

A note from the MSAT Program Manager

Since our last newsletter there's been a great deal of activity within the MSAT Program. This issue is designed to bring readers up-to-date with many of those activities and to advise them of some of the new directions which MSAT is taking.

The program passed a major milestone in May 1986 when former DOC Minister Marcel Masse announced federal Cabinet approval of a funding package that will lead to the implementation of a commercial mobile satellite (MSAT) system. He said that the Government was committing up to \$176 million over the next decade to

support this industry-led venture, one of the largest components of the Canadian Space Program.

Telesat Canada, the company which operates Canada's domestic satellite network, will invest over \$300 million in the space and earth segments which it will own and operate as a commercial venture. In addition, the federal government will allocate another \$45 million for technology and product development support, and to sponsor service trials for the program.

The Government will also enter into a service contract with Telesat to lease satellite space for government communications. The lease fees, valued at up to \$126 million, will be paid in installments over a five-year period beginning in the early 1990s.

On the spectrum front

A number of meetings were held between officials of the Department of Communications (DOC) and the U.S. Federal Communications Commission (FCC) early in 1986 on the allocation of frequencies in the United States in the 800 MHz band for MSAT. On July 24, 1986, the FCC announced its domestic spectrum allocations in that band. Canada objected that these did not comply with the 1982 Canada-U.S. agreement and, accordingly, were not satisfactory.

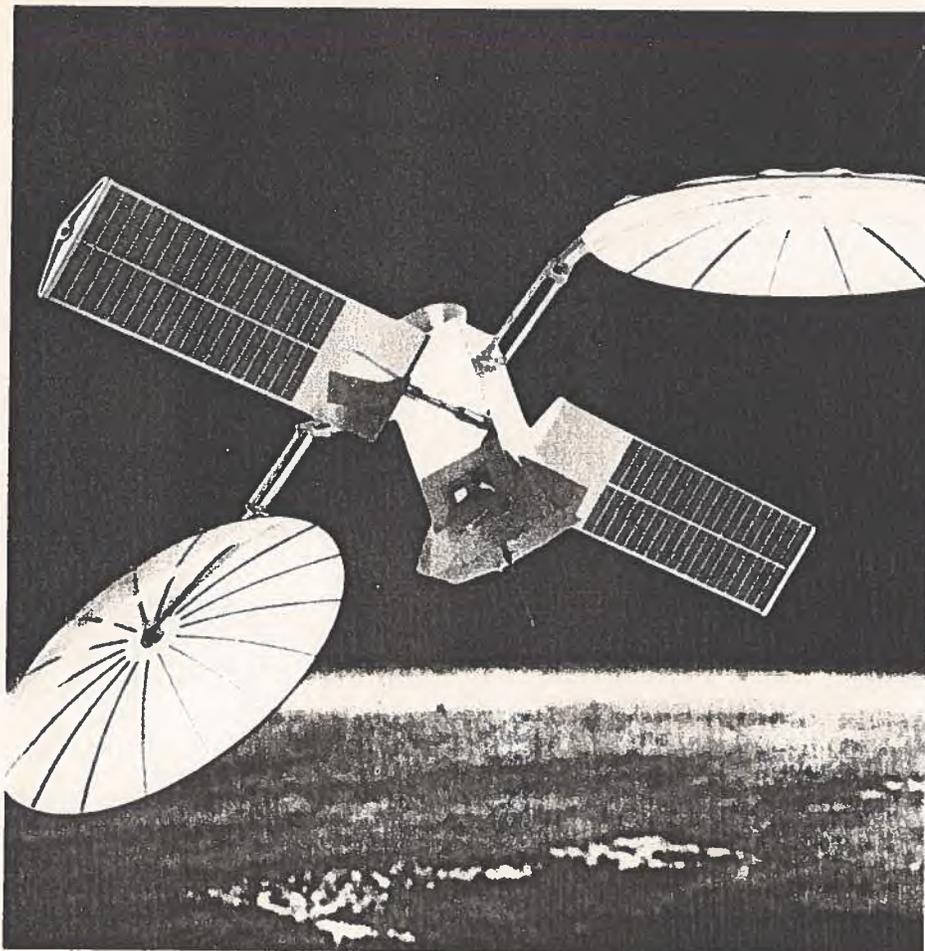
Before Canada and the United States can proceed with these allocations, however, they must be ratified at the Mobile World Administrative Radio Conference (WARC-MOB-87) in Geneva this fall. Telesat has examined the technical and economic feasibility of proceeding with MSAT in L-Band and, while there are certain disadvantages at L-Band compared with UHF, the returns and associated risks proved to be acceptable to them.

