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Historical Overview: Braving the Challenge of Satellite Technologies: National Breakthroughs and Indonesia's Role in International Forums

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Braving the Challenge of Satellite Technologies: National Breakthroughs and Indonesia's Role in International Forums

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Abstract

Recalling the Palapa domestic satellite system, as a breakthrough technology for assessing isolated areas, and triggering business activities.

INTELSAT commenced the opening of new horizons for reliable international satellite communication, and Indonesia took a wise decision to join, notwithstanding its economic hardships.

Indonesia, had to take crucial decisions during ITU WARC-ORB '85 and '87 in the interest of the global community and its national interest. In cooperation with other Mobile Satellite Services (MSS) operators, Indonesia obtained an endorsement at WRC-95 for improving the fragmented MSS bands, and an additional allocation at WRC-2003.

Indonesia took part in the ITU sponsored deliberations on GMPCS, and consistently assisted emerging non-geostationary satellite systems, such LEOs and MEOs at WRC forums, for their spectrum allocation.

Indonesia is experiencing its initial stage of DTH (Direct-to-home) satellite broadcasts using Broadcast Satellite Services (BSS).

More widespread use of terresterial means in Indonesia's telecommunications scene will cause a shift in the application of satellite technologies.

Introduction

Triggered by its early success in operating its Palapa system, Indonesia became involved in many international forums such as INTELSAT and ITU. Its vocal participation in these forums contributed to better cooperation with other countries, particularly developing countries. These new links of cooperation among developing countries provided Indonesia with more leverage to solve more crucial issues among others regarding planned bands at ITU Radiocommunication Conferences for the benefit of all Members.

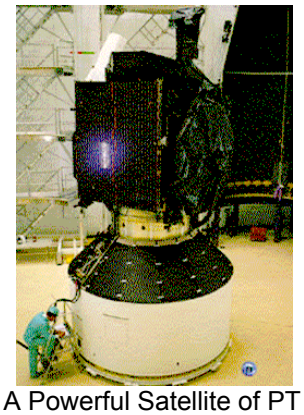
Since the launch of the first Domestic Satellite Systems, PALAPA, several papers regarding its project management, technical characteristics and national economic benefits have been presented. It would be interesting to reveal untold events closely related to its development.

1. The Early Days of Satellite Communications in Indonesia

It occurred in Ternate, a small island in the northern part of the Maluku province (Moluccas), known as the Spice Islands, in the eastern part of Indonesia. The Palapa system, owned by PERUMTEL (now PT. TELKOM) had been in operation for around a year when we made our inspection. Never before were people in this city able to communicate with somebody in Jakarta, as the only communication in the past was through unreliable HF means to Ambon, the capital of the Maluku province, and some neighbouring islands. You could imagine how people had to wait for certain hours of the day when HF radio waves could be reflected by the ionosphere to reach its intended destinations. And even if you succeeded to have access, you still had to be patient listening to your correspondent's fading and interrupted voice, or you had to shout several times in order to be heard above the noise. It was a routine excruciating exercise to communicate by HF means, and you should be glad if you managed to convey the most emergent message with your correspondent.

However, with the introduction of the Palapa system in 1976, it was like an amazing luxurious event to be able to talk to your business partner or your family, recognizing their voice and talking normally. This was a breakthrough technology, where supply creates demand. Hence, it was not possible to forecast the demand before the service was available.

In less than one year after the domestic satellite system had been put into operation, direct communications between Ternate and the centre of trade for all kinds of tools and spare-parts in Jakarta, became a daily routine through Direct Distance Dialing. It was interesting to observe the emergence of workshops for agricultural equipment and other economic activities never imagined before. This was made possible because the owners were able to order spare-parts or other tools directly from their source, and receive shipments within two weeks. This is only a small example. I do not even mention about the national televison program that could reach even the most remote locations. Operators of the domestic satellite system, PT Telkom Tbk. and PT. Satelindo (now merged with PT Indosat) have since then launched bigger and more powerful generations of satellites.



