of the twentieth century, a minority of the human race should enjoy the benefits of the new (telecommunications) technologies, while a majority live in a comparative isolation. A comprehensive telecommunications network will allow more contacts among people and increase their development activities and mutual understanding.

3. The system benefits.

The foregoing is an illustration of the lofty side of the PALAPA system. I admit that the system capacity and capability is not yet fully utilized. Let us now have our feet on the ground, and try to identify the benefits provided by the PALAPA system to Indonesia and the Asean region. Quantitative values, however, have not been duly assessed, but there are definite qualitative indications summarized below:

- the busy traffic at all routes of the network indicates the progress of national and regional (province, kabupaten) development activities in all parts of Indonesia. And judging from the users, they are government administrations, state enterprises, banks, business, industry, news agencies, defence and security institutions, as well as the general public, it is evident that the development efforts covers almost all sectors.
specialized services such as the aviation, maritime, and oil company's internal communications are established covering all parts of the country, improving efficiency and safety of their operations. Similar concepts are adopted by government agencies such as the banks, customs offices, immigration offices and many other businesses, improving their coherence, product output and productivity.

The broadcasting capability of the system has been a great help in disseminating radio and television broadcasts. Programs consist not only of news, government policies, and mass & rural such as the program "from village to village", but equally important are cultural programs. These programs promote the national cohesion and unity, stimulate local initiative, etc.

The ASEAN regional coverage of the system has been used by ASEAN member countries, enhancing their domestic networks or linking bordering towns among the countries. This contributes to the ASEAN regional cooperation.

In short, the system has been providing the much needed capabilities, to support the national telecommunications network, to support unity and progress in the social and economic aspects, to promote regional cooperation, and to provide a good base for an up-coming rural service. To add one more important aspect of the system is that while it is rendering services that lead to the tangible and intangible benefits to the country and region,
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the system is also economically and financially viable. The return brings surpluses that are not only to guarantee continuity of its services, but to a certain extent, also enabling expansions for the needed equalization aspects.

Emphasise is being given to ways in which the country can be provided with extended and new services. As we develop our telecommunications, we enhance our ability to make the most of the natural and human resources available to us in an increasingly complex, fast-paced world. Telecommunications are frequently referred to as an infrastructure to other infrastructures, because it promotes efficiency and productivity. It is also a strategic means because it supports strategic sectors. The better understanding of the functions and potential of telecommunications has urged us to acquire the ability to put the available technologies into good use.

It is understood that the single most important resource for managers, either in business or government is information, or access to it. But it is also understood that telecommunications is an integral part of other development sectors. The impacts of telecommunications on the process of development is inevitably influenced by other sectors. Other infrastructures or activities have to reach certain levels if the indirect benefits of an efficient system are to be realized. It stands to reason that a well-managed, decentralised organisation will derive greater benefits than a poorly-managed and understaffed operation.
4. Service development.

The following points are few examples other than the "conventional" services such as telephones and telex, in equalizing communications, and thereby equalizing the efforts and the fruits of development.

a. Teaching at a distance.

The Department of Education and Culture (PDK) of Indonesia has embarked on a network for teaching at a distance popularly referred to as tele-education, comprising 10 university campuses, mostly of the Eastern part of Indonesia. While I do not claim expertise in the art of teaching and learning, but to me, such a system could bring equalization in the university educational standards. In this example one lecturer can be heard by 10 campuses spread throughout the country. The technology is available for more sophisticated services, including computer hook up, distribution of printed matter, and transmission of slow scan or freeze-frame TV.

My assessment in the overall costs of such a system is that it could bring efficiencies. Students are not required to live in relatively expensive cities, reducing their costs for living and travel; Remote areas could establish their tertiary level of education, or otherwise they can not afford to pay for the facilities, limited as they are in skilled personnel and financial resources.
In the meantime we are anxiously awaiting reports on the subject by the authorities concerned. My apparent question would be: will the students be prepared to watch TV and listen to the lecturer without having the personal communication? It definitely needs a "transitional" or "acclimatization" period.

My next question will logically be that such a system would serve not only tertiary levels of education, but also for non-formal education such as adults and farmers, health care workers and many others.

