



The Space Launch Industry Recent Trends and Near-Term Outlook

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1.0 Executive Summary

Since 1996, Futron has maintained an extensive database of past and future launch activity. Futron reviews over 20 space-related publications and over 30 on-line space-related resources to collect launch information. The database is updated on a daily basis.

Using this information as a starting point, Futron analysts regularly review planned and proposed launch activity and generate launch forecasts. This type of forecast, referred to as a “supply-side” forecast, can be fairly accurate in predicting near-term launch activity.

With the start of the third quarter of 2003, Futron has performed a rigorous analysis of future launch activity and generated a “best estimate” forecast for the next 18 months. In comparing projected 2003 and 2004 launch numbers with those from previous years, trends and significant points become apparent. Among those are:

- ⊕ Worldwide launch activity (commercial and non-commercial) is cyclical, increasing some years and decreasing in others. However, by 2004, the launch industry will have experienced three years of consistent increases.
- ⊕ 2001 experienced the lowest number of commercial launches (16) since 1994. 2002 saw a modest recovery (24) and the number of commercial launches will remain stable in 2003 and 2004 (23 and 26 respectively).
- ⊕ While it is too early to say definitively, there is a preliminary trend towards increasing numbers of non-commercial launches.
- ⊕ Regarding the number of GEO commercial satellites, 2000 and 2001 experienced a whiplash of a high of 30 followed by a low of 13. Since then, the number of GEO comsats has settled into the 20-23 range, which is consistent with the number of launched throughout the late 1990s.
- ⊕ The three major commercial space-faring nations (USA, Russia, and Europe) have been battling mightily to distinguish themselves and garner launch orders. However, currently, the global launch-buying community seems equally satisfied with each nation’s products, as each nation will capture about 30% market share in 2003 and 2004.
- ⊕ There are ominous signs ahead for the commercial launch industry. While the near-term commercial manifest is fairly stable, the outlook is much less robust after 2004.
- ⊕ Two years ago in a White Paper like this one, Futron predicted there would be 19 commercial launches in 2001 and 23 in 2002. The actual numbers were 16 and 24.

2.0 Forecast Methodology

The first step in developing Futron's supply-side forecast starts with Futron's Electronic Library of Space Activity (ELSA). ELSA is an extensive satellite and launch database that contains over 500,000 pieces of information including over 8,000 distinct launch events. All historical launches are contained in ELSA as well as proposed systems that have been announced in the public domain. Source data is gathered from over fifty open-source periodicals, websites, and technical documents and entered daily by Futron Analysts. The information in ELSA forms the basis for many of Futron's consulting projects; however, we do sell the database, or parts of it, to select customers.

Futron generates an initial list of planned launches from the information in ELSA. The next step is to apply analytic judgments regarding the likelihood of the planned launches. Many announced launches have no realistic chance of being launched as proposed. The satellites linked to these launches are referred to as "paper satellites" and they appear on the initial list because some organization made a public announcement of its intention to launch a satellite. However, these announcements are sometimes made for public relations or national pride reasons.

Futron applies the following types of considerations to the initial list of announced launches to determine their likelihood of actually launching:

- Satellite manufacturing contract status
- Launch vehicle contract status
- Market situation
- Spectrum allocation approval status
- Orbital slot approval status
- Other regulatory issues such as export control
- Track record of the satellite owner/operator
- Technical risk

What remains is a list of projected launches that theoretically could be launched during the time period, or "peak load." However, several factors can affect the execution of a scheduled launch. These include:

- Launch failures
- Launch site scheduling conflicts
- Technical problems with the launch vehicle
- Satellite manufacturing problems
- Regulatory issues
- Business and financial issues

Based on a historical analysis of projected versus actual launch activity, Futron has determined that the above issues tend to reduce the peak load forecast by approximately 25%.