A Powerful Satellite of PT Telkom.

Indonesia entered the global space communication era by the inauguration of her international INTELSAT station at Jatiluhur, 60 km south of Jakarta, in 1969. Indonesia's membership at INTELSAT brought new experiences and opportunities for reliable international communication for the first time in the Indonesian international communication history. Practically all international communications in the past were by unreliable HF means.

Indonesia made a wise decision to join the INTELSAT global system, although she had just experienced a difficult period, economically and politically. Indonesia was then one of the poorest countries in the world with an average income per capita of less than $100 (one hundred US dollars) per annum. PT. Indosat, the Indonesian operating company in charge of international telecommunication services was wholly owned and operated by a foreign company, a subsidiary of ITT, a US multinational company. It was a historic milestone for Indonesia's international communications. In the interest of the public, international communication rights using satellites were transferred to ITT for 20 years until 1989: it was a "win-win" deal, also financially. It turned out that Indosat was really successful in boosting international traffic, as INTELSAT was the only global satellite consortium at that time, dominating international telecommunication traffic. Even in the mid-80s it carried two-thirds of the total international traffic, and was even used as a back up of high capacity submarine cables.

Indonesia has been involved in numerous INTELSAT Conferences and meetings. It is worthwile to note that the Vice Chairmanship and Chairmanship of the INTELSAT Board during the period 1998 – 1990 were entrusted to Mr. J.L Parapak, who was PT. Indosat's CEO at that time.

With the introduction of high capacity international sub-marine cable systems, it was not possible for Indonesia to retain her agreement with ITT, as it inhibited also her sovereign rights for other international access. Hence, Indonesia negotiated amicably an early termination of the ITT satellite agreement. Indonesia successfully bought back the company's ownership and rights, and turned it into a national limited company in 1980, nine years prior to the original termination date. Again it was a wise and timely decision, as the approximately $70 million deal, taking into account foregone future profits for ITT (had the agreement been retained), turned INDOSAT into an effective sizable company with a turn-over of half a billion USD in just 5 years time.

2. First-Come-First-Served vs. Planned GSO Orbit Allocation

At the time that the ITU World Administrative Radiocommunication Conference for Orbital allocation, WARC-ORB, in 1985 was held, only a few countries were able to launch their domestic satellite systems. Some vocal developing countries at the Conference expressed their worries, that the orbital space would soon be fully occupied by satellite systems of a few industrialized countries; at the moment developing countries would utilize them. The author of this article was deeply involved with the preparations and the actual deliberations at this and other, ensuing Conferences.

The major issue was the existing ITU regulation, stipulating satellite registration for the orbit and spectrum allocation "on a first come first served basis". Hence, they proposed that the greater part of the spectrum allocation for GSO Fixed Satellite Service (FSS) had to be allocated on a "Planned basis", stipulating equal distribution of allotments for each ITU Member. As a developing country, besides being an equatorial country, Indonesia was caught in the middle between the position of our colleagues from most of the developing countries and that of the industrialized countries, in the debate for the unplanned bands.

Indonesia at ITU Conferences

Although we experienced great difficulties in coordinating our first Palapa-A (Palapa-1 and Palapa-2) system in 1974 with other satellite systems, like INTELSAT and the USSR satellite system, Indonesia still believed that unplanned bands for the FSS spectrum, regulated on a first come first served basis, would still better serve future satellite developments, for developed as well as developing countries alike.

On this very sensitive issue, during WARC-85, Indonesia, while honouring the right of every country to have a guaranteed access to the GSO, proposed a minimum planned orbital allocation, similar to the Canadian proposal representing the developed countries, which was then endorsed by the relevant Committee and confirmed by the Plenary. This decision has been retained up to now. After several revisions, registration to these planned orbit is governed by Appendix 30B of the Radio Regulations.

However, we should note after almost 2 decades since then, while many developing countries have notified their satellites in the unplanned bands,

only a few developing countries registered for their “planned” orbital positions. Interestingly, many developed countries did enter their registrations. These developments confirm the right course of Indonesia’s approach during Orbital WARC-85.