In April 1987, DOC announced a new domestic allocation of spectrum L-Band for MSAT mobile satellite services between 1530 MHz and 1660.5 MHz. The Department is at present promoting these allocations with the United States and other countries in preparation for WARC-MOB-87.

Mexico and a number of South American countries have already been visited by a delegation composed of DOC and Telesat officials. As a result of these discussions and other co-operative efforts with the United States, the Department and Telesat are hopeful that a sufficient allocation of spectrum in L-Band for MSAT will be agreed upon, and that the service will be introduced in 1992.

Government commitment

DOC Minister Flora MacDonald reaffirmed the Government's commitment to MSAT at a luncheon for the Canadian Satellite User Conference in May 1987. She said that the development of an overall communications and information technology strategy was one of her main priorities.



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Department of Communications Minister, Flora MacDonald speaking to delegates at the Satellite User Conference in May 1987.

Miss MacDonald said that the key to such a strategy would be government-industry co-operation, one good example of which is MSAT. "Thus the Government is today stating its intention to take the necessary measures to foster the development of this service and to ensure its commercial success."

The Minister announced the telecommunications and regulatory policy for MSAT at the same time. She said that DOC's radio and licensing policy would place no limitation on the types of mobile radio services to be provided and would allow for the transmission or receipt of voice and data signals to and from any point inside or outside Canada.

"The Department recognizes the need for appropriate technical and operating standards to ensure optimal system integrity, and will require, as a condition of licence, that end-user service and private system operators adhere to such standards," Miss MacDonald said.

In support of the government's policy to minimize regulation where the goals of regulation can be attained by other means, the Minister said she would introduce legislation permitting

the Government to issue policy directions to the CRTC. She said that it was important from a subscriber's point of view to ensure that the service was initiated. To this end, one of the key aspects of an appropriate regulatory regime will be to ensure that Telesat can earn a sufficient return to permit it to attract the upfront financing required to implement the commercial service.

Resolution

It is anticipated that the spectrum issue will be resolved in late 1987 and that a U.S. operator for the service will be licensed by the FCC at that time. Telesat and the U.S. operator would then finalize the system's specifications and the operating arrangements between the two countries. In addition, the final spectrum-sharing arrangements between the two countries would be co-ordinated and Telesat would proceed to raise the necessary financing and begin preparing a Request for Proposal (RFP) for the spacecraft.

In the interim, Telesat and DOC are introducing a pilot service using leased facilities from INMARSAT. Telesat issued an RFP for the Hub and Mobile terminals in July 1987. □

