Paper Session I-C - U.S. Commercial Space Enterprise - Opportunity and Challenge

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U S Commercial Space Enterprise - Opportunity and Challenge

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The Opportunity

The total market for space transportation services until the year 2000 is $25-30 Billion. Foreign space carriers have enviably positioned themselves in a posture capable of getting the lions share of that business, in the near term. The challenge to the U S aerospace community is the development of new technology and methods resulting in lowest cost, highest reliability, timely and flexible response to mission needs. Only then can we recapture the initiative through international competitiveness.

All present and past space transportation has been government subsidized, which is to say taxpayer supported. There are indications that the taxpayer is tiring of the burden. The space access needs of science, industry and government are sufficiently well defined and the value of space operations soundly established, to permit assessment of the potential profitability of investment in space transportation services. The time has come for a viable, privatized, commercial space services industry to stand on its own feet and take a place beside railroads, trucking, airlines, mining, petrochemicals and all other elements of our industrial base. An industry serving the needs of society is not subject to the vagaries of geopolitical winds, rather it plots its own course with long range objectives and interests. Commercial space exploitation is a vital element in the achievement of national, societal and private venture goals.

The Market

Many studies and compilations have served to establish the scope and complexity of the space transportation market. By the year 2001 more than 900 satellites will require launch for some space objective. Some will require in orbit services and recovery. Commercial, government and industry demand includes 474 communications, 200 earth observation, 53 navigation aids, 14 extra-orbital, 105 scientific/technical development and 130 materials processing missions.

Figure 1 shows the number and category of missions available to the U S commercial market, excluding STS and its manifest. (Source: OUPM, Department of Commerce, NASA, DoD, Janes Spaceflight Directory and numerous contracted and independent studies). The U S Government obligation to contract for commercial launch services when possible and trends in design of new satellites toward smaller, lighter, more capable payloads, are included in this assessment.
A viable, and dynamic U.S. Space Transportation Industry faces several hurdles due to the process by which all space activity has evolved during the past three decades. Commercialization, before it can emerge from the inhibiting influences of the past, must resolve some basic problems. Fortunately, there are good solutions for each of them.

The fundamental issue limiting the growth of commercial space services is that the real cost of launch operations has not been established. All such operations have been cloaked in the cyclical spending of government programs. No payload user has ever paid the fair and square costs and has been carried to space with a subsidy, a high tech welfare program. Privatization of space requires a firm business proposition with cost, revenue and margin made obvious to the investment community. To the payload user this will mean greater expenses for launch in their program budget, at least initially, but growth industries do not rely on government handouts. The era of hitching a ride on the back of national imperative programs has ended.
The fundamental challenge to commercial space services growth is convincing investors that there is money to be made in the arena. The multibillion dollar market with a future linked to so many of mankind's needs, is apparent. In order to assure profitability for investment, costs of space operations must continuously drop as revenue producing activity rises, making it affordable to an ever increasing number of users of that place called space. The potential for future cost of operations reduction must be the primary objective of management and the criteria for all designs and planning. By such means financing a capital intensive, seemingly risky business, can be facilitated. Figure 2 shows the capital flow for investment and return potential in the commercial space transportation industry. Prelaunch processing and postlaunch mission services, components of space operations, are factored into the assessment.

**FIGURE 2  FINANCIAL ANALYSIS**

Hand in hand with making commercial space investment attractive, is the need to establish a sound actuarial basis for insuring the investment for capital, property and legal liability. The insurance industry has no precedent for commercial space operations and it is the responsibility of the technical community to input data sufficient to establish risk assessment schedules. In this, as well other business administration matters, technically oriented personnel must cooperate and understand the concerns of the finance community. This is virgin territory for most of us who have never had to concern ourselves with the driver of industry and commerce, namely money and profits. Perhaps it is time we emerged from our cocoons.
Another significant problem facing commercialization is the relationship of private industry to the government operated launch facilities. Commercial space must have an established priority for the use of these facilities. The national ranges must recognize that time is money and delays in operations can greatly affect the competitive posture of a venture. The ranges are a national resource, developed expensively and laboriously with public funds and although private use may not be the highest priority, it must be recognized as important for the achievement of other national goals. Prioritization should be part of larger policy decisions supporting the exploitation of space in which government agencies and departments cooperate, a task once again, in which commercial technical and management elements must become the prime movers. The policy decisions should be at the insistence of a vital future industry, not by acquiescence to various establishment interests.

