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AUSSAT MOBILE SATELLITE SERVICES

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ABSTRACT

Australia will be introducing a domestic mobile satellite communications service early in 1992 using L Band capacity on AUSSAT's second generation satellites. The mobile satellite services are targeted at rural and remote area users throughout Australia. The prime services to be provided are mobile voice and data for land, maritime and aeronautical applications.

This paper provides an overview of AUSSAT's planned mobile satellite system and describes the development program which is being undertaken to achieve the 1992 service date. Both business and technical aspects of the development program are addressed.

INTRODUCTION

In July 1988, AUSSAT Pty Ltd, Australia's satellite communications operator, will be contracting for the supply of two high capacity communications satellite that will form part of its second generation system. These new satellites, termed AUSSAT B1 and B2, will replace two of the A-series 'birds' currently in orbit that are due to be retired from service around December 1992 and June 1993.

The AUSSAT-B satellites will be substantially larger and more powerful than the current series, each carrying 15 high power Ku Band transponders for telecommunications and broadcasting service both in Australia and New Zealand. Additionally, each will carry a high power L Band communications payload for the provision of domestic land, air and coastal marine mobile applications, making Australia one of the first nations in the world to implement its own commercial domestic mobile satellite system.

AUSSAT AND ITS FIRST GENERATION SYSTEM

AUSSAT Pty Ltd is a commercial company established by the Australian Government to own and operate Australia's domestic satellite system. AUSSAT currently employs around 250 staff, the majority located at the head office in the Sydney CBD and the TT&C facilities and network control centre in the Sydney suburb of Belrose with the remaining staff in earth stations in each of the capital cities.

The first generation AUSSAT system comprises three Hughes built HS 376 communications satellites operating at Ku Band. Each satellite has fifteen transponders operating to a range of national and spot beams covering Australia with the third satellite also providing coverage of the South West Pacific region. The AUSSAT ground segment comprises AUSSAT owned Major City Earth Stations (MCES) in each of the capital cities as well a range of customer owned earth stations which provide fixed telecommunications and broadcasting services throughout Australia.

AUSSAT SECOND GENERATION

With the first of AUSSAT's current satellites due to run out of fuel in December 1992, planning is now well advanced for the second generation satellites (AUSSAT-B). The AUSSAT-B system has been designed to cater for the continuation of the existing services but with capacity for growth in the key market areas of television and radio, corporate voice and data, and offshore. As well a new market sector will be catered for, namely mobile services.

The mobile satellite market represents a major new business opportunity for AUSSAT on the next generation system, with prospective applications including two-way mobile voice and messaging services for land, aeronautical and maritime applications as well as remote low speed data collection for telemetry monitoring applications. The procurement timetable for the AUSSAT-B satellites, Table 1, will enable the introduction of the mobile satellite service during 1992.

Tender Evaluation	Dec 1987 - April 1988
Government Approval to Execute Contract	May - June 1988
Contract	July 1988
Likely Launch Dates	Mid 1991 - Mid 1992
Latest in service Date	4th Quarter 1992

Table 1. AUSSAT-B Procurement Timetable

AUSSAT MOBILE SATELLITE SYSTEM

The AUSSAT mobile system will comprise an L band package on-board each of the AUSSAT-B satellites and ground component of L Band mobile terminals, Ku Band base stations and a Ku Band control and monitoring centre (see Figure 1). L Band will be utilised for the mobile terminal to satellite communication links and Ku Band for the control and base stations to satellite links. No provision has been made in the system design for direct single hop L Band to L Band links in order to avoid unauthorised and uncontrolled access to the system. Hence all mobile to mobile communications will be with a double satellite hop via an intermediate base station. All access to the system will be under the control of a demand assignment network operated by AUSSAT.

The mobile satellite system has been designed to cater predominantly for those users of mobile communications who operate in the rural

and remote areas of the country outside the existing terrestrial communications infrastructure. The indicative services being catered for are mobile voice, both telephony and radio, mobile data including messaging, paging and position fixing as well as a range of fixed or transportable applications which become economically attractive when using an L Band satellite system. These include remote data collection, 'briefcase' communications, low cost rural telephony for applications such as School of the Air and transportable communications for short duration base camps such as in mining exploration or search and rescue.