Another factor that must be considered is that some nations do not announce satellite launches in advance, usually for national security reasons. This is particularly true in Russia and China. With an in-depth understanding of historical launch activity and government policy statements, and a general knowledge of launch activity for various nations, the issue of unannounced future launch activity can be addressed.

Once all these factors have been rigorously analyzed, considered and acted upon, the “best estimate” of future launch activity is produced.

3.0 Forecast Results and Definitions

Tables 1-4 show the number of commercial launches, non-commercial launches, total launches, and commercial satellites for the period 1998 through 2004. These tables show actual launch numbers for 1998 through June 2003 and projected launch numbers from July 2003 through 2004.

Table 1: Commercial Launches by Country, 1998 – 2004

Country	1998	1999	2000	2001	2002	2003 (Best Estimate)	2004 (Best Estimate)
USA	22	15	7	3	5	7	6
Russia	5	13	13	3	8	7	9
Europe	9	8	12	8	10	6	7
China	4	1	0	0	0	0	0
Multinational	0	2	3	2	1	3	3
Japan	0	0	0	0	0	0	1
India	0	0	0	0	0	0	0
Brazil	0	0	0	0	0	0	0
Israel	0	0	0	0	0	0	0
TOTAL	40	39	35	16	24	23	26

Note: Ukraine had one commercial launch in 1998.

Table 2: Non-Commercial Launches by Country, 1998 – 2004

Country	1998	1999	2000	2001	2002	2003 (Best Estimate)	2004 (Best Estimate)
USA	14	16	21	19	12	23	26
Russia	19	15	23	20	17	15	12
Europe	2	2	0	0	2	0	4
China	2	3	5	1	5	5	5
Multinational	0	0	0	0	0	0	0
Japan	2	1	1	1	3	3	5
India	0	1	0	2	1	2	3
Brazil	0	1	0	0	0	1	1
Israel	1	0	0	0	1	0	0
TOTAL	40	39	50	43	41	49	56

Note: North Korea had one non-commercial launch (attempt) in 1998.

Table 3: Total Launches by Country, 1998 – 2004

Country	1998	1999	2000	2001	2002	2003 (Best Estimate)	2004 (Best Estimate)
USA	36	31	28	22	17	31	32
Russia	24	28	36	25	25	22	21
Europe	11	10	12	8	12	8	11
China	6	4	5	1	5	5	5
Multinational	0	2	3	2	1	3	3
Japan	2	1	1	1	3	4	6
India	0	1	0	2	1	2	3
Brazil	0	1	0	0	0	1	1
Israel	1	0	0	0	1	0	0
TOTAL	80	78	85	59	65	72	82

Table 4: Total Commercial Satellites by Orbit, 1998 – 2004

	1998	1999	2000	2001	2002	2003 (Best Estimate)	2004 (Best Estimate)
GEO	22	22	30	13	23	21	20
NGSO	82	54	19	7	11	12	14
TOTAL	104	76	49	20	34	39	34

Definitions

Commercial launches are defined as launches that are internationally competed (i.e., available in principle to competitors in the international launch services market), or launches that are licensed by the U.S. Office of the Associate Administrator for Commercial Space Transportation of the Federal Aviation Administration, or privately financed launches.

Commercial satellites are defined as spacecraft that serve a commercial function or are operated by a commercial entity, without regard to how they are launched. Certain Russian and Chinese domestic communications satellites are commercial if a significant portion of the transponders is offered for lease through commercial operators.

GEO satellites are spacecraft that operate in geosynchronous orbit – an orbit approximately 22,300 miles above the equator in which a spacecraft completes one orbit around the Earth every 24 hours.

NGSO satellites are spacecraft in non-geosynchronous orbits (NGSO), such as low Earth orbit (LEO), medium Earth orbit (MEO), elliptical orbits, and deep space probes.

Launches are attributed to the country in which the primary vehicle manufacturer is based, with the exception of launches by Sea Launch, which are designated as “Multinational.”

