Growth and Challenges in the Satellite Industry

Paul Brown-Kenyon reflects on technical and business issues facing the satellite industry.

The world's first communication satellite providing two way communication services was the United States' Project SCORE ("Signal Communications Orbital relay Equipment"). Carried aloft atop an Atlas-B rocket in December 1958, the launch of Project SCORE heralded the beginning of the communication satellite industry.

Initially used to provide basic communication links between continents – something now provided by undersea cables -- satellites soon developed into an integral part of the world's telecommunication infrastructure. With unique characteristics as a communications technology – such as wide service areas (a single satellite is able to provide communications services to over one third of the earth's surface); a communication cost irrespective of distance; and, instantaneous coverage on launch – satellites were soon supporting a unique set of satellite specific applications.

Over the following 50 years, thousands of communications satellites were launched creating a multi-billion dollar global industry which, through their support of telecommunication and broadcasting services, today impacts many aspects of our lives.

MEASAT's entry into the space club...

Malaysia joined the space club with the launch of the MEASAT (or Malaysia East Asia Satellite) satellite system in the mid 1990s. Conceived in 1992 as part of the 2020 Vision laid out by YA.Bhg Tun Dr Mahathir Mohamed, and pioneered by Binariang as a private venture, the first of the MEASAT satellites was launched in January 1996 atop an Ariane 44L rocket from Kourou in French Guyana.

A Boeing Satellite Systems 376 HP "spin stabilised" satellite, MEASAT-1 provided a total of 16 transponders (each transponder a unit of capacity of between 36 and 72MHz bandwidth) for telecommunication or broadcasting services. Located in geostationary orbit- a unique orbit 36,000 km above the earth at which the speed of the satellite matches that of the earth to give users the impression of a "stationary" satellite –MEASAT-1 provided state of the art communication services across Malaysia and South East Asia. MEASAT-1 was joined shortly after by MEASAT-2, launched in November, 1996 to provide an additional 12 transponders to the MEASAT fleet.

MEASAT-1 and MEASAT-2, and the subsequent MEASAT-3 series of satellites, were designed to support both corporate and consumer communication services through separate C and Ku-Band communication payloads:

- C-Band Payload: Operating in the 4 GHz and 6 GHz frequency bands, C-Band payloads provide communication services to larger antennas (of at least 1.8m or 2.4m in diameter). While the use of large antennas is a clear disadvantage for some applications, C-Band communication provides a very reliable communication link for corporate networks where close to 100% availability is needed and space for the antenna is not a constraint.
- Ku-Band Payload: Operating in the 11 GHz and 14 GHz frequency bands, Ku-Band payloads provide communication services to antennas of as small as 0.6m. While having the key advantage of operating with smaller, more cost effective dishes, Ku-Band communication are impacted by heavy rain (as one tends to get in Malaysia). As such, Ku-Band services tend to be used for consumer applications, such as direct to-home ("DTH") PayTV or Broadband, where a small amount of outage, while not welcome, can be tolerated.

The launch of the first of the MEASAT satellites was a catalyst for the development of satellite communications in Malaysia. Initially used to provide a link between East and West Malaysia, and provide a platform for the distribution of the RTM broadcast nationally, MEASAT satellites were soon supporting the rapid development of the local GSM network which at the time covered less than 10% of the population. Fundamentally a USP technology providing ubiquitous coverage over the country, satellites were soon used to expand other networks out across the country, linking remote communities, hospitals and universities to the main population centers.

The launch of the MEASAT-1 satellite also led to the launch of the regions first digital DTH television service. Initially argued as impossible in the heavy rain fall region of South East Asia by many 'global' experts, by using higher powered satellites and newly developed digital transmission technologies, the MEASAT fleet supported the launch by Astro of its DTH TV service in 1996 which is now such an important part of our lives.