AUSSAT MOBILE SATELLITE SYSTEM CONCEPT

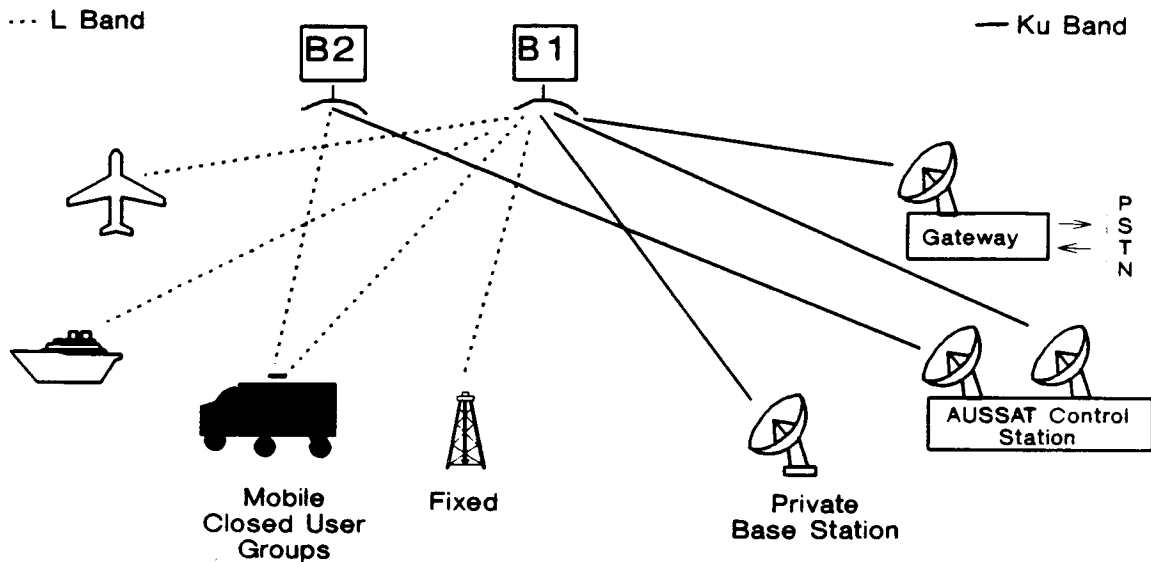


Figure 1. Mobile Satellite Configuration

MOBILE DEVELOPMENT PROGRAM

AUSSAT is undertaking an integrated business and technical development program for the mobile satellite services with the key aim of establishing a commercially viable mobile satellite service by early 1992.

Market Development

The market development program is being conducted in four phases:

- Phase I Strengths, Weaknesses, Opportunities & Threats
- Phase II Service and Segmentation
- Phase III Planning and Awareness
- Phase IV Specific Market Targetting

The first phase was carried out during the middle of 1986 at which stage the potential for mobile satellite services was proposed to the existing AUSSAT customer base as part of the planning for the overall

second generation system. This interactive process enabled a set of generic products and services to be postulated for the Australian marketplace which could later be analysed on their own merits in terms of commercial viability and attractiveness to AUSSAT. The culmination of this initial customer contact and supporting research and analysis was the decision by AUSSAT to undertake a formal investigation of the potential for Mobile Satellite Services as a future AUSSAT business.

The second phase which commenced in late 1986, consisted of a market study; model development and data analysis; revenue and growth projections; and competitive and sensitivity analyses. The market study was multi-faceted being aimed at assessing the market reaction to the features and benefits of the proposed new services as well as establishing estimates for the level of traffic and the total market demand for each of the service types. The market sectors targeted consisted of:

- the transport sector (road, rail, sea & air)
- the exploration sector
- the Government and emergency services sector.

The projected demand derived from this phase of the market research estimated in the order of 20,000 terminals within the first five years of service with around 50,000 in the eight to ten year period. The output of the second phase was a detailed business case which formed the basis of a decision by the Company during the second quarter of 1987 to include the L Band package in the second generation satellite design.

The third phase included a detailed market awareness program conducted by AUSSAT which provided the potential user organisations with sufficient detail to allow them to incorporate the mobile satellite products within their own planning cycles and to enable them to address the possibility of using these products and services. At this stage, AUSSAT also sought detailed information from the potential users in order to earmark those organisations who would be suitable for follow-on contact with AUSSAT either as a part of the customer consultancy program of phase IV or those who were potential business or joint venture partners with AUSSAT.

