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FORMER CHAIRMAN,
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SPACE NEWS PHOTO BY SANDY HOFFMANN

▲ ViaSat Chairman Mark H. Dankberg (above) said ViaSat's profit on the WildBlue and Telesat programs will take longer than previously forecast, in part because of the continued research and development expense the company is incurring to ensure that their product meets customer requirements.

Early Satellite Broadband Demand Exceeds Expectations Delays in Hardware Deliveries a Concern

PETER B. de SELDING, PARIS

Early demand for satellite consumer broadband in North America is proving greater than anticipated, but hardware-delivery delays remain a concern, according to industry officials.

With Telesat Canada's Anik F2 satellite's Ka-band service operational and the testing of a ViaSat Inc.-based consumer broadband terminal completed, the front line in the battle to make satellite broadband a viable presence in North America now moves to the distribution points, where a two-month delay in product delivery — especially in northern latitudes — can threaten a business plan.

U.S. and Canadian distributors would prefer to deliver and install consumer equipment — a rooftop antenna linked to a modem attached to a computer — before winter closes in.

In the case of Barrett Xplore Inc. of Woodstock, one of Ottawa-based Telesat's biggest consumer-broadband distributors across Canada, a scheduled July 1 commercial launch date was scrapped because insufficient numbers of terminals were available.

The company continues to take orders for the product, sold under the brand name Xplornet, and had more than 1,000 customers committed to take delivery on July 1.

"We are now into August and

we still have not officially launched," Barrett Xplore said in a statement issued to *Space News* Aug. 3. "We have between 50 and 100 units, but problems with the manufacturers continue, so we are still in our pre-signing phase. We are taking orders to get an idea of where to distribute once the product arrives. A couple of thousand units delivered now might be enough to permit us to start commercial deliveries. But the orders we have had from our dealers were in the tens of thousands."

Telesat Canada and WildBlue Communications Inc. of Denver are both using Telesat's Anik F2

SEE BROADBAND PAGE 4

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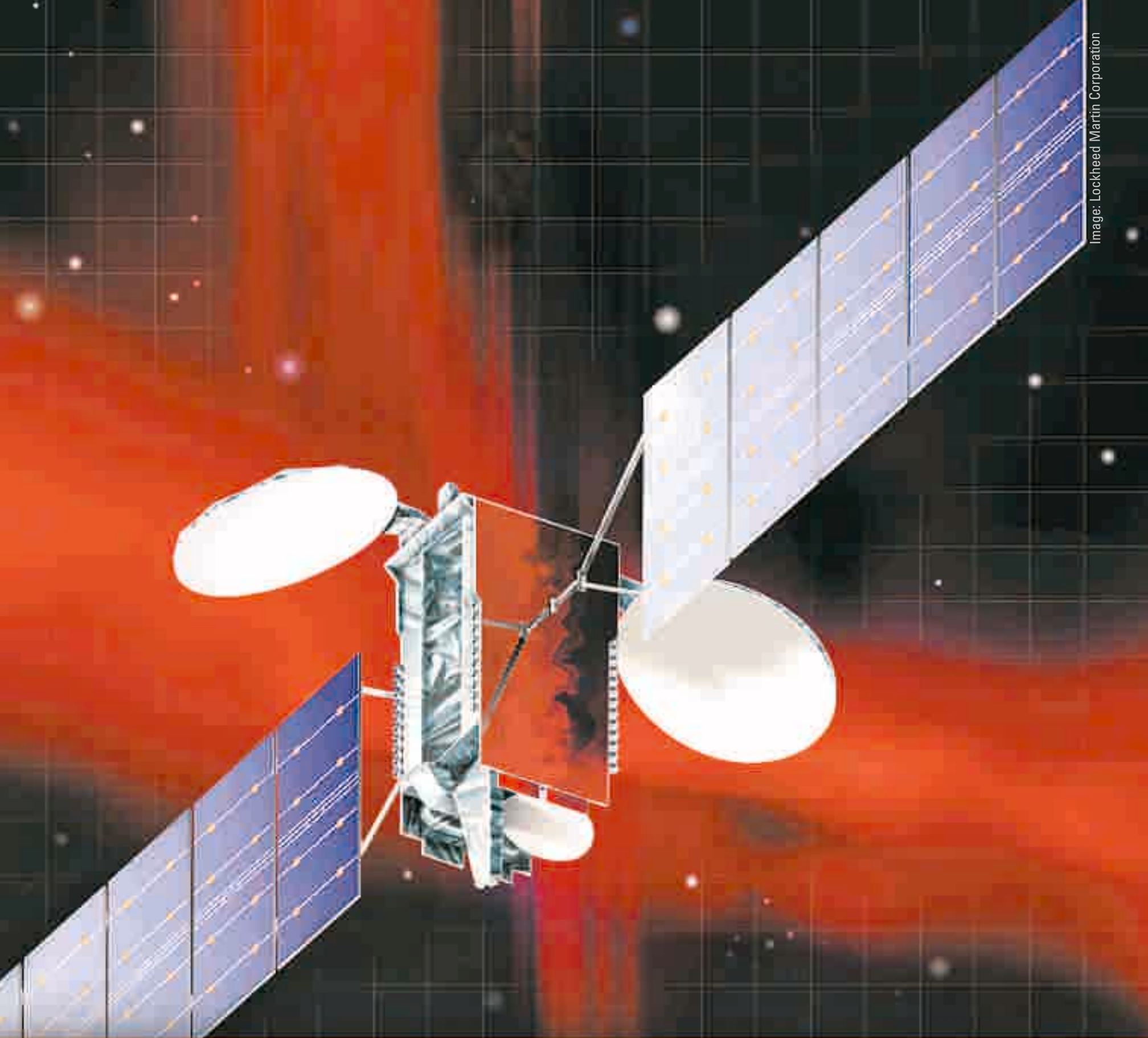


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August 8, 2005

NEWS BRIEFS

Pentagon Demurs on Long-Term Lease Deals

An eagerly awaited U.S. Defense Department review of its satellite transponder leasing habits has yielded recommendations that stick to largely the status quo, drawing a disappointed reaction from an industry advocacy group.

"The satellite industry as a whole is disappointed to see they didn't address multiyear procurement, and we are discussing next steps," David Cavossa, executive director of the Satellite Industry Association (SIA), said Aug. 5. The SIA, which represents satellite companies, has been pushing for long-term transponder leases and other changes in the way the Pentagon procures commercial satellite capacity. Currently the Pentagon relies heavily on short-term leases of capacity on an as-needed basis, a practice that industry officials say results in higher prices and makes it difficult for them to plan ahead to meet the needs of their largest single customer.

At the request of Congress, the Pentagon launched a review of its satellite capacity buying habits earlier this year. The resulting report, "Defense Commercial Communications Satellite Services Procurement Process," was released in July.

Boeing Satellite Exec To Leave at the End of 2005

Roger Roberts, Boeing vice president and general manager of space and intelligence systems and chief executive officer of Boeing Satellite Systems, informed company officials Aug. 5 that he will retire Dec. 31.

Roberts will be replaced by Howard Chambers, who currently serves as vice president of program management for Boeing Integrated Defense Systems, according to Marta Newhart, a company spokeswoman.

Newhart denied an Aug. 5 *Wall Street Journal* report that linked Roberts' retirement to Boeing's performance on the Future Imagery Architecture spy satellite program, which has run into repeated cost and schedule problems.

SpaceX to Announce New Falcon 1 Business

Space Exploration Technologies (SpaceX) expects to announce as many as four new orders during the month of August for launches aboard its Falcon 1 rocket. The company already has won three of those contracts, and expects to land the fourth soon, said Elon Musk, president of El Segundo, Calif.-based SpaceX.

"All I can say at this point is that we have three launch customers from three different countries, one of which is the U.S.," Musk said Aug. 5. Those launches will take place in 2008, he said.

Musk said he also anticipates winning a contract with the U.S. Air Force and Defense Advanced Research Projects Agency for a 2007 Falcon 1 launch under a program designed to foster development of a new generation of quick-reaction launch vehicles.

The four new missions would bring SpaceX's Falcon 1 launch backlog to seven.

The Falcon 1, which has been in devel-

opment for three years, is expected to debut from SpaceX's launch complex on the Kwajalein Atoll no earlier than Sept. 30. The payload for the inaugural mission is the U.S. Air Force Academy's experimental FalconSat-2 satellite. The rocket is designed to carry up to 670 kilograms of payload to an orbital altitude of 200 kilometers for \$5.9 million plus range fees.

Africa, Middle East Seen Driving C-Band Growth

Sub-Saharan Africa will be the hottest growth market for commercial C- and Ku-band satellite capacity in the next five years, with Western Europe among the most sluggish, according to a global satellite-demand assessment by Northern Sky Research.

The Orlando, Fla.-based consultancy estimates that global demand for C- and Ku-band satellite capacity will grow 3.1 percent per year between 2005 and 2010. But more than 90 percent of this growth will be in Ku-band. C-band demand will be flat in most areas — with two exceptions being the Middle East and North Africa, where it will grow with a thriving video market.

Another exception is North America, where demand for C-band will decline during the period.

The report, "Global Assessment of Satellite Demand, 2nd Edition," is consistent with other market forecasts in concluding that video broadcasting, which in 2004 accounted for 61 percent of all C- and Ku-band capacity leased commercially, will continue to increase its share of demand.

Global commercial satellite operators were beaming 10,650 standard-definition video channels in 2004, a 16.5 percent increase over 2003. High-definition television, which requires more satellite bandwidth than standard-definition television, will help keep the satellite-video market growing. High-definition television channels numbered just 56 in 2004, according to the study, but should be nearly 100 by the end of 2005, and around 200 in 2006.

The well-documented global trends — a healthier market for video than for traditional carrier-type telecommunications and telephony, and the gradual decline of C-band relative to Ku-band — mask the sharp differences among regions. The study attempts to assess regional demand for satellite capacity by measuring it in equivalent units of 36-megahertz transponders.

It also assesses regional pricing trends, despite the hazards. "Reliable transponder pricing is notoriously difficult to obtain... because of the large number of contract types and conditions," the study says.

It is much easier to count leased transponders, even if 36 megahertz of capacity in a high-value video neighborhood covering the United States or Western Europe can generate two or three times the annual revenues of the same transponder used for telephony.

By counting only leased C- and Ku-band transponders, Northern Sky concludes that Intelsat Ltd. was the world's biggest satellite operator in 2004, with 22 percent of the market. PanAmSat was second, with 15 percent of the market. SES Global followed at 12 percent, with Eutelsat S.A. of Paris in fourth position at 9 percent.

GOES Launch Delayed At Least Until Aug. 12

The launch of a new U.S. government weather satellite aboard a Boeing Delta 4 rocket from Cape Canaveral Air Force Station, Fla., has been delayed at least until Aug. 12 due to problems with communications subsystem components on the spacecraft, according to Robert Villanueva, a Boeing spokesman.

The launch of the Geostationary Operational Environmental Satellite (GOES) N (shown at right being encapsulated in its protective fairing for launch), also built by Boeing, previously was scheduled for July 28. The satellite had been expected to launch in May, but has been delayed by a series of launch vehicle issues.



NASA PHOTO

GOES-N

Initial SBIRS Launch Could Slip Yet Again

The U.S. Air Force's troubled Space Based Infrared System (SBIRS) missile warning satellite program may be in for further delays as the Pentagon conducts another review to justify continuing the effort.

The SBIRS satellites originally were scheduled to begin launching in 2002, but that date has slipped repeatedly, to June 2008. The latest date is now in jeopardy, according to an Aug. 3 Air Force news release.

SBIRS was expected to cost about \$2 billion when the system prime contract was awarded to Lockheed Martin Corp. in 1996. The program's total cost, driven up by funding-related delays and technical difficulties, was estimated at \$9.9 billion when the Pentagon submitted its 2006 budget request to Capitol Hill in February. The Air Force told Congress a month later that the cost would go up again by an unspecified amount.

Acting Air Force Secretary Michael Dominguez notified Congress July 28 that the program's cost was expected to increase by more than 25 percent, triggering a recertification review under a law known as the Nunn-McCurdy provision. The Pentagon will have to certify to Congress that SBIRS is essential to national security; no lower-cost substitutes exist; the new SBIRS cost estimates are realistic; and the program is structured to avoid further problems.

The Pentagon conducted a similar review on SBIRS in 2002, opting to continue the program with additional oversight from senior military and industry officials.

WorldSpace Shares Rise on First Day of Public Trading

Struggling satellite-radio provider WorldSpace Inc., riding a wave of investor enthusiasm for satellite-radio in the United States, successfully completed an initial public offering (IPO) of stock on the U.S. Nasdaq market Aug. 4. The stock price rose by nearly 6.5 percent on the first day of trading even after the company increased the number of initial shares and twice boosted the offering price.

