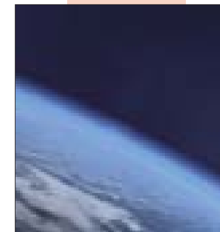


European satellite makers lead GEO surge

Arabsat 4A

The number of large commercial satellites being launched to geostationary orbit each year continues to rise. At least 21 were launched in 2006, marking the second year in a row that there was growth. Following a stagnant period during 2002-2004, in which an average of just over 16 GEO (geostationary Earth orbit) commercial communications satellites went up, the number increased in 2005 to 19 and to two more last year.

The increase was accompanied by the second consecutive year of growth in the number of GEO commercial satellites ordered. As of mid-December 2006, a total of 21 satellites were ordered for the year, which is two more than the number ordered in 2005.

One year of growth can simply be written off as an aberration. Two years, however, starts to look like a trend—good news for the industry. The last time there were more GEO commercial satellites launched was in 2002, when there were 22. The last time there were more GEO commercial satellites ordered was in 2000, when the total reached about 24.

The two consecutive years of growth in the number of GEO commercial satellites launched is particularly interesting when you consider that this has not happened in the last 20 years, at least. Even during the boom period of 1994-1996, when more than 70 GEO commercial satellites were launched worldwide, we did not experience two years in a row where the numbers rose.

The 22 satellites launched in 1994 marked a dramatic increase over the 12 in 1993. But the number launched in 1995 dipped slightly to 21, followed by the all-time peak number of 30 in 1996. Since then, the numbers have dropped for several years in a row, have been up and down, or have been flat.

For the first time in a long time, we are now able to say that the market for GEO commercial satellites has shown steady growth during the past two years. While this is a positive thing, we observe that the market activity continues to be fueled largely by the same companies.

Of the 80 GEO commercial satellites launched or ordered during 2005-2006, 80% belong to companies that were active in the market in the 1990s. In the past 10 years, the market for GEO commercial satellites has managed to attract a relatively small number of new competitors. It remains dominated by companies such as China Satellite Communications, DirecTV, EchoStar Communications, the European Telecommunications Satellite Organization (Eutelsat), the International Mobile Satellite Organization (Inmarsat), the International Telecommunications Satellite Organization (Intelsat), PanAmSat (now merged with Intelsat), Russian Satellite Communications, SES Global, and a handful of other companies with smaller constellations.

GEO COMMERCIAL SATELLITES LAUNCHED: BY TOP FIVE PRIME CONTRACTORS

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Alcatel	3	4	2	3	3	5	1	0	3	4
Astrium	0	2	0	3	0	1	1	3	3	1
Boeing	9	9	6	9	5	3	4	2	3	2
Lockheed	9	6	6	7	0	4	1	4	0	5
Loral	5	3	3	1	2	7	3	4	4	3

A shift in the balance of power

Whether or not market domination by relatively few companies is good for the market depends on what area of the market you are talking about, and it depends on your point of view. It depends on whether you are talking about pricing for services, pricing for satellites, orders for satellites, orders for launch services, or innovation in user applications.

The fact of the matter is that while the industry is in the midst of a new growth trend in the number of GEO commercial satellites being ordered and launched, the trend cannot be attributed to any significant influx of new competitors. In terms of its players, the market has not changed very much during the past decade.

What has changed, though, is the balance of power in the satellite manufacturing community, specifically the prime contractors for GEO commercial satellites. A few years ago we began to notice that a shift was occurring within this segment of the industry. We saw that a growing number of the prime contracts were being awarded to non-U.S. companies, which traditionally had a very small presence in the GEO commercial satellite manufacturing market.

Actually, our first hint that something was afoot in the market came in 2002-2003, when we realized that, of the 35

GEO commercial satellites launched during those two years, nearly a quarter were produced by Alcatel Space Industries (now Alcatel Alenia Space) of France and Italy.

More Alcatel-built satellites (three) were launched in 2001 than satellites manufactured by Lockheed Martin Commercial Space Systems (none) or Space Systems/Loral (two). Only Boeing Satellite Systems (now Boeing Satellite Development Center) produced more satellites (five) launched that year.

Similarly in 2002, there were more Alcatel-built satellites (five) launched than satellites manufactured by Boeing (three) or Lockheed Martin (four). Only Loral produced more satellites (seven) launched that year.

Traditionally, Alcatel had accounted for no more than 15-16% of the GEO commercial satellites launched. All of a sudden in 2001, the percentage had noticeably jumped and was maintained in 2002. Our first inclination was to assume that the change was somehow connected to the revisions of International Traffic in Arms Regulations (ITAR) passed by the U.S. government in 1999, transferring the control and licensing of satellite technologies from the Dept. of Commerce to the Dept. of State. We thought, "U.S. manufacturers are now starting to feel the pinch from ITAR."

Whether or not the improvement in Alcatel's satellite business after 1999 was directly due to ITAR, we cannot say for sure. It may simply have been coincidental. Or it may have been related to bad publicity suffered by U.S. competitors such as Boeing following a series of technical problems with several of its in-orbit satellites based on its highly successful BSS-601 bus, including the DirecTV-3, Galaxy 3R, Galaxy 8i, Palapa C1, and the PAS-4.