The Industry Tools

The tools available to the U S Commercial Space Transportation Industry are inadequate. All designs are twenty to fifty years old, they do not address the full range of payload user market interest and they do not incorporate features necessary for potential cost-of-operations reduction, necessary for the competitive world of today. Vehicles are unnecessarily expensive and intricate, but they were designed in another time for a different purpose. Launch operations are slow and expensive and little opportunity exists for correcting these shortcomings. In-flight operations are divided among many separate activities, each claiming that their responsibility is so unique that it must be accomplished independently, and the costs soar. No established capability for payload recovery (except STS, not available for commercial applications), has been made available. 1980’s methods and designs are needed to address future market demands.

The New Technology

Present space access carriers are an outgrowth of military programs of the past. The technology of the past did not consider factors pertinent to commercialization and profitability. The development costs of new systems capable of overcoming this handicap, is high. Those expenses, however, have already been absorbed in the case of launch vehicle technology using solid rocket motor propulsion. The operational success and reliability of the Peacekeeper, Trident and other solid propellant vehicles is well established and waiting to be put to commercial purposes. The tooling and production capacity are paid for and in place. This advanced technology is an American resource ready to be tapped for commercialization in an internationally competitive market.

Our present commercial carriers are the IRBM’s and ICBM’s of years ago. Our future commercial launch systems are the ballistic missiles of today. The more things change, the more they don’t. Competitive advantage is gained in reduction of costs through minimum launch site staffing, automated production facilities, simplified launch site activation and transportation requirements. Competitiveness is enhanced by a modular approach to vehicle configuration serving a broader range of payloads and a timelier response to launch dates.
A family of solid rocket motor Expendable Launch Vehicles is being prepared for commercial applications by E'Prime Aerospace Corporation (EPAC), derived from the technology of the Peacekeeper ICBM. The space services planned by EPAC also include provision of the launch site, payload integration, flight preparation and launch, in-flight support and payload recovery. The objective is to offer these services at the lowest possible cost with maximum mission flexibility for a wide range of payloads, minimum processing time and multiple launch capability.

The launch vehicle propulsion components are proven, flight certified solid rocket motors stacked and/or clustered to meet the mission trajectory requirements. The capability of the EPAC S-Series family of Expendable Launch Vehicles is 1,000 to 20,000 pound payloads into low earth orbit. Figure 3 shows configurations and ratings of the EPAC S-Series family.

**FIGURE 3  EPAC - S SERIES LAUNCH VEHICLES**

![EPAC - S SERIES LAUNCH VEHICLES](image)

Total Space Services

Scientific research, industrial processing, earth observation, communications and extra orbital missions require ground facilities for data retrieval and flight control. A new era of commercial space activity begins with recovery of payloads return to earth made routine. Commercial space transportation will mature when all facets of mission accomplishment are in private hands, operated with first priority given to the industry's needs, assuring responsiveness to market conditions and impetus for investment in an expanding and ever more profitable arena.
Integrated data and tracking facilities are essential components of a commercial space industry. Government plans for withdrawal from that responsibility make the planning of a multi-use, cost effective replacement network vital.

The United States Commercial Space Transportation Industry must be comprehensive in the services provided to the payload user, from pickup at the door to control and communications in flight, and to delivery back home if required. Planning on a lesser scale is irresponsible.

The Challenge

The United States lags behind progress made elsewhere in development of an industry capable of capturing the major volume of the space transportation market. The challenge, in order to reverse this condition, may be summarized as follows:

1. The multibillion dollar market is here and growing.
2. The inhibiting factors of the past keep U.S. industry restrained.
3. New methods and technology are available to reverse the situation.
4. The industry must organize on an investment attractive basis.
5. The industry must provide comprehensive space transportation services.

For all of the advantages to be gained, people will operate profitably in space whether it be with U.S. carriers or with others. Resources are available to make America predominant in space once again.