Washington-based WorldSpace, which has two satellites in orbit, offered 11.9 million shares of stock — up from the originally planned 8.8 million — at a price of \$21 per share. The stock closed Aug. 4 at \$22.36, with 12.7 million shares traded, but slipped to close at \$20 Aug. 5.

WorldSpace is a founding shareholder in XM Satellite Radio, which along with competitor Sirius Satellite Radio has made subscription-based satellite radio a popular consumer product, with more than 7 million subscribers in the United States. XM, which uses WorldSpace technology for its system, recently agreed to invest in WorldSpace as an entry into the Asian market.

WorldSpace is targeting markets in India, China and Europe to offer a similar service. WorldSpace has spent \$1.2 billion developing its services over the past five years, but in 2004 generated less than \$9 million in revenue.

SEE BRIEFS PAGE 8



This Week on Space.com

The Homestead Project: The Mars Foundation presents plans for a permanent settlement on Mars.

Mars on Earth: Astrobiologists are closing in on how best to look for life on Mars, but they are doing so walking around on Earth.

SmallSats Move to Center Stage: Over the last year, significant progress has been made in using pico, nano and micro-satellites.

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August 8, 2005

Foam-Shedding Investigation Begins as Discovery Heads Home

TARIQ MALIK, HOUSTON

NASA's next space shuttle flight will not launch before Sept. 22 as engineers struggle to understand and fix the persistent foam debris issues with the launch system's external tank, agency officials said Aug. 5.

NASA had targeted Sept. 9 to launch the Atlantis orbiter on its STS-121 spaceflight, a second test of fixes made in response to the 2003 Columbia disaster. But the external tank foam shedded during Discovery's launch and other mission-processing activities have eaten away at that flight window, which closes Sept. 26, NASA officials said.

Despite the new concerns that the space shuttle's external fuel tank is still capable of shedding pieces of foam insulation large enough to cause a serious problem like the one that doomed Columbia and its crew during re-entry Feb. 1, 2003, NASA has not given up on the idea of launching the next mission in September.

"I don't presume the worst, I don't assume the best, I like to go where the data takes me," NASA Administrator Mike Griffin said Aug. 5 in a press conference at Johnson Space Center here.

While acknowledging that the cause and solution of the foam problem would have to become apparent very quickly for the agency to commit to a shuttle launch in September, Bill Gerstenmaier, the space station's program manager, told reporters Aug. 5 that NASA has not given up on launching the Space Shuttle Atlantis then, but is now targeting the end of the two-week window, or no earlier than



This photo of the shuttle Discovery, taken from the international space station, shows the damaged thermal blanket just above the "D" in Discovery under the orbiter's crew cabin window.

Sept. 22.

"Until we run out of lead time to make the September window we will preserve it ... because that is what the taxpayers pay us to do," Griffin said. "When we can no longer preserve the window, we will reset for November."

Griffin has appointed a tiger team to troubleshoot the cause of the foam shedding witnessed during Discovery's July 26 launch.

Gerstenmaier said he expects his first briefing from the tiger

team Aug. 9. The tiger team spent the week of Aug. 1 at Lockheed Martin's Michoud Assembly Facility near New Orleans, where the space shuttle external tanks are built.

"If next week, the guys have a eureka moment on the foam and say 'yes, we understand it' ... then we'll go forward," Griffin said.

NASA mission managers decided Aug. 2 that Discovery was ready to return to Earth on Aug. 8, and ruled out the need to conduct

a fourth spacewalk to repair a damaged thermal blanket that came loose near one of the orbiter's windows.

Gerstenmaier said he had not reviewed a 2004 internal NASA memo, first reported Aug. 3 by *The New York Times*, criticizing quality control on some foam application techniques. The report stated that engineers "did not do a thorough job" of tracking the minute variations in hand-applied foam, *The Times* reported.

"It's available, I'm sure, in all the other documentation that the teams are looking at," Gerstenmaier said. "We'll take that information and see if there are some things there, again from a technology standpoint or from an engineering standpoint, that we can use and apply."

During Discovery's July 26 launch, video from a camera mounted to its external tank recorded several pieces of foam insulation peel away during the ascent. A large, 0.4-kilogram chunk visibly popped free from a ramp previously thought safe from foam shedding. That chunk did not strike the orbiter, but at least three other foam pieces that also separated during the launch were too large to be considered acceptable, shuttle officials said.

The foam debris from Discovery's external tank disappointed shuttle engineers and Discovery's astronaut crew, given that NASA has spent two and a half years and about \$200 million of the \$1.4 billion devoted to its post-Columbia accident work toward revamping orbiter external tanks to prevent harmful foam shedding. Shuttle officials said

they will not launch another shuttle until they understand and address the foam issue.

A 0.8-kilogram of foam fell from Columbia's external tank during its launch and pierced the heat shield panel lining its left wing leading edge. That wing damaged allowed hot atmospheric gases to enter the wing during re-entry on Feb. 1, 2003, leading to Columbia's destruction and the deaths of all seven astronauts onboard, investigators found.

Gerstenmaier said that all of the imagery collected of Discovery's launch and subsequent orbital inspections has given engineers a wealth of data. "We learned a lot from this flight," Gerstenmaier said. "The next step ... is to look at the future tanks that are coming and see if there any applications from what we learned."

Only then will engineers decide whether to modify the external tank for Atlantis, which stands mated to its external tank-solid rocket booster launch stack in the massive Vehicle Assembly Building at Kennedy Space Center, or shift the orbiter to a completely new tank, Gerstenmaier added.

While the Sept. 22 launch date for Atlantis shaves about two weeks from its flight window, there are still multiple opportunities to launch the shuttle within the narrow flight window.

"It's still gives us four launch attempts toward the end of the window, and still looks good from a planning standpoint," Gerstenmaier said.

Brian Berger contributed to this story from Washington.

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BROADBAND FROM PAGE 1

satellite. Both have signed bulk orders for terminals from hardware manufacturers.

Ted Ignacy, chief financial officer of Telesat, said Aug. 3 that demand for the broadband service is just as strong as the company had hoped. But he also said that the consumer-hardware manufacturers have had trouble ramping up their production fast enough to meet demand.

"Right now demand is outstripping supply," Ignacy said. Telesat already has seen the first benefits of consumer broadband demand from its sales of Anik F2 satellite capacity to WildBlue and to the Canadian government. This capacity was pre-sold before Anik F2 was launched in July 2004 but was not booked as revenue until this year.

The early success of Anik F2 partly explains Telesat's record revenues and earnings for the three months ending June 30. As reported Aug. 3, Telesat posted net earnings of \$26.3 million, up 35 percent from a year earlier. Revenues, at \$137.3 million, were up 62 percent.

Ignacy said between 30 and 40 percent of the increase could be attributed to one-time events including Telesat's purchase of Spaceconnection, a satellite-services company that Telesat purchased in January.

Telesat and WildBlue both ordered satellite modems and transceivers from Vi-

aSat Inc. of Carlsbad, Calif. The modems are attached to users' computers, and the transceivers are part of the outdoor unit that features a two-way Ka-band antenna built by Raven Antenna Systems of Acrcrington, England.

Raven manufactures most of its antenna components and purchases some from China. The equipment is then sent to Raven's Bavaria, Ill., assembly plant, which was inaugurated in January.

Marc H. Agnew, ViaSat vice president for broadband systems, said ViaSat had trouble with its modem in the spring, and more recently slowed deliveries because of underperformance of its transceiver in extremely cold conditions.

"We are going from a couple of hundred units per month to 10,000 or more per month, and it is not unusual to face ramp-up issues," Agnew said Aug. 4. "Also, you have the fact that both WildBlue and Telesat are ordering the same product from us, and they are competing to get delivery."

Agnew said the issues related to the modem were resolved in May, and the transceiver-performance problem was resolved in June. There are no more issues that need to be resolved, other than those inevitably associated with manufacturing and shipping a new product.

ViaSat Chairman Mark H. Dankberg said in an Aug. 4 conference call with fi-

nancial analysts that ViaSat profit on the WildBlue and Telesat programs will be longer in coming than forecast, in part because of the continued research and development expense ViaSat is incurring to ensure that the product meets customer requirements.

"Overall, my impression is that it's gone pretty well," Dankberg said. ViaSat shipped 12,000 units in the three months ending June 30, with almost all of them occurring in June.

Raven Managing Director Richard Davies agreed with ViaSat's Agnew that part of the delivery bottleneck is due to the simultaneous demand for a new product from Telesat and WildBlue.

Davies said Aug. 5 that Raven had agreed with WildBlue and Telesat to deliver 100,000 antennas over two years. Since the commercial introduction of the systems in the United States and Canada in June, those forecasts have been revised upward.

"We now think that the 100,000-antenna mark will be passed after 12 months, not 24 months," Davies said. "The product has been more popular than anyone expected. It's great news, but it does take time to increase production in China and in Britain, and then to ship to the United States for assembly and delivery."

Davies said Raven shipped 2,000 antennas in June, 7,000 in July and plans to de-



Anik F2

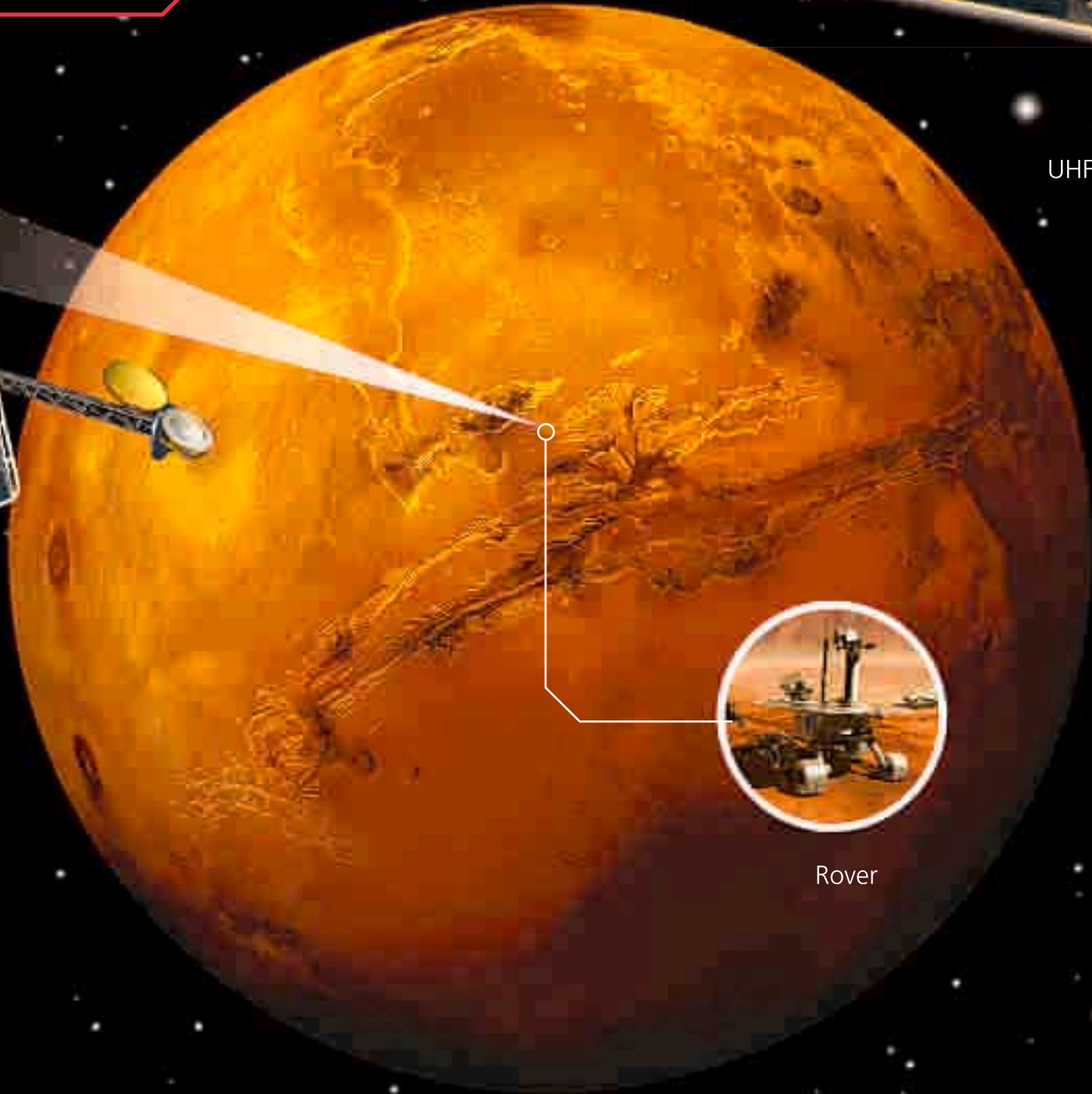
liver about 10,000 in August. By January, he said, deliveries should be between 10,000 and 15,000 per month.

