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MOBILE SATELLITE SERVICES: INTERNATIONAL CO-ORDINATION, CO-OPERATION AND COMPETITION

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INTRODUCTION

My remarks on international co-ordination, co-operation and competition in the mobile satellite services are based on the following assumptions:

First, there will be more than one civil mobile satellite system in the 1990s.

Second, competition between these separate mobile satellite systems is inevitable. No system should, however, enjoy monopoly protection or subsidies.

Third, since the available L-band spectrum is in short supply and given the peculiar technical characteristics of the mobile satellite services, coordination and cooperation are desirable and necessary.

COORDINATION

The IFRB has so far been notified of L-band networks planned by Australia, Canada, France, INMARSAT, Japan, Papua-New Guinea, the US and the USSR. Additional L-band networks are likely to be notified.[1]

INMARSAT has so far sought only the lower 3 MHz of the aeronautical mobile satellite service band, but it may well seek to cover the full 14 MHz of the aeronautical and land mobile satellite bands (i.e., 1545-1559 MHz and 1646.5-1660.5 MHz) in its third generation satellites.

INMARSAT's assessments indicate the potential for unacceptable levels of interference between the networks already notified. Consequently, we have begun or will soon begin coordination with these networks. (We also need to coordinate our feeder links with several other fixed satellite service networks.)

Coordination of L-band networks is necessary because, as the FCC put it, "existing and incipient technology does not allow discrimination between two or more MSS systems operating on the same frequencies".[2] Others have recognized that "intersatellite interference has become a serious concern"[3] and that "it would be extremely difficult to obtain adequate isolation ... even at orbital separations of 30 degrees or more."[4] Unless operational arrangements can be worked out, it appears to me that the only solution is to share the available spectrum.[5]

It would be easier to co-ordinate the various L-band networks and to share the limited spectrum available if significant frequency reuse could be achieved. In reality, the degree of frequency reuse appears minimal at this stage. The American Mobile Satellite Consortium (AMSC)

in its 1 February 1988 filing to the FCC envisages a frequency reuse factor of only 1.5.

Clearly, more L-band spectrum is needed. WARC-MOB-87 recommended that another WARC be convened not later than 1992 to provide more spectrum for the mobile satellite services.[6] It also invited the CCIR to study as a matter of urgency the spectrum requirements and inter-system and intra-system sharing aspects of the mobile-satellite systems.

For its part, WARC-ORB-88 was asked to consider the particular characteristics of the mobile satellite services when dealing with procedures for coordination and notification[7] and to take note of the concerns expressed with respect to feeder links for the mobile satellite services in the L-band.[8]

WARC-ORB-88 takes place for six weeks starting in August 1988. The first session of the WARC-ORB held in 1985 adopted a report containing the planning principles and methods recommended for use by the second session, as well as inter-service sharing considerations and recommendations regarding feeder links.

The second session will revise or establish new regulatory provisions for implementation of a dual planning approach for the fixed-satellite service. Regulatory provisions will also be adopted to meet improved planning and co-ordination requirements for other services in order to meet the needs of all ITU members.

INMARSAT provided a contribution to the Joint Interim Working Party (JIWP) of the CCIR which met in December to prepare a Technical Report to WARC-ORB-88. The INMARSAT contribution, which forms part of the Technical Report, addresses the unique aspects of mobile-satellite systems and the technical incompatibility of feeder links in a mobile satellite environment with the concept and requirements of allotment planning.

The Technical Report also recommends changes in the criteria used to determine whether there is a need to coordinate.

INMARSAT supports the view that the unique aspects of multi-administration networks should be considered in the development of future intersystem coordination procedures.

Those planning or operating networks requiring co-ordination must show good faith in trying to resolve the technical difficulties. If they cannot successfully coordinate, the IFRB will try to facilitate an agreement between the parties.

COOPERATION

Cooperation between mobile satellite systems can take many forms. For example, INMARSAT has frequently granted free use of its system for tests and demonstrations by other organizations, some of whom are potential competitors.

Today, however, I would like to focus on cooperation in setting standards for mobile earth stations. The benefits of common standards are well known. Users can roam anywhere and still use the same equipment. Manufacturers benefit from the economies of scale inherent in mass production, which means users buy equipment of lower cost than would be the case if manufacturers are producing smaller volumes to meet several different standards. The need to drive down the cost of equipment is especially important when there are doubts about the size of the market and how quickly it can be penetrated. When considering

standards, we should remember the saying "United we stand, divided we fall."

Happily, I note from its filing that the AMSC is "committed to ensuring that the system will be interoperable with other satellites in a worldwide network to serve aviation"[9] and that, like INMARSAT, it plans to adopt the system architecture defined by ICAO for AMSS(R) services.

