Commercial Space Transportation Advisory Committee
May 20, 2004
MEETING MINUTES

COMSTAC Chair John Vinter, president and chief executive officer, International Space Brokers, Inc., Rosslyn, Virginia, convened the meeting at 8:33 a.m., welcomed COMSTAC members and guests, and asked that members and alternates introduce themselves. Mr. Vinter acknowledged the work of COMSTAC member Alex Liang, and team members John Sloan and Dave Pollack, on the 2004 Commercial Space Transportation Market Forecasts. He also acknowledged and congratulated COMSTAC member Lou Gomez of the New Mexico Office of Space Commercialization on the selection of New Mexico as the first site to host the upcoming X-Prize Cup event to be held in 2006. Mr. Vinter also acknowledged FAA's Associate Administrator for Commercial Space Transportation (AST) for the groundbreaking work in licensing manned reusable suborbital launch vehicles. He pointed out that both New Mexico's success and AST's work with licensing suborbital RLVs are indicators that the U.S. commercial space transportation industry is moving in a positive direction.

Report on AST Activities

Patricia G. Smith, associate administrator for Commercial Space Transportation, FAA, reported on AST activities since the October 2003 COMSTAC meeting. She congratulated Lockheed Martin Corporation for the successful launch of the Atlas IIAS on Wednesday, May 19th and she reported on the upcoming launch of Orbital Sciences Corporation's Taurus rocket scheduled for that afternoon. Ms. Smith mentioned the 2004 Commercial Space Transportation Forecast Conference in February, which highlighted the 20-year anniversary of the Commercial Space Launch Act of 1984.

Ms. Smith discussed the historic emergence of manned suborbital reusable launch vehicles (RLVs) and the increased national attention for the X PRIZE Competition. She reported that AST has received three applications for proposed manned RLVs—two of which are X PRIZE competitors and one proposing space tourism and space adventure travel. She also reported that the House of Representatives passed legislation which included definitions for suborbital launch vehicles and suborbital trajectories and that currently this legislation is awaiting review and concurrence in the Senate. Ms. Smith also reported that AST issued licenses to Scaled Composites (Scaled), headed by Burt Rutan and XCOR Aerospace, headed by Jeff Greason, in April. She noted that Scaled conducted a successful test flight in which SpaceShipOne reached 112,400 feet, and that XCOR has proposed 35 experimental flights between now and December 2006. She reported that Mojave is striving to be the first FAA-licensed inland launch site in the U.S.

States' Perspective on Commercial Space

Tim Huddleston, executive director, Aerospace States Association, discussed state activities and initiatives for economic development through commercial space transportation ventures, acknowledging specifically New Mexico, Oklahoma, California, Florida, Virginia, Alaska and Alabama. He discussed the emergence of suborbital RLVs, the entrepreneurial spirit for these ventures, and the ways in which states are working to

take advantage of these ventures through better, cheaper access to space. He reported on the Space Exploration Alliance, a newly organized, informal coalition made up of space advocacy organizations. He also reported that ASA would be releasing the *Space Enterprise Model*, their national space vision on approximately June 28th. He noted that the *Model* would be in four parts and would hopefully provide useful input for the upcoming National Space Policy.

Transportation Market Forecasts: GSO Forecast Report

David Pollock, senior advisor, The Boeing Company, presented the ***2004 COMSTAC Commercial Geosynchronous Orbit Launch Demand Model***. He reported that the forecast covers the years 2004 to 2013 and that the average annual demand is down approximately 9 % from the previous year in terms of satellites (21.1 satellites per year vs. 23.3 for last year). He stated that the 2004 report provides new insights into industry trends, including an estimate of a "realization" of demand which has been expanded to the first three years of the forecast; an analysis of the growth in satellite mass and transponders per satellite presented; and respondents' views on the factors affecting demand. He also indicated that the amount of dual manifesting is down causing a dip in satellite demand but not in launch demand, pointing out that Arianespace would be doing less dual manifesting than previously planned and Boeing and Lockheed are not planning to do any.