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August 8, 2005

Satmex's U.S. Creditors Still Eager to Invest

Group Is Eager To Finance The Launch of Satmex 6

PETER B. de SELDING, PARIS

Satmex's U.S. creditors remain willing to advance the bankrupt satellite-fleet operator up to \$55 million in cash to permit the launch of a new, already-built satellite in early 2006 despite the fact that Satmex's bankruptcy proceedings will be conducted in Mexico, and not under a U.S. court's jurisdiction, the creditors' principal representative said.

Mitchell A. Harwood, managing director of the investment bank Evercore Partners of New York, which represents Satmex's U.S. creditors, conceded that the U.S. creditors had lost the battle of court jurisdiction. They had wanted to force Satmex to file for bankruptcy protection in the United States.

But he said they had nonetheless secured enough U.S. court backing to enable them to press their case with Satmex in the future, if the Mexican government's handling of the Satmex bankruptcy rides roughshod over the interests of the U.S. creditors.

For the moment, Harwood said, the U.S. creditors are willing to help salvage Satmex with cash to enable the company to finance the insurance premium and other launch-related costs of the Satmex 6 satellite, which has been in storage since October 2003, when Satmex ran out of cash.

"The financing is ready for

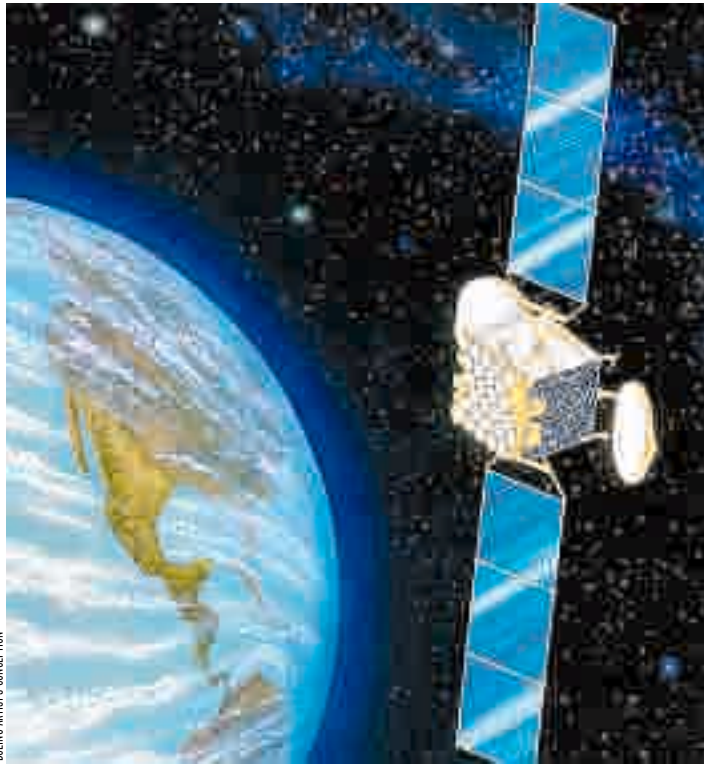
them if they want it," Harwood said in an Aug. 4 interview. "The Mexican government is not unaware that our interests and its interests should be the same with respect to Satmex." But should things go badly in Mexico, he said, the U.S. debtors reserve the right to seek a U.S. court order to attach a lien against Satmex's U.S. revenues.

Satmex generates nearly half its revenues through the sales of satellite services to U.S. companies. In 2004, satellite data-services provider Hughes Network Systems of Germantown, Md., was Satmex's biggest customer, accounting for 28 percent of Satmex's \$71.7 million in revenues.

Harwood said that the U.S. Bankruptcy Court for the Southern District of New York, which reviewed the Satmex case before accepting July 29 that Mexico would take the lead in the proceeding, left the door open for future action by the U.S. creditors if Satmex or the Mexican government do not proceed in a straightforward manner.

U.S. creditors, who hold most of the debt of Satelites Mexicanos, S.A. de C.V., in late May, had tried to force the company into a Chapter 11 U.S. bankruptcy filing. The Mexican government responded that Satmex, in which the government has a 25 percent equity stake, is a Mexican affair to be resolved in a Mexican court.

Satmex management appeared to side with the U.S. creditors in a



▲ Satmex operates two telecommunications satellites. Solidaridad 2 (above) is expected to continue operating for another 4.4 years; Satmex 5 is estimated to have nine more years of in-service life.

June 30 filing with the U.S. Securities and Exchange Commission (SEC). A bankruptcy procedure in Mexico, the company said, "may take significantly more time and be significantly less predictable than a reorganization case under U.S. laws."

Satmex operates two telecommunications satellites — Solidaridad 2, which was launched in 1994 and is expected to continue operating for another 4.4 years; and Satmex 5, launched in 1998, which has an estimated nine more years of in-service life.

Both satellites have suffered in-

orbit problems, and the Satmex 5 satellite is at risk of losing both its primary and backup electric-propulsion systems. Satmex 5, a Boeing 601 satellite model, is one of several Boeing-built satellites launched in the late 1990s whose xenon-ion propulsion system's (XIPS's) on-board power units were defective.

In May, the backup XIPS on Satmex 5 began performing defectively, forcing the company to return to the primary XIPS. If this one fails, Satmex would be able to operate for 3.7 years using its chemical-propellant system, ac-

ording to Satmex's SEC filing.

The shaky status of these satellites, plus their relatively limited geographic coverage and broadcasting power, have made the launch of Satmex 6 "critical to our ability to increase cash flows and improve our financial position," Satmex said in the SEC filing.

Satmex and its shareholder and supplier, Loral Space and Communications of New York, in late June agreed to resolve a series of payment disputes to permit Loral to return Satmex 6 from its French Guiana launch site to Loral's Palo Alto, Calif., manufacturing plant to be recertified.

A Mexican court must approve the Loral-Satmex deal before Satmex 6 is moved. If approval is granted quickly, Satmex 6 could be launched in early 2006, according to Satmex and Loral.

Satmex and the Arianespace commercial-launch consortium of Evry, France, continue to discuss possible launch dates aboard an Ariane 5 ECA rocket, a new version of Ariane 5 that has made only one launch, in February.

Satmex also is weighing the option of transferring Satmex 6 to Sea Launch LLC of Long Beach, Calif., whose Zenit-3SL vehicle operates from a platform in the Pacific Ocean. Arianespace and Sea Launch have a mutual-backup agreement, and Satmex officials are weighing whether to switch to Sea Launch to guarantee an early launch for Satmex 6. The Ariane 5 ECA launches two satellites at a time, meaning Satmex's launch would depend in part on Arianespace finding a compatible co-passenger.

Comments: pdeselding@compuserve.com

Competitor's Inmarsat Service Price Cuts Affect Stratos' Bottom Line

PETER B. DE SELDING, PARIS

Mobile satellite-services provider Stratos Global Corp., seeking to calm investor concerns, said the recent market-share and revenue declines in its Inmarsat business have been caused by a single, unnamed competitor that slashed prices to an extent that cannot be sustained.

The Bethesda, Md.-headquartered company, whose stock is traded on the Toronto Stock Exchange, has seen its Inmarsat business attacked since April by a dramatic price drop on the part of a competitor. The price promotion is for Inmarsat's Global Area Network (GAN) service, the voice, data and video communications links provided users equipped with small, portable terminals.

Stratos had warned investors in mid-July that pressure on its Inmarsat sales, as well as slower-than-expected expansion of its business-oriented mobile-broadband service, would prevent the company from reaching its financial targets. Stratos stock tumbled on the news and has since been trading near its 52-week low at 7.11 Canadian dollars (\$5.81). Stratos announced Aug. 2 that its mobile-satellite division's earnings dropped

by 8 percent, to \$10.7 million, for the three months ending June 30 compared to the previous three-month period. Sales for the division, at \$61.9 million, were down 4 percent.

Stratos reported company-wide earnings, before accounting for one-time events, of \$2.5 million on revenues of \$92.7 million — flat over the previous quarter despite the January purchase of a German broadband satellite-services supplier.

Stratos is the biggest of London-based Inmarsat plc's 31 global distributors. These companies purchase Inmarsat satellite capacity at fixed rates at the beginning of each year and then win discounts during the year when they hit preset sales-milestone targets.

Each distributor thus is aware of the wholesale cost of the services its competitors are buying from Inmarsat.

Stratos President Jim Parm said during an Aug. 2 conference call with financial analysts that "the intelligence we have" suggests that only one Stratos competitor has sharply cut GAN service prices.

Stratos in 2004 had a 25.3 percent share of the global market for Inmarsat services. Next was Telenor of Norway, with 23.5 percent; Xantix, a joint venture of KPN of The

Netherlands and Telstra of Australia, with 18.8 percent; France Telecom Mobile Satellite Communications, with 13.9 percent; and KDDI of Japan, 5.2 percent.

Several Inmarsat distributors owned by large telecommunications operators are now on the market as their parent companies focus on core businesses.

According to Stratos, pressure to show a high Inmarsat market share to prospective buyers is driving the competitor in question to reduce GAN prices to levels that provide little or no profit.

Parm said Stratos' other competitors have resisted the temptation to match the GAN price promotion. He said the problem should be resolved by the end of the year as Stratos and the other distributors respond to the challenge by sweetening their service offers — but not through dramatic price cuts.

"We won't match that price" level, Parm said. "But we are working with our government and military distributors to create customized prices and value-added services for this market. Our [sales] volumes have stabilized since April."

As he has said in the past, Parm said Stratos is keeping a relatively large cash balance to take advantage of opportunities as

competitors seek to exit the business. Stratos, he said, would be a buyer, not a seller.

"Stratos is the natural consolidator — we're the low-cost leader" in the Inmarsat-distribution sector, Parm said. "I feel that this is the year of consolidation for the mobile satellite services market. There are significant cost synergies from consolidation."

Accelerating the move toward consolidation is the drop in global Inmarsat business following the peak U.S.-led military activity in the Middle East, centered on Afghanistan and Iraq. Inmarsat sales peaked in 2003 and have since drifted down.

Stratos Chief Financial Officer Alfred C. Giammarino said the company's January purchase of Plenexis Holding GmbH of Bonn, Germany, a supplier of corporate and government satellite services, will take time to realize its potential.

Plenexis reported \$40 million in revenues in 2004, but Giammarino forecast about \$30 million for 2005. "This was a financially challenged business," Giammarino said. "It will take six months to re-establish Plenexis' momentum. We expect modest growth in the second half" of this year.

Comments: pdeselding@compuserve.com



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Carried the first American into space.

Carried the first human beings to the moon.

Powered space probes to nearly every planet in the solar system.

Created the electric power system for the International Space Station.

Photo Credit: Carleton Bailie for Boeing

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NEWS BRIEFS

BRIEFS FROM PAGE 3

Sea-Based X-Band Radar Gets Formal Dedication

U.S. military officials dedicated the Sea-Based X-Band Radar (SBX) July 26 at a ceremony at Kiewit Offshore Services in Corpus Christi, Texas. The new device will be able to track and assess ballistic missile threats as part of the Ground-based Midcourse Defense program, Boeing Co. of Chicago announced in a July 26 news release. Boeing is prime contractor on the Ground-based Midcourse Defense system and built the SBX.

The SBX consists of an advanced X-band radar mounted on a converted oil-drilling platform about 70 meters wide and 120 meters long. The system will collect and transmit data to elements of the ballistic missile defense system that operate sea- and ground-based interceptors.

The radar will be able to move throughout the Pacific Ocean from its home port in Adak, Alaska, where it will head in several months after sea tests and exercises.

United Technologies Now Owns Rocketdyne

United Technologies Corp. on Aug. 2 closed on its purchase of Boeing's Rocketdyne Propulsion & Power unit, which builds the main engines for the space shuttle and other launch vehicles.

The \$700 million deal, announced in February, narrows the field of U.S. competitors in the liquid-fuel rocket propulsion business to two: Pratt & Whitney Space Propulsion, a division of Hartford, Conn.-based United Technologies; and GenCorp Aerojet of Sacramento, Calif.

Patrick Loudon, a spokesman for Pratt & Whitney Space Propulsion of West Palm Beach, Fla., said the sale will give the company a comprehensive product line that can better serve customers. He did not comment on how much additional revenue the deal could bring.

"This will make us better able to support the launch industry, and ultimately our customers, including NASA and its vision for space exploration," Loudon said.

Fernando Vivanco, a spokesman for Chicago-based Boeing, said the company sold Rocketdyne to concentrate on other business areas.

"We've been focusing more and more on systems integration," Vivanco said. "Owning the ability to produce propulsion systems is not what I'd call a strategic core competency for Boeing."

Rocketdyne, based in Canoga Park, Calif., has additional facilities in Alabama, Mississippi and Florida, and employs approximately 3,000 workers. Loudon said nothing will change for Rocketdyne, at least for now.

"For the foreseeable future we're telling our employees that everything will stay the same ... that right now, everything will be stable," Loudon said.

Rocketdyne does significant business with various Boeing units, and that relationship is expected to continue.

