

Russia, China, and India lift payload count

Either we are getting better at collecting and interpreting data on new satellite programs around the world, or there has in fact been a more noticeable increase over the past year in the number of spacecraft being proposed for launch. We suspect it is probably a little of both.

In 2005, we published the results of our *Worldwide Mission Model*, showing a total of 1,297 payloads proposed for launch during 2005-2014. Last year marked the first time in four years that the number of payloads in our model increased. The model grew by 6.8%. We counted 1,547, 1,410, and 1,209 payloads in 2002, 2003, and 2004, respectively.

Our current model contains 1,450 payloads for the period 2006-2015, a 10.5% increase over last year's model. It is worth noting that part of the growth can be attributed to slightly more flexibility on our part in identifying payloads for inclusion in the model.

In the past, we would only include those payloads that were announced for launch in a certain year. We did not make a judgment about whether the payload would actually be built and launched. Our goal was to populate the model with as diverse a range of programs as possible to give a broad picture of possible scenarios for predicting the future of the satellite and launch services markets.

At the point where we saw a program had been canceled or was clearly no

longer viable, we would eliminate it from the model. This continues to be our strategy for maintaining the model. The only modification is that we now include payloads that we suspect, with a "high degree of probability," will be launched.

Counting on the Russians

Based on historical launch patterns and general pronouncements of future construction and launch plans by governments and companies, there are a number of spacecraft that we can count on to be launched year after year, like clockwork. These do not necessarily have to be announced for us to know that they will likely go up. In the past, we neglected to include these as payloads in the model simply because they were not "proposed." But they may as well be proposed.

We know, for example, that the Russian government can be counted on to launch three or four RSC Energia-built Progress unmanned supply capsules and two Energia Soyuz crew capsules annually to the International Space Station (ISS). The Russians have consistently kept to this schedule, even prior to 2001, when the capsules were launched to the Mir Orbital Station, which was deorbited in March of that year.

Over the past five years, 21 Progress capsules have been launched. The last one was the Progress 21P, orbited on April 24. Progress 22P was scheduled for launch on



Russia is expected to launch three or four Progress unmanned supply capsules annually to the ISS.

June 28. Since 2001, 11 Soyuz capsules have been launched. The last one was the Soyuz TMA-8, on March 30. Soyuz TMA-9 is scheduled for liftoff on September 13.

Thus we have added more than two dozen Progress and Soyuz missions to the model, in addition to numerous Cosmos-designated military satellites. Ever since the first successful launch of a Cosmos on March 16, 1962, the Russians have launched (or attempted to launch) more than 2,000 Cosmos satellites, including Kometa photoreconnaissance, Oko early warning, Parus and Uragan navigation, Prognoz scientific, Strela tactical communications, Tselina signals intelligence, and Yantar optical reconnaissance spacecraft built by companies such as NPO Lavotchkin, KB Photon, NPO Polyot, and NPO Yuzhnoye. We are now up to Cosmos 2420, which was launched on May 3. Cosmos 2421 was scheduled to go up on June 22.

China's projections

The Chinese government can also be expected to launch a certain number of spacecraft each year. While the Chinese do not regularly provide a lot of informa-

PROPOSED PAYLOADS

2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
305	346	208	246	91	68	66	53	40	27	1,450

PAYLOADS BY TYPE

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Civil	140	154	94	134	28	28	27	9	14	11	639
Commercial	70	161	76	68	33	16	23	28	16	9	500
Military	46	24	28	37	27	23	15	16	10	6	232
University/other	49	7	10	7	3	1	1	0	0	1	79

tion about specific satellites they will launch, they do habitually talk in broad terms about their “great plans” for space, in terms of their satellite building, their launch vehicle fleet, and their manned flight programs.

During the 1990s, China’s government started to include ambitious projections of the number of satellites the country would build as part of its five-year economic programs. In the mid-1990s, China projected it would build and launch some 20 of its own satellites in a five-year period. It never came close to meeting its target. The largest number of domestically produced satellites China built and launched during a five-year period in the 1990s was no more than 10.

In 2001, China projected it would build and launch some 35 communications, weather, and disaster-monitoring satellites by the end of this year. Through April, the country was closing in on its target, with approximately 26 spacecraft built and launched, including Double Star scientific satellites manufactured by China Aerospace Science and Technology, Fanhui Shi Weixing (FSW) military reconnaissance and Ziyuan commercial imaging satellites produced by the China Academy of Space Technology, Feng Yun meteorological and Yaogan Earth observation satellites manufactured by the Shanghai Academy of Space Technology, and Zhongxing (Chinasat series) communications satellites built by China Aerospace Science and Technology, as well as several other smaller scientific and technology development spacecraft.