The problems began toward the end of 1998 with the loss of the PAS-4's prime control processor and the failure of the Palapa C1's backup battery charge controller, which resulted in the total loss of that satellite. They continued in 2000-2001 with the malfunction of the XIPS


DirecTV

(xenon ion propulsion system) and battery problems on the Galaxy 8i and the loss of the satellite control processor on the Galaxy 3R. The DirecTV-3 also lost its satellite control processor in early 2002. By late 2002, Boeing was starting to attract additional negative press resulting from problems with the solar arrays on some of its in-orbit BSS-702 buses.

U.S. competitors Lockheed Commercial Space Systems and Space Systems/Loral also experienced technical difficulties with some of their in-orbit satellites during this period.

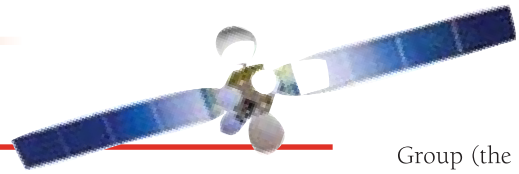
By 2004-2005, the growing number of satellites for which EADS Astrium of Europe had started to receive prime contracts during 2000-2002 were being launched. In short, the Europeans have

GEO COMMERCIAL SATELLITES LAUNCHED IN 2006 (21)

Satellite	Bus	Prime Contractor
AMC 18	A2100A	Lockheed Martin Commercial Space Systems
Arabsat 4B	Eurostar 2000+	Alcatel Alenia Space
Astra 1KR	A2100AX	Lockheed Martin Commercial Space Systems
Chinasat 22A	DFH-3	China Academy of Space Technology
DirecTV-9S	LS-1300	Space Systems/Loral
Echostar 10	A2100AX	Lockheed Martin Commercial Space Systems
Galaxy 16	LS-1300	Space Systems/Loral
Hot Bird VII-A	Spacebus 3000B3	Alcatel Alenia Space
Hot Bird VIII	Eurostar 3000	EADS Astrium
JCSat-9	A2100AX	Lockheed Martin Commercial Space Systems
JCSat-10	A2100AX	Lockheed Martin Commercial Space Systems
Kazsat 1	Yacht	Khrunichev
Koreasat 5	Spacebus 4000	Alcatel Alenia Space
Measat 3	BSS-601HP	Boeing Satellite Development Center
MTSat-2	DS2000	Mitsubishi Electric
Optus D1	Star 2.4	Orbital Sciences
Satmex 6	LS-1300X	Space Systems/Loral
SpainSat	LS-1300	Space Systems/Loral
Thaicom 5	Spacebus 3000A	Alcatel Alenia Space
Wildblue 1	LS-1300	Space Systems/Loral
XM-4	BSS-702	Boeing Satellite Development Center

IN 2005 (19)

Satellite	Bus	Prime Contractor
AMC 12	Spacebus 4000	Alcatel Alenia Space
AMC 23	Spacebus 4000	Alcatel Alenia Space
Anik F1R	Eurostar 3000	EADS Astrium
Apstar 6	Spacebus 4000C1	Alcatel Alenia Space
DirecTV-8	LS-1300	Space Systems/Loral
Express-AM2	Express	Prikladnoi Mekhaniki
Express-AM3	Express	Prikladnoi Mekhaniki
Galaxy 14	Star 2	Orbital Sciences
Galaxy 15	Star 2	Orbital Sciences
Inmarsat 4-F1	Eurostar 3000GM	EADS Astrium
Inmarsat 4-F2	Eurostar 3000GM	EADS Astrium
Intelsat Americas 8	LS-1300S	Space Systems/Loral
Ipstar-1	LS-1300SX	Space Systems/Loral
MTSat-1R	LS-1300	Space Systems/Loral
Spaceway 1	BSS-702	Boeing Satellite Development Center
Spaceway 2	BSS-702	Boeing Satellite Development Center
Telkom 2	Star 2	Orbital Sciences
XM-3	BSS-702	Boeing Satellite Development Center
XTAR-EUR	LS-1300	Space Systems/Loral



GEO COMMERCIAL SATELLITES ORDERED IN 2006 (21)

Satellite	Bus	Prime Contractor
AMC 21	Star 2	Alcatel Alenia Space
Arabsat 4AR	Eurostar 2000+	EADS Astrium
Asiasat 5	LS-1300	Space Systems/Loral
Astra 3B	Eurostar 3000	EADS Astrium
Ciel-2	Spacebus 4000C4	Alcatel Alenia Space
Eutelsat W2A	Spacebus 4000C4	Alcatel Alenia Space
Eutelsat W2M	I-3K	EADS Astrium
Hot Bird IX	Eurostar 3000	EADS Astrium
Hot Bird X	Eurostar 3000	EADS Astrium
Hylas	I-2K	EADS Astrium
MSV-1	BSS-702	Boeing Satellite Development Center
MSV-2	BSS-702	Boeing Satellite Development Center
MSV-3	BSS-702	Boeing Satellite Development Center
Nimiq 4	Eurostar 3000	EADS Astrium
NSS-9	Star 2	Orbital Sciences
Sirius 5	LS-1300	Space Systems/Loral
Telstar 11N	LS-1300	Space Systems/Loral
TerreStar-2	LS-1300	Space Systems/Loral
Turksat 3A	Spacebus 4000B2	Alcatel Alenia Space
Venesat-1	DFH-4	Chinese Academy of Space Technology
Vinasat 1	A2100	Lockheed Martin Commercial Space Systems