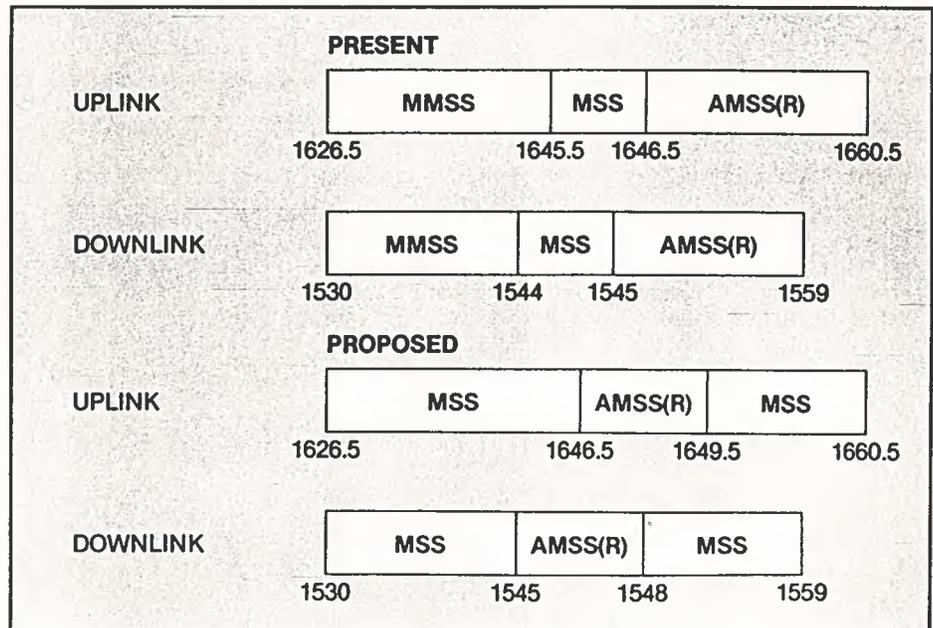
Editor's note

Demetre Athanassiadis has replaced P.M. Boudreau as MSAT Program Manager. Should you have any questions relating to the overall program or specific questions regarding spectrum allocation, please contact Demetre Athanassiadis at (613) 990-4111. □

International spectrum allocations for MSAT

The fate of L-Band spectrum for MSAT will be decided at the Mobile World Administrative Conference (WARC-MOB-87) in Geneva between September 13 and October 16, 1987. Canada's delegation to this conference has been augmented by DOC and private sector experts on MSAT to ensure the best possible Canadian representation.

Spectrum allocation



MSS - Mobile Satellite Service
 MMSS - Maritime Mobile Satellite Service
 AMSS(R) - Aeronautical Mobile Satellite Service (Route)

Frequencies in L-Band are at present allocated internationally to both the Maritime Mobile Satellite Service (MMSS) and the Aeronautical Mobile Satellite (R) Service (AMSS (R)).

Some countries prefer that these allocations remain unchanged. Others, particularly West European countries, are proposing that aeronautical public correspondence be allowed to operate in the aeronautical band on a secondary basis. In addition, they advocate that slow speed data for land applications be allowed in the maritime band, similarly on a secondary basis.

Canada's position, as submitted to WARC-MOB-87 (see diagram on facing page), is that both the Maritime and Aeronautical Mobile Satellite (R) bands should be allocated to a more generalized Mobile Satellite Service (MSS) which includes maritime, air and land mobiles, on a primary basis. A narrow band of 3+3 MHz, which would remain the exclusive use of AMSS (R), is exempted.

Canada also suggests that safety and emergency communications be further safeguarded through real time priority on a pre-emptive basis in the MSS bands.

Similar views are held by a number of other countries, most notably the United States, Japan and Australia. The following discussion analyses the respective merits of the different positions and draws certain conclusions.

It makes sense to change the existing allocation now

Those countries who believe that maritime and aeronautical mobile satellite allocations should remain unchanged fear that:

- there may not be enough spectrum to satisfy all needs, and
- safety communications would take second place behind other more commercially attractive applications.

Canada's position is that such fears are unfounded for the following reasons:

- Existing satellite technology makes it possible for the available spectrum to be reused 10-15 times around the world. To support this claim, Canada will present a paper at WARC-MOB-87 on how this can

be achieved through the systematic use of existing spot beam satellite antenna technology. This would benefit satellite technology in the same way that carrier systems and the emerging fibre optic systems have benefited land communications. A cable that was once thought capable of carrying only a single conversation can now carry hundreds or even thousands of simultaneous messages. In a similar fashion, spot beams will allow the repeated use of the spectrum many times over without interference.

- Access priority with real time pre-emptions ensure that those users belonging to the priority service will be served immediately, even if it means dropping the existing connection of a lower priority user.

Spot beam technology and priority service access are important elements of the Canadian proposal, and would guarantee that aeronautical safety and all other high-priority needs are served both adequately and reliably.

What is more important: Commercial interests or essential user needs?

Aeronautical public correspondence and digital land mobile service are generally accepted worldwide as two

services with strong commercial demand. They are, therefore, expected to be very profitable for satellite operators.

