SPACE ALLIANCE

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WORLD SPACE WEEK

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QuetzSat

On September 29th, the Baikonur Cosmodrome was the host of the newest commercial launch of ILS, one week after Russia officially restarted the flights which were holded for a while as a consequence of the two accidents in August.

Being launched at 18:32 GMT, the Proton M Breeze M rocket of the ILS operator carried on the orbit, in a 9 h 13 min flight, a geostationary telecommunications platform- the QuetzSat-1 which will be operated by the SES Company.

The new satellite will be placed at the 77 degrees West orbital slot, where the Mexican company QuetzSat (a joint venture between SES and the Mexican investors) obtained the operating license for the next 15 years. The satellite is built on a LS-1300 Space Systems/Loral spacecraft bus, it has two solar panels and weighs 5.5 tons.

The 32 Ku band transponders of the satellite which cover Mexico, North America and Central America were subcontracted to the Dish Mexico and Dish Network USA companies. The Dish Network Company, with the headquarters in Meridian, Colorado, was founded in 1996 as a subsidiary of the EchoStar Company (established in 1980) and reported for 2008 a number of 26000 employees and revenue of 11.6 billion dollars, with a net profit of 902 million dollars.

DishNetwork, which operates 15 satellites, is in direct competition with the powerful cable companies from US and with DirectTV, a company controlled by the media billionaire R. Murdoch. Thanks to a good management and to the constant growth of the active transponders operating standard or HD TV services, the company was able to lower the prices such that today it is estimated that every new user brought in the DishNetwork needs an investment of 600 dollars, a lot less compared to the past years.

Lowering the investment spent per user, the company is able to come with better prices on the market and to permanently attract new clients. From official sources, the total number of the clients reached already 14 millions.

Some details about the launcher.
Proton M Breeze M – the rocket used for launch, has a length of 58 meters and weighs 705 tons in a normal configuration. It is equipped with three stages and a booster system, with a length of 42.3 meters and a diameter varying from 4.1 to 7.4 meters. The additional Breeze M system, which is also installed on top of the rocket, develops a force of up to 20 kN and is equipped with a three axes stabilization system, a navigation system and an onboard calculator, being directly responsible for the quality of the orbital injection of the payload. In its case, the quantity of fuel which is loaded depends from one mission to another and thus is variable, optimizing the flight performance.

The first stage of the rocket is powered by six RD 276 engines which provide a total of 11 MN. The second stage is powered by three RD 210 engines plus an RD 211 engine providing a force of 2.4 MN. The third stage is powered by an RD 213 engine with a 583 kN traction force, and the control and the directing of the flight are realized with a triple redundant avionics system which commands a 31 kN engine with four nozzles. In this mode, the rocket is capable of placing a mass of up to 6360 kg on a geostationary transfer orbit.
The Proton rocket, initially named UR500, made its debut into flight on July 16th 1965. Since then, it had flights with complex scenarios: it was used for launching the Russian interplanetary missions to the Moon, Mars, Venus and the Halley comet, it delivered cargos to the MIR and ISS, and last but not least, it transported military and commercial satellites on the orbit (the commercial flights started on April 9th 1996 with the Astra 1F satellite). For the statistics, this was the 67th flight under the ILS indicative.

The rocket's operation is done by ILS or "International Launch Services"- a company with its headquarters in Virginia, USA, whose shareholder is the Russian company Khrunichev Space Center, the same that builds the Proton rocket. The ILS company, which has exclusive rights for marketing the transport services, was founded for facilitating Khrunichev's access to the satellite operators all over the world.

Credit: ILS

Launch video

Russia launches another Glonass satellite and come closer to the number of GPS satellites

As a confirmation for its determination to complete the satellite navigation system, Russia has managed to launch another satellite on Sunday, 2nd October 2011.

Launched from the Plesetsk Cosmodrome at 20:15, the newest version of the Soyuz rocket (Soyuz 2-1b), managed to successfully put into space, after a 3.5 hour flight (separation from the launcher took place at 23:47 GMT), a new platform belonging to the Glonass M- generation – the Kosmos 2474 satellite.
This was the first Glonass M launch aboard a Soyuz 2-1b rocket. Usually, these launches were managed by a Proton M-Blok DM2.