The fourth phase, which is currently in progress, has started with application consultancies involving a number of specific potential users. The aim of this work is to extract product and functional requirement information from the marketplace to feed back into the technical development program. In addition we are seeking commercial detail which will allow detailed viability analyses to be performed on specific products and services. Each service will be required to be self-sufficient in a business sense and in conducting the applications consultancies AUSSAT will ensure that the likes of tariff levels, functionality and user friendliness of the services will be in accordance with the market place demands. Another output from this phase will be a number of specific customer business cases which will be fed back into each of the organisations to provide a framework for them to proceed with the business planning and analysis of the mobile satellite services within their own organisations. These business cases will be developed by AUSSAT for the users from the users' perspective.

Business Development

As well as the market development activities AUSSAT is undertaking to establish a number of relationships with key organisations in the mobile satellite area. These include co-operation with potential joint service providers and joint ventures with organisations who can bring to AUSSAT guaranteed markets or other valuable assets such as market credibility, distribution channels and service capability in the provision of mobile satellite services to the marketplace. AUSSAT is also pursuing a strategy which includes establishing relationships and with other major organisations in the Australian telecommunications environment in order to insulate AUSSAT's projected market from erosion by competitors and competing products and services.

Technical Development

The key aim of the technical development program is to provide the technical infrastructure to enable the introduction of AUSSAT's mobile satellite service by early 1992. This includes outfitting the hub monitoring and control station, providing connection to public and private terrestrial networks and ensuring that the L Band terminals are available to the marketplace at acceptable costs. A supporting aim is to ensure that the AUSSAT Mobile Satellite System is as compatible as possible with other systems to be implemented throughout the world.

The major milestones of the program are summarised in Table 2.

July 1988	- Release of Draft Terminal & Network Control Specifications
July 1989	- Release of RFT for Hub Network Control Station
	- Release of RFT for 500 - 1,000 L Band Terminals
	- Release of Terminal & Base Station Specifications
January 1990	- Award Contract for Hub and Terminal Supply
January 1992	- Service Commencement Date

Table 2. Major Development Milestones

Experimental Program

The launch and deployment of the Japanese experimental satellite ETS-V has given AUSSAT a unique opportunity to undertake a practical experimental program to support the development of the mobile satellite services. The ETS-V satellite, which operates at L Band, has a beam that is centred near New Guinea which provides around 32-35 dBW of usable EIRP across Australia. AUSSAT earlier this year established an agreement with the Radio Research Laboratories, RRL, of Japan's Ministry for Posts & Telecommunications for the use of ETS-V within Australia.

AUSSAT is outfitting a hub station and a van both with communications, test and monitoring equipment to enable a range of tests to be undertaken. These include a series of propagation studies to evaluate the effects of multipath and fading within the Australian environment and a range of terminal prototype equipment tests. A number of parties have already committed equipment to the test program to enable the review of items such as antenna performance, voice encoding capability and digital and analog modems. AUSSAT is actively encouraging equipment and system providers to join in the test program using ETS-V.

Industry Liaison

Early in October 1987 AUSSAT released a worldwide call for registration of interest to all parties who may wish to participate in the development of the ground segment equipment for AUSSAT's Mobile Satellite Service. The aim of this exercise was to establish a mailing list of all interested parties, currently around 150 organisations, to whom AUSSAT would provide regular updates of the system technical progress. As well AUSSAT has distributed the list of all parties and their areas of interest in an attempt to encourage relationships and possible joint ventures in the development of the terminal products. This mechanism has been used previously by AUSSAT and is seen as an ideal means for the transfer of technology and ideas between parties aiming to achieve a common goal.

AUSSAT conducted during March 1988 a briefing for industry at which the Mobile Development Program was outlined in detail. As well a number of Australian Government representatives provided detail of the support and incentives provided to organisations wishing to manufacture and develop products for the Australian market.

CONCLUSIONS

The introduction of mobile satellite services to the Australian marketplace is an exciting new business venture for AUSSAT, Australia's national satellite operator, and is being implemented through a carefully co-ordinated business and technical development program. The potential system users have been consulted extensively in the development of the system features in order to ensure that the final mobile service offering meets the demands and requirements of the marketplace. The technical development activities have focused on close liaison with the equipment suppliers in both the testing and conceptual areas in order to ensure that the available equipment meets the needs of both AUSSAT and its customers.