Although profitability is an important element in the commercial viability of existing and emerging mobile satellite systems, Canada does not believe that this is sufficient reason for these two services to be the only new ones permitted to operate in the spectrum under consideration. Many nations, Canada included, suffer from an inability to provide adequate basic communications to a sizable portion of their population who live in remote or less developed areas.

Land mobile satellite voice communications can offer to these people essential communications with the rest of the country. Essential communications are defined as those communications necessary in the event of medical emergencies or other disasters, law encroachment and other situations requiring immediate action.

The issues beg the question, "What is more important?" Is it the ability to place business calls while in the air or the ability to provide essential communications access to those who are isolated and, in many cases, helpless? ▸



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Canada's position is that the last is by far the most important, and that the ability to serve land mobile voice applications in the spectrum under consideration is needed.

The alternatives

Canada believes that adoption of the West European proposals would refuse essential voice telecommunications access to those land mobile users who need it the most. By contrast, the Canadian proposal calling for a generalized allocation for a generic MSS serving land, marine and aeronautical terminals will ensure that:

- aeronautical safety and other such essential needs will not only receive priority but will also be made possible earlier, due to the commercial viability of integrated MSS systems, and
- aeronautical public correspondence and digital land mobile services will be readily implemented.

International systems such as INMARSAT would benefit from a greatly expanded market opportunity. Other countries or regions would have the option of developing their own regional or domestic systems. Those not prepared to implement such systems immediately may easily do so at a later date because the proposed spot beam technology constrains satellite use to a specific area and permits spectrum re-use many times over.

If the Canadian position were adopted it would benefit most of the parties involved. However, the Canadian delegation does not expect to have an easy time at WARC-MOB-87. During the past year, INMARSAT has promoted a very successful campaign aimed at frustrating efforts for a North American Mobile Satellite Service. Although it is clear that INMARSAT's ultimate aim is to ensure a monopoly of MSS, a number of nations appear hesitant to endorse sweeping changes to the existing allocations.

The outcome of WARC-MOB-87 will thus be of great significance to Canada. □

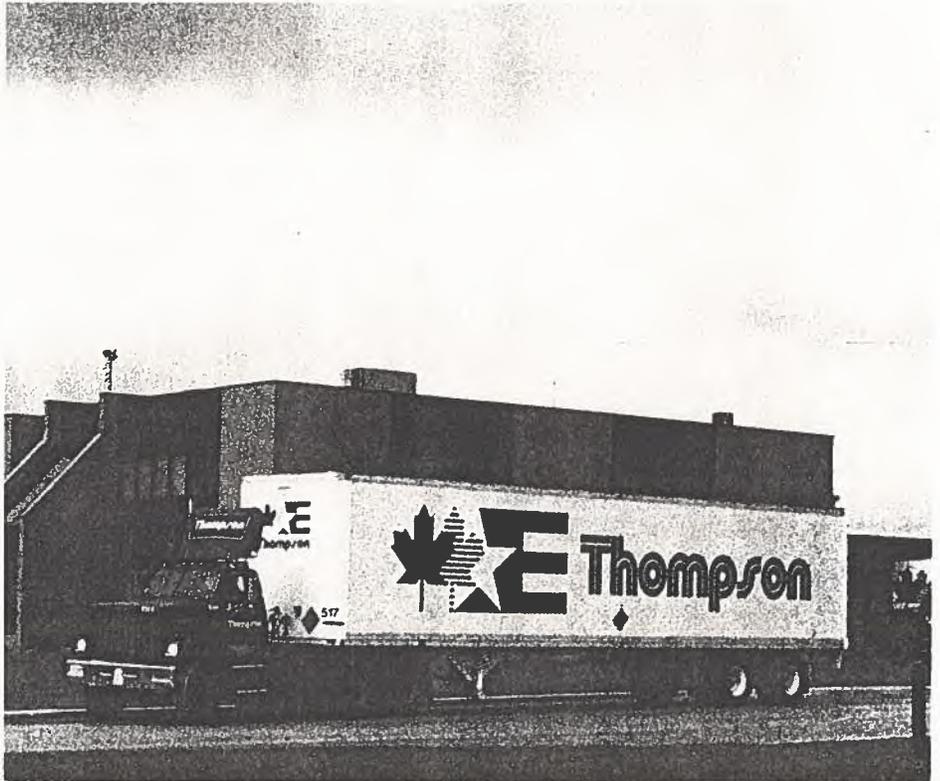
Telesat making progress with MSAT

Telesat Canada and the Department of Communications signed a joint endeavour agreement in February 1987 for co-operation on the MSAT program. The signing followed the federal government's approval in May 1986 of \$176 million in funding for MSAT. The agreement outlines principles governing the lease of MSAT capacity to federal government departments and agencies.