In comparison to the classic version, Soyuz 2-1b brings a number of significant changes to: the control system through an additional Fregat module; the traction force of the 3rd stage by changing the old RD110 motor with a RD124 one; a new fairing system with more volume for useful load. With all these new modifications the rocket is able to carry 3.6 tones to a geostationary orbit.

The Russian system reaches, thus, a number of 28 satellites on orbit, very close to the American competitor, the GPS system. However, we should say that 3 of the platforms are old and must be kept in maintenance and 2 other satellites are still going through tests (the last one which joined the constellation and another, launched in February 2011 which belongs to the newest version, the K block).
Because of this, we can only speak of 23 operational satellites, but things will change until the end of the year, as Russia is planning to send another 4 satellites into space.

Recently, the Russian government placed the aerospace field on its long term priority list, providing large budgets for modernization of the old systems inherited from the USSR or for construction of new ones.
In order to keep the pace with competing satellite navigation systems, the Glonass is set to benefit from a 2.6 billion dollar investment and the hopes to reach 30 operational satellites by the end of 2011 seems accomplishable.

The Glonass (“Globalnaya Navigationnaya Sputnikovaya Sistema” or “Global Orbiting Navigation Satellite System”) started on September 1993 with a group of 12 satellites and reached the desired number of 24 satellites for global coverage in December 1995. However, because of financial problems in that period and due to a lack of new investments, later, a part of the satellites were retired from activity, without being replaced.

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GLONASS

Orbital plane	Slot	Satellite	Launch date	Operational since	End of life	Lifetime (months)	Comments
1	1	730	14.12.09	30.01.10		21.7	Operational
	2	728	25.12.08	20.01.09		33.3	Operational
	3	727	25.12.08	17.01.09	08.09.10	33.3	Maintenance
	5	734	14.12.09	10.01.10		21.7	Operational
	6	733	14.12.09	24.01.10		21.7	Operational
	7	712	26.12.04	07.10.05		81.3	Operational
	8	729	25.12.08	12.02.09		33.3	Operational
2	3	715	25.12.06	03.04.07		57.4	Operational
	9	736	02.09.10	04.10.10		13.1	Operational
	10	717	25.12.06	03.04.07		57.4	Operational
	11	723	25.12.07	22.01.08		45.4	Operational
	12	737	02.09.10	12.10.10		13.1	Operational
	13	721	25.12.07	08.02.08		45.4	Operational
	14	722	25.12.07	25.01.08		45.4	Operational
	15	716	25.12.06	12.10.07		57.4	Operational
	16	738	02.09.10	11.10.10		13.1	Operational
3	4	701	26.02.11			7.3	Test
	17	714	25.12.05	31.08.06		69.4	Operational
	17	718	26.10.07	04.12.07	29.11.10	47.3	Maintenance
	18	724	25.09.08	26.10.08		36.3	Operational
	19	720	26.10.07	25.11.07		47.3	Operational
	20	719	26.10.07	27.11.07		47.3	Operational
	21	725	25.09.08	05.11.08		36.3	Operational
	22	731	02.03.10	28.03.10		19.1	Operational
	22	726	25.09.08	13.11.08	31.08.09	36.3	Maintenance
	23	732	02.03.10	28.03.10		19.1	Operational
	24	735	02.03.10	28.03.10		19.1	Operational