In addition to ICAO and the AEEC which are setting global standards for aeronautical satellite communications, the CCIR and CCITT play important roles in setting world-wide standards.

The Plenary Assembly of each committee draws up a list of technical "Questions", which are entrusted to a number of Study Groups, composed of experts from different countries. The Study Groups draft and revise Recommendations which are submitted to the next Plenary Assembly for ratification. CCIR and CCITT Recommendations have an important influence on telecommunication administrations and companies, manufacturers and designers of equipment throughout the world.

Although the activities of the CCIR and CCITT are nominally quite distinct, the one concerned with radio, the other with telephony, telegraphy and data communications, it is worth noting that both are studying various aspects of mobile as well as fixed communications. It is no coincidence that both the mobile and fixed networks are developing independently towards a scheme of universal personal telecommunications.

INMARSAT has been an active participant in several CCIR and CCITT Study Groups concerned with mobile communications or whose work affects the setting of mobile standards. The main CCIR Study Group of interest to us is Study Group 8, which has two Interim Working Parties, 8/7 and 8/13, dealing directly with mobile satellite issues.

IWP 8/7, which met last in Tokyo in May 1987, has been considering the technical and operating characteristics of the maritime mobile satellite service. It has also discussed aeronautical satellite communications issues and if it continues after the Study Group 8 Interim Meeting (20 Apr to 6 May 1988), its terms of reference could be broadened to include aeronautical and perhaps also land mobile satellite services.

At its last meeting, IWP 8/7 revised Report 509 on modulation and coding techniques for mobile satellite communications services. It also drafted a new Question on the impact of ISDN and public data networks on the technical characteristics of the future Mobile-Satellite Systems.

IWP 8/13 is studying the requirements for Future Public Land Mobile Telecommunication Systems (FPLMTS), draft recommendations on which are to be presented to the Interim CCIR meeting which concludes on 6 May. The FPLMTS would provide a system architecture which would allow anyone to communicate wherever in the world they may be. The FPLMTS would accommodate a variety of mobile terminals, from pocket-sized to vehicle-mounted. A primary objective is "to allow the co-existence with, and interconnection with, mobile systems which use direct satellite links".

The IWP noted that mobile users operating over wide areas could benefit by having direct access to both mobile satellite and terrestrial systems. According to the IWP 8/13, this could most readily be achieved by the use of adjacent satellite and terrestrial mobile frequency bands. In this regard, remember that WARC-MOB-87 recommended

that the next competent WARC should consider designating a suitable band or bands for future public land mobile telecommunication systems.[10]

The IWP also said that given the prospect of more than one mobile satellite system, it is desirable that technical and/or functional compatibility of mobile earth stations be a goal of the FPLMTS, so that mobile users are able to roam regionally and/or world-wide with the same piece of equipment.[11]

Like the CCIR, the CCITT has several important Study Groups dealing with mobile matters, especially in regard to how mobile systems interwork with the fixed networks.

The current four-year CCITT Study Period is coming to an end. The IXth CCITT Plenary Assembly which is being held in Melbourne in November 1988 is expected to reorganize its Study Groups and to approve many new questions on mobile communications.

INMARSAT has been participating in those CCITT Study Groups dealing with matters of importance or interest to us.

Several CCITT Study Groups (SG I on telegraphy, SG II on telephony and SG VII on data) have been drafting recommendations for numbering plans that would treat mobile satellite services in a consistent way and that would in particular describe how new INMARSAT mobile services are accessed via the fixed terrestrial networks. They are also developing standardized selection procedures for mobile subscribers to access the telephone, telex and data services. Specialized operational procedures for the interworking between the telex service and the Standard C services have also been drafted by Study Group I, as telex is currently the only mandatory Standard C service.

Study Group XI is producing texts for the network signalling architecture required for the interfacing of digital mobile systems. It has prepared several Recommendations so that the INMARSAT user can access the fixed networks in a standardized way no matter where in the world he goes.

The aviation industry is in the process of adopting the network layer of the CCITT X.25 interface standard as a means of transferring data between the mobile satellite network and existing avionics. Since this standard is already in widespread use, it will enable the aircraft to communicate no matter where in the world it is flying.

Study Group XVIII is carrying out long range studies of digital networks, including the possible services which digital mobile systems may provide in conjunction with the PSTN/ISDN. (Other Study Groups, such as I, II, III, VII and XI, are also studying the implications of ISDN evolution and paving the way for the transition.) It is also concerned with digital codec standardization. While INMARSAT, NASA, the Canadian Department of Communications and others are considering voice transmission methods which are very economical of power and bandwidth-- e.g., 4.8 kbit/s digital or amplitude companded single side band (ACSSB) -- such methods have not been adopted yet by the CCITT. Study Group XVIII has cleared 32 kbit/s and is now working on 16 kbit/s codecs. It has only recently begun considering voice coding algorithms at bit rates below 16 kbit/s (for the aeronautical satellite service), but it does at least recognize the need for new recommendations on transmission planning to cover the growing numbers of mobile users who will want to interconnect with the PSTN.