3. Entrance into the Broadcast Satellite and Mobile Satellite Services

Being a tropical, monsoon type country, Indonesia tends to avoid the use of the Ku-band Planned Band BSS-Plan as regulated by Appendix 30A. Ku-band propagation in tropical areas suffers significant attenuation during heavy rainfall, occurring more often compared to other areas. Hence, to provide broadcasting satellite services nationwide, Indonesia initiated the use of S-band for Broadcasting Satellite-Services in the early 1990s by registering INDOSTAR satellite networks to the ITU.

INDOSTAR-1 (or CAKRAWARTA) a dedicated Broadcasting Satellite Service (BSS) system, was launched and became operational since 1997.

Indonesia became interested in MSS (Mobile Satellite Service) since 1993 when PT. Pasifik Satelit Nusantara (PSN) an Indonesian satellite company, initiated the GARUDA satellite and registered for its network filing to ITU. Subsequently, PSN, together with two other telecommunication companies from the Philippines and Thailand formed the Asian Cellular Satellite Company (AceS) to build and operate the GARUDA satellites on a cooperative ownership basis . GARUDA-1 was successfully launched and became operational in 2000.

The L-band MSS spectrum at that period was fragmented into several bands depending on their applications, such as Maritime MSS (MMSS), Land MSS, and Aeronautical MSS, such fragmentation would limit and reduce the utilization flexibility of MSS. Hence,since its preparation for the World Radio Conference of 1995 (WRC-95) and preceded by a Conference Preparatory Meeting (CPM), the idea for obtaining additional allocation for the MSS and converting the MSS L-band into a generic one, was pursued. And in cooperation with other supporting countries, mostly those owning MSS systems, Indonesia was then able to obtain the endorsement of WRC-2000 for the MSS L-band to become generic, and to pass a Resolution for a further study for additional allocation for MSS, which was considered inadequate.

Based on the above resolution, Indonesia participated actively at the regional level, the APT Preparatory Group Meetings (APG) for WRC for

developing support for the MSS additional allocation. The APG meetings endorsed the proposal, resulting in an APT common proposal. This proposal became a strong force for cooperating with other countries or regional groups to support an additional allocation for the MSS band. And finally WRC-2003 was able to endorse said additional MSS allocation for MSS systems.

Although the personal mobile communications systems using satellites, also termed GMPCS, did not have the success as predicted and promoted at that time, Indonesia supported its inception at the ITU sponsored GMPCS Conferences and Meetings from 1996 onwards, keeping in mind that GMPCS could be a breakthrough especially to serve remote areas of the world at an affordable cost to the users. In fact at the 1996 World Telecommunication Policy Forum, deciding on issues relating to the introduction of GMPCS, the Head of the Indonesian Delegation was elected as Chairman of the conference.

Viewed from a political and economic standpoint, the addition of CAKRAWARTA and GARUDA-1 to Indonesia's FSS systems (PALAPA and TELKOM), made this country one of the biggest satellite users and owners of the region.

4. Interest in Emerging Non-GSO Satellite Systems

In the beginning of the 90s, new satellite technologies were emerging, the non-geostationary orbit satellite systems, the MEO (Medium Earth Orbiting satellite systems) and LEO (Low Earth Orbiting Satellite systems). The so-called Big LEOs offered voice and data services, while the Little LEOs offered non-voice communications.

Considering Indonesia's vast un-served and under-served areas, even though it had already introduced services by geostationary satellite systems, it seemed that other systems with even more cheaper terminals could enhance alternative communication means to its citizens, as stand-alone VSAT terminals are still not economical for personal access.