"We've been a customer before, and now Boeing will become a customer," Loudon said.

European Venus Probe Bound for Baikonur

Europe's Venus Express satellite is expected to arrive at the Russian-run Baikonur Cosmodrome in Kazakhstan the week of Aug. 8 in preparation for a late-October launch aboard a Russian Soyuz-Fregat rocket, the European Space Agency announced. The spacecraft will spend five months en route to Venus orbit once launched.

The satellite was packed into a container at the Toulouse, France, facility of prime contractor EADS Astrium for its flight to Baikonur, via Moscow, aboard an Antonov 124 cargo jet.

Built in three years, Venus Express features equipment already in use on Europe's Mars Express satellite, with modifications to account for the operating environment of Venus orbit. The total mission budget, including satellite construction, seven observing instruments and two years of operations in elliptical Venus orbit, is 220 million euros (\$266 million).

Chandra Star Observations Raise Questions About Sun

Scientists using data from NASA's Chandra X-ray Observatory have determined there is three times as much neon in Sun-like stars as is estimated to be in the Sun, which may indicate that those estimates are off the mark.

It is difficult to take precise measurements of neon because its atoms do not emit signatures in visible light. While Chandra is capable of taking X-ray readings of neon in distant stars, the Sun is too close for such observations, said Jeremy Drake of the Harvard-Smithsonian Center for Astrophysics in Cambridge, Mass. The spacecraft's sensors have too narrow a field of view to capture the entire Sun and also could be destroyed by the intensity of the Sun's rays, he said.

Neon, along with carbon, oxygen and nitrogen, is vital to the energy flow from nuclear reactions in the Sun's core to its edge. Obtaining a more accurate estimate of neon in the Sun would help scientists build new theoretical models of the Sun to better understand its workings.

Cloud on Saturn Moon Indicates Ice Volcanism

NASA's Cassini spacecraft has discovered a large cloud of water vapor over the south pole of Saturn's icy moon Enceladus, indicating ice volcanism on a body that scientists say should be cold and dead.

In its July 14 flyby of Enceladus, Cassini also found warm fractures where evaporating ice likely supplies the water vapor cloud, NASA said in a July 29 press release.

"Enceladus is the smallest body so far found that seems to have active volcanism," Torrence Johnson, Cassini imaging team member at NASA's Jet Propulsion Laboratory in Pasadena, Calif., said in a statement. "Enceladus' localized water vapor atmosphere is reminiscent of comets. Warm spots in its icy and cracked surface probably are the result of heat from tidal energy like the volcanoes on Jupiter's moon Io."

Cassini's spectrometer found water vapor comprises about 65 percent of Enceladus' atmosphere, with molecular hydro-



Messenger

NASA's Mercury Orbiter Completes Earth Flyby

NASA's Messenger spacecraft swung by Earth Aug. 2 for a gravity-assisted boost that propelled it deeper into the solar system to study Mercury, the least explored of the terrestrial planets including Venus, Earth and Mars.

Messenger used Earth's gravity to sling it into a trajectory toward Venus for two scheduled gravity-assist flybys in October 2006 and June 2007. These flybys will propel Messenger toward Mercury, where it will make another three flybys — in January 2008, October 2008 and

September 2009 — to help place the spacecraft into orbit around the planet for a yearlong science mission starting in March 2011.

Messenger will provide the first images of the entire planet of Mercury, as well as collect data on the planet's crust, geological history, atmosphere and its core and polar materials. The spacecraft, which launched from Florida's Cape Canaveral Air Force Station Aug. 3, 2004, is operated by the Johns Hopkins Applied Physics Laboratory in Laurel, Md.

gen accounting for about 20 percent and the rest a mix of carbon dioxide, molecular nitrogen and carbon monoxide. Readings indicate the south pole also is warmer than the rest of the moon, especially near the tiger stripe-like fractures that characterize the south pole terrain.

Scientists speculate the moon is geologically active enough to replenish the water vapor at a slow continuous rate, as it does not instantly escape into space.

Iridium Subscriber Rolls Increased In Past Year

Mobile satellite communications provider Iridium Satellite LLC of Bethesda, Md., has seen a 20 percent increase in subscribers since mid-2004, with 127,000 subscribers as of June 30, the company announced Aug. 1 in its mid-year report.

The new total also represents an 11 percent increase in subscriptions since December 2004, when the company had about 114,000 customers.

Iridium's revenue for the first half of 2005 increased about 27 percent over total revenue for the same period last year. Iridium spokeswoman Liz DeCastro would not provide exact figures.

Organizers Ratchet up Student Rocket Contest

The Team America Rocketry Challenge has decided to make next year's rocket contest for middle and high school students a lot more difficult, requiring competitors to shoot their rockets to altitudes as close to 240 meters as possible in flights lasting about 45 seconds.

The event, cosponsored by the Aerospace Industries Association (AIA) and the National Association of Rocketry, still will require the rockets to carry a raw egg as a payload that must be returned to the ground unbroken.

The AIA estimates about 10,000 students participated in this year's contest, with a team from Dakota County, Minn., taking the top prize. Next year's event is scheduled to take place May 20 at Great Meadow in The Plains, Va.

Boeing Connexion Service Wins Intel Certification

Connexion by Boeing is the first provider of high-speed Internet services to commercial airline passengers to get the seal of approval from chip maker Intel Corp., Connexion announced Aug. 1.

The Wireless Verification Program tests Intel's Centrino mobile technology with various access point devices and providers to figure out whether the two are compatible. If the hotspots are found to work with laptops built with the Centrino technology, Intel awards certification.

Santa Clara, Calif.-based Intel has recognized 103 companies through its Wireless Verification Program for Internet services in hotel rooms, lobbies and other areas. Seattle-based Connexion is the first to get the nod for airline service, Connexion spokesman Terrance Scott said. The Intel verification program's purpose is to minimize service problems such as downtime and poor site coverage.

Scott said the Intel certification will award instant recognition for Connexion.

"In the mind of the consumer, they know Boeing already as an aircraft manufacturer, and this partnership really puts an additional stamp of approval on the services customers want and need," Scott said.

Connexion has been delivering high-speed Internet services to airborne customers for 14 months now, Scott said. The venture has 600 agreements with corporations to provide wireless services through either a flat rate or a per-minute fee structure.

August 8, 2005

Sirius Makes Big Subscriber Gains But XM Still Leads Market

MISSY FREDERICK, WASHINGTON

Sirius Satellite Radio Inc. picked up a significant number of new customers, leading to a big increase in second-quarter revenue, but still trails far behind competitor XM Satellite Radio, Inc.

New York-based Sirius finished the second quarter with 1.81 million subscribers, a 59 percent increase in subscribers compared to the same period a year ago, when the company had 1.14 million subscribers. Sirius filed its 2005 second quarter financial report Aug. 3.

XM Satellite Radio of Washington, by contrast, finished the second quarter with 4.42 million subscribers, a 110 percent growth over its 2.1 million subscribers at the end of the 2004 second quarter. The company added 647,226 subscribers in the 2005 second quarter.

The increased subscriber-base for Sirius offered a boost to revenue, which came in at \$52.19 million for the quarter, \$49.62 million of that from subscribers. In 2004, revenues were at \$13.23 million at the end of the second quarter.

Operating expenses, however, also were up, at \$226.78 million for the second quarter, compared to \$146.22 million in 2004. Sirius ended the quarter with a net loss of \$177.55 million, \$40.75 million more than its second quarter losses in 2004.

The company has operated at a loss since its inception, and said in the report it expects to continue to do so "until the number of our subscribers increases substantially."

Sirius will have to contend with even higher operating expenses as its high-profile additions of radio personalities and sports programming begin to take effect. Its contract with U.S. entrepreneur Martha Stewart begins in the third quarter, and agreements with shock-jock Howard Stern and for NASCAR broadcasts are scheduled to follow in 2006 and 2007, the report said.

The quarter also saw the announcement of an agreement between Sirius and Ford Motor Company of Dearborn, Mich., to have an exclusive relationship until September 2011, through which Sirius will supply satellite radio receivers to be installed in Ford vehicles upon a customer's purchase or lease.

Comments: mfrederick@space.com

EMS Reports Record Revenue

MISSY FREDERICK, WASHINGTON

EMS Technologies Inc. has yet to finalize the sale of its two Montreal-based commercial space divisions, but company officials said it should happen well before the end of the year.

The Norcross, Ga.-based company held a conference call with financial analysts Aug. 3 to discuss its second-quarter earnings report.

Overall for the quarter, EMS had what company Chief Executive Officer Al Hansen called record revenue, bringing in \$3.9 million in earnings compared with \$1.8 million in 2004's second quarter.

Total sales for the quarter were at \$81.6 million, up significantly from \$62.1 million for the same time period the year before.

Operating income, coming in at \$7 million, was the highest in several years, Chief Financial Officer Don Scartz said.

During the call, Hansen said letters of intent have been execut-

ed with buyers of both the Canadian units: Satellite Networks and the Space & Technology division. The company is in the "due diligence" phase, Hansen said, and expects to complete the transaction late in the third quarter or early in the fourth quarter of 2005.

Satellite Networks has been a drag on company business in the past largely due to problems associated with the antenna it is supplying for the Canadian Space Agency's Radarsat-2 program.

EMS's involvement with Radarsat-2 will end once the sale of Satellite Networks is finalized. In this quarter, however, the program did not have a negative financial effect on the company, according to Gary Shell, a spokesperson for investor relations.

"We didn't specifically address it in the conference call because we're in the very final stages of wrapping that up, and it didn't have an impact on the quarter," Shell said in a follow-up interview, though he would not give a specif-

ic date for the close of the project.

The company's LXE division, which handles mobile computers and wireless local area networks, set a new sales record for the 11th consecutive quarter, Hansen said. The division posted \$31.6 million in net sales, compared with \$27.7 million during second quarter the year before, and \$1.3 million in earnings from continuing operations, up from \$900,000 for the same quarter last year.

"I would best describe [LXE] as a revenue- and profit-generating machine," Hansen said.

Scartz attributed the record revenue in part to high sales of vehicle-mounted terminals. For LXE, the company has made a \$1.7 million investment in new initiatives, including both wearable and voice-activated units, Scartz said.

LXE is looking to expand its business primarily in southeast Asia, Hansen said.

The defense and space systems division of EMS showed \$13.3 million in sales, up from

\$12.2 million in 2004 at this time, and \$800,000 in earnings, \$500,000 higher than second quarter 2004.

In the defense area, Hansen alluded to large potential government contracts on the horizon, without specifying further, saying he had a "high degree of confidence we will be successful in capturing them."

Defense and space revenue dropped off first quarter due to some restructuring of defense business as well as technical problems, Hansen said, but bounced back in the second quarter. The company is developing antennae to be used on narrow-bodied aircraft, and expects it will become "the standard for airlines," he said.

The company's SATCOM division, which handles antennae and terminals for aeronautical, land-mobile and maritime communications via satellite, earned \$12.2 million in net sales, up from \$9.5 million during second quarter 2004. Earnings for the division were \$900,000, higher than 2004's \$500,000 for second quarter.

Comments: mfrederick@space.com

MONTHLY Launch Report



A Japanese M-5 rocket successfully launched the Astro-E2 X-ray astronomy satellite July 9 from the Uchinoura Space Center. While Space Shuttle Discovery (right) successfully launched July 26 from Kennedy Space Center, Fla., marking the shuttle fleet's return to flight, NASA announced a grounding of further shuttle flights due to the detection of foam separating from Discovery's external fuel tank.

JULY Launches

Date	Launch site	Vehicle and provider	Payload and owner	Outcome or purpose
July 9	Uchinoura Space Center, Japan	M-5 rocket, JAXA	Astro-E2, JAXA	Launched X-ray observatory spacecraft.
July 26	Kennedy Space Center, Fla.	Space Shuttle Discovery, NASA	STS-114 mission, NASA	Launched first shuttle mission to the international space station since the loss of Space Shuttle Columbia.

AUGUST Launches

Date	Launch site	Vehicle and provider	Payload and owner	Outcome or purpose
Aug. 10	Cape Canaveral Air Force Station, Fla.	Atlas 5, Lockheed Martin	Mars Reconnaissance Orbiter, NASA	To launch Mars orbiter.
Aug. 11	Guiana Space Center, Kourou, French Guiana	Ariane 5G, Arianespace	iPSTAR 1, Shin Satellite	To launch communications satellite
Aug. 18	Plesetsk Cosmodrome, Russia	Rocket, Khronichev State Research and Production Space Center	Monitor-E, Khronichev State Research and Production Space Center	To launch remote sensing satellite.
Aug. 24	Baikonur Cosmodrome, Kazakhstan	Dnepr, ISC Kosmotras	OICETS nad INDEX spacecraft, National Space Development Agency of Japan	To launch test satellite and technology demonstration experiment.
Aug. 30	Vandenberg Air Force Base, Calif.	Delta 4, Boeing	Classified payload, National Reconnaissance Office	To launch classified payload for National Reconnaissance Office.
August	Baikonur Cosmodrome, Kazakhstan	Proton-M, Khronichev State Research and Production Space Center	Anik F-1R, Telesat Canada	Communications satellite launch delayed due to satellite problems.
August	Cape Canaveral Air Force Station, Fla.	Delta 4, Boeing	GOES N, NASA and NOAA	Weather satellite launch delayed due to spacecraft problems.
August	Baikonur Cosmodrome, Kazakhstan	Soyuz-FG, TSSKB-Progress	Galaxy 14, PanAmSat	Communications satellite launched delayed for technical reasons.