Mr. Pollock explained the two-part methodology of the forecast, noting that the near-term forecast is a bottoms-p forecast of launch opportunities by name that covers the first three years (2004-2006); and the long-term forecast covers the last years of the period (2007-2013), an average of the comprehensive domestic forecasts by mass categories. He said that the working group looked at addressable commercial payloads only, i.e., those that are open for internationally competitive launch service procurement. He also reported that 26 responses were received from spacecraft manufacturers, launch service providers, and satellite service providers, both international and domestic.

Mr. Pollock summarized the reports findings:

- The average satellite demand for the period 2004-2013 is 21.1 per year (down 9% from last year);
- Near-term demand is 20 satellites in 2004 (expected realization is 12-17); 22 satellites in 2005 (expected realization is 16-20); and 16 satellites in 2006 (expected realization is 12-14);
- Transponders-per-satellite and mass-per-satellite launched continue to grow;
- Economic conditions and availability of financing continue to have a negative effect on market demand; and
- Factors affecting demand include global and regional economic conditions, new market applications, high-speed terrestrial services, data compression technology, the regulatory environment, and new space hardware.

COMSTAC member Lou Gomez noted that suborbital RLVs were not discussed in the GSO report. Dr. George Nield, deputy associate administrator for Commercial Space

Transportation reported that AST would be conducting a study on suborbital RLVs over the next few months.

Transportation Market Forecasts: Non-Geosynchronous Orbits (NGSO) Forecast

John Sloan, senior policy analyst in AST's Space Systems Development Division, provided the briefing on FAA's *2004 Commercial Space Transportation Forecast for Non-Geosynchronous Orbit*s. Mr. Sloan noted that the NGSO forecast uses payloads that are open to internationally competed launch services procurement and other commercially sponsored payloads, including payloads that generate launch demand, and no secondary or dummy payloads. He described a 7-step methodology:

Step 1 – Identification and research of all current and proposed NGSO systems;
Step 2 – Review of business and financial progress, satellite specifications, launch plans, and overall market status;
Step 3 – Examination of companies' FCC licensing status;
Step 4 – Interviews with companies, the FCC, and survey of launch providers on their near-term manifests;
Step 5 – Development of an Excel-based traffic model using constellation configuration and deployment schedule;
Step 6 – Review of data with companies, updating the model, writing the report; and
Step 7 – Peer review of the final text.

Next Mr. Sloan reported the Forecast results:

Baseline Satellite Forecast: 106 payloads for 2004-2013, an average of 10.6 per year (32% higher than the 2003 forecast of 80). This includes international science and other satellites (55%); telecommunications satellites (30%), and commercial remote sensing satellites (15%).

Baseline Launch Forecast: 51 total launches for 2004-2013 (same as 2003 forecast, lower than 63 launches projected in 2002 forecast). This is an average of 5.1 launches per year including 2 medium-heavy vehicles and 3 small launch vehicles. By sector, this includes 33 scientific/other satellite launches; 12 remote sensing satellites launches; and 6 telecommunications satellite launches.

He reported that the near-term satellites and launches are higher than the far-term (i.e., telecommunications (ORBCOMM and Globalstar) and commercial remote sensing; and that the far-term international scientific/other satellites are estimates based on historical activity because small science satellites appear rapidly and are difficult to forecast.

He also highlighted several trends:

- Return of telecommunications - There is a more favorable business climate for ORBCOMM and Globalstar, including steady customer growth, debt-free operations, and new, committed private investors. It is still too early to forecast for Iridium and Globalstar second-generation systems. Second-generation have

strategies include launch "on need" basis to replace failing first-generation satellites and spread costs over time and earn money while deploying.
- International science satellites still have the bulk of the market;
- There are more multiple-manifest small launches, e.g., the Russian Dnepr and the Cosmos;
- Digital audio radio (DARS) has strong customer growth in the U.S. but, so far, none from international companies; and
- There are signs of improving economic outlook.

