

**The Diffusion Of Broadcast Satellite Technologies In Asia-Pacific**

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TECHNOLOGIES IN ASIA-PACIFIC**

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## The Diffusion of Broadcast Satellite Technologies in the Asia-Pacific Region

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### Background

1. From the inception of the geostationary satellite as a communications tool, its potential application for the Broadcasting Service was recognized. Regardless of terrain, the single retransmitter in the geostationary orbit could provide coverage of land or sea of approximately one third of the earth's surface.
2. Programme transmission for both Radio and Television Broadcasting Services is now widespread both nationally and internationally and extensive use of satellites for this purpose are in operation and further satellite space segment and ground segment facilities are planned for the Asia Pacific Region.
3. The application of satellites for point to multipoint programme transmission as an economical means of providing national TV programme to remote areas was pioneered in the region in India and Indonesia and has now become a widespread practice.
4. The application of Direct Broadcast Satellite (DBS) service has been slow to develop in the region, however a quasi DBS service has evolved in the region and elsewhere.
5. The paper explores the diffusion of satellite application in Asia and the Pacific at the present time and considers some likely trends for the future.

### The present Position

#### Television Programme Transmission

6. From its inception, geostationary orbit satellites were expensive and in particular the relatively high cost of launch predicated the need for relatively high capacity systems for economic application. In turn this large capacity, high capital-cost system required the agglomeration of high revenue earning services for economic customer utilization. From these basic economic parameters the early application of satellite communication technology evolved with :
  - A monopoly world wide system supply - Intelsat.
  - The agglomeration of service users through a single national carrier/signatory.
  - The concentration of services through single (or very few) very large earth stations.
  - The use of the system for high cost/high tariff international services.

7. In this technical and economic environment, the first application of satellite technology for broadcast purposes was the transmission of international "special event" television programme.
8. To this day the predominant use of satellite systems in the broadcast industry is international television programme distribution.
9. Notwithstanding the dramatic growth rate in communications of all types, the imminent suitability of satellite transmission for point to point and most importantly point to multipoint transmission of "special interest" and news television programmes has now reached the point where it is the largest category of Intelsat space segment in use.
10. All nations of the Asia and Pacific region now receive (and many transmit) international television programme from Intelsat and other satellite systems for re-broadcast.
11. The progressive decline in the real cost of satellite system use and in particular in Television Receive Only (TVRO) earth stations, together with the increase in use of this category of service, has now changed the economic parameters for the reception of international programme for most countries of the region. It is usually cheaper for the broadcasters to receive their programme direct with their own TVRO installations rather than to operate through a single national collection point, and there is a trend throughout the region for the broadcasting authorities to establish these TVRO antenna at, or in close proximity to, their main television studio facilities.
12. At a national level, some larger developed and developing countries were quick to realize the advantage of national satellite systems to provide national coverage.
13. Following the same pattern of historic cost trends as applied in the international service, the national application of satellites has been through agglomeration of services, and for broadcasting has been most widely applied to the point to multipoint distribution of programme.
14. For the developed countries of the region, Australia and Japan, there has been a large enough agglomerated demand to viably operate their own national satellite systems. For the very large developing countries with special socio economic problems, viz. Indonesia, India, China there has also been sufficient agglomerated demand to justify their own national systems. For the remainder, the necessary economies of scale of utilization is being achieved at the present time by negotiating and leasing space segment either from Intelsat or from suitably foot printed neighbouring national/regional systems.
15. At the present time most countries of the region are now using satellite systems for point to point or point to multipoint national television programme transmission.