COMPILED BY CORRESPONDENTS TARIQ MALIK AND SIMON SARADZHAN

◀ Small Satellites and Small Launchers ▶

Standard Interfaces Could Help Unlock Potential of Small Sats

JEREMY SINGER, WASHINGTON

The U.S. Defense Department's interest in small satellites has given rise to efforts to develop platforms and components with standard interfaces that would allow planners to mix and match hardware to perform a variety of missions at an economical cost.

In one such effort, the Pentagon expects to award a contract in late 2005 for development of the Standard Interface Vehicle, a common satellite platform that could host a variety of payloads.

The Standard Interface Vehicle could lead to cost savings that enable the military to fly more of the experimental payloads that get built but then languish on the ground because funds are not available to launch them, according to a Defense Department Space Test Program statement-of-objectives document for the program dated June 13.

The Space Test Program finds rides to space for military experiments that have been ranked in priority by a Defense Department-wide group called the Space Experiments Review Board. The program finds rides at no charge to the experimenter for ranked projects, but provides launches for unranked payloads on a reimbursable basis.

The Standard Interface Vehicle should be compatible with a variety of rockets, according to the document, which was posted on a Pentagon Web site. Among these rockets are Boeing's Delta 4 and Lockheed Martin's Atlas 5, which were developed under the U.S. Air Force's Evolved Expendable Launch Vehicle (EELV) program and which launch the majority of U.S. military payloads. Therefore the platform must be compatible with the EELV Secondary Payload Adapter, a ring-shaped device that enables both vehicles to accommodate multiple secondary payloads, the document said.

The Space Test Program hopes to launch the first Standard Interface Vehicle in late 2008, according to Air Force Lt. Col. Dan Griffith, acting director of the Space Test Program.

Pentagon leaders have expressed increasing interest in recent years in using small satellites, not just for experiments but also to support military operations. One set of Pentagon programs, generally referred to under the heading of responsive space, aims to develop a new breed of satellites and rockets that can be launched on short notice to meet military contingencies as they arise.

Congress has been largely supportive of the effort. For example, some of the committees that oversee Pentagon spending have proposed increasing the military's 2006 budget request for responsive space activities.

The Standard Interface Vehicle is by no means the only effort of its type. The Pentagon's Office of Force Transformation in Arlington, Va., is developing a common spacecraft platform that could

debut later this decade as part of its TacSat program, which aims to develop small satellites that can be tasked and controlled by forces in the field. The proposed mission, dubbed TacSat-3, would fly an experimental hyperspectral imaging payload, according to Pentagon officials.

Meanwhile, the Naval Research Laboratory in Washington, and the Johns Hopkins Applied Physics Laboratory in Laurel, Md., are leading an industry and academic consortium developing a more advanced version of the platform intended for use on TacSat-3.

Pat Patterson, manager of the Technology Development branch at the Utah State University's Space Dynamics Laboratory in Logan, said the adoption of standard interfaces for small satellite hardware could lead to capabilities that cannot even be imagined today.

To illustrate that point, Patterson drew an analogy with the personal computer industry, where the use of common ports for Internet connections and accessories enable easy integration of systems. This has led to the development of new devices such as flash memory cards that can be carried on a keychain and plugged into most computers, he said.

Another advantage of standardized satellite platforms with common component and instrument interfaces is that they would be less costly than custom-built hardware because they could be produced in relatively large quantities, Patterson said.

Despite these advantages, not everyone is sold on the benefits of standardization, and industry has made few strides in that direction, said Patterson, who is chairman of the 19th Annual American Institute of Aeronautics and Astronautics/Utah State University Conference on Small Satellites in Logan Aug. 8-11. The conference will feature a variety of presentations on the pros and cons of standardization.

One of the downsides of standardization is that it can require compromises in capability, said Quinn Young, a senior mechanical engineer at the Space Dynamics Laboratory. Standardization also can drive up the weight of a satellite because the platform is designed to accommodate a large number of applications, he said.

The potential market for satellite platforms, components and instruments with standard interfaces is not clear at this point, Young said. While the Pentagon has several standardization initiatives under way, neither the military nor NASA is buying small satellites in large quantities, he said.

This leaves some companies uncertain as to whether it is worth investing significant internal research and development dollars on standard hardware that may be used on only a few satellites, Young said.



▲ Scientists say that data from NASA's Lunar Prospector has produced decent gravity maps of the near side of the Moon, but that today's small satellites can be used for future missions to map the far side of the Moon (shown in the 1996 Galileo image above).

Small Satellites May Play Big Role In Future Interplanetary Missions

BRIAN BERGER, WASHINGTON

Proponents of small satellites say that tiny spacecraft have potentially big roles to play in planetary exploration.

Today's small satellites — generally spacecraft weighing around several hundred kilograms — are confined largely to low Earth orbit where they perform remote sensing missions, conduct science operations and serve as technology testbeds and communication relays.

But some forward thinkers are already looking ahead to interplanetary missions and see small satellites as a good fit with the space exploration agendas outlined by the world's spacefaring nations.

The European Space Agency, for example, is taking a look at a low-cost, multiple spacecraft Venus mission that would utilize small satellite technologies, including a small, deployable weather balloon of sorts, to study the planet. The Indian Space Research Organisation last year short listed a gravity-mapping nanosatellite for inclusion on its Chandrayaan-1 lunar orbiter mission.

Andy Phipps, a senior engineer at the British small satellite company Surrey Satellite Technology Ltd., said his team recently completed a so-called technology reference study funded by the European Space Agency to identify the technologies and design philosophy needed for the proposed Venus mission.

Phipps said his team spent 18 months and several hundred-thousand Euros developing a mission concept featuring two orbiters packed with miniaturized instruments and a tiny aerobot that would be dropped into Venus' corrosive atmosphere.

The aerobot, consisting of an instru-

ment-laden gondola suspended from a balloon, would add about 90 kilograms of mass to one of the orbiters, a data relay satellite that would be placed in a highly elliptical orbit around Venus. The aerobot would be dropped into Venus' atmosphere where it would float at an altitude of 55 kilometers, circumnavigating the planet several times during its projected 15- to 22-day mission.

The other orbiter would be packed with miniaturized instruments and would circle the planet at a lower altitude, imaging the planet and making scientific measurements.

The proposed orbiters themselves would be relatively small for interplanetary spacecraft, weighing several hundred kilograms apiece. NASA's Mars Reconnaissance Orbiter, in contrast, will weigh nearly 2,200 kilograms at launch and require an Atlas 5 rocket to reach orbit.

The two satellites and the inflatable robotic stowaway would launch on a single Russian-built Soyuz rocket equipped with an upper stage. The total projected mission cost, Phipps said, is several hundred-million dollars, or about one-tenth of what the U.S. and Europe spent on the Cassini-Huygens mission to Saturn.

The proposed Venus Entry Probe mission is only one of a half-dozen mission ideas the European Space Agency is considering as it looks ahead to the 2015-2025 timeframe to try to understand what technologies it should be investing in now.

Phipps said the technology needs of the Venus Entry Probe mission are considerable and include: highly protective cover glass to shield imaging instruments from acid rain; steerable planar array antennas to increase

August 8, 2005

Hopes Rekindled for Low-cost Launches

BRAD AMBURN, WASHINGTON

The Falcon 1 rocket developed by Space Exploration Technologies Corp. (SpaceX) of El Segundo, Calif., is the first of what industry and government officials hope will be a host of new vehicles and systems providing low-cost flight opportunities for experiments and other small payloads.

Affordable access to space has been a longstanding problem for university researchers and others on tight budgets, said Charles Swenson, director of the Center for Space Engineering at Utah State University in Logan.

"There have always been few opportunities to launch small payloads," Swenson said in a phone interview. "Over the last year or two, those opportunities have shrunk even more because we can no longer make use of the shuttle for launching small payloads."

With no program in the United States to regularly provide secondary flight opportunities for low-cost payloads, Swenson said, SpaceX and other such ventures may be the only near-term hope. SpaceX's Falcon 1 "and other low-cost launchers [in development] appear to be the only way to get small payloads into orbit. It is the only credible outlook on the horizon," he said.

After numerous delays, the Falcon 1, which SpaceX President and founder Elon Musk said will cost \$5.9 million per launch, plus range fees, is scheduled to debut no earlier than Sept. 30 from SpaceX's launch complex on the Kwajalein Atoll in the Pacific Ocean. The payload is an experimental satellite funded by the U.S. Defense Advanced Research Projects Agency and built by students at the U.S. Air Force Academy in Colorado Springs, Colo.

Musk said in an interview that the Falcon 1's first stage shipped out Aug. 2 on a 28-day journey by sea to the atoll. The rocket's second stage, he said, is to be delivered to Kwajalein aboard a C-17 cargo aircraft in late August.

For the last decade or so, the primary launch option for small U.S. government-sponsored satellites has been the air-launched Pegasus rocket. Built by Orbital Sciences Corp. of Dulles, Va., the Pegasus launches small satellites at prices starting above \$15 million.

That price tag puts the Pegasus out of reach for small companies like SpaceDev of Poway, Calif.

"It doesn't make sense to make a \$5 million or \$10 million satellite and pay nearly \$20 million to get it launched," said Jim Benson, founding chairman and chief executive officer of SpaceDev.

SpaceDev is working on its own low-cost rocket, dubbed Streaker, with funding help from the Pentagon. Benson says his company is about three years and \$25 million away from completing development of the vehicle.

"We have all the pieces of the puzzle under contract, it's just go-

ing to take a relatively small amount of time to get everything together and start launching," Benson said. "We want to unleash the demand for small satellites that we hope to build."

To help accomplish this, Benson said SpaceDev is considering buying multiple Falcon 1 rockets from potential competitor SpaceX. "It is more important to get these things launched. It is important

that [the United States] have a small expendable launch vehicle."

NASA, meanwhile, is designing hardware that would enable secondary payloads to launch aboard vehicles like the Streaker whose development is being subsidized by the Pentagon. The Multiple Payload Ejector, being developed at NASA's Wallops Flight Facility in Virginia, would deliver up to six small payloads to orbit, said Gary

Letchworth, technical manager for the advanced projects office at Wallops.

"We are trying to build a capability that can service the smaller side of the market that has been left out in the cold," Letchworth said. He said NASA hopes to have the ejector built and tested by the spring of 2006.

Swenson said that while prospects for small payload flight opportunities are looking up, the future would be brighter if the U.S. government would implement a program to regularly in-

clude secondary payloads on its operational launches.

The U.S. Air Force has designed hardware to accommodate secondary payloads on its workhorse rockets, but the effort has gained little momentum because satellite managers are reluctant to share their rides to space, Swenson said. "The risk is not as great as it is perceived to be," he said. "Personally, I think nothing ventured, nothing gained."

Brian Berger contributed to this story.
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SPECIAL: SMALL SATELLITES AND SMALL LAUNCHERS

SMALLSAT FROM PAGE 10

data return from the aerobot; higher efficiency solar cells; low-mass structural components that can withstand the planet's corrosive environment; and lightweight thermal protection system for the aerobot's entry vehicle.

Phipps' colleagues will be presenting the Venus Entry Probe mission concept at the 19th Annual

Small Satellite Conference in Logan, Utah, Aug. 8-11.

Also presenting at the conference is a group of Canadian scientists and engineers that have come up with a nanosatellite mission dubbed Lunette that would map the gravitational field of the far side of the Moon.

Kieran Carroll, a Lunette team member and director of technology development at Gedex Inc., a

Toronto-based start-up company specializing in terrestrial gravity mapping for mineral exploration, said better maps of the Moon's irregular gravitational field would shed more light on the lunar interior, aid the cause of exploration by potentially locating useful resources below the Moon's surface and help engineers better plan and operate missions in lunar orbit.

Carroll said that when space-

craft began orbiting the Moon in the 1960s it became clear just how lumpy and irregular the Moon's gravitational field is compared to the Earth's. Spacecraft tracking data obtained during the Apollo program and more recently from NASA's Lunar Prospector mission have produced decent — yet far from perfect — gravity maps of the near side of the Moon. But gravity maps of the Moon's far side, Car-

roll said, are "largely guess work at this point" because Earth-based tracking stations lose sight of spacecraft as they travel over the lunar horizon.