In reiterating the not fully utilised Palapa system capacity, I like to point out that the transponder for TV programs are used only during late afternoons and the evenings (except on Sundays). During the day the transponder is normally idle, and could therefore be shared for other usage such as teaching at a distance or a similar system called teleconferencing.

b. Community TV reception.

Palapa-B provides a relatively high signal strength (34 dBW/m²) which allows operation of relatively small earth stations with smaller antenna dishes, say 3m diameter. A couple of years ago, an idea of full-fledged DBS (Direct Broadcast System) was launched to limited circles. Some responses, including that from Dr. Alwi Dahlan, indicated that the overall costs for such a system would be relatively high, and the bigger part
of it will be beyond the reach of many people. Besides, controlling the flow of information was questioned.

To me, it seems, that we could learn from India or elsewhere, and analyse whether Community TV reception is viable for Indonesia. Small earth stations can be produced locally, receiver frequencies can be locked to the Palapa frequencies, and remote communities will be eager to organise and establish their own limited receiver and distribution system.

The idea has still to be studied carefully, taking into account all aspects involving its implementation. I suggest, that with participation of the public in investing systems, the TV programs could be enjoyed by many more people, and both TVRI and the government could have information channels to reach more people.

c. The rural service.

Assessment of the costs in providing such a service per line unit is in the average five times more expensive compared to a similar service for urban areas. The expected traffic will be low, so that rural service will not yield direct financial returns.
While the above is true, but it is not telling the whole story. In trying to find the intangible benefits or rural service promised, and keeping in mind the decentralizing potential of telecommunications, I would like to raise a few questions:

- Would it not be more efficient to have productive activities nearer to the natural and human resources, provided that telecommunications are at hand? Almost all natural resources and the bigger percentage of people are found in rural areas.

- If practical and acceptable (tele)communications systems can be devised, would people be willing to work and live in rural areas, again, provided that telecommunications are easily accessible? I suggest that rural areas provide more space and healthy environment, away of noises and problems likely found in cities, while production activities can be distributed.

- The fast progressing technologies are promising; even at present one can envisage a rural system employing a combination of satellite and terrestrial radio systems. The subscriber radio serving the local distribution, while the earth station provides long distance channels to integrate into the national network. A radio span will cover an area of approximately 30 km radius depending on the intervening terrain, but with repeaters the radius could be expanded, and a community of say 10 to 15 thousand square km could be
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served by one such a system. Indonesia's land area is 1.9 million square kilometers. We can therefore find out, through suitable surveys, how many rural earth stations would be adequate to serve all the 65,000 villages in Indonesia. At present the number of telecommunications earth stations operate totals 132 small stations.

In summary, I would say that the technology is improving and the economics is promising. The next step could be selling the idea and coordinating the support for resources, including for the initial investment.

Distinguished guests, ladies and gentlemen,

There are a number of areas that could be thought of as paths for expansion of telecommunications, such as the use of the potential of (tele)communications for education, information transfer serving centres of research and scientific activities, or in summary, telecommunications supporting other basic development efforts, but the few points I have presented above are the most readily available services with the Palapa system. One can even further analyse the possibility of substituting travel by telecommunications, due to the fact that transportation is expensive and consumes a lot of energy. Fuel engines are operating with low efficiencies, and the overall costs for a road system is expensive. Just to pick up a comparison, we could estimate that the price of the toll roads with their fly-overs
and other bridges implemented in Jakarta is about the same as the costs of the initial Palapa system with 40 earth stations.

To conclude, I would suggest that the system capabilities and electronic communications impose upon us is the need to adjust our whole approach to communications. We could almost say that any thinkable communication service can be devised thanks to the fast progressing technologies. Instant global communications is already the order of the day, and more efficient and modern networks are being constructed, but the prospects of achieving national instant communications have not had our overall integrated attention to come to concepts, plans and step-by-step implementation programs for equalling, making even more optimal use of the Palapa system. The decentralizing power of (tele)communications should be observed for better equalizing development, and promote understanding among the people in Indonesia.

Thank you very much for the kind attention.


DIRECTOR GENERAL
AND TELECOMMUNICATIONS

Ir. S. Abdulrachman