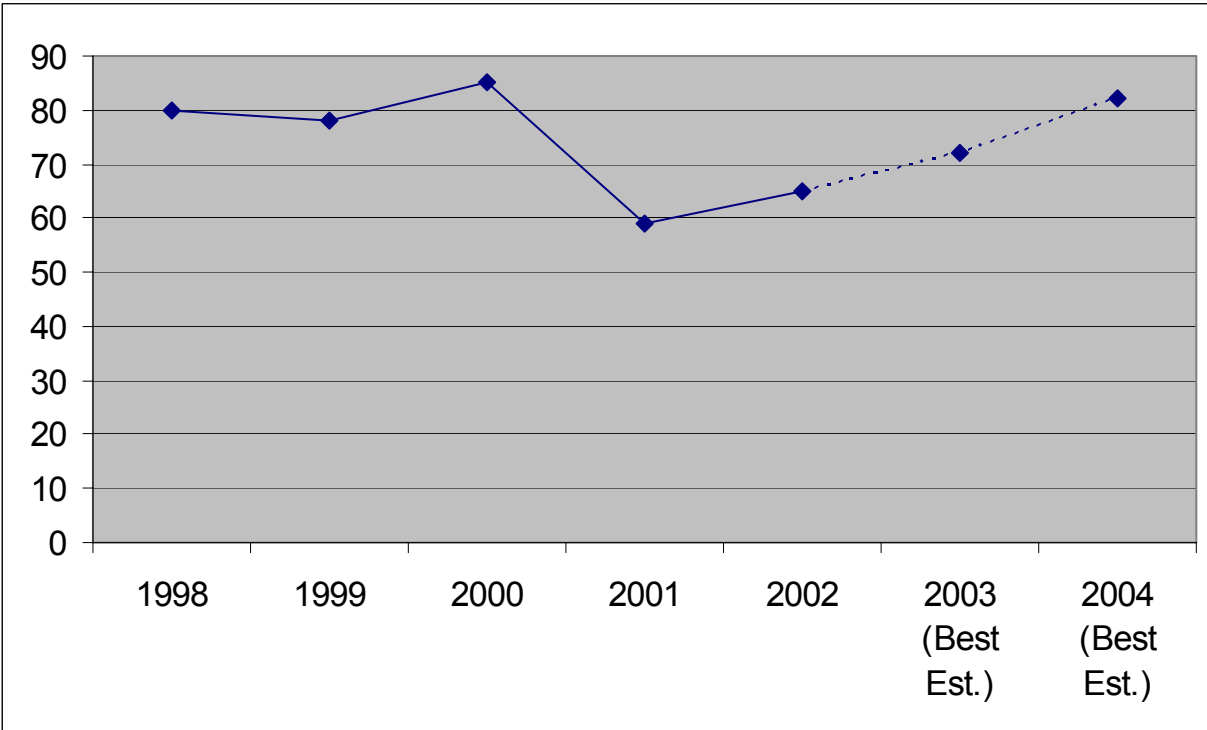
4.0 Trends and Significant Points

Many significant points become apparent from Tables 1-4.

- ✦ Worldwide launch activity (commercial and non-commercial) is cyclical, increasing some years and decreasing in others. However, by 2004, the launch industry will have experienced three years of consistent increases.

In looking at the total number of launches worldwide (Figure 1), there is no pronounced trend during the entire period shown. Instead, there are year-to-year variations, with the total number of launches increasing in some years and decreasing in others. However, in the latter part of the time period, there is a consistent trend towards increasing numbers of launches. The average annual increase from 2001 to 2004 is 11.5%.

Figure 1: Total Launches Worldwide, 1998 - 2004



While this growth is welcome news to the launch industry, it should be noted that 2001 was the worst year in terms of total launches since 1961. In that year, which coincidentally included President Kennedy's announcement regarding a U.S. mission to the moon, there were only 47 total launches.