The Lunette mission would solve that problem, Carroll said, by substituting spacecraft-to-spacecraft tracking for Earth-based tracking. Lunette is a five-kilogram payload that would be added to a low altitude, lunar polar-orbiting satellite mission such as the Indian Space Research Organisation's Chandrayaan-1, or NASA's Lunar Reconnaissance Orbiter. The payload consists of a three-and-one-half-kilogram nanosatellite and a small amount of equipment that would need to be left behind on the parent spacecraft for the mapping mission.

The Lunette nanosatellite would be released from its parent spacecraft and then maintain a distance of 100 kilometers. The two spacecraft would send signals back and forth using low-power transponders. By measuring slight changes in the signal, the differential effect gravity has on each spacecraft can be measured, enabling scientists and engineers to create a detailed map of the Moon's lumpy gravitational field.

"All the gravity models of the Moon have been done using similar techniques except tracking stations on the Earth have sent signals to spacecraft at the Moon," Carroll said. "That's a classic range-rate tracking exercise NASA does on almost all spacecraft it sends into deep space."

While that tried and true technique works fine for mapping the side of the Moon that faces Earth, it does not work so well for the far side of the Moon, Carroll said. "What we aim to do is to do Doppler tracking on the far side of the Moon by tracking between one spacecraft and another."

The Indian Space Research Organisation short listed Lunette for inclusion on Chandrayaan-1 last year, Carroll said, but had to move on when the team was unable to secure an immediate funding commitment from the Canadian Space Agency.

Likewise, the window of opportunity for including Lunette on the Lunar Reconnaissance Orbiter has closed. NASA already has chosen its payloads for the 2008 mission, and the NASA official in charge of the project said it is too late to accommodate something like Lunette. "Effectively the door is closed because of the timing," NASA Lunar Reconnaissance Orbiter program manager Mark Borkowski said.

Carroll said the team is still trying to line up a funding commitment for the mission, which he said could be done for a "Canadian-sized prize" of just a few million dollars provided accommodations for the tiny nanosatellite can be secured aboard some future Moon-bound orbiter.

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August 8, 2005

New Skies Increases Transponder Fill Rate

PETER B. de SELDING, PARIS

Satellite-fleet operator New Skies Satellites Holdings Ltd. has increased the fill rate on its five operating satellites to 61 percent from 52 percent a year ago with no substantial reductions in its transponder-lease prices, New Skies Chief Executive Dan Goldberg said.

Presenting the Bermuda-headquartered, Netherlands-based company's financial results Aug. 4, Goldberg said transponder prices worldwide have generally held steady in recent months. The average price for new business booked by New Skies this year stayed at around \$1.2 million per year for a 36-megahertz transponder.

New Skies' owner, the private-equity investor Blackstone Group, took the company public in May with an initial public offering on the New York Stock Exchange. New Skies has since used the stock proceeds to cut its \$744 million in debt by 31 percent.

Also helping to reduce debt was a \$168 million cash refund from Boeing Satellite Systems International on the NSS-8 satellite, now in construction. Boeing had missed construction milestones. To avoid a contract termination, Boeing agreed to refund the New Skies deposits and take its future NSS-8 payments in installments stretched out over years.

Goldberg said New Skies in July concluded an agreement with competitor



Dan Goldberg

SES Global of Luxembourg in which New Skies agrees not to place a satellite at the 125 degrees west longitude orbital slot, where it risked interfering with an SES spacecraft.

New Skies had secured international regulatory approval to place a satellite at that position. But this authorization was

set to expire in December if New Skies had not taken concrete steps to use the slot. Despite the impending deadline, and despite the fact that New Skies had not demonstrated a willingness to occupy the slot, SES agreed to pay \$9.5 million in cash to remove the New Skies threat.

SES Global spokesman Yves Feltes confirmed the agreement Aug. 5, but said SES would have no other comment on it.

For the six months ending June 30, New Skies reported a net loss of \$12.8 million, on revenues of \$117.9 million.

The company reported a net profit of \$19.6 million a year earlier. The loss this year has been caused by interest payments on the substantial debt New Skies incurred as part of its purchase by Blackstone, and by a one-time payment to Blackstone that accompanied New Skies' May stock offering.

But several of its other financial measures have improved. Earnings before interest, taxes, depreciation and amortization (EBITDA) — a commonly used financial metric for satellite operators — were \$75.4 million, or 64 percent of revenues, compared to 56 percent a year ago.

Backlog was down 14.5 percent, to \$555 million, as of June 30 compared to a year earlier.

Transponder-lease contracts are often signed for multiyear periods, in which case customers get a discount over one-year lease rates. Depending on its

strength in a given regional market and that market's prevailing prices, a fleet operator may decide to favor shorter- or longer-term leases.

Some types of customers, notably military and other government agencies, are unable or unwilling to take out longer-term leases, which could explain why New Skies reported revenue and satellite-occupancy growth without a corresponding effect on backlog.

Goldberg said New Skies is seeing strong government and military demand "for requirements that cover every region of the globe."

Goldberg said in an Aug. 5 interview that one-third of New Skies' total revenues come from military and other government services. He attributed the decline in backlog to the late 2004 cancellation of a \$90 million contract with India's Data Access, a satellite services provider.

New Skies generates 42 percent of its revenues from North America; 20 percent from Europe; 19 percent from a region including India, the Middle East and Africa; 11 percent from Latin America; and 8 percent from the Asia-Pacific.

Data transmissions are 51 percent of its business. Video transmissions, including direct-to-home television, account for 30 percent, with Internet and voice traffic accounting for 14 and 5 percent, respectively.

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SPACE NEWS



August 8, 2005

New NASA Orbiter To Pave Way for Future Mars Missions

TARIQ MALIK, CAPE CANAVERAL, Fla.

The pieces are coming together for NASA's next Mars mission, a reconnaissance satellite designed to identify good prospective landing sites for future explorers.

The Mars Reconnaissance Orbiter (MRO) is set to be launched by a Lockheed Martin-built Atlas 5 rocket Aug. 10.

"It's a real mixture of feelings," MRO project manager James Graf said in an interview. "We're elated that we're ready to go launch, but white-knuckled hoping that everything will go as we expect."

NASA researchers tout the MRO spacecraft as the largest orbiter aimed at Mars in the last 30 years. Standing about six meters tall and spanning 13 meters wide, it is larger than the agency's other red planet orbiters, Mars Global Surveyor and Mars Odyssey. The orbiter weighs about 2,180 kilograms, but came in about 51 kilograms underweight, allowing engineers to add propellant that should extend its flight lifetime out to about 2014.

"This is a big mission for us," said Doug McCuiston, director of NASA's Mars Exploration Program

at the agency's Science Mission Directorate, in a preflight press briefing. "It's the most powerful suite of instruments ever sent to another planet."

MRO will carry a hefty science payload to Mars, with six instruments designed to track martian weather, resolve objects the size of a kitchen table and measure the planet's composition and atmospheric structure with more detail than ever before.

"The MRO spacecraft is many things," said Richard Zurek, the mission's project scientist at NASA's Jet Propulsion Laboratory

in Pasadena, Calif. "It's a weather satellite, it's a geological surveyor and it's a scout for future missions."

The MRO is expected to be the vanguard for two landers NASA plans to launch toward Mars in the next five years, and will identify potential landing targets. The Phoenix lander currently is scheduled to launch in August 2007 and touchdown in the planet's polar region. A large rover, the Mars Science Laboratory, is expected to launch in late 2009.

To prepare for those missions, MRO carries three cameras, one spectrometer, a climate sounder

and subsurface radar, all designed to shed new light on the structure and composition of Mars.

MRO's High-Resolution Imaging Science Experiment will photograph Mars' surface with such detail that researchers expect to resolve objects as small as 1.3 meters wide. To get a wider view, the orbiter's Context Camera will gather images about 40 kilometers across, with a resolution of about eight kilometers per pixel.

A third camera, the Mars Color Imager, is expected to generate a global map of martian weather and track large-scale dust storms, day-to-day weather conditions, as well as atmospheric and polar cap changes.

"Each day we will build up a full weather map of Mars," Zulek said of the Mars Color Imager. "And [the camera] is the size of a hand."

MRO's Compact Reconnaissance Imaging Spectrometer for Mars will observe the red planet in the visible and infrared range to pick out minerals and other materials that may have formed in water or wet conditions in the planet's past.

The Mars Climate Sounder, an instrument designed to study the changes in Mars' atmospheric composition and temperature according to its height, is expected to take measurements every five kilometers between space and the martian surface.

Finally, a shallow subsurface radar — similar but smaller to one that rides aboard Europe's Mars Express probe — will search for underground water down to one kilometer beneath the martian soil. The Mars Advanced Radar for Subsurface and Ionosphere Sounding aboard Mars Express, on the other hand, will look deeper, probing as deep as five kilometers beneath Mars' surface.

"The radar profile will build up a 3D view of Mars," Zulek said.

Before the MRO spacecraft can cull secrets from the red planet, it must first leave its home world.

After launch, it should take MRO about six months to reach Mars, then another seven months or so to adjust its eccentric orbit into a 400-kilometer high circle. The orbiter will use aerobraking to adjust its orbit, swooping in close to Mars and using the atmosphere to slow the spacecraft.

Engineers are taking care not to damage any of MRO's components during the integration with its launch vehicle, including the spacecraft's massive solar arrays.

"These are the biggest solar arrays ever sent to another planet," Graf said.

Craig Calvin, an MRO systems engineer for Lockheed Martin, said the orbiter's solar panels span a total of about 20 square meters and carry about 7,000 solar cells. All those cells are needed to generate the five kilowatts of power in Earth orbit, though that power output will diminish to about two kilowatts at Mars, Calvin said, adding that MRO's instruments only require one kilowatt to function.



Invited Panelists and Speakers Include:

- **Dr. Charles Elachi**, Director, NASA/Jet Propulsion Laboratory
- **Dr. Michael D. Griffin**, NASA Administrator
- **Lt. Gen. Michael A. Hamel**, Commander, Space and Missile Systems Center, Air Force Space Command, USAF
- **Gen. Lance Lord**, Commander, Air Force Space Command, USAF
- **Dr. Adena Williams Loston**, Chief Education Officer, NASA
- **Dr. Pete Rustan**, Director, Advanced Systems & Technology Directorate, NRO
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COMMENTARY

< EDITORIAL >

Mars Science Lab Can Wait

Worried advocates of Mars exploration are waiting for the other shoe to drop in the wake of NASA's cancellation of the Mars Telecommunications Orbiter – and with good reason. The same budgetary pressures that drove that decision likely will force agency officials to seriously consider postponing a nuclear-powered Mars rover mission that was supposed to rely on the telecom orbiter to relay back to Earth the large, steady stream of data it would produce.

NASA faces a lot of tough money decisions that are certain to mean delays or outright cancellations affecting worthwhile programs. Given some of the other priorities on its plate, NASA might decide that it cannot afford full funding of the Mars Science Laboratory right now and stretch out the program to put its launch off for a few more years. Those priorities – re-fixing the space shuttle, re-furbishing the Hubble Space Telescope, completing the international space station and gearing up for human missions to the Moon by 2018 – are going to make it extremely difficult for NASA to pay for everything that different constituencies would like to see funded in aeronautics, astronomy, Earth science and exploration of other planets.

Under such circumstances, NASA had little choice but to cancel the Mars Telecommunications Orbiter. With the missions that absolutely had to have it for data relay now on hold – sample return missions for example – pressing ahead with the \$500 million spacecraft could not be justified.

Should NASA proceed with the Mars Science Laboratory, currently scheduled to launch in December 2009 and arrive at the red planet the following October, plans that call for using the Mars Reconnaissance Orbiter as the data-relay craft. The orbiter is slated to launch Aug. 10 and begin science operations in November 2006.

That plan is perfectly sound, but NASA's back-up idea is anything but.

If the Mars Reconnaissance Orbiter is for any reason unavailable for the Mars Science Laboratory, NASA would rely on the Mars Global Surveyor and Mars Odyssey orbiters, which were launched in 1996 and 2001, respectively. NASA officials insist that both spacecraft have sufficient fuel to continue operating into early next decade, but to count on them with the science return from a billion-dollar rover at stake seems shaky at best, reckless at worst.

If the Mars Reconnaissance Orbiter launch goes smoothly, putting a healthy spacecraft on a good trajectory, NASA could continue work on the Mars Science Laboratory at the current pace. But things can go wrong at any time, and the orbiter faces another critical juncture upon arrival at Mars in the form of an aerobraking maneuver that will put it into martian orbit. NASA therefore would be wise not to go full-throttle on rover development until the relay craft is safely in orbit around Mars.

If the Mars Reconnaissance Orbiter is lost or encounters serious problems, NASA probably would have little choice but to delay the Mars Science Laboratory. Relying on the Mars Global Surveyor or Mars Odyssey for telecommunications is too risky, and building an alternative relay probably is not in the budgetary cards.