IN 2005 (19)

Satellite	Bus	Prime Contractor
AMC 18	A2100A	Lockheed Martin Commercial Space Systems
AMOS-3	AMOS	Israel Aircraft Industries
Astra 1M	Eurostar 3000	EADS Astrium
BSAT-3A	A2100A	Lockheed Martin Commercial Space Systems
COMS-1	Eurostar 3000	EADS Astrium
Galaxy 18	LS-1300	Space Systems/Loral
Horizons-2	Star 2	Orbital Sciences
ICO-Geo 1	LS-1300	Space Systems/Loral
JCSat-11	A2100AX	Lockheed Martin Commercial Space Systems
Measat 1R	Star 2	Orbital Sciences
Nigcomsat-1	DFH-4	China Aerospace
PAS-11	Star 2	Orbital Sciences
Sirius 4	A2100AX	Lockheed Martin Commercial Space Systems
Star One C2	Spacebus 3000B3	Alcatel Alenia Space
TerreStar-1	LS-1300	Space Systems/Loral
Thaicom 5	Spacebus 3000A	Alcatel Alenia Space
Thor 2R	Star 2	Orbital Sciences
XM-5	LS-1300	Space Systems/Loral
Zohreh 1	Express-1000	Prikladnoi Mekhaniki

managed to catch up during the past five years. The wide gaps in the number of GEO commercial satellites built by U.S. companies versus those made by Europeans companies are gone.

During 1997-2001, the three top U.S. builders of GEO commercial satellites saw 80 of their spacecraft launched, compared to 20 for the top two European companies. During 2002-2006, the gap had been sizably reduced to 49 for the Americans and 22 for the Europeans.

If you look at the GEO commercial satellites ordered in 2006, it seems clear that two primary European satellite makers are continuing to make inroads in the market. Of the 21 satellites ordered last year, Alcatel Alenia Space and EADS Astrium will build 11. Astrium received seven of the orders and Alcatel four.

Who's ordering what

Astrium owes much of its success in 2006 to its relationship with Eutelsat, which awarded three prime contracts to the company for the Eutelsat W2M telecommunications/broadcasting satellite and the Hot Bird IX and Hot Bird X direct-to-home TV broadcasting satellites.

The company's other customers included the Arab Satellite Telecommunications Organization (Arabsat), which ordered the Arabsat 4AR direct-to-home TV broadcasting satellite; Avanti Screenmedia Group (the Hylas broadband communications satellite); SES Global (the Astra 3B direct-to-home TV broadcasting satellite); and Telesat Canada (the Nimiq 4 direct-to-home TV broadcasting satellite).

Alcatel's four orders came from four different customers. The Ciel Satellite Group ordered the Ciel-2 broadband communications satellite; Eutelsat, the Eutelsat W2A telecommunications/broadcasting satellite; SES Americom, the AMC 21 telecommunications/broadcasting satellite; and Turksat Satellite Communication and Cable TV Operation, the Turksat 3A direct-to-home TV broadcasting satellite.

The top four U.S. commercial satellite makers—Space Systems/Loral, Boeing Satellite Development Center, Lockheed Martin Commercial Space Systems, and Orbital Sciences—received a total of nine orders. Loral was tops with four.

Loral's orders came from four different customers. Asia Satellite Telecommunications (Asiasat) ordered the Asiasat 5 direct-to-home TV broadcasting satellite; Loral Skynet, the Telstar 11N broadband communications satellite; Sirius Satellite Radio, the Sirius 5 digital audio radio communications satellite; and TerreStar Networks, the TerreStar-2 mobile communications satellite.

The orders for Boeing all came from one source, Mobile Satellite Ventures (MSV). These were the first orders to be placed in 2006, and they were for the MSV-1, MSV-2, and MSV-3 mobile communications satellites. Lockheed Martin's sole order was from Vietnam Post and Telecommunications, and that was for Vietnam's first national satellite, the Vinasat telecommunications/broadcasting satellite. The last order placed with a U.S. satellite manufacturer last year was for SES New Skies Satellites' NSS-9 broadband communications satellite. That contract went to Orbital Sciences.

The only other order for a GEO commercial satellite was for Venezuela's Venesat 1 broadband communications satellite. That contract was awarded to China Great Wall Industry by the Ministry of Science and Technology of Venezuela. Our understanding is that the contract was actually signed on November 1, 2005, but that the order was placed in 2006.

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