Mr. Sloan listed several factors affecting launch demand, including:
- Strength of the U.S. and international economies;
- Investor confidence;
- Need for replacement satellites;
- Business case changes;
- Corporate mergers;
- Regulatory and political changes; and
- Government missions open to launch services competition

COMSTAC member Mike Kelly pointed out that it is difficult to get companies to do multiple manifesting because of the placement of the satellites. Mr. Sloan indicated that that factor was taken into consideration in the methodology for the forecast.

The Economic Impact of Commercial Space Transportation on the U.S. Economy

Paula Trimble, policy analyst in AST's Space Systems Development Division, provided a briefing on AST's study on the *Economic Impact of Commercial Space Transportation on the U.S. Economy,* which was undertaken to highlight the extent to which other industry sectors profit from activity in the commercial space transportation sector and to provide an outlook for commercial launch and the potential economic impacts of various future scenarios. She summarized findings from the study, noting that the commercial space transportation industry, along with the industries it enables, generated significant impacts on the nation's economy in 2002, including $95.0 billion in economic activity, $23.5 billion in earnings, and 576,400 jobs; satellite services were the greatest contributor to economic activity and jobs impacts with a total of $49.6 billion in economic activity and 278,287 jobs; from 1999 to 2002, economic activity impact increased 55%, earnings impact grew 43%, and jobs created increased about 16%; launch vehicle manufacturing and services experienced the largest decline in economic activity, earnings and jobs; economic activity declined from $3.5 billion in 1999 to $791 million in 2002; commercial space transportation affects all major U.S. industry sectors defined by the RIMS model; and in 2002, the communications and electronic and other electronic equipment industry sectors were the two most affected sectors in terms of additional economic activity, earnings, and jobs.

Ms. Trimble explained that using two scenarios, constrained versus robust, the analysis included three factors, i.e., the number of commercial launches expected worldwide in 2010, U.S. market share, and U.S. launch revenues to conclude that in the constrained scenario, commercial launch would generate about $496 million in economic activity in

2010, compared to $791 million in 2002 and by contrast, the robust scenario results in economic activity impacts of $3.5 billion. She concluded the while the overall contribution of enabled industries to the U.S. economy has grown in recent years, the role commercial space transportation itself has played has diminished; the key difference between 1999 and the robust 2010 scenario is the total number of commercial launches worldwide: 39 in 1999 versus only 25 forecast for 2010; and the U.S. commercial space transportation industry must become more competitive and capture a greater fraction of the overall market in order to provide the same level of economic impact that it did in 1999. COMSTAC member Mike Kelly recommended that future studies expand the economic impact in terms of integration with very large industries.

Private Sector Opportunities In Space Transportation

General Simon "Pete" Worden, Congressional Fellow, Office of Senator Sam Brownback, discussed the President's Space Exploration Vision and the opportunities for the private sector to participate in the initiative to go to the moon and to Mars. He stated that America needs to go to the moon and to Mars in order to maintain leadership in space (why we should go). As far as the affordability of such missions, he discussed the growing trend of young, wealthy entrepreneurs who are privately funding space exploration and space transportation ventures. He noted that the Government could enable private sector space opportunities through service procurement, such as having NASA do a Request for Proposal for Space Station resupply. He cited private sector development of small payloads such as the Department of Defense FALCON program, and the X PRIZE as excellent examples of private sector opportunities.

COMSTAC Alternate Bob Bocek asked about the NASA Reauthorization Bill and its prospects for getting passed. General Worden responded that there is a good chance that the bill would be passed. COMSTAC member Mike Kelly asked about the status of the Commercial Space Act (H.R.3752) as it goes to the Senate as S. 1260. General Worden responded that he and his boss, Senator Brownback, are working to get it through.