GPS

Orbital plane	Slot	Satellite	Launch date	Operational since	End of life	Lifetime (months)	Comments
A	1	9	26.06.93	20.07.93		217.3	Operational
	2	31	25.09.06	13.10.06		59.7	Operational
	3	8	06.11.97	18.12.97		164.7	Operational
	4	7	15.03.08	24.03.08		42.3	Operational
	6	27	09.09.92	30.09.92	10.08.11	225.8	Maintenance
B	1	16	29.01.03	18.02.03		103.3	Operational
	2	25	28.05.10	27.08.10		13.3	Operational
	3	28	16.07.00	17.08.00		133.7	Operational
	4	12	17.11.06	13.12.06		57.6	Operational
	5	30	30.08.93	28.09.93		184.5	Operational
	6	1	24.03.09				Test
C	1	29	20.12.07	02.01.08		45	Operational
	2	3	28.03.96	09.04.96		184.5	Operational
	3	19	20.03.04	05.04.04		89.9	Operational
	4	17	26.09.05	13.11.05		69.5	Operational
	5	6	10.03.94	28.03.94		209.5	Operational
D	1	2	06.11.04	22.11.04		82.3	Operational
	2	11	07.10.99	03.01.00		141.1	Operational
	3	21	31.03.03	12.04.03		101.7	Operational
	4	4	26.10.93	22.11.93		214.4	Operational
	5	24	04.07.91	30.08.91	05.10.11	237.7	Maintenance
E	1	20	11.05.00	01.06.00		135.9	Operational
	2	22	21.12.03	12.01.04		92.7	Operational
	3	5	17.08.09	27.08.09		25.3	Operational
	4	18	30.01.01	15.02.01		127.5	Operational
	5	32	26.11.90	10.12.90		201.3	Operational
	6	10	16.07.96	15.08.96		180.7	Operational
F	1	14	10.11.00	10.12.00		129.8	Operational
	2	15	17.10.07	31.10.07		47.2	Operational
	3	13	23.07.97	31.01.98		164	Operational
	4	23	23.06.04	09.07.04		86.8	Operational
	5	26	07.07.92	23.07.92		230.2	Operational

The system is made up of 3 orbital planes, separated at 120 degrees, with the satellites belonging to each plane separated at 45 degrees. Each satellite performs a circular orbital motion at a height of 19100 km and an inclination of 64.8 degrees and has a orbital period of 11 hours and 15 minutes. Satellites are identified by the so-called “slot number”: the first orbital plane contains slots 1-8, the second slots the numbers 9-16 and the third contains the 17-24 slots.

Every satellite can send two types of signals: a standard one- accessible to commercial applications and a codified one -of high precision, used by military applications. We can actually talk about 25 channels separated by 0.5625 MHz in the so-called frequency bands L1: 1602.5625 – 1615.5 MHz and L2: 1240 – 1260 MHz.

According to official announcements, when the system will be complete, it will have a maximum positioning error of up to 70 m on both horizontal and vertical planes and a speed error of about 15 cm/s (for the civilian system), and about 10-20 meters for the military service.

Some studies performed in 2007 led to a change in the architecture of the Glonass system – the number of satellites was modified, from 24 to 30, meaning 8 operational satellites and 2 spares for each orbital plane.
The new generation of Glonass- the K satellites which are planned to be launched (the first one was launched in February 2011, as previously stated) benefits from a better design which should increase their lifetime (up to 10 - 12 years) and reliability. They will be as well smaller in size and weight (750 kg) and this will allow the replacement of Proton-M with Soyuz-2 rockets (and a reduction to half of the launch costs).

It should be stated, though, that the plans and ambitions of the Russian Government weren’t so easily applicable. The Russian space program has lately began showing signs of weakness – faulty management, program delays, poor communication between different actors involved in the process etc. – signs which are probably the result of poor funding in the last decade.
50 years after Gagarin’s flight, the Angara rocket is still in a project state, the Svobodnyy Cosmodrome is not yet available, the on-going projects have massive delays and little money is invested in new technology.
Until a little while ago, the worst standing project was Glonass, despite the large funds invested in the system. In a global navigational market estimated at 60-70 billion dollars annually, Russia was targeting a 15% niche (meaning about 9-10 billion annually, a level that would surpass the armament selling) but could only maintain itself at 1%, a lot below its expectations.

This launch of a Glonass satellite, the second one in September, comes like a breath of fresh air for the Russian program. Russia resumed its flights on 20 September after the August accidents and is trying to erase the concerns about its program.

Two consecutive failures took place in August – an unpleasant surprise for such an advanced spatial program, but which are not the only ones, following similar accidents which took place in December 2010- when 3 satellites were lost, and February 2011- when the GEO-IK2 didn't reach its orbit, which were lately found to be the result of severe management problems throughout the Russian spatial agency.

On 18 August, Russia sent the newest telecommunication platform Ekspress onto orbit aboard a Proton M Breeze M launcher. The new Express AM4 satellite weighed 5775 kg and was built in cooperation by Khrunicev Space Center and EADS Astrium based on the Eurostar 3000 architecture.
It should have entered Russian Satellite Communication Company's (RSCC) fleet which has another 11 telecommunication satellites and should have operated in the orbital slot situated at 80 degrees East, for approximately 15 years making use of 30 transponders in the C band, 28 transponders in the Ku band, 2 transponders in the Ka band and 3 transponders in the L band.
Unfortunately, the launch was a failure: ground stations lost the contact with the rocket after the fourth activation of the Breeze M module (a number of 5 activations should have taken place on this flight).