The larger question is whether NASA should decide now to stretch out the rover mission. NASA has major bills coming due between now and the space shuttle's planned retirement in 2010, a period that coincides with the prime spending years for the Mars Science Laboratory.

First there is the space shuttle. With the U.S. Congress still having not seen the full bill for returning the shuttle fleet to flight following the 2003 Columbia accident, NASA is facing a new investigation and possible redesign work to eliminate the foam-shedding problem that cropped up again during Space Shuttle Discovery's July 26 liftoff. And NASA still does not have a handle on how much more costly the shuttle will be to operate in the post-Columbia environment.

Then, of course, there is the hardware needed to return astronauts to the Moon. NASA expects to spend \$10 billion developing the Crew Exploration Vehicle and the shuttle-derived rocket it would launch atop and wants both systems ready for space station missions by 2011. A heavy-lift rocket is not needed until later, but is expected to cost at least \$5 billion to develop, not including long-overdue infrastructure investments needed at NASA's Kennedy Space Center, Fla.

Unless NASA drops all other science activities for the next five years, or gets a huge budget increase, it is difficult to see how the agency can squeeze in the Mars Science Laboratory during that time frame given its estimated \$900 million price tag.

Deferring the launch would by no means constitute an abandonment of Mars exploration. Despite some high-profile setbacks, NASA has had a robust program over the past decade, and this will continue with the Mars Reconnaissance Orbiter, the 2007 Phoenix Mars Scout lander and a yet-to-be-selected Mars Scout mission that would launch in 2011. Although none is as tantalizing to scientists as a two-year mission of a high-power rover, they will continue to add to the growing knowledge base of Mars.

Human exploration of the red planet is a long way off. The Moon is the next destination for human explorers and activities that support that goal, including building a new crew transport and launching robotic lunar precursor missions, should take precedence over a flagship-class Mars mission.

If NASA can somehow handle the Mars Science Laboratory along with everything else it is trying to do over the next five years, that's great. But if something must be scaled back during this crucial period, the Mars Science Laboratory is a logical choice.

LETTERS

Best Deal for DoD

In his *Space News* Commentary ["DoD Increasingly Dependent on Satcom Services," July 11, page 19], SES Americom's David Helfgott articulates a flawed proposition regarding the commercial satellite bandwidth purchased by the U.S. military. While David was correct in stating that DoD is seeking to more fully integrate commercial satellite communication (Satcom) services into its long-term strategic considerations, his advocacy that the DoD should do away with the current commercial Satcom procurement practice and instead engage in long-term bulk buys directly from the carriers ignores both marketplace realities and the military's unique requirements.

As many satellite industry observers know, in 2001 the Defense Information Systems Agency awarded the valuable Defense Information Systems Network Satellite Transmission Services-Global (DSTS-G) contract to three small business prime contractors; Arrowhead Global Solutions, Artel and Spacelink. Under the guidelines of DSTS-G, all DoD commercial Satcom bandwidth and services must be procured through this contract. And this has led to more than 30 percent cost savings for the government when compared to other less competitive procurement arrangements.

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DSTS-G, the satellite carriers offer their best prices for bandwidth to the prime contractors, who act as brokers, integrators and solution providers, and the primes then compete against one another to provide the government with the total, end-to-end, best-value Satcom solutions for every individual task order.

Under this contract structure, the DSTS-G prime contractors succeed and win task orders only when they can provide the lowest price, best value, total Satcom solutions. The structure of this procurement process ensures that the most competitive pricing for technically compliant solutions will prevail. The process also has admittedly decreased profit margins for the carriers, (which is the underlying reason for Mr. Helfgott's commentary) but that is the way things work in the government market space.

Furthermore, the government also has very unique requirements and restrictions that the long-term, bulk bandwidth buys advocated in the Helfgott's commentary cannot address. As John Stenbit, the former undersecretary and chief information officer of the DoD has said, "The current business model for acquiring commercial Satcom services is generally based on the philosophy of 'acquire as needed.'" The warfighter's needs in military theater operations are often transient, unpredictable and require highly complex Satcom solutions.

The government recognizes that it often takes

SEE LETTERS PAGE 21

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August 8, 2005

Saving Space: Securing Our Space Assets

◀ JEFF KUETER and ANDREW PLIENINGER ▶

The weaponization of space, recently dubbed the “question long neglected in most discussions about U.S. defense policy,” is moving to the forefront. Prompted by a recent meeting of the U.N. Conference on Disarmament in Geneva, proposed doctrinal revisions by the Air Force, calls for a White House national security directive, congressional hearings and press reports, the opportunity for a reasoned and open discussion of the importance of space systems to the United States and the requirements to ensure the security of space assets is clearly upon us.

The time is right to consider also whether those systems are sufficiently well protected, which is a concern particularly appropriate for an era of asymmetric strategies. Space systems serve human welfare, enable global commerce and are platforms for scientific advancement. They are also ever more central to U.S. national security. The protection of these assets in the future is a critical national interest.

What are the precautionary security measures that the United States should consider to safeguard these systems? Even the most casual observer can see the positive influence of space on our economy and national security. These contributions, already significant, will only increase in importance and criticality over time. This is underscored not only by the increased popularity of DirecTV and satellite radio, but also by the growing reliance on space assets by our military

forces.

Space assets are an essential force multiplier for the U.S. military, providing a tremendous advantage on the battlefield. The statistics speak for themselves: the amount of bandwidth utilized for military operations increased by 42 times from Operation Desert Storm in 1991, to Operation Iraqi Freedom in 2003.

What the casual observer may not know is that space has already been thoroughly militarized via military space assets such as the GPS, imagery and communications satellites, and that these military space systems as well as their commercial counterparts are virtually undefended. That, combined with their growing significance to our economic and military power, makes them attractive targets for those who would wish us harm. As our reliance on space assets increases, this present vulnerability also means we have the most to lose.

Thankfully, the challenges of getting to and operating in space minimize the number of countries that can pose threats today, but that will change for the worse. Other nations are looking at space for military purposes now, and more will certainly follow.

The pivotal question facing the United States now is whether it will take the steps necessary to preserve and protect its position in outer space. While the number of nations capable of reaching space today is relatively few, the number of spacefaring nations is growing, and not all of

them are peace-loving friends of the United States. As such, it is crucial that in protecting and preserving our space assets, we adopt a proactive rather than reactive approach. In any matter of national security, we cannot and should not be caught flat-footed against potential enemies.

Thus, we must work to preserve the peace while simultaneously preparing to defend our position. This means specifically:

- Continued development and refinement of doctrine and planning so decision makers know how to react to events in space;

- Continued investment in research, development and refinement of those technologies, which provide the capability to maintain peace and security in outer space; and,

- Educating the American people about the vulnerabilities of our systems in space and why those vulnerabilities may prove tempting to others.

Russia and China clearly see a role for an international framework to govern space. Arms control advocates are using the renewed interest in space issues to repeat the mantra that the United States is hell-bent on deploying weapons, that such actions are dangerous and unnecessary and that only a treaty can restrain our aggressive tendencies. Fortunately, all these claims are flat wrong. Too many of the arguments demanding that our country pre-emptively and unilaterally disarm itself in space sound very much like old Cold War ideologies recycled for the target du

jour.

It has long been a favorite tactic to thoroughly radicalize the very doctrine of the Armed Forces designed to protect our country. Caution is somehow transformed into reckless abandon; preparedness into aggressive posturing.

Lastly, the United States should resist calls for a new international treaty prohibiting the deployment of weapons in space, as Russia and China demand. Such a treaty is unenforceable and compliance to its strictures virtually unverifiable.

The ignominious record of enforcing and verifying treaties prohibiting activities on Earth is proof enough to give pause to any conversation about a treaty governing activities in space. A treaty also would fail to address the chief reason an adversary would seek access to space in the first place — namely, the potential for inflicting a crippling blow against U.S. military and economic might by decapitating our surveillance and communications abilities.

Instead, a treaty would eliminate the U.S.’s ability to defend against or deter such threats by precluding the necessary development of space systems and doctrine.

Treaty proponents and arms controllers contend that the technological sophistication of the United States would allow for quick reaction against any other nation deploying weapons to space. While the United States has few peers today in space operations, the ease of putting sys-

tems into space is greatly overestimated by this view.

Space is a challenging environment, and the design and production of new systems is complicated, expensive and subject to frequent reversals. To think that we can simply have assets ready to deploy quicker and better is a gross simplification. And even if it were true, this course still leaves U.S. assets in space completely vulnerable, opening the possibility of blackmail, coercion or worse.

Much like the world’s oceans, outer space can be preserved and balanced with the protection of the parochial interests of states to ensure free passage and access for all. The unique position of the United States today affords it the opportunity to take steps to ensure the defense of our interests.

Such actions are not incompatible with the preservation of peace and stability. Indeed, our history shows that to be the first order preference of U.S. policy.

Unfortunately, history also shows that others do not share that view. The inevitability of increased access to space creates new challenges for U.S. policy; challenges that must be confronted in a manner consistent with and supportive of our national interests.

Jeff Kueter is president of the George C. Marshall Institute, a Washington-based nonprofit organization that specializes in national security and environmental issues. Andrew Plieninger is an executive research analyst at the institute.

NASA’s Timid, Hysterical Critics

◀ ELLIOT G. PULHAM ▶

No country ever built an airplane by running for the hills and abandoning the program the first time a bolt sheared or a rivet popped during test flight. Our effort to conquer the seas was not cast on the trash heap of history the first time some ship sprung a leak.

These points seem to be lost on our current generation of lily-livered commentators and pundits, and even a few faint-hearted friends in Congress. In the wake of the successful launch of Discovery, a chorus of these timid souls seem willing to abandon human spaceflight at the first sign of evidence confirming that which we all know — putting humans in space is a tricky, difficult, unforgiving and risky business.

It is, nonetheless, worth it all. I shudder to think where our country would be if this “do nothing, risk nothing” attitude had prevailed throughout our history. Our territories west of the Mississippi would likely fly the French and Mexican flags, railways

would never have crossed the continent, and heaven knows the defense department never would have been allowed to fund the Wright Brothers and that risky, dangerous, flying machine contraption.

A test flight is a test flight. It is designed to ferret out problems and flaws. If you understand this, then you understand that STS-114 in its first week was a fabulous success that generated a treasure trove of knowledge that will make future human spaceflights — not only of the space shuttle but of any spacecraft — better.

I normally balk at overreacting to anything that happens at NASA. In speeches around the country, I usually start by debunking the notion that NASA “is” space — pointing out that the largest space agency in the world is the U.S. Air Force, that NASA accounts for less than 10 percent of space activity worldwide and that since 1996 commercial space activities have comprised the largest sector of the market.

But it matters what NASA does. The fact that hundreds of millions of people watched the launch of Discovery on television, a half-million showed up in person in Florida for the launch and another half-million more had it streamed to their desktops should tell us all we need to know. Human spaceflight and space exploration is what captivates the minds and hearts of our people, especially our youth, and propels us forward.

Warts and all, foam shedding and all, the fact that virtually every newspaper in America (and most around the globe) had space exploration on its front page nearly every day for the better part of a week should tell us something. We know it is dangerous. We know it will probably always be dangerous. And still we want to go, for in going lies all our hopes, dreams and aspirations.

For all those cranks, sots, killjoys and ignoramuses who think the launch of Discovery was a failure — sit down, shut up,

and listen:

- Spectacular Success No. 1 — Discovery is safely on orbit, docked to the international space station, and all indications are that she has suffered far less launch damage than any shuttle launched before. Human space exploration is proceeding. It is only the schedule of this exploration that will vary.

- Spectacular Success No. 2 — Thanks to the efforts of thousands of NASA, contractor and Department of Defense personnel (let’s not forget that the Air Force plays numerous critical roles in every shuttle launch, and that U.S. Strategic Command is also heavily involved), the new launch observation and monitoring measures performed brilliantly. We’ve collected more data and imagery on this shuttle launch than on any human spaceflight in history. The systems worked. Because of that, we know we still have things to fix on

SEE PULHAM PAGE 21

INTEGRATED BATTLESPACE

Lockheed Touts Coastal Missile Shield

JEREMY SINGER, WASHINGTON

Defense and aerospace giant Lockheed Martin Corp. of Bethesda, Md., is trying to drum up U.S. government interest in a system that would defend American territory against missiles launched from ships lurking offshore.

The U.S. Department of Defense is deploying a rudimentary system to protect the nation against intercontinental ballistic missiles (ICBMs), but there is no program under way to guard against sea-based threats. With approximately 20,000 kilometers of coastline, the United States is highly vulnerable to such an attack, according to David Kier, Lockheed Martin vice president and managing director of protection systems.

Approximately 75 percent of the U.S. population and 75 percent of U.S. military bases are located within 322 kilometers of a coast, putting them within range of missiles fired from offshore, Kier told reporters at a July 28 luncheon at the National Press Club here.