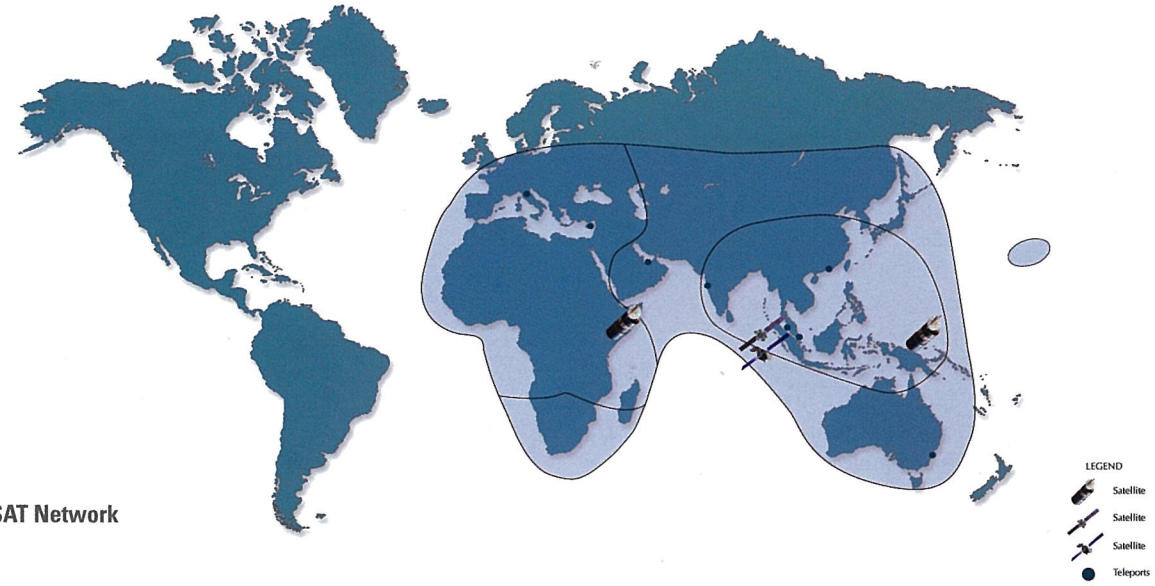
Growth and expansion

While the MEASAT-1 and MEASAT-2 satellites have been very successful, supporting our local satellite requirements and allowing the company to expand into adjacent markets of Indonesia, Philippines and Vietnam, operating a network of 2 medium sized satellites was never going to be viable in the heavy capital intensive satellite communications industry.

At the start of the new Millennium, therefore, MEASAT clarified its vision clarifying two separate targets: 1) Providing a state-of-the-art satellite system for Malaysia's ICT companies; while, 2) Developing one of the top three video distribution satellites serving the Asia-Pacific region. This led to Binariang Satellite Systems Sdn. Bhd. (renamed in 2003 to MEASAT Satellite Systems Sdn. Bhd.) to invest in the significantly larger MEASAT-3 and MEASAT-3a satellites to increase capacity on the MEASAT fleet by some 200% to 100 transponders:

	MEASAT-1 / 2	MEASAT-3	MEASAT-3a
Manufacturer	Boeing Satellite Systems International, Inc.	Boeing Satellite Systems International, Inc.	Orbital Sciences Corporation
Launch Vehicle	Ariane 44L	Proton Breeze M	Land Launch Zenit – 3SLB
Satellite Dimensions (HWL)	Spin Stabilized 2m diameter / 8m height	Tri-Axis Stabilized 7 x 7 x 28m	Tri-Axis Stabilized 7 x 4 x 21m
Launch Mass (Kg)	1395 Kg	4,757 Kg	2,440 kg
Power (watts)	1580	9370	3840.8
C-Band Transponders	M1: 12 / M2: 6	24	12
Ku-Band Transponders	M1: 4 / M2: 6	24	12

The MEASAT Fleet



MEASAT Network

Investments in the MEASAT-3 and MEASAT-3a satellites, which were launched in December 2006 and June 2009 respectively, allowed MEASAT to continue to meet the rapidly developing requirements of the local ICT industry. In particular, supporting:

- The distribution of the RTM and TV3 television channels from South East Asia (as provided by MEASAT-1) to a region which now includes embassies and broadcasters across 110 countries;
- The growth of the local telecommunications network including the GSM network (where our fleet today carries the communication links of almost 2000 base stations located too far away from the existing fibre network); corporate networks (connecting for example every gas station in the country to ensure supplies and reduce cost); and, broadband communication network to remote communities; and,
- The development of the Astro DTH platform which over the last few years has almost doubled its content; launched of a wide range of pay per view channels; and recently introduced its first High Definition (HD) bouquet of channels.

Able to reach over 110 countries, MEASAT-3 and MEASAT-3a have also allowed the continued expansion of MEASAT's regional business. The new satellites have allowed the company to support the launch of the Reliance DTH platform in India, making MEASAT the second foreign satellite operator to support PayTV operators in this vibrant new media market; and, expand the company's regional video distribution business which now distributes over 40 channels and 10 HD channels from international broadcasters such as Fox, National Geographic and AETN.

The challenges

During its journey from the initial idea in the early 1990's, to a fleet of four satellites across three orbital slots today, MEASAT has faced, and overcome, many challenges:

- Building required technical expertise: Operating in the harsh environment of space for periods of 12 or 15 years, the design, manufacture and operation of a satellite is, well, literally rocket science. At the same time, with our satellites supporting the core operations of most of our local ICT companies, including the nation's GSM networks, the distribution of RTM and TV3; and, the Astro DTH platform, ensuring error free operation is critical to our mission. This requires significant technical expertise and knowledge.