Introduction to the NASA Centennial Challenges Program

Brant Sponberg, NASA Centennial Challenges program manager, provided a briefing on the Centennial Challenges Program, administratively located in NASA's Office of Exploration Systems. He began by discussing NASA's Solar System Exploration Roadmap which starts at year 2000 and goes to 2020. He described the Centennial Challenges Program as a program of contests in which NASA will establish prize purses to stimulate innovation and competition in technical areas of interest to space exploration and ongoing NASA priorities, with the program goals of stimulating innovation in ways that standard federal procurements cannot; enriching NASA research by reaching new communities; helping address traditional technology development obstacles; achieving returns that outweigh program investment; and educating, inspiring, and motivating the public. He added that the program addresses NASA's vision with an exploration emphasis to improve life here, extend life to there, and find life beyond. He noted that he is committed to having a lean program with low overhead to preserve funding for the challenges.

Mr. Sponberg explained that the types of challenges for the program include 15-20 top candidates from the Space Architect study that fall into the categories of revolutionary advances in fundamental technologies, breakthrough robotic capabilities, and very low cost space missions. He added that for FY 2004, agencies can pursue prizes of $250 thousand or less, and in 2005 perhaps larger prizes, and that for right now participation is open to U.S. citizens in industry, academia, non-profits, students, and individuals who are not federal employees, unless otherwise specified in rules. He also announced the upcoming workshop on June 15-16 for the purpose of gathering external ideas, developing competition rules, promoting competitor teaming, and generating overall interest in the program and in NASA.

Mr. Sponberg also reported that criteria for good challenges include simplicity, relevance to NASA programs, right level of difficulty, follow-on opportunities, competitor and funding interest and the ability to generate public excitement. He next described specific ideas for challenges including a micro reentry vehicle, a solar sail race, a lunar landing, a Mars communication/navigation micromission, a near-Earth asteroid sample return, a precision lander, and a robotic insect. He noted that the challenges could have implications for the launch market and for FAA, including an increase in launch demand and launch vehicle licenses, and could help in defining regulatory boundaries for reentry and flight-testing.

COMSTAC member Mike Kelly pointed out that the Centennial Challenges program exhibited a lack of attention to space launch. Mr. Sponberg explained that if there seemed to be a lot of interest in space launch at the June workshop then it would be included in the program; however, currently the emphasis is on in-space applications and exploration. He added that since the X PRIZE and the DARPA FALCON competitions focus on space launch, NASA wants to avoid duplicating efforts.

COMSTAC member Lou Gomez asked if the program would require a non-refundable entry deposit. Mr. Sponberg responded that the program would require participants to register but no monetary fees. Mr. Gomez also asked if the program would allow recommendations regarding flight analyses and debris patterns. Mr. Sponberg responded that this was not currently part of the program but it could be a topic to discuss at the June workshop.

WORKING GROUP REPORTS

Risk Management Working Group (RMWG)

Chairman Vinter reported on the Wednesday Risk Management working group meeting, wherein discussions focused on the extension of indemnification authority that is scheduled to end this year. Mr. Vinter noted that the RMWG talked about the proposal to extend it through 2009 in a bill introduced by Senator John McCain and how this falls short of COMSTAC's proposal to delete the "sunset" limitation or, as a minimum, extend the indemnification authorization for a ten year period); the passage of H.R. 3752 in March which extends indemnification authority to 2007; and the referral of this bill to the

Senate Committee on Commerce, Science, and Transportation. He noted that the bill focuses on the emerging commercial human space flight industry and its regulation by AST and calls for a study by the National Academy of Public Administration on "the liability risk sharing regime in the U.S. for commercial space transportation" and "how best to gradually eliminate" its protection. He noted that ranking minority member, Rep. Bart Gordon opposes this study because it "may well hinder growth of the commercial human space flight industry"

Mr. Vinter summarized the H.R. 3752 and the accompanying report, noting that it provides for a three-year extension of indemnification authority but passengers would not be eligible for indemnification protection and addresses reciprocal waivers of liability for manned space flight. He noted that the report includes the Committee view that "experimental" permit holders should be excluded from indemnification but should be required to purchase insurance to cover maximum probable loss.