Short- and medium-range ballistic missiles are widely available throughout the world and are easy to conceal and launch from an innocuous looking ship, said Kier, a former deputy director of the U.S. National Reconnaissance Office. Cruise missiles are even easier to hide, less expensive and are about 10 times more accurate than ballistic

Thad Madden, a spokesman for Lockheed Martin, said the various components of the architecture would be integrated and managed using the command-and-control system for the Ground Based Midcourse Defense system, the U.S. territorial ICBM shield.

Lockheed Martin designed its proposed coastal defense architecture on its own accord — the Pentagon has no program under way to address the threat and no immediate plans for one. But that could change if a congressional proposal to provide funding in 2006 for such an effort becomes law, an official with the U.S. Missile Defense Agency (MDA) said.

The House of Representatives included about \$20 million for work on a coastal missile defense system in its version of the 2006 Defense Appropriations Act, which was passed June 20.

In the report accompanying the bill, members of the House Appropriations Committee said they have become “increasingly concerned” about offshore missile attacks and asked the MDA to conduct a comprehensive analysis of the threat and how to counter it. The lawmakers directed the MDA to give periodic updates on its findings to the committee.

“This analysis should consider deployment options that would protect significant population centers, use mature technologies,

Approximately 75 percent of the U.S. population and 75 percent of U.S. military bases are located within 322 kilometers of a coast, putting them within range of missiles fired from offshore.

David Kier

rockets, he said.

For about \$10 billion to \$12 billion, Kier said, the United States could deploy a shield against such threats drawing on missile defense systems that are either in use today or well under development — in several cases by Lockheed Martin. The hardware in use today or ready for deployment includes theater missile defense systems such as the Patriot Advanced Capability 3 interceptor and the Aegis-ship-based tracking radars and Standard Missile 3 interceptors, he said.

Ballistic missiles launched near U.S. shores could be detected by the Space Based Infrared System, a series of missile warning satellites under development by Lockheed Martin Space Systems of Sunnyvale, Calif. Those satellites are supposed to begin replacing the Defense Support Program missile warning satellites in 2008 or 2009.

Cruise missile launches cannot be detected with the infrared satellites, but Kier said Lockheed Martin is working on a system that could do the job by measuring disruptions in FM radio frequency waves.

Other hardware that could contribute to a coastal missile defense system include unmanned aerial vehicles and a high-altitude airship under development by Lockheed Martin that would be able to dwell over areas for extended periods of time, Kier said.

and include progressions for spiral technology upgrades that would enhance missile defense capabilities over time,” the report said.

The Senate Appropriations Committee has yet to mark up its version of the 2006 defense budget, and will not do so before Congress returns from its August recess in September.

Victoria Samson, a research analyst at the Center for Defense Information, a think tank here, said cruise missiles potentially could pose a significant threat to the U.S. homeland, but added that a nationwide interceptor network likely is unaffordable.

Samson noted that the Pentagon has spent roughly \$92 billion to date on the national ICBM shield, and said Lockheed Martin likely is underestimating the price tag of its proposed coastal defense system. She pointed out that the Pentagon deployed over 1,000 Patriot interceptors to defend U.S. troops in Iraq, a far smaller area than the United States.

The United States could only afford to protect a few key areas of its territory against missiles launched from offshore, Samson said. Measures to stop the spread of missile technology to U.S. enemies are a far more sensible way to address the problem, she said.

Comments: jsinger@space.com



AIR FORCE PHOTO BY JIM SHARPE

Airborne Laser

ABL Fire Control System Performs Well in Tests

A Boeing-led industry team has completed a series of flight tests of the fire control system for the Airborne Laser (ABL), the company announced in a news release Aug. 3.

Lockheed Martin is building the fire- and beam-control systems for the ABL, a modified Boeing 747 aircraft that will be equipped with a laser for shooting down enemy missiles in their boost phase. The first missile-intercept test of the ABL is scheduled for 2008.

The recently completed testing demonstrated that the ABL's laser-pointing, vibration-control and target-acquisition systems are working

properly, the press release said.

“Completion of this test phase for the Airborne Laser program further demonstrates the air worthiness and the functionality of the airborne mission payload,” said Patrick Shanahan, Boeing vice president for missile defense systems. “With each testing increment, the ABL team is making steady progress in bringing the ABL into the hands of the warfighter to defend against ballistic missile threats.”

Now that these tests are complete, the aircraft will be moved to a Boeing facility in Wichita, Kansas, where it will be modified to accommodate the rest of the laser system.

MDA Tweaks Missile Shield Deployment Plan for 2005

The U.S. Missile Defense Agency (MDA) plans to take four of the 10 interceptor rockets that were slated for operational deployment this year at Fort Greely, Alaska, and use them instead for ground-based testing, according to an agency official.

That decision, first reported Aug. 3 by the newsletter *Inside Missile Defense*, was based on recommendations from review teams in the wake of back-to-back tests late last year and early this year in which interceptors failed to launch, the official said.

The Pentagon had expected to declare the Ground Based Midcourse Defense system operational by the end of 2004, but missed that date and has yet to set a new deadline.

Currently there are six interceptors in silos at Fort Greely, and by the end of 2005 there will be 12, the MDA official said. Those 12 rockets will give the Pentagon “a very good defensive capability,” the MDA official said.

The MDA has two interceptors deployed at Vandenberg Air Force Base, Calif., and plans to add 12 more rockets in silos at Fort Greely in 2006, the official said.

Meanwhile, the MDA plans four flight tests of the Ground Based Midcourse Defense system over the next year, with all but the first taking place from Vandenberg, the MDA official said. The first two are booster flight tests with no target launched. The official described the third test as a “radar characterization” test, and the fourth as an intercept.

Senate Confirms Sega as Air Force Undersecretary

The U.S. Senate confirmed Ronald M. Sega to serve as undersecretary of the U.S. Air Force July 29, shortly before departing for the month of August.

Sega, who previously served as the Pentagon's director of defense research and engineering, replaces Peter B. Teets, who retired in April.

Comments: Jeremy.Singer@space.com

August 8, 2005

LETTERS FROM PAGE 18

multiple operators to provide the global coverage or capacity required to meet the DoD's needs. Yet, the satellite operator's primary business mission is to sell their own capacity first — at the highest possible price and in the greatest amount possible. And when the operators can't satisfy particular coverage capacity requirements, they too must buy and integrate bandwidth from others. By inserting the DSTS-G prime contractor integrators in the process as honest brokers of bandwidth and as providers of engineered solutions, the government has ensured the best end-to-

end solutions — at the lowest possible cost.

The two-tier competitive process has lowered the carriers margins, and the satellite operators would like to see DSTS-G just go away. This will not happen as long as well-informed government decision-makers continue to recognize DSTS-G as a best practice procurement process that provides the government and the U.S. taxpayer, with the lowest cost, best value commercial Satcom solutions for our nation's military.

*Mary Ann Elliott
Chairman of the Board
Arrowhead Global Solutions
Falls Church, Va.*

PULHAM FROM PAGE 19

the external tank.

■ Spectacular Success No. 3 — The NASA culture. Within moments of understanding that foam shedding is still a problem, NASA managers immediately and unequivocally decided that no further flights would take place until remedies are found. This goes to the heart of the recommendations of the Columbia Accident Investigation Board. Whereas Columbia's launch and return was the textbook study of how not to run a space agency, mission STS-114 is the textbook example of how things should be done.

In short, NASA is back. Get over it.

None of this means the shuttle program won't change, or that plans for developing a replacement won't be altered. There are legitimate questions about what fixes need to be made next, and whether the time and cost of those fixes is the best way to crank up the space agency and vigorously pursue the Vision for Space Exploration.

But those things should happen in view of the lessons learned on this flight, not despite them.

Elliot G. Pulham is president and chief executive officer of the Space Foundation.

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PROFILE

Jean-Marc Nasr



AFP PHOTO

**FORMER CHAIRMAN
SPOT IMAGE**

Switching to Partnerships for Profitability

Jean-Marc Nasr arrived at Spot Image in 2001, a time when the company was reeling from rapid changes in the global Earth observation market that he says threatened Spot's existence.

Four years later, the Toulouse, France-based company has restructured its business model to feature channel partnerships that grant companies exclusive rights to sell Spot imagery in exchange for guaranteed annual revenues. It has permitted Spot to reduce its staff, particularly in the United States, and to concentrate its sales efforts where there are no partnerships.

The Spot 5 satellite has met its backers' expectations of offering relatively high ground resolution without sacrificing swath width. The satellite collects imagery at ground resolutions of 2.5 meters and 5 meters.

Nasr, who left Spot Image in July to take up a new post inside the EADS group, spoke recently with *Space News* staff writer Peter B. de Selding.

How were sales in 2004, and how would you characterize Spot Image's financial condition?

Revenues in 2004 were 56.5 million euros (\$77 million using Dec. 31, 2004, conversion rate), a 13 percent increase over 2003. And at constant exchange rates, sales would have been 58 million euros. The dollar's weakness in 2004 hurt us. Our U.S. business accounted for 6.3 million euros, and our Chinese business — remember the yuan is pegged to the dollar — was about 6 million euros. We have nearly doubled our sales in the past four years. The company has never been stronger.

And profitability?

We were profitable in 2004, and we are distributing a dividend to shareholders — our first one since 1999 and the crisis years. The dividend is modest, about 1.40 euros per share, for a total payout of 200,000 euros. But it's symbolically important for us.

How does 2005 look?

Revenues for the first six months of the year are about 40 percent higher than what they were for the same period a year ago. So it's a good start for the year.

The French space agency, CNES, finances the construction and launch of the Spot satellites. It also operates the satellites in orbit and provides some ground-network maintenance. How much does Spot Image pay for this?

The maintenance contract we have with CNES has been substantially revised. In 2005 we are paying 7.5 million euros for the service, compared to 3.4 million euros in 2004. So as of 2005, we are paying the full cost of the CNES maintenance and operations services. We are getting closer to financial independence.

Is it fair to say that the Spot 5 satellite, launched in May 2002, saved the company?

It's not far off. We were boxed in by the U.S. government decision to offer basically free access to Landsat

low-resolution imagery, and the U.S. government decision to permit global commercial sales of high-resolution imagery. We couldn't compete with free images at the low-resolution end, and we had no product to compete with the emerging U.S. companies offering high-resolution data.

And if Spot 5 had failed at launch?

We would have been in serious trouble. Certainly the possibility was there that the company would shut down, or be absorbed by CNES.

If Spot 5 has been such a success, why didn't you use today's low-interest-rate environment to take out a loan to launch another high-resolution satellite on your own?

I am convinced that the day we can do that is fast approaching. We couldn't have afforded another Spot 5, but in the past couple of years, EADS Astrium has been designing and selling high-resolution satellites that are much less expensive. Look at Formosat-2 for Taiwan, and Theos for Thailand.

One of my real regrets is leaving Spot Image before we were able to purchase our own satellite. But it's going to happen, and it will prove wrong the people who thought there is no sustainable business model in selling Earth observation satellite data.

CNES is leading development of the two Pleiades high-resolution optical imaging satellites, to be launched in 2008 and 2009. Could you take advantage of this development and order a third Pleiades for yourselves?

This is something we're looking at, but we still have some time before we need to decide. In any event, Pleiades — Spot will be the commercial sales agent, even if contract details have not been finalized with CNES — is going to be a great addition to our product line.

CNES and other French government interests own nearly 43 percent of your equity, with EADS at 40.1 percent, Alcatel at

7.1 percent and the Swedish Space Corp. at 6.7 percent. Will this mix need to change if Spot is going to act more like a commercial company?

It's possible. CNES has said it is willing to reduce its shareholding to a low level, perhaps even to zero, now that we are paying full price for the CNES maintenance services. EADS has said it is willing to become a majority shareholder. These things take time.

You have won the rights to market imagery from Formosat 2, the former Rocsat 2, outside Taiwan and China. What's the appeal of this satellite for you?

Formosat 2 is in an unusual orbit for an Earth observation satellite in that it is low inclination, passing over the same swath of Earth with each orbit. It offers a daily revisit of very interesting places — the whole of the Middle East and North Africa, most of Asia, and it can swivel up to 45 degrees to either side quickly. We have very high hopes for sales from this satellite.

Korea's Kompsat-2, or Arirang 2, is set for launch later this year. Are you going after rights to market that outside Korea?

We certainly are and we are not alone. There is a fairly heated competition going on now between us and some of our competitors over who will have the distribution rights for Kompsat-2.

Besides your channel-partnership policy and the arrival of Spot 5, what has changed to make you so optimistic about Spot's future?

It's several things. First is that we finally have enough satellites in orbit — not just Spot, but the U.S. companies, plus the Asian satellites — to offer a good revisit time. Image freshness matters just as much as sharpness, especially for some government users. Then you add the fact that satellite prices have come way down. And more recently, the non-governmental commercial market and Internet-related applications are arriving fast. A short while ago I visited Google to discuss business. That certainly wouldn't have happened four years ago.



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