## Television Direct Broadcast Satellite Service

16. In any discussion of direct broadcasting it is desirable to first define what we mean by a broadcasting services as there are unfortunately widespread differences in international, national and legal meanings and applications of the term. The International Telecommunication Union (I.T.U.) Radio Regulations, Article 1, no. 36, 3.17 defines a "Broadcasting Service" as a "Radio Communication Service in which the transmissions are intended for direct reception by the general public. This service may include sound transmission, television transmission or other types of transmissions". Under Article 1 no. 37, 3.18 the term "Broadcasting Satellite Service" is defined as a "Radio Communication Service in which signals transmitted or retransmitted by space stations are intended for direct reception by the general public. In the broadcasting satellite service the term direct reception shall encompass both individual reception and community reception".
17. To avoid confusion in this paper, I will refer to "true" DBS or "high power" DBS which is that satellite DBS service which is in the purpose planned allocation of the Ku band and I will refer to those individual public or small community systems which are currently widespread in the USA and elsewhere as "quasi" or "low power" DBS.
18. In the Asia and Pacific region, only the Japanese has an exclusive purposed built "true" DBS satellite in the Ku band. Japan with its relatively small coverage area and its large wealthy population, is clearly exceptional in the region in that it has the necessary demand size and wealth to economically justify a separate special purpose satellite broadcast system. It should be noted, however, that while the initial application of "true" DBS in Japan is for television broadcast, there are plans to expand the application in the future to a range of other broadcast services including high vision, PCM sound, data broadcasting, teletext, facsimile broadcasting, integrated services digital broadcasting (ISDB) etc. On this basis, it is easy to conceive the commercial justification in Japan for a separate "true" broadcasting satellite system which will accommodate all broadcasting communication services to the public.
19. Australia provides "true" DBS service on its Aussat system but unlike the Japanese model, the system is in the (uplink) 12.2 to 12.75 Ghz fixed and broadcast satellite band. This system finds widespread application for direct broadcast of television and sound to remote rural homestead customers and to small rural communities. The much smaller scale of the Australian economy and communication services as a whole mitigates against the viable provision of a separate exclusive "true" DBS satellite system.
20. While the remainder of the Asia Pacific region does not have "true", "high power" DBS television service to the public there is nevertheless widespread planned and unplanned "quasi" DBS.
21. With the widespread transmission of television programme on fixed service satellites, with the technological developments and high quantity demands for suitable C band and Ku band TVRO's, it is practicable for members of the public to receive television programme from satellite systems for approximately US \$ 2,000 for the TVRO plus the cost of suitable decoding equipment when applicable. Whilst the

largest percentage of satellite programme transmission is encrypted these days, this has only served to establish a very substantial market for decoding "black boxes" so that the numbers of unplanned DBS users continues to grow rapidly in the region. Clearly the reception of signals which are protected by Article 23 of the I.T.U. Radio Regulations and by National Law has important connotations for all of us regarding the privacy and protection of all fixed service satellite signals, and in particular in the context of this discussion the piracy of their material is harmful to broadcasters.

22. The pioneering work done in India and other countries in the world using planned "low power/quasi" DBS service to small communities with either single receiver community reception or low power re broadcast has become an economically attractive alternative to both "true" DBS or traditional terrestrial TV coverage.
23. With a single TVRO antenna costing of the order of US \$ 2,000 and a small low power (10 Watt) VHF or UHF retransmission and very basic studio costing approximately US \$ 30,000, it is clear that this is a very attractive solution where the number of viewers exceeds a very small number. For example, the unit cost of such a community system for 20 viewers would be only US \$ 1,600 compared with US \$ 2,000 each for an exclusive TVRO service.
24. The community TV satellite service has the additional important advantage to many countries of the region of permitting segments of local programme to be added to the national programme.

#### Radio Programme Transmission

25. The application of radio programme on the fixed satellite service has followed the same pattern historically as television programme transmission, and the international transmission of "high interest" and news radio programme via the FSS is now common place. Similarly the transmission of national radio programme is routine throughout the region wherever the channel cost via FSS's is cheaper than a terrestrial equivalent programme circuit.
26. A welcome development in more recent times is a growing trend for the international shortwave broadcast services to decentralize their HF transmitting operations and to use the FSS for their programme transmission to these lower powered shortwave retransmitters. In view of the congestion and interference within the HF broadcast band this development can only be commended.

#### Radio Direct Broadcast Satellite Service

27. The history of radio broadcasting to the public via satellite is somewhat different to that of television. The terrestrial alternative is relatively well established throughout the region and the cost structure of the existing service, particularly at the customer radio receiver end, is very much lower than could be provided at the present time using a satellite service.

28. To date, direct broadcast satellite radio service has therefore only been provided as an auxiliary service tacked on at marginal costs to television direct broadcast satellite service. Since only Australia and Japan have "true" DBS television service in the region, it follows that none of the other countries have a DBS radio service.
29. There are resource constraints and technical developments which together may induce change to this situation in the not too distant future and in particular in the field of shortwave radio services.

