‹Satellite Manufacturing›

Demand for Larger, More Powerful Satellites Returns

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Demand for satellites with ever-greater power appears to be picking up again as commercial satellite operators become comfortable with new technologies and satellite manufacturers prepare spacecraft capable of delivering 20 or more kilowatts of electricity.

Industry officials have long said that at least a portion of the commercial market will demand satellites that test the limits of what available launch vehicles can deliver to orbit, and that appears to be happening now.

Boeing Satellite Systems International of El Segundo, Calif., is building two satellites for Mobile Satellite Ventures of the United States and Canada, each with 22-meter-diameter unfurlable mesh antennas — nearly double the size of the antenna carried on the Boeing-built Thuraya mobile telephone spacecraft launched in late 2000.

TerreStar Networks of Reston, Va., a subsidiary of Motient Corp., has ordered two TerreStar mobile communications spacecraft from Space Systems/Loral of Palo Alto, Calif., that will have 18-meter-diameter antennas, with the possibility that one of the two spacecraft will carry a 25-meter antenna.

Loral is building a single satellite for ICO Global Communications of Reston, Va., also for mobile communications. It will have a 12-meter-diameter unfurlable antenna. The satellite is scheduled for launch in November.

In a bid to keep up with U.S. satellite builders' progress in adding power to satellites, the European and French space agencies have contracted with Thales Alenia Space and Astrium Satellites to jointly build a new satellite platform, called Alphabus, to provide more than 20 kilowatts of power. The first Alphabus is scheduled for launch in 2010 or 2011.

The current high-power product produced by Thales Alenia Space and Astrium provides about 15 kilowatts at the end of the satellite's 15-year orbital life.

Blaise Jaeger, director of Thales Alenia Space's telecommunications business unit, said the current market appears to be more active at the upper and lower ranges of satellite onboard capacity than in the middle range.

"For us it is important to be able to maintain a single production line capable of manufacturing satellites with a power of anywhere from 5 kilowatts to more than 20 kilowatts," Jaeger said. "The market currently is asking for satellites at the lower and upper ends. There are fewer orders for middle-range spacecraft."

Loral is currently producing five 20-kilowatt satellites, with the first scheduled for launch this year. Loral is building the EchoStar 11 direct-broadcast television satellite for EchoStar Communications Corp. of Englewood, Colo., which may or may not find a launch slot this year aboard a Sea Launch Co. rocket, depending on Sea Launch's manifest as it returns to flight from a January failure.

U.S. and European builders have different ways of referring to satellite power. U.S. companies commonly refer to the amount of power available to the entire satellite at the end of its 15-year life. European manufacturers, when referring to power, list the power available to the satellite's payload electronics only.

Loral, which has been among the more successful commercial satellite manufacturers in winning new contracts over the past three years, is preparing to further increase satellite power, to 25 kilowatts in the short term and, longer term, to 35 kilowatts, said Christopher T. Hoeber, the company's senior vice president for program management.

SPACE SYSTEMS/LORAL PHOTO

Christopher T. Hoeber

Hoeber said Loral has made two proposals to customers for 25-kilowatt satellites, and has received preliminary inquiries from at least one potential customer about a 35-kilowatt product.

"For customers that today ask us about a 25-kilowatt product, we can show that we already have the building blocks to be able to do this as part of our technology-insertion plan," Hoeber said, adding that going from 20 kilowatts to 35 kilowatts "requires no new technology, but it will require a multiyear technology development and insertion plan."

Providing additional power means adding more batteries to the satellite's platform, and taking account of the need that more power produces more heat, and that this extra heat will need to be evacuated somehow.

Replacing nickel-hydrogen batteries with lithium-ion units helps reduce the weight gain of a satellite as more power is added, as does the use of ion-electric propulsion for in-orbit station-keeping.

Hoeber said customers are now comfortable with lithium-ion technology and that Loral, which builds batteries and also purchases them from Mitsubishi Electric Co. of Japan, has used them on the last dozen satellites it has built.

Loral also has added ion-electric propulsion units on three satellites — the same technology used by Russian satellite builders for decades but only recently adopted in the West by Loral and by Snecma of France.

Six satellites — three built by Loral and three built by Astrium Satellites — now are operating with ion-electric thrusters, which can save hundreds of kilograms of weight for a large satellite. Five Loral satellites under construction also carry the technology, Hoeber said, adding that the spacecraft also carry at least a small complement of conventional thruster propellant as a backup.

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