The second failure (the most important because of its impact on an international scale) was the underperformance of the Soyuz launcher which should have sent the Progress M – 12 M container towards the ISS, on 24 August 2001.
The third stage stopped prematurely, only 325 seconds after take-off and the Progress M cargo remained attached to the rocket. It entered the atmosphere at a later time and crashed in an uninhabited zone in Russia.
This was the first loss of a Progress-M cargo since its first use in 1978 and comes in an inappropriate moment when the Space Shuttle has been retired from activity and the ATV3 and HTV3 missions, alternatives for serving the ISS have been delayed for 2012.

In these circumstances, a possible short-term abandonment of the ISS by the astronauts was taken into account, because they would be no longer provided with supplies from Earth.

As we were recalling earlier, for a few weeks, the whole Russian space program was suspended for a new investigation, in order to determine the exact causes which lead to the accident. Obviously, economic consequences came as a result and the Russian government was not pleased, so we can expect new drastic measures and changes at the highest level in the national aerospace industry.

Credit Roskosmos

Launch video

China launches a new telecommunication satellite for Eutelsat

On the 7th of October China had a new commercial flight of its CZ-3B/E rocket from the Xichang space base on the Sichuan region. The beneficiary of this flight was Eutelsat.
It must be mentioned that the launches made from China are attractive because of the price, but have the disadvantage of entering under the influence upon the technologic transfer regulations- the manufacturer being limited in the choices he can make for the spacecraft's components.

The new Eutelsat W3C satellite was launched at 08 :20 UTC and was placed approximately 26 minutes later on a GTO orbit (geostationary transfer orbit) 200 km x 35746 km x 26.1 inclination degrees. From there the Eutelsat engineers will guide the satellite to bring it on the final orbital position, the 16 degrees East slot.

Being constantly operated, starting with 1988, the slot is a very important node for the TV and Video services in Europe, and thus a strategic position of the Eutelsat Company. It covers especially the Central and Eastern Europe, a market which proved extremely profitable because it had a constant rate of growth in the past years.

Weighting 5.4 tons, the satellite was built by the French branch of Thales Alenia Space, on a Spacebus 4000 C3 platform. It is equipped with 56 transponders (53 of which are operating in the Ku band, and the remaining 3 in the Ka band) and it has a lifetime of at least 15 years.

The 16 degrees East slot caused a lot of problems to Eutelsat.
The initial contract signed in February 2008 between Eutelsat and Thales Alenia Space was focused on only one satellite- the W3B, which was supposed to be positioned on the 7 degree East orbital slot, from where should have been operated alongside the old W3A.
The launch of W3B was also negotiated with China, but later Eutelsat changed its option to Ariane 5 (one of the reasons being the technological embargo stated above).

W3B was finally launched on 28th of October 2010, but with a different purpose than the initial one, because the company decided to change its operating position.

This way, the satellite was supposed to replace on the 16 degree East orbital position, one of the malfunctioning satellites of the Eutelsat constellation: Eutelsat W2M which was launched in December 2008, but which was suffering technical failures from the very beginning and thus was not able to support the whole responsibilities it was designed for.
W2M was programmed to replace the W2 satellite at the 16 degrees East slot, but because of the failures stated above, W2 remained operational until January 2010, and got out of the operational position just in March 2010.
At this moment we find 3 satellites on this position: Sesat1, W2M and Eurobird 16.
The 16 degree East slot handles also Romanian TV channels (Antena1, 2 si 3, N24, National TV, TVRi, TVR Cluj, TVR Timisoara, Cultural, Pro TV, Prima, Realitatea etc).

The problems of W2M

The launch of W3B wasn't also that lucky, despite the correct orbital injection, the satellite that should've used the onboard engines for orbital maneuvers (to lower the inclination of the initial transfer orbit), underperformed instead. Apparently it was a massive loss of hydrazine, and a few hours after the launch, despite the equipment being in nominal parameters, Eutelsat announced at Paris, the end of the mission. Luckily the satellite was under the protection of an insurance policy that covers launches, and the recovered money from the insurer could be used to build another platform.