From the considerable amount of work being devoted in CCIR and CCITT Study Groups, it is apparent that an objective of growing

importance is the development of common mobile standards which can be used anywhere in the world and which can be functionally integrated with the fixed networks.

This objective is shared by the aviation and maritime communities. It seems increasingly likely that the FDMA SCPC protocol supported by INMARSAT and other mobile satellite applicants in the US and Canada will prevail both in the AEEC and ICAO.

Standard-C

I would now like to mention the status of the two main standards being developed by INMARSAT for use in the land mobile environment. The first is Standard C, which we developed for low speed data communications for use on the smallest of fishing boats, yachts and even liferaft. Standard C could be regarded as a general purpose digital link, for either two-way messaging or as a one-way outbound or one-way inbound link, which means it could be used for point-to-multipoint broadcasting (enhanced group call), polling and monitoring, can be provided as a subset of Standard C.

The International Maritime Organization's subcommittee on radiocommunications has adopted INMARSAT's Standard-C for its global maritime distress and safety system which comes into being from 1991. It has also adopted our enhanced group call system for promulgation of maritime safety information.

Standard C has stimulated considerable interest for land mobile applications because of its low cost and small size. Standard C is being used in a series of technical and pre-operational trials planned by 13 European telecom administrations to start later in 1988 following establishment of a test coast earth station or gateway station in mid-1988.

We have had numerous discussions with Telesat, DOC and others in Canada and it would seem that there are minimal differences between Standard C and the Canadian MSAT equivalent and that there is a recognition of the benefits of a common standard. It is my hope that others planning domestic or regional mobile satellite systems could also support Standard C as a world-wide standard for low speed data communications.

CCITT Study Group I is at present finalizing three Recommendations related to the Standard C system. These relate to the Standard C telex numbering plan, the selection procedures and the interworking procedures to be used between the telex network and the Standard C system.

The standard effectively has the support of INMARSAT Signatories from 53 member countries. A preoperational trial service which can support up to 1,000 terminals in the Atlantic ocean region will start in the third quarter of 1988 and a full world-wide commercial service should start in mid-1989.

Standard-M standard setting

We have also begun work on establishing a second land mobile standard, that is, for voice. In January 1988, we wrote to Signatories, manufacturers, potential users and others suggesting the establishment of a group of interested parties, whose purpose would be to define an internationally acceptable standard for a low cost land mobile

satellite telephony service, which we call Standard M.

A common land mobile satellite standard would allow mobile subscribers to communicate anywhere, no matter where they are, and through any mobile satellite system. A common standard would allow manufacturers to address much larger markets and to spread development costs over larger production quantities. Achieving economies of scale is critical to the mobile satellite market which is likely to be considered to be a high risk venture for some years to come.

We envisage Standard M as having an antenna gain in the range of 10-15 dBi (with a G/T of the order of -13 dBK). It could be either a digital (4.8 kbit/s) or ACSSB standard, but it would be specified for production at the lowest possible cost. These and other issues are planned for discussion at the first meeting scheduled to take place in London on 28-29 March 1989. Participation in this and subsequent meetings is open to all interested parties, including competitors.

COMPETITION

While the potential for significant and productive cooperation exists between the mobile satellite competitors, so does the prospect of competition.

Domestic MSS monopolies have been assumed for Canada and US. For example, the FCC said three years ago that it did "not foresee the development of a competitive market in the near term".[12] If domestic systems compete with INMARSAT, however, it does seem to me that INMARSAT should be allowed to compete with the domestic systems, particularly those with regional aspirations. I did note in a US contribution to last year's Mobile WARC a line that said, "Domestic markets can be served by international systems, regional systems or by domestic systems, depending on the circumstances."[13]

The FCC and other domestic regulatory agencies should come out with clear policy statements as to whether they will allow inter-system competition. In doing so, they should note that INMARSAT has not sought nor has it been given a monopoly in the provision of aeronautical or land mobile satellite services. On paper, INMARSAT has a maritime monopoly, but in practice, many fixed satellite services among others have not let that paper protection stand in their way, nor have we tried to enforce it.

It has been said that competition between INMARSAT and the domestic MSS is not on, because INMARSAT is a foreign controlled communications provider and under US law, no more than 20 per cent of a common carrier can be under foreign control. This argument, however, disregards the fact that it is not INMARSAT which provides service to the end user; it is the US Signatory, i.e., Comsat. Hence, the question of foreign ownership would appear to be a red herring.

