EXECUTIVE COMMENT

Evolving Communications Satellites Services --- What Comes Next?

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<Biography>

Date of Birth: December 24, 1940

Education

High School: Narimasu High School, Tokyo Japan

B.S. in Electron Physics, Louisiana State University, 1962

M.S. in Electrical Engineering, University of Minnesota, 1968

Employment

1962 - 1970: Honeywell Aerospace Division. Development engineer for Guidance and Control Systems. Worked on many programs, including Mariner Mars, Apollo, and Japanese Q/N launch vehicle.

1970 - 1997: European Space Research Organization (later European Space Agency). Hired as Principal Engineer for Attitude and Orbit Control for communication satellite programs. Over the years, held many positions of increasing importance, finally becoming head

of the Communication Satellites Department, responsible for the development of all new communication satellite programs, as well as for R&D programs to develop the technology and systems needed for future satellites. Was ESA contact person with Japan (MPT and NASDA) for telecommunications matters for some twenty years.

1998 - 1999: Lockheed Martin Corporation. Initially as Vice President for Broadcast Satellite programs in the LM Telecommunications (LMT) subsidiary, and later as VP for global Transport in Lockheed Martin Global Telecommunications (LMGT).

1999 - present: With Societe Europeenne des Satellites, initially in the Business development department, and now in his present position.

During the almost forty years of my working career, I have been closely involved with space research and development, with Japan (where my relationship goes back even further), and with the AIAA. I therefore feel both honored and highly pleased to have been asked to contribute this commentary to the Space Japan Review, where all three of these aspects come together. During this forty years, the field of space has matured from a largely experimental pioneering endeavor into a mature industry whose yearly contribution to the world's economy is measured in many billions of dollars. That is not to say, however, that the field has become mundane in any way. Satellites and the launchers that place them into orbit are highly sophisticated and complex devices, and have become increasingly more so as the years have gone by. This becomes all too evident whenever a satellite or launcher fails, as they unfortunately sometime do, despite the most careful steps taken by their designers and builders to avoid this happening.

In the space field in which I am most familiar, that of communication satellites, there is an additional reason why the field has not become mundane. That is because the field is in a constant state of evolution. When they first entered commercial service in the mid-1960s, the mission of communication satellites was primarily that of providing inter-continental telephony trunking services, plus relaying the occasional television program across the oceans. These were the services that gave rise to Intelsat, perhaps the best known of the international satellite operators.

With the increasing numbers and capabilities of undersea cables, however, satellites began to take a back seat for such services. Their role in this area became that of a supplement to cable for telephony and television services, and that of a backup media in case of a loss of a cable connection. About the time this transition began to occur, satellites began to be used for mobile services, primarily to ships at sea. Inmarsat came into being to provide these services on a global scale. Later, Inmarsat expanded as well into providing telephony services to aircraft, particularly when these are flying intercontinental routes.

Later still, albeit only after several economically unsuccessful false starts, satellites began to be used for direct to home (DTH) broadcasting of television. This exploited one of the major advantages of geostationary satellites, that of being able to see, and be seen, from large geographical areas on the earth from a single orbital position. This allows a practically unlimited audience to receive multiple TV programs from a single satellite, either directly or via television cables carrying satellite channels received at the cable heads. The large audience numbers reduce the cost of reception per household to easily affordable levels. The advent of digital television, which is rapidly replacing analog broadcasting on satellites, allows multiple programs to be broadcast via a single satellite transponder, increasing the efficiency of satellites for this service even more.

Satellite television broadcasting is now the largest money earner of all of the satellite services. The customer base in the USA and Europe, in particular, is large and still growing at a significant pace. This is, however, expected to level off in the middle of this decade, as the

total competitive market for satellite and cable television reaches saturation levels.

So what comes next? What are the new satellite services that will arise in the next few years to maintain and expand the satellite market? For a time, ambitious non-geostationary mobile communications systems such as Iridium, ICO, and GlobalStar made it seem that this type of service would become the "killer application" for satellites, but the events in the past year have demonstrated that this is not the case. Only time will tell whether GEO mobile systems, such as ACES and THURAYA, may prove to be more successful.

A number of wide-band Ka-band On-Board Processing type systems have been proposed, such as Astrolink, Euroskyway, and Spaceway. These systems are being developed to provide services primarily to businesses. They have been characterized by significant program delays, caused by the slowness in obtaining sufficient investment funds to complete them, but at least one or two of these should initiate services in the next two or three years. Once again, only time will tell whether these will become as economically successful as their backers proclaim.

Personally, I have no better crystal ball to foretell the future than anyone else. I do believe, however, that there will be four new types of satellite services to residences that will become the big "money winners" in the coming years. The first is interactive television, where satellite terminals are used both to receive television channels and to send return information from the television viewers. The return link for such a service will be one with a low average bit rate, since most return signals will be transactional in nature (e.g., sending a users credit card number and the address to which items ordered in this way should be sent). Terminals allowing a very low bit rate return channel are yet to be developed, but it should be possible for them to be mass-produced and sold relatively cheaply.

The second is Video on Demand. This is not economically feasible with today's two-way satellite terminals, as real-time point to point connections don't use satellite resources very efficiently, but it can become economically attractive in the future with the use of extensive hard disk caching at a users terminal.

The third service is Internet access for PC users, using two way satellite terminals. As for Video on Demand, this type of point to point service does not make very efficient use of satellite resources today, but with intelligent caching and user profiling at customers premises, this service should become both economical and in wide demand in the future.

Finally, I believe that there will be great synergy between future navigation and communications satellites. While navigation satellites let a user know where he is, combining this with position reporting lets the user identify his position to the world. This then makes a number of new types of services more feasible, including emergency rescue, hazardous cargo tracking, stolen vehicle recovery, targeted road condition reporting to motorists, targeted advertising, etc. Several of these are already starting to be offered, and these and others should grow significantly in the future.

As I said, my crystal ball is probably no better than that of anyone else, but it will be interesting for me at least, in say five years from now, to re-read this commentary and to see how accurate my educated guesses have been.