Meanwhile Eutelsat decided upon building a second satellite – W3C which was supposed to go at the 7 degrees East position left uncovered after the repositioning of the W3B. The plans changed again, and the 16 degrees East slot, which was the most important, will be taken care by this satellite.
The money recovered from the insurer will be used to build the platform for W3D, which will be launched in 2013 and will finally complete the 7 degrees East slot.

Let's have a few words about the launcher.
Chang Zeng CZ-3B/E is an improved version of CZ-3B – now in the seventh operational flight after entering in the Chinese fleet with the launch of the NigComSat 1 in 2007.
The previous launch took place on 18th of September carrying at that time, a military telecommunication Chinese satellite, Chinasat 1A.

Equipped with a system of 4 YF-25 boosters and 3-stages (an YF-21 C engine for the first stage, YF-24E for the second and YF-75 for the third), with a length of 54.84 m and a medium diameter of 3.35 m, the rocket is capable of transporting on a geostationary transfer orbit a payload of 5500 kg, or on a low orbit around the Earth (LEO-low Earth orbit) a payload of 11500 kg.

Who is Eutelsat?
Eutelsat SA with the headquarters in Paris, has a capacity of 27 satellites with global coverage (Europe, Middle East, Africa, India, Asia and America) handling from 20 orbital slots, more than 3800 TV channels and 1100 radio channels. These services are used by more than 200 million users in over 150 countries.
A total of 7 distinct series of satellites are operated now: Hot Bird, Eurobird, the W series, Sesat, Atlantic Bird, KA-Sat and Eutelsat.
For the financial year 2011, Eutelsat is expecting revenues of 1.168 billion euro, with a growth of 11.5% from the 1.047 billion in 2010.
The company has a personnel of approximately 700 people and 9 subsidiary companies: Eutelsat Beijing (China), Eutelsat Benelux (Belgium, Netherlands and Luxemburg), Eutelsat do Brasil (South and Central America), Eutelsat GmbH (Germany, Austria and Switzerland), Eutelsat Inc. (North America), Eutelsat Ltd. (UK and Ireland), Eutelsat Madeira Lda (Portugal), Eutelsat Polska (Poland) and Skylogic (Italy).

Credit Eutelsat & CNSA

Launch video

LandLaunch returns to flight after less than two weeks since the resumption of the SeaLaunch's flights

We were discussing recently the success of the saving plan for the SeaLaunch Company and its return on the first stage of the commercial launches with the September 24th flight.

Confirming the positive forecast, the younger sister, the LandLaunch Company with its headquarters in California, also made a launch on October 5th, from the Baikonur Cosmodrome. Since its founding in 2008, the company has made a total of four Zenit 3SLB launches (based on a modified version of Sea Launch's maritime launcher) from the Baikonur Cosmodrome (the first one in April 2008 with the Amos 3 satellite, and the last one in November 2009 with the Intelsat 15 satellite).
In the past years, due to the financial problems and the bankruptcy of the SeaLaunch Company, all the continental commercial flights operated by LandLaunch had been also stopped.

Therefore, the October 5th flight was the fifth success of the operator. Launched at 21:00 UTC, a Zenit 3SLB rocket transported correctly on the orbit, the newest Intelsat satellite- Intelsat 18, after a flight of almost six hours. Intelsat 18 is built by the Orbital Space Sciences Company on a Star 2.4 platform and will replace the old Intelsat 701 satellite at the 180 degrees East orbital slot. From there, it will operate for at least 17 years the 24 C band transponders and the 12 Ku band transponders.

The 3.2 tons satellite is equipped with two solar panels built in GaAs technology which develop more than 6.8 kW, and a storage system consisting of two Li-Ion batteries with a capacity of 100 Ah.

Intelsat is one of the biggest companies in this domain and also a pioneer (in 1965 Intelsat launched the first commercial telecommunications satellite in the world) and provides since then satellite services as telecommunications, media data, video and voice services in almost 200 countries, for 1800 clients.

Since then Intelsat wrote history several times through its technical achievements- for example, in 1969 when it has realized the first global direct TV transmission of the lunar landing of the Apollo 11 mission, or in 1974 when the first international satellite communication network was established.