- ✦ 2001 experienced the lowest number of commercial launches (16) since 1994. 2002 saw a modest recovery (24) and the number of commercial launches for 2003 and 2004 will remain stable (23 and 26 respectively).

The 16 commercial launches that occurred in 2001 was the lowest number since 1994, when there were 14. Since that time, the commercial industry rebounded with 24 launches in 2002 and Futron predicts that the number of commercial launches will remain steady for the next two years.

In the classic example of a glass half empty or half full, this steady rate of between 23 and 26 launches can be viewed as either good or bad. On one hand, a commercial launch rate in the low 20s is well below the total launch capacity of the industry and it is also well below the number of launches experienced during the late 1990s when the LEO telecommunications satellite constellations were being launched (ORBCOMM, Iridium, and Globalstar). On the other hand, 23-26 launches a year is well above the number recorded in 2001 and it is also well above the average experienced prior to the LEO constellation debut. In the four years prior to the launching of the LEO constellations (1993-1996), the average annual commercial launch rate was 15.5.

⊕ While it is too early to say definitively, there is a preliminary trend towards increasing numbers of non-commercial launches.

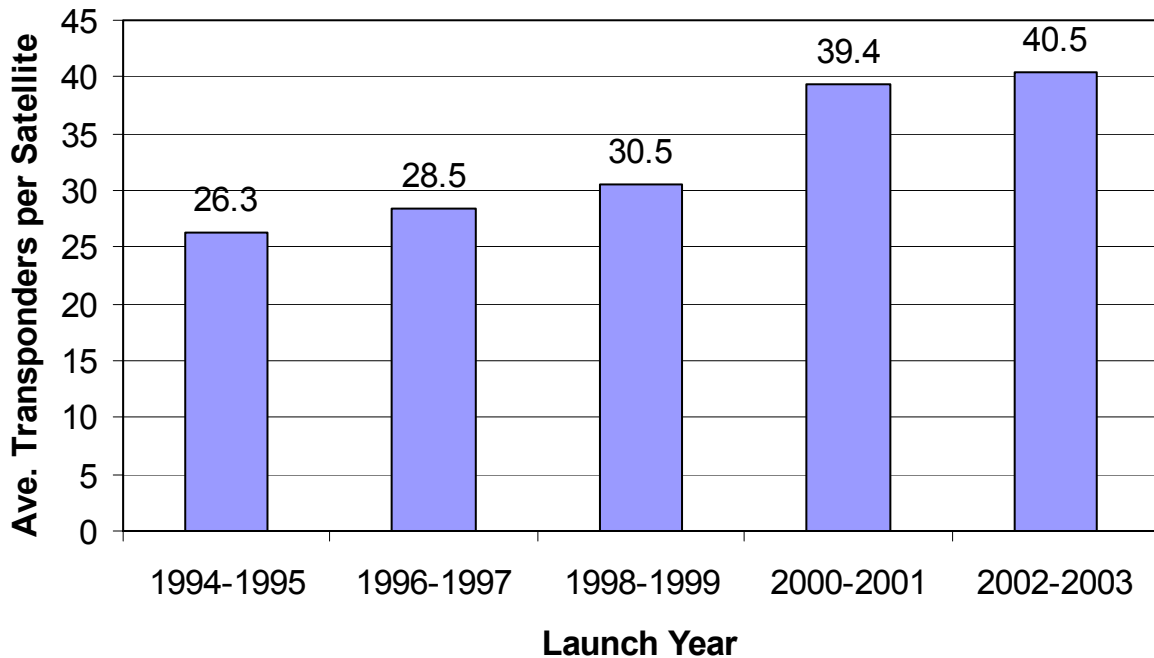
Futron predicts the number of non-commercial launches will grow at a healthy rate in 2003 and again in 2004 (19.5% and 14.3% respectively). While two years is not nearly enough time to indicate a strong trend, this is a pronounced increase and it is sustained over more than just one year.