As a part of the rush to enter into the personal mobile communications by satellite, a number of Indonesian companies made their arrangements with foreign GMPCS proponents, owners and would-be operators. Among others, a subsidiary of PT. Bakrie Communication, a national company for communications, became a joint owner of the first launched Big LEO systems, IRIDIUM, a non-GSO MSS (mobile satellite system), a few months

before its operation. The initially prospective system for global mobile (voice) communication from any point the globe seemed to have difficulties in meeting its planned revenues although technically and operationally there seemed to be no flaws in the system. Finally, PT Bakrie Communication sold back its shares timely, before this giant LEO system crashed and accepted its bankruptcy under the so-called “Chapter 11” stipulations.

Other Indonesian companies had been negotiating their participation with another Big LEO system, TELEDESIC, a non-GSO FSS (Fixed Satellite System) intended particularly for global instant broadband Internet and data services from any location of the country. Indonesia and several other developing countries were actively involved in obtaining the required 2 x 500 MHz allocation for the system at WRC-95 and WRC-97, however, the owners seemed to doubt its revenue stream as planned, and withdrew from further implementation.

Another non-GSO system where telecommunication companies are interested in was the Little LEO system, FACS, a non-GSO non-voice MSS system, a data-only store and forward service, very effective among others for two-way messaging, internet service, remote monitoring of devices, transportation management, search and rescue and file transfer. Negotiations have been slow, causing also a slow entry for its launch and operation.

Indonesia and many other developing and developed countries see the benefit of Little LEO systems for opening-up their isolated areas through economical store and forward data communication, and hence cooperated with each other in obtaining additional spectrum allocations for several MHz of the UHF bands since WRC-95. Finally, in the last WRC-2003 the endorsement of a preliminary secondary allocation for the Little LEO feederlink was secured. As the system’s launch and operation exceeded its planned schedule, FCC, the United States regulator has not yet fulfilled a request for a further operational license extension.

All this shows that the Indonesian telecommunications sector is keenly observing technological developments in the field of space communications, so as to be ready to take advantage of them, if and when found beneficial for the community and the industry.

5. Trends in Deployment and Use of Satellite systems for Indonesian National Development

With the failure of timely operations of the non-geostationary satellite systems, presently, only geostationary satellite systems are in operation. Non-geostationary satellite systems have experienced unexpected challenges during their past history, and have still to prove their emergence.

The trend of satellite utilization in Indonesia, shows a shift away from using fixed satellite service (FSS) for voice communications to using FSS for more innovative and modern purposes, such as community broadcast reception using VSATs (Very Small Aperture Terminals), approach links serving Base Transceiver Stations (BTS) for cellular services in outlying areas, while retaining the function as carrier for televison program distribution, as relatively more voice communications are carried by terrestrial means, including underground and submarine cables as they become available. In such cases, fixed satellite service become emergency standby solution and moving to underserved areas. For economical reasons, VSATs are increasingly used for the downlink of Internet traffic.

In addition, in fulfilling the Universal Service Obligation (USO) towards universal telephone access in Indonesia, and probably also in a number of neighbouring Asian countries, the use of MSS is seen to play a role in the forseeable future.

While currently two companies, PT. Mediacitra Indostar (Indovison) and PT. Telkom (Telkomvision), have introduced DTH (Direct-to-Home) television service, bringing pay-TV broadcasts directly to homes from satellites, competition in the bigger cities where cable television services are being offered will be a challenge to them. Notwithstanding the success DTH is experiencing in many countries in the world, it remains to be seen, whether DTH (Direct-to-Home) services in Indonesia could become a prospective large-scale business in the future.

6. Conclusion

Indonesia's satellite communication history has been marked with several remarkable milestones that contributed to its unique vision and timely satellite system implementation. We have noted that during crucial periods of technological development and emergence, Indonesia had taken timely decisions, in keeping up with those developments to provide the best service for its people.

As the first developing country to operate its domestic satellite system in the mid seventies, Indonesia has consistently taken necessary steps for developing the existing geostationary satellite systems for multiple services, safeguarding its global orbital allocation on an equitable first come first served basis, and embracing emerging satellite communication systems including non-geostationary ones expected still to emerge from their lingering stage.

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