With a modern fleet of about 50 satellites and 8 ground stations, with 1100 employees and offices in Brazil, China, France, Germany, India, Singapore, South Africa, the UAE, UK and the USA, Intelsat reached earnings of 2.5 billion dollars at the end of 2010, consolidating its position on the global telecommunication market.

Credit: Intelsat/ Orbital Space Sciences/ LandLaunch

Launch video

SPACE ALLIANCE

Indian launches several satellites at the same time

On Wednesday October 12, India came back on the spatial stage with a launch that used the PSLV rocket (Polar Satellite Launch Vehicle) - the 20th flight in the history of this launcher and the 18th consecutive successful flight since its entry in operation in 1993.

The previous flight took place on July 15, 2011 when was launched the satellite GSAT-12.

With a liftoff occurred at 05:31 UTC from the Satish Dhawan base of Sriharikota region, the PLSV rocket placed the satellites Megha-Tropiques, VesselSat 1, SRMSAT and Jugnu on orbit, after a flight of about 22 minutes. This multiple scenario is not new for the Indian rocket as since April 2008 it holds the record in terms of launching multiple satellites simultaneously, with 10 satellites launched at the same time.

Megha Tropiques is a 1-ton satellite and a French-Indian partnership between CNES French Space Agency and ISRO, the Indian Space Agency. It will fly in a circular LEO orbit 867 km x 867 km x 20 deg inclination. The spacecraft bus was provided by ISRO-an IRS-type bus with 3 scientific instruments onboard:

-Madras
-SAPHIR
-SCARAB

With their help, data about Earth's atmosphere will be collected, (water vapor, cloud distribution, evaporation and precipitation phenomena), data that will improve knowledge about the water cycle in nature and its influence on the evolution of climate in tropical regions.

Jugnu is a 3U-Cubesat-type nano-satellite-that means is a triple Cubesat with the dimensions 10 cm x 10 cm x 30 cm and a weight of 3 kg. The satellite is built in India by Indian Institute of Tehnology Kampur. For one year (its estimated lifetime), it will operate an optical camera, which will produce near-infrared observations. The camera will be used to monitor natural disasters in agricultural land.

SRMSAT is a 10 kg microsatellite built by SRM University and will monitor the effect of greenhouse gases with observations in the near infrared spectrum at around 900nm-1700nm.

Vesseksat-1 is a 29 kg microsatellite built in Luxembourg by Luxspace. It is the first from a constellation of 3 microsatellites which are going to be leased to Orbicomm Company and will automatically monitor from a LEO orbit the merchant vessels.

Polar Satellite Launch Vehicle or PLSV is a 294 tons rocket with 4 stages that combine solid and liquid fuel and is able to liftoff a payload of 3200 kg in a low orbit (LEO), or 1600 kg in a sun-synchronous orbit (SSO).

Although the Indian space program has a positive trend, there are also some negative elements and unfortunately they are critical for India if it wants to succeed in its plans: long-term-manned flights, or flights to the Moon and to Mars. The weak point is right at the forefront of the Indian aerospace industry (in terms of storage capacity and the perspectives it opens)-the GSLV launcher.

India hopes to have a smooth transition from the actual version GSLV-Mark1 to the new one GSLV-Mark2 (capable of transporting 5 tons in a LEO low orbit) and later to GSLV-Mark3 (with a capacity of about 13 tons for a LEO orbit). The country had an extended partnership with Russia that should ensure the entry amongst nations capable of sending astronauts into space.

Among others fields, the collaboration includes the technical support for the rocket engines-more precisely the third stage of the GSLV rocket. This engine, a KVD-1M type, provided until now by Russia from the Proton rocket, will be replaced with an indigenous developed cryogenic stage (CS).

The old Russian engine runs on liquid oxygen and hydrogen and was sold in the early '90, right after the collapse of the USSR, in a total of 7 pieces to India of which 6 have already flown (and only one remained in stock until the entry into operation of the new Indian engine). Later, due to technology transfer regulations occurring on the aerospace market, India, unable to buy more Russian components, was forced to take the decision of developing an indigenous engine. Its development in Indian laboratories has been a difficult process that lasted more than 18 years and is still not 100% functional as we will show below.