⊕ Regarding the number of GEO commercial satellites, 2000 and 2001 experienced a whiplash of a high of 30 followed by a low of 13. Since then, the number of GEO comsats has settled into the 20-23 range, which is consistent with the number launched throughout the late 1990s.

The GEO commercial satellite market, traditionally viewed as a very attractive market by launch providers, has gone through a roller coaster ride with an extreme high followed immediately by an extreme low. Futron predicts that this market will settle down for the next couple years.

Another trend emerging in the GEO comsat market is the moderation in the growth of the size of the average GEO comsat. As measured by the number of transponders, the average GEO comsat only grew by about 3% recently (see Figure 2).

Figure 2: GEO Commercial Satellite Size

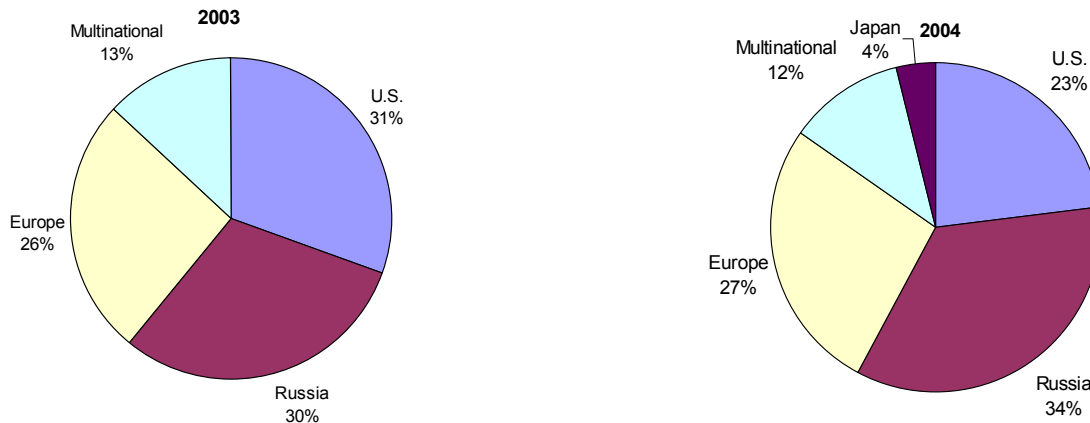


✚ The three major commercial space-faring nations (USA, Russia, and Europe) have been battling mightily to distinguish themselves and garner launch orders. However, currently, the global launch-buying community seems equally satisfied with each nation's products, as each nation will capture about 30% market share in 2003 and 2004.

Market share has long been a benchmark for launch providers (even though launch rate is a more direct measure of the health of a launch company). In recent years, launch providers have become increasingly aggressive in their sales and marketing activities. Part of the sales strategy for most launch providers is to highlight the attractive features of one's own launch vehicle, such as reliability, schedule assurance, and customer service.

Without a doubt, there are differences in these key characteristics among the various launch providers. However, no single launch provider or launch nation is currently dominating the market. Global launch buyers have more or less evenly divided up the market among USA, European, and Russian launchers (see Figure 3). It should be noted that many European launches involve dual-manifested Ariane 5 launches. Thus, Europe's market share in terms of satellites is slightly higher than shown in Figure 3.