### Some Likely Future Trends

#### General

30. For point to point communication services wide band terrestrial technologies are continuously evolving to provide a cost advantage over satellite transmission. Higher production quantities with the continued rapid expansion of communications as a whole are expected to reduce the unit cost of production of optical fibre and wide band digital systems much faster than can be expected with the rate of cost reduction of satellite systems.
31. It can therefore be expected that fixed terrestrial systems will carry an increasing percentage of the point to point switched and non switched information flows in the future.
32. By contrast, the system comparative advantage of satellites for point to multipoint services which of course includes broadcasting services, is not only apparent now but is expected to continue into the future. The continued growth of international programme exchange, the rapid growth of television service in developing countries and the development and provision of new broadcast services (telefax, data etc.) are expected to provide an agglomerated broadcast demand load such that high capacity and more specialized broadcast specific satellites will be economically justified. This trend is already apparent in continental Europe and the United States and will undoubtedly follow in due course in the Asia Pacific Region.
33. The extent to which satellite systems will be international, regional or national will depend on many factors but the over-riding requirement will be for an adequately viable load factor to justify the particular satellite launch and operation.

#### DBS or not DBS

34. "True" DBS service has evolved in the present state of the art for three primary reasons.
  - i) Firstly, to differentiate it from demand driven fixed satellite communication services, recognizing the equal rights of all peoples of every nation to broadcast information. On this basis, spectrum has been set aside and a planning mechanism established and agreed by all nations to ensure equitable access to the limited geostationary orbit resource for this purpose.

- ii) Secondly, the frequency spectrum has been set aside from those services in which the respective carrier authorities hold an international and national legal responsibility to protect the security of the information carried to the customers paying for the services and from the public at large. In this respect, it is clearly much easier to implement safe guards against piracy of the non broadcast services, if broadcast services to the public at large by satellite are separated out in the frequency spectrum.
  - iii) Finally, the technology of the day requires higher EIRP for direct television services and there are sound engineering reasons why it is better from a frequency management/interference point of view to separate this service off from the FSS.
35. Reasons i) and ii) above retain their validity, however the technical evolution of TVRO equipment is being accelerated not only by the television broadcast industry demand, but also by the mobile and business data VSAT industries. These developments are bringing both the physical dimensions and the costs of TVRO antenna down. It is a mute point whether the current high power satellite technology with its greater space segment costs both directly in the satellite bus itself, and indirectly in the greater orbital spacing required, will be either necessary or justified in the future. It may be that with continued evolution of satellite technology and in particular satellite antennae, together with continued development and cost reduction of ground segment, that the DBS satellites of the future will retain their special IFRB character but without the need for greater spacing and the special coordination requirements of today.
36. From the customer perspective all current trends suggest that we can expect an increase in demand for satellite based community television service throughout the Asia Pacific Region.
37. If adequate coverage for the public is provided by this community satellite broadcast means, it is expected that the demand for individual direct broadcast service will not be strong in the developing economies of the region for some time into the future.
38. The expected trend will however be for multi purpose satellites as in the case of India, Indonesia, Australia and China and it is expected that it will be some considerable time before the other countries of the region invest in a DBS-specific satellite as Japan has done.

#### Direct Broadcast Satellite Radio Services

39. As previously discussed in this paper, the existing infrastructure and coverage of the broadcast radio service with huge economies of scale providing very cheap public radio receiver terminals, has provided a more cost effective service than could be provided by satellite.
40. Developments in the field of the land mobile satellite industry are however opening up the possibility of very small antennae and terminal systems which in large production quantities could find application in the radio broadcast industry.

41. Noting the very high cost of the separate components of the terrestrial cellular radio systems and the present and foreseeable future incompatibility of terrestrial systems, there is the distinct possibility of a substantial mobile service demand for such a wide area coverage satellite system to a uniform standard. The CCIR has been requested to initiate study group action on this technology.
42. The prospect of a significant demand for terminals leading to large scale production could bring unit cost down to a level where the public would be willing to buy the receivers for home broadcast reception.
43. For the broadcasters, the coverage provided by suitable satellites could provide a very attractive alternative to the increasingly costly and inconvenient shortwave service and for high quality national coverage. These developments however face strong competition from well developed, cost efficient, established broadcasting infrastructures and could not be expected to be in place in the near term future.

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