On April 15, 2010 and later on December 25, 2010, India has made the first test flights with the new GSLV rocket. Unfortunately, both were failures which ended in rocket and payload loss.

These are very bad news for the country. Without the ability of replacing the GSVL launcher, the entire space program is in danger-and we mean here not only manned flights but also GEO satellite launches that will have to be transferred to other commercial operators and so they will need extra money from the budget of the Indian agency ISRO. For India it would be a major deviation from its strategy, which was based from the early stages on developing its own range of launchers and its own internal resources serving all segments and types of space missions. ISRO has a growing budget (about one billion dollars per year) financed from its own resources and from provision of launching services for other international operators. ISRO also benefits from the activity of 16.000 engineers directly involved in research/design/infrastructure.

Credit ISRO

Launch video

SPACE ALLIANCE

The Romanian satellite Goliat waits in French Guyana to be loaded onboard the Vega rocket

The Romanian satellite Goliat waits in French Guyana to be loaded onboard the Vega rocket for what will be the first Romanian space mission around the Earth.
The launch of the first Romanian built satellite the Cubesat nano-satellite Goliat has been postponed several times due to the delays encountered by the European launcher.

In the first phase these delays were strictly caused by the tests performed on the rocket engines but recently the technical problems moved at the European spaceport in French Guyana- where the ArianeSpace tries to set the ground system for the future launcher.

As we have anticipated in the past articles, when we said that the ArianeSpace's engineers are too busy working on three different areas with the Ariane 5, Soyuz and Vega being integrated at the same time, but also taking into account that December is a less productive month, there is no surprise in the recent announcement that the launch was again delayed from December 2011 to January 2012.
The new components of the rocket have been loaded at the beginning of October, some from the Italian harbor of Livorno and the others from Rotterdam. From there they will have a transatlantic trip of 18 days to the Cayenne harbor in French Guyana.
The first test, the so called 'Flight Readiness Review' will start on 13-14 October, being followed by an intensive campaign of tests and checks starting from November and preparing the flight in January.
Even if the new launch date is not entirely safe (there is still some chance that it will change if the engineer will have technical problems to solve), a small delay is not a big issue if this will guarantee the success of the launch (there is no economical pressure on ArianeSpace since the satellites flying this inaugural flight do not have a major economical or scientifically importance, but rather being symbolic- like the platform coordinated by the Romanian Space Agency Rosa which should mark the debut of Romania in space).
Anyway, as we have already done in the past, Space Alliance will try to carefully monitor this subject and to keep the readers up-to-date with the latest news.

SPACE ALLIANCE

ArianeSpace is well known through its veteran Ariane 5 rocket, but as part of the new management strategy the company intends to cover also the segments of the small and medium launchers serving the increasing needs of the customers. Thus it hopes that a part of the operations will be transferred to these niches and soon it can set another record superior to the one from 2010 when it covered 60% of the telecommunication satellites launches worldwide.
The good news is that the agenda is tending to go to the nominal plan, after succesive delays in the past, the Soyuz 2-1b maiden flight from Kourou taking place on 20th of October and with the Vega test flight being scheduled for January 2012.

We were speaking recently in a SpaceAlliance article about the document VERTA- 'Vega Research and Technology Accompaniment Program' the one which establishes the mass production for the components of the new launcher- covering in the first phase another 5 missions (on the sponsored launching list we can find ADM Aeolus, Lisa Pathfinder, the Swarm constellation and IEV –'Intermediate Experimental Vehicle'). In this way the Vega project moves from the design and development phase to the operation.

This huge operation called Vega involves directly 7 European countries (Italy, France, Spain, Belgium, Holland, Swiss and Sweden) prime contractor being the Italian company ELV SpA where the Italian Space Agency ASI holds 30% of the shares and the rest is the property of Avio SpA.
The group will be represented by ArianeSpace who will offer on the commercial market the rocket's new launching services and it will take care of all the operational aspects.

Vega intends to be positioned in the niche of the small launchers bellow the Ariane5 (the big class ArianeSpace launcher) and the newcomer –the modernized Soyuz which will operate in the medium sector.
ArianeSpace did not have a launcher in this niche, but the estimations speak about at least two Vega launches per year.