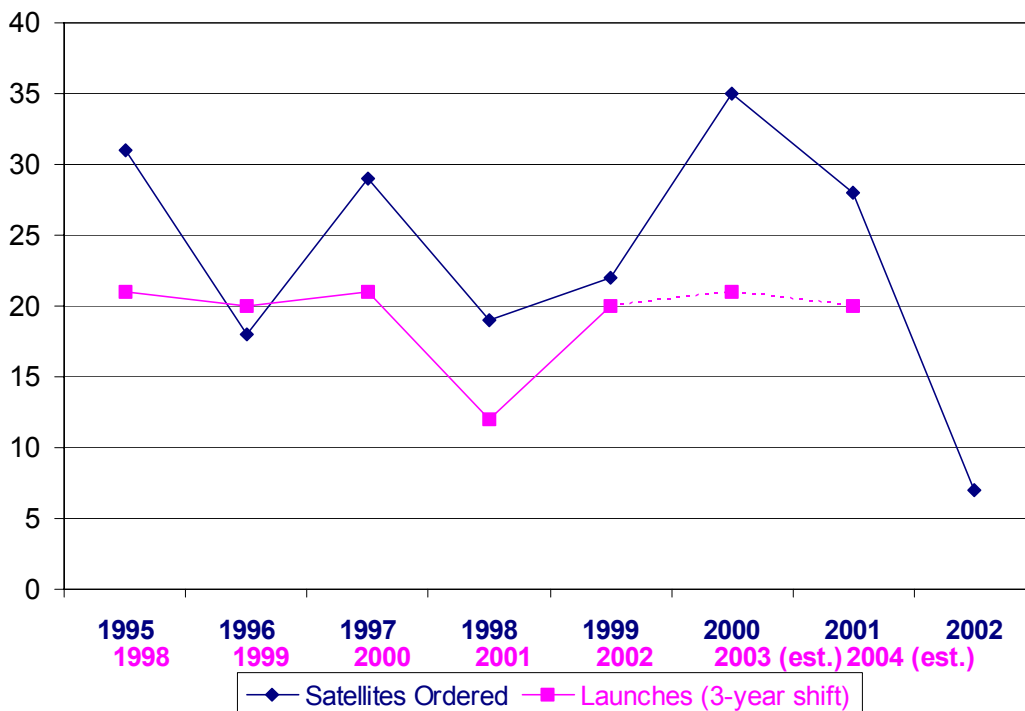
Figure 3: Commercial Launch Market Share, by Nation



There are ominous signs ahead for the commercial launch industry. While the near-term commercial manifest if fairly stable, the outlook is much less robust after 2004.

There is a strong correlation between the number of commercial GEO comsats launched and the number previously ordered. The number of launches usually follows the number ordered by about three years (see Figure 4). While the correlation is not perfect, the two data points do track. If this correlation continues, 2005 could be a very challenging year for the launch industry.

Figure 4: GEO Commercial Communications Satellite Orders and Corresponding Launches with a 3-year Shift



Futron Overview

Futron Corporation is a technology management consulting firm. Futron applies analytically rigorous decision-support methods to transform data into information. We collaborate closely with clients to relate decisions to future outcomes and measures of value. Our aerospace consulting services include market and industry analyses, safety and risk management, remote sensing, and communications and information management. Futron was founded in 1986 and is headquartered in Bethesda, Maryland with a branch office in Houston, Texas. Futron employs approximately 100 professionals and has annual revenues of over \$10M.



*Futron's headquarters in
Bethesda, Maryland*

Summary of Capabilities

Futron's Space and Telecommunications Division is the industry leader in researching, analyzing, and forecasting space and telecommunications markets and programs. Futron offers our commercial and government clients a suite of proprietary, leading-edge analytic methodologies. Our world-class team of market and policy analysts, economists, and engineers bring unparalleled skills and expertise to each account.

- ✦ We have surveyed hundreds of aerospace firms to develop a unique revenue, employment, and productivity profile of the industry.
- ✦ We have developed country-by-country models of demand for telecommunication services that aggregate a global forecast up from the individual household PC or business network; these models have accurately predicted future launch levels and business changes in the satellite industry.
- ✦ Futron helps clients win competitions, analyze competitors, estimate costs and prices, and track opportunities.
- ✦ Futron also performs cost estimates and economic analyses. Futron generates bottoms up, parametric, and analogous cost estimates for commercial satellite and launch vehicle programs.
- ✦ Futron provides a subscription-based service providing information on every FCC satellite application filed since 1990. Futron's FCCFilings.com is the only source for competitive intelligence and business data contained in FCC satellite licensing documents.

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