Mr. Vinter also reported on the status of the insurance market, pointing out that between the years 2002 through 2004, the biggest loss has been the Boeing 702 claims, creating a maximum exposure of $1.2 billion (U.S.) and that there have been fewer launches, and less income even though some spacecraft still require large sums insured relative to the market. He noted that income fell from $1 billion in 2002 to $600 million in 2003 and that after a number of underwriters left the market in 2001, the remaining underwriters tightened coverage terms, shortened the policy and risk periods, and raised the premium rates. He summarized that for 2004, a viable space insurance market exists, coverage terms and conditions are tighter than in 2002, the maximum for policy and risk periods is now one year, constructive total loss points are 75% of payload capacity and/or expected life, and rates are substantially higher but steady.

Launch Operations and Support Working Group (LOSWG)

Dr. Billie Reed, Executive Director of the Virginia Commercial Space Flight Authority, reported on the DARPA FALCON program and provided a brief summary of what that program entails. He explained that the program is focusing on force application and launch from the Continental U. S., through the integration of the latest technology, an innovative concept of operations, and the creation of "transformation, operationally responsive, affordable spacelift and global strike capability. He noted that the program proposes to develop a new common aero vehicle (CAV), a new small satellite launch vehicle (SSLV), and a new enhanced CAV launch vehicle (ECLV) over three phases, and he described the capability objectives for each launch vehicle. He added that the challenge to launch sites and ranges is to compress a process that typically takes 18 or more months into 24 to 48 hours and to fit that process into a $5 million cost.

Dr. Reed noted that this program could have implications for commercial space because the SSLVs may launch from FAA-licensed launch sites, and the FALCON technologies and systems will affect launch site and range operations as well as other launch vehicles and operations. He recommended that the COMSTAC LOSWG undertake the task to assess the impacts of the FALCON program and provide advice to the FAA.

Reusable Launch Vehicle Working Group (RLVWG)

Mike Kelly, RLVWG Chair, reported on the RLVWG meeting held on Wednesday, which included presentations by AST staff on Alternative Methods for Meeting E_c, Suborbital Launch Market Analysis, RLV O&M Guidelines, and a study concerning ways to exclude the Environmental Review process for RLV research flights. He also reported on presentations by an AIAA representative, Mr. Craig Day, on the AIAA Working Group on Safety Critical Systems; and a briefing by Dr. Arnold Angelici of FAA's Civil Aerospace Medicine Institute on Environmental Control and Life Support Systems for Manned Commercial RLVs for Suborbital Spaceflight. Mr. Kelly reported that there were also discussions on the Commercial Space Act and alternative terms for reusable launch vehicles. Mr. Kelly noted that the RLVWG voted unanimously to establish a sub group to work with AST on alternative methods for E_c.

New Business and Wrap Up

Since there was no new business, Mr. Vinter adjourned the meeting at 12:53 p.m.

John L. Vinter, Chairman, COMSTAC

ATTENDEES

COMSTAC Members/Alternates

John Vinter, COMSTAC Chair, International Space Brokers, Inc.
Eleanor Aldridge, AIAA
Robert Bocek, The Boeing Company
Richard Buenneke, The Aerospace Corporation (Alternate)
Dale Busath, Alliant Aerospace (Alternate)
Elaine David, Lockheed Martin Corporation (Alternate)
Louis Gomez, New Mexico Office of Space Commercialization
Lisa Hague, The Boeing Company (Alternate)
Michael Kelly, Northrup Grumman
Billie Reed, Virginia Commercial Space Flight Center
Janet Sadler, Redholm Underwriting

FAA Associate Administrator for Commercial Space Transportation

Patricia G. Smith**,** Associate Administrator for Commercial Space Transportation
George Nield, Deputy Associate Administrator for Commercial Space Transportation