The rocket, with a weight of 137 tones, 30 m in length and a diameter of 3m, has four stages: a P 80 engine using solid fuel for the first stage-with a 3040kN force of traction and 107 s burning time, a Zefiro 23 engine powered by solid fuel for the second stage-with a force of 1200 kN and a burning time of 71 s, again a solid fuel engine type Zefiro 9-with a force of 213 kN and a burning time of 117s and finally a fourth stage powered by liquid fuel engine AVUM (Attitude and Vernier Upper Module) with a force of 2.45 kN and a burning time of 315 s.

The launcher is able to put in a circular, 700km height orbit, a satellite weighting up to 1500 kg which is usually the characteristic of the scientific Earth observation satellites.

The Vega rocket will use the spaceport ELA-1 from French Guyana – the same place used before by the Ariane 3 and Ariane 1 rockets. The hangar needed a complete refurbishment starting from the buildings of the complex and continuing with the auxiliary electrical, protection or control systems and last but not least the transport mechanisms. More, there will be a new mobile platform transporting the rocket, with a height of 50 m and a speed of 5m/minute, being able to cover the distance of 80 m which separates the operational position and the parking place.
The launch campaign for a standard flight has been increased from the current 2-3 weeks to 42 days, just to ensure the proper preparation, taking into account that the new rocket could serve in the future up to 4 flights per year.

The Goliat project which aims to lift the first Romanian satellite in orbit, has been started in 2005 by ROSA, having an initial budget of approximately 400.000 euro.
It is a nanosatellite based on the American Cubesat standard, cube-shaped 10x10x10 cm and weighting 1 kg. There are three scientific experiments onboard: SAMIS which aims to measure the meteorites flux, Dose-N which should measure the cosmic radiation dose on an Earth orbit and probably the most valuable, the acquisition of images from a 3Mpixels and 21x28 m ground resolution camera installed on the satellite.

The latest information speak about an elliptical orbit 350x750 km with an inclination of 71 degrees which would be a major change compared with the initial requirements of the designing team – a circular polar orbit with 500 km altitude.
In more concrete terms it will mean the project will only cover the medium latitude sites and will never reach the poles. Most of the scientific missions are launched in polar orbits because they need to have a complete set of Earth data and this is the only type of orbit which can ensure a full coverage (also for the poles).
The Romanian project and some other 8 satellites from the same category are given the chance to fly in the inaugural launch of the European Vega rocket (most of these satellites coming from emergent countries which, as Romania, have started their national space programs and will soon join the European Space Agency):

-SwissCube (École Polytechnique Fédérale de Lausanne, Switzerland)
-Xatcobeo (University of Vigo and INTA, Spain)
-UNICubeSAT (University of Rome, Italy)
-Robusta (University of Montpellier 2, France)

-AtmoCube (University of Trieste, Italy)
-e-st@r (Politecnico di Torino, Italy)
-OUFTI-1 (University of Liège, Belgium)
-PW-Sat (Warsaw University of Technology, Poland)

These 9 Cubesats are attached to the main payload- LARES (Laser RElativity Satellite) and the ALMASat (Alma Mater Satellite) a demonstrative mission developed from 1993 by the Bologna University. As with the previous Italian missions Unisat 1 and 2, the mission is trying to develop a modular concept able to integrate a large variety of scientific experiments at a very low cost.

Romania is involved in another 2 European space programs, two of the universities from Bucharest- the Polytechnic University of Bucharest and University of Bucharest being included on the research center list who will work for the development of the ESMO and ESEO projects.

ESEO or European Student Earth Orbiter is the third satellite designed for the Education Satellite Program of ESA- in fact a micro-satellite operated in a LEO orbit and intends to capture Earth images, to measure the radiation level and to test new technologies such as new star cameras, reaction wheels etc.

ESMO or the European Student Moon Orbiter will be the first educational satellite to be sent to the Moon. With a technology inspired by the previous ESA's Smart 1 mission it will be the fourth satellite from the Education Satellite Program. The main contractor is the Surrey Technology Limited from UK and subcontractors spread trough several universities from ESA member or cooperating states.
Romania is represented in this project by the Polytechnic University of Bucharest- responsible for ADCS and structure systems and by University of Bucharest- responsible for the development of the radiation monitoring experiment.

Credit ESA/ArianeSpace

Video of the Goliat satellite in orbit around the Earth

Virtual model of the spacecraft


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