In addition to a commitment to use the MSAT system to meet government communications needs, the federal government will also support development of spacecraft and ground station hardware and communications trials for early adopters of MSAT services.

Encouraged by the government's support, and in an endeavour to meet immediate demands for mobile satellite services, Telesat Canada is implementing a small portfolio of services using interim-leased L-Band facilities. Applications include a fleet management information system (trademarked FLEET*STAR) for the transportation industry, voice services to Ontario Air Ambulance, and a ship tracking and two-way message service (trademarked MARINE*STAR) for the east coast fishing industry.

A Request-for-Proposal (RFP) document for the fleet and mobile terminals was sent to interested manufacturers in July 1987. A contract will be awarded later this year which will allow the technical and market trials of these services to begin by the end of 1988.



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Upon successful completion of the trials, Telesat will offer FLEET*STAR and MARINE*STAR as pre-operational commercial services. Telesat is at present working on this trial system with a group of trucking companies, the Ontario Ministry of Transportation and Communications, several aviation companies and the east coast fishing industry.

In July 1986, the FCC decided to promote the development of MSS at L-Band instead of the originally proposed UHF band. Although this caused Telesat to baseline L-Band in the proposed Canadian MSAT system, the original concept remains unchanged. It is still based on the Canada-U.S. co-operative approach whereby each party will back-up the other for service reliability and continuity.

Co-ordination with the major U.S. applicants is progressing as planned. It is expected that a U.S. operator will be appointed by the spring of 1988 and a common design agreed upon shortly thereafter.

Telesat has revised its original business plan to reflect the new L-Band system design. This plan will be presented to potential investors this fall to secure the necessary financing.

Additional information on Telesat's activities with MSAT may be obtained by contacting David Sward or Matt Lok at (613) 746-5920. □

Plans for MSAT trials moving forward

To cope with increased pressure for an MSAT trials program from potential users, the MSAT Program Office has replaced the post-launch communications plan with a new communications trials plan. This new plan covers a wider scope of trials, both prior to and after the launch of an MSAT spacecraft.

Although progress on the MSAT project has been delayed by international co-ordination and frequency allocation issues, arrangements are going ahead for Telesat to lease dedicated service on MARECS B2, an INMARSAT spacecraft over the Atlantic Ocean. If these lease plans are successful, DOC will offer a mobile satellite communications trials package prior to the launch of MSAT.

Trials may be offered for users with digital terminals similar to those installed in some police cruisers and taxi cabs. Short messages and status (including, in some instances, automatic location information) will be sent to and from the mobile vehicles to a digital data terminal at the customer's main location.

The look angle of the MARECS B satellite over North America limits coverage to points east of the line between Thunder Bay and Fort Severn on Hudson Bay. On the other hand, the INMARSAT spacecraft at present over the Pacific provides only limited coverage over the coastal strip of British Columbia. For this reason it is not currently being considered for the purposes of the trials.

Information pertaining to schedules, eligibility for trials, message lengths, etc., will be made available in the near future. It is expected, however, that a simple antenna will be sufficient for MSAT data traffic.

Air ambulance

A number of recent press reports have provided information on an Ontario Air Ambulance Satellite Communications Trial. This is a technical and service trial of a very specialized nature. Voice communications between an air ambulance operating in Northern Ontario and a corresponding hospital location are planned. The first phase of the technical trials took place between June and August 1987. The characteristics of the communications link were established, and in particular the fading and multipath effects of satellite signals with a low look angle were analyzed.

These tests were carried out by researchers at the Communications Research Centre (CRC) at Shirley's Bay, Ottawa with the full co-operation of Teleglobe Canada and INMARSAT. A formal lease arrangement with Teleglobe and INMARSAT is being negotiated by Telesat to ensure that true-situation experimentation can begin soon after the completion of technical trials. It is expected that this will result in the use of the satellite channel by the Ontario Ministry of Health on a routine basis for air ambulance service.