MSS and MSAT should not fear competition. It will stimulate the size of the market, drive down the cost of equipment and improve service. Competition will be good for us all. Not all of that competition will be inter-system in nature; the inter-modal competition, that is, from cellular radio and other such terrestrial technologies, will be severe. Bob Maher, president of the US Cellular Telephone Industry Association (CTIA), recently predicted that 80-85 per cent of the land area of the US will be served by cellular radio within three years. If 85 per cent of the long haul trucker's route is covered by cellular radio, how likely is he to buy a mobile earth station?

The answer to that question may come from a lease of capacity by INMARSAT to Teleglobe Canada for Telesat Canada's interim MSAT service.

In leasing capacity to a potential competitor, INMARSAT has promoted inter-system competition even though we have many concerns about leases, especially of the non-preemptible kind. Such leases effectively remove capacity from the "pool" available to the international community on a demand-assigned basis and thus strike at the heart of the concept of an international co-operative for mobile services.

Competition could be further promoted if governments ended their subsidies. Among such subsidies, I count research and development paid for by taxpayers, free launches and guaranteed government use of services. Competition can be further thwarted if one potential competitor seeks to use the standards-setting process as a means of delaying the introduction of service by others.

Another drawback we see to effective competition is the risk of a conflict of interest. This particularly touches the INMARSAT Parties, who may, for example, delay ratification of amendments to the INMARSAT Convention because they are also supporting a domestic competitor.

Another major risk is that Parties will not support INMARSAT's access to spectrum if a domestic system operator wants the same spectrum. Neither Canada nor the US has supported INMARSAT's having access (non-exclusive access, I hasten to add) to even 3 MHz of the AMSS bands, even though they are seeking the full 14 MHz of the AMSS and LMSS bands for their own domestic use.

Another potential policy minefield relates to the use of mobile communications as a substitute for fixed services. I noted that the US said in its 18 September 1987 contribution to the Mobile WARC that "the applications for which mobile-satellite service systems will be employed are mobile in nature... the mobile satellite service will not substitute for fixed satellite services."[14] Yet the day before, the FCC said "if there is a demand for fixed services that can be provided on a mobile satellite system, there is no reason why they should excluded."[15]

AN OPEN DOOR POLICY

I would like to summarize my message, as follows: We believe in the benefits of competition and we have supported competition by granting free use of our system to potential competitors for tests and demonstrations and by leasing them capacity, even though leases are regarded by many as inimical to the interests of an international co-operative for mobile satellite services.

While competition is important and beneficial, so is co-operation. Cooperation will be vital to solve the formidable co-ordination difficulties which lie before us. Cooperation in developing common mobile standards will serve the interests of users, manufacturers and facilities providers. Many of those attending this conference sponsored by JPL hold the keys to cooperation, especially in designing mobile equipment allowing the user to roam anywhere. I urge you to open doors, not to close them.

REFERENCES

1. Following the amendments to the Radio Regulations made by the WARC-MOB-87, which come into force in October 1989, INMARSAT plans to register with the IFRB for the provision of aeronautical public correspondence in the 1545-1548 MHz and 1646.5-1649.5 MHz bands; of a land mobile satellite service, limited to non-speech low bit rate data transmissions in the maritime mobile satellite bands; and of a telephony land mobile satellite service in the 1530-1533 MHz and 1631.5-1634.5 MHz bands.

2. p. 24, MSS NPRM, released January 1985.

3. p. 6, MSAT-X Quarterly, July 1987. Article by Dr. John Huang, Jet Propulsion Laboratory, NASA.

4. p. 60, MSSLP filing to the FCC, 4 Sept 1987.

5. The 4 Sept 1987 MSSLP filing proposed (see p. A-8) that the Canadian spacecraft utilize 6.75 MHz while the US spacecraft use the remaining 6.75 MHz.

6. RESOLUTION COM4/14 of the MOB-WARC-87 Final Acts.

7. Ibid.

8. RECOMMENDATION COM4/A of the Final Acts.

9. p. 22 of 1 Feb 88 AMSC filing to the FCC.

10. RECOMMENDATION COM4/G of the Final Acts.

11. WARC-MOB-87 Resolution 44 also urges administrations to encourage the development and manufacture of compatible user equipment in the mobile satellite service.

12. p. 24 of MSS NPRM released January 1985.

13. p. 2, Document 156-E, USA Information Paper "Mobile Satellite Service Implementation and Institutional Considerations" to Committee 4 of WARC-MOB-87.

14. p. 2, Ibid.

15. p. 13, Memorandum Opinion and Order, adopted 17 Sept 1987; see also Second Report and Order, Gen. Docket 84-1234, at para 34.