  The MEASAT technical team responsible for overseeing the MEASAT fleet was set up in the mid 1990's by Dr Ali Ebadi, our Senior Vice President of Space Systems Development, and has been managed ever since by En Azih Md Zin, Head of Satellite Engineering and Operations. With our entire engineering team recruited from local universities and companies, they have spent many years building knowledge and experience such that today they can rival any other group of satellite engineers in the region. In a rapidly developing industry, however, this investment in the technical expertise never stops.
- Ensuring a long term view: To launch a new satellite requires significant upfront investment – the launch of MEASAT-3, for example, cost almost RM1 billion. Having launched, the satellite, it can take seven to eight years to pay back the money invested, and up to 12 to 15 years to earn a return on the shareholders investment. During this period, the environment – defined in terms of technology, market requirements and regulation – is likely to change, impacting the original business case laid out for the investment. While operating within Malaysia -- with a world class regulatory regime that understands the need for stable and well planned regulatory environment that can be factored into our long term business plans – provides a degree of comfort on the regulatory side, MEASAT still faces significant technical and market risks.

The company has addressed these inherent industry risks through a continual focus on market diversification and satellite flexibility:

- Operating now across four continents and over 145 markets, and serving customers in the media, telecommunications and IP segments, MEASAT has been able to spread its market risk. As an example, while today the telecommunications markets across some South East

Asia countries is quite challenging, we are seeing – and tapping into -- significant growth in video services and in the African telecommunication markets.

- In addition to diversifying across customer segments and geographic markets, the company has been focused on making our satellites as flexible as possible so that they can continue to provide tailored communication services as the market adjusts. This has been done by providing clean communication links - with all processing, that will change over time, being done in the ground equipment – and by designing satellite capacity to be switched betweens beams (and hence markets) as the market develops.
- Highly Competitive Industry: While the industry globally is dominated by 3 or 4 major operators, the Asian market has over 20 different satellite operators competing for business. This has led to a highly competitive market, with some operators prepared to use predatory pricing at rates below the cost to secure revenue.
- To address this intense competitive environment, MEASAT has focused on customer segments where it believes that it can offer a more competitive solution than our competitors. In addition to focusing on the Malaysian market, where we believe we can better understand and better support customer's requirements, the company has focused on the international broadcast market where the power and reach of the new MEASAT-3 and MEASAT-3a satellites have been able to develop distinctive market positions.
- While seeing the value of competition is important for innovation and customer value, the company also lobbies to ensure that operators in a market are allowed to compete on a level playing field. This includes asking regulators to ensure that all operators face the same taxation regime, and that MEASAT has the same access to the home markets as they do to our market.

The Next Chapter

With four operational satellites, the MEASAT fleet now reaches customers in 145 countries - representing some 80% of the world's population -- across Asia, Africa, Eastern Europe and Australia. While a significant growth compared to the two satellites operated during the 1990's, in an industry where scale is important, the company needs to continue to build its fleet to be able to compete with many of the regional or international operators. We are looking at growth both locally and internationally:

- While core part of the Malaysian ICT industry, MEASAT is continuing to work with our customers and partners to see how we can better support local communication requirements. Of particular focus at this time is the country's broadband requirement. While MEASAT today is already is a key component of the local broadband network, through our support of 3G GSM and Broadband VSAT networks, the company is exploring ways in which our satellites (or others available in orbit) can more directly support the government targets through the use of DTH Broadband services.
- With the launch of MEASAT-3, and the de-commissioning of the MEASAT-1 satellite from operational service at 91.5E, MEASAT was able to relocate the MEASAT-1 spacecraft to the 46.0E orbital slot. Renamed AFRICASAT-1 the satellite now provides satellite coverage into the African region. While AFRICASAT-1 is a small part of the MEASAT fleet, it provides an initial foothold into a vibrant and rapidly expanding market which provides significant opportunity for future growth. This focus on international expansion, essential for the strength of the company, is also in line with government encouragement to create a breed of "Malaysian Champions": strong local companies expanding internationally to raise the profile of the country.

Given the heavy investment made over the last few years to launch MEASAT-3 and MEASAT-3a – a total of over RM1.6bn -- MEASAT is limited in its ability to finance new satellites by itself for the next few years. As a result, MEASAT is in discussions with a number of partners to allow the company to continue to expand the network. While requiring a different mindset, and providing certain challenges, working with partners to develop new satellites provide significant advantages in allowing the company to more rapidly expand the fleet in support of our local and international customers.

In addition to commercial activities looking to build the size and reach of the satellite fleet, MEASAT is also seeking ways to reach out more effectively in Malaysia to raise awareness and knowledge of satellite communications. While having always undertaken activities in this area -- hosting student tours of our operations and teleport facility in Cyberjaya; organising open days for the facility; and, supporting students through post graduate programmes -- the company is looking for ways to better support the Government and Local University education initiatives. With our industry requiring a long term perspective, focusing today on building the knowledge and expertise of the next generation of Malaysia's satellite leaders is essential to ensure the continued development of a critically important sector of the Malaysian telecommunications industry. my

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