Benefits of MSAT communications link

It is the intention of DOC to seek and obtain the partial use of an INMARSAT channel, such as the emergency air ambulance channel, for specific demonstrations on a secondary and limited use basis. Such demonstrations would provide potential MSAT users with an indication of the ease, convenience and sound quality of a mobile satellite communications link. Voice trials, or demonstrations, would be offered to potential MSAT users in the summer of 1988. ▶

In addition, these trials could include the use of MSAT voice terminals in vehicles. An electronically steered antenna mounted on the vehicle's roof under a radome the size of an upturned wash basin is required to gain access to the satellite without undue drain on the mobile vehicle's battery. This antenna, developed by CRC engineers, underwent considerable field testing in Canada and the United States in 1986 and 1987.

Although, as mentioned earlier, usage will be limited, some trials can be located near the satellite's beam limits. Users outside the specific operating area could use their mobile terminals temporarily in those regions where coverage is available. Further information will be made available after a detailed analysis of the air ambulance technical trials has been completed.

Negotiations between Telesat Canada and Teleglobe Canada for access to satellite channels for voice and digital packet radio will be completed shortly. In-depth studies for specific services are either completed or under way and the remaining ground station hardware not at present in production is currently being developed.

Further information may be obtained from Hugh Reekie at (613) 990-4099. □

MSAT opportunities for Canadian industry

When Cabinet approval of the federal Long Term Space Plan was announced in May 1986, \$25 million in developmental funds for MSAT was included. The Department of Regional Industrial Expansion (DRIE) was authorized to ensure that appropriate funding was committed to the project to encourage and stimulate the development of the Canadian space industry sector.

DOC and DRIE are at present finalizing an interdepartmental Letter of Agreement (LOA) to establish their roles, responsibilities and working arrangements and also to improve the fund allocation approval process to Canadian industry. Approval of the LOA by the two responsible Cabinet Ministers is expected in September-October, 1987.

The LOA proposes that applications received from industry be evaluated for suitability and that the level of funding would be determined prior to the release of funds. The assessment process will be influenced not only by the degree to which an application or proposal meets MSAT requirements, but also in the wider context of its benefits to Canadian space industry and to associated regional development activities.

Since the beginning of FY 1986/87, two components of the program have been funded from within the DRIE Defence Industry Productivity Program (DIPP). The first component was the MSAT earth station technology and product development program to which \$11.5 million has been allocated. The balance has been allocated to those industries which support the spacecraft portion of the program.

The space segment

The space segment is being directed by Spar Aerospace Ltd. in Ste. Anne de Bellevue, Quebec, the prime contractor for satellites in Canada. Spar Aerospace has a mandate to develop Canadian subcontractor suppliers, and briefings have already taken place in many Canadian cities. Although a number of areas require space segment support, the capability to produce good reliable equipment to commercial standards is all that is needed.

The ground segment

The ground segment area probably affords the best opportunity for the small to medium-size company. There are requirements for the design and supply of several different types of equipment ranging from small data terminals, mobile voice radios, data collection platforms and antennas, to the main gateway and control stations. There are also opportunities to supply sub-assemblies to the original equipment manufacturing market. This should be of particular interest to small specialty manufacturers.

Developments in the services provisioning area should also offer many opportunities — opportunities for service providers, equipment dealers, suppliers, installers, repair depots, etc. □

New publication

In March 1987 the MSAT Project Office issued a report entitled "MSAT Ground Segment: An Industry Strategy Paper". It is intended to provide industry with a better understanding of the contribution it can make to the MSAT ground segment program. Copies can be obtained from Alan Maclatchy at (613) 998-0007. □

If you are interested in becoming a part of this new technology, please contact either Joe McNally at (613) 998-0008 at DOC, or Jacques Boulakia at (613) 954-3266 at DRIE.

Anyone interested in the space segment area should contact Chris Morgan at Spar Aerospace in Ste. Anne de Bellevue at (514) 457-2150. □