The fact is that China is averaging about six of its own satellites a year, and this number will go up. Chinese companies will still purchase commercial com-



Among the satellites launched this year by China is the Zhongxing communications satellite built by China Aerospace Science and Technology.

munications spacecraft from the Europeans, but the vast majority of Chinese satellites will be domestically produced (thanks to technology cooperation programs with the Europeans), and we are better able to identify many of these even without specific information from the government.

Given the noticeably increasing number of Chinese satellites during the past five years, we can now see some trends that allow us to comfortably assume, for example, that there will be regular launches of Feng Yun, FSW, and Zhongxing. We have included a couple of these satellites each year in our model, as well as a variety of scientific and imaging satellites such as Shijians and Ziyuans and Shenzhou manned capsules that are being produced with some regularity. In the past five years, these five programs alone have launched 19 spacecraft.

Assessing growth in India

We are also better able to identify and include more Indian satellites in our model even though detailed information about these payloads is not often readily avail-

able. In view of the 30% annual growth in India’s national space budget, it is probably safe to assume the country’s satellite development programs will only expand.

We certainly know that the country will continue to modernize its constellations of Insat communications and IRS (Indian remote sensing) imaging satellites. The Indian Space Research Organization has been averaging one Insat satellite a year during the past few years, and we know that at least four or five more from the Insat 4 series are planned through 2010. India has been developing and launching GSAT experimental communications satellites that may lead to later versions of the Insat 4s growing significantly in both size and power.



India will continue to modernize its constellations of Insat communications satellites.

India’s GSLV (geostationary satellite launch vehicle) is gradually being upgraded and will have the ability to launch 4,000-kg satellites to geostationary orbit by 2010. It will no doubt be used for the

PAYLOADS BY MASS

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
1-100 kg	79	60	26	102	5	1	1	0	0	0	274
101-500 kg	42	72	27	35	9	11	1	6	5	0	208
501-1,000 kg	13	30	26	15	11	0	0	0	0	0	95
1,001-3,000 kg	26	29	16	6	0	2	3	0	0	0	82
3,001-5,000 kg	31	22	12	8	6	2	4	2	1	0	88
5,001-25,000 kg	11	16	15	12	16	12	14	10	6	6	118
N/A	103	117	86	68	44	40	43	35	28	21	585

PAYLOADS BY ORBIT

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
LEO	208	226	128	195	51	38	40	36	19	13	954
GEO	69	76	57	42	37	17	15	14	12	9	348
Deep space	17	21	7	3	0	8	6	1	2	3	68
MEO	7	14	12	6	2	5	4	2	3	2	57
Elliptical	4	9	4	0	1	0	1	0	4	0	23

heavier Insat 4s and the next-generation Insat 5s, as well as for the country's more ambitious manned Moon mission proposed for 2015.

India's IRS system is the largest commercial imaging constellation in the world. Since 1996, four IRS satellites have been launched successfully. At least three are being readied for launch within the next 3-4 years, including the IRS-P7, -P8, and -P9. We have included a few more from this series after 2010 that we anticipate will follow those already in the pipeline.

In last year's model, Russian, Chinese, and Indian spacecraft accounted for 168 payloads, or about 13% of the total. This year, they account for 242 payloads—

an increase of 30.6%, largely due to our more liberal methodology for selection.

The bigger picture

The increased number of Russian, Chinese, and Indian payloads accounts for about half the overall growth in payloads in this year's model. The number of payloads of U.S. origin—47% of the total payloads in our model—increased by 6.3%. U.S. payloads account for approximately 28% of the overall growth in payloads, with the remaining growth distributed among several other European countries or other regions.

By far the largest single payload customer in this year's model, as in past

models, is NASA. The agency accounts for 15.3% of the proposed payloads, as compared to 16.8% last year. Other top government customers include Russia's space agency, Rosaviakosmos; ESA; and the USAF. These four customers account for one-third of the payloads. Top commercial customers include companies like SES Global SA of Luxembourg, Intelsat, and PanAmSat of the U.S.

The top 25 government customers and top 25 commercial customers together account for 60% of the total payloads in the model. Not much has changed here since last year.

Marco Cáceres

Teal Group
mcaceres@tealgroup.com

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