



TIROS SPACE INFORMATION  
**NEWS BULLETIN**



Vol. 41 No.3, December 2015  
Editor: Jos Heyman FBIS

**In this issue:**

Satellite Update	2
Cancelled Projects:	
Russian Comsats	3
News	
Bangabandhu-1	7
CRS-2	6
Eutelsat 65 West A	3
Eutelsat 9B	3
FLEX	8
Hera	8
IGS	6
Iridium Next	7
ISS EVAs	6
Landmapper	8
Luch Olimp K	6
Moonspike	3
Orbcomm	3
Roscosmos	3
SpaceX	3
Super Strypi	2
Tundra	7
ULA	7
Unicorn-1	7
Venera D	7



*EVA of 6 November 2015*

---

**TIROS SPACE INFORMATION**  
86 Barnevelder Bend, Southern River WA 6110, Australia  
Tel + 61 8 9398 1322  
(e-mail: [tirosspace@hotmail.com](mailto:tirosspace@hotmail.com))

---

The *Tiros Space Information (TSI) - News Bulletin* is published to promote the scientific exploration and commercial application of space through the dissemination of current news and historical facts. In doing so, Tiros Space Information continues the traditions of the Western Australian Branch of the Astronautical Society of Australia (1973-1975) and the Astronautical Society of Western Australia (ASWA) (1975-2006).

The News Bulletin can be received worldwide by e-mail subscription only. Subscriptions can be requested by sending an e-mail address to [tirosspace@hotmail.com](mailto:tirosspace@hotmail.com). Tiros Space Information reserves the right to refuse any subscription request without the need to provide a reason.

All opinions expressed are those of the authors and do not necessarily reflect the opinions of the Editor or Tiros Space Information.

All material contained in this publication may be reproduced provided due acknowledgment is made.

---

## Calling card...

NASA Administrator Charles Bolden recently expressed the hope that the goal set by President Obama in 2010 to send humans to Mars by the mid-2030s, is something "that future leaders from all sides of the political spectrum see it through."

Having been slightly exposed to the raving and ranting of presidential hopefuls during my recent visit the United States, I am not surprised by Bolden's concern.

All of the recent US Presidents – Clinton, Bush and Obama - have tinkered with the space programme and, as a consequence, NASA's viability, by changing the course of action to suit their own programme, or, to be more blunt, to be different than their predecessor.

At least when President Kennedy's famous statement to 'placing a man on the Moon and return him safely, before the end of the decade', was continued by his successors Lyndon Johnson and Richard Nixon. But then Kennedy was assassinated and one can only wonder to what extent his successors did allow the Apollo programme to continue in the memory of Kennedy.

The NASA should not be used as a political tool, but rather be seen as one of these partisan tools to improve a nation's standing in the world.

Jos Heyman

*Merry Christmas and a Happy  
New Year*

## Super Strypi

On 4 November 2015 the first Super Strypi launch vehicle failed to place its thirteen payloads into a 415 x 490 km polar orbit due to a failure of the first stage.

Originally intended to be launched in 2013, the Super Strypi is also known as the Space-borne Payload Assist Rocket – Kauai (SPARK) and is a small satellite launch vehicle developed by Sandia National Laboratories in association with the University of Hawaii and Aerojet. Based on the Sandia Strypi sounding rocket, which was developed in 1962 for nuclear weapons testing, the 19.02 m long vehicle has three stages with a capability to place 250 kg into low-Earth orbit.

The first stage is powered by a Castor IV-XL solid fuelled engine assisted by 2 Terrier Mk.70 strap-on boosters.

The second stage is driven by an Orbus 7A whereas the third stage uses a Star 30BP engine. Both the second and third stage engines use solid fuel.

The vehicle was launched using a rail launcher and the first two flights this launcher will be from Barking Sands, in the Hawaiian islands.



The collective payloads on the first flight have been identified as Operationally Responsive Space (ORS)-4 and comprises a number of satellites.

The main payload was HiakaSat-1, formerly known as HawaiiSat-1, a 55 kg satellite developed by students of the University of Hawaii, Honolulu (Ma-noa). Apart from demonstrating a cost effective on-orbit platform for technology demonstrations, it was to test remote sensing with a newly designed space ultra-compact hyper-spectral imager (SUCHI) and make images with two HSFL color cameras which were co-aligned with SUCHI

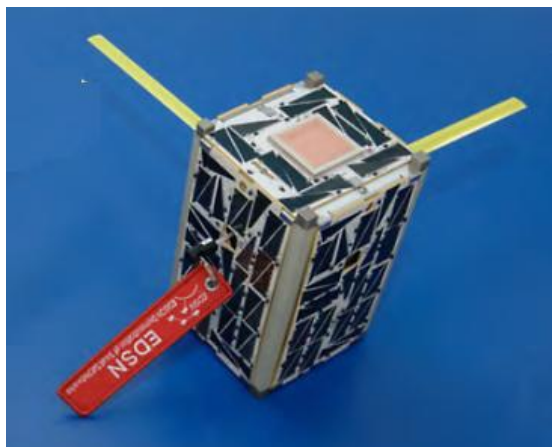
In addition the launch carried twelve cubesats of a variety of formats. All these cubesats were part of NASA's Educational Launch of Nanosatellites (ELaNa) VII program.

The ORS<sup>2</sup> was a 6U cubesat that was to evaluate a small spacecraft platform to be used in a variety of programs to be undertaken by the Operationally Responsive Space (ORS) office. In particular the satellite was to measure and record the vibration and shock data during the launch.

The satellite was also to test a new solar array system called the High Watts per Kilogram (HaWK) system. On a boom extending one meter out of the spacecraft, was a magnetometer to measure the Earth's magnetic field, and a dosimeter to measure the radiation.

ORS<sup>2</sup> was to be deployed using the Canisterized Satellite Dispenser (CSD) which was built by Planetary Systems Corporation as an easy adaptable space delivery system for 6 U cubesat.

NASA's Edison Demonstration of Smallsat Networks (EDSN) consisted of eight cubesats which were to fly in loose formation at an altitude of 400 km to demonstrate the feasibility of multiple small satellites as tools for a wide array of scientific, commercial and academic space research. Each of the 2 kg 1.5U cubesats carried a sensor to measure space radiation in Earth orbit. The combined data from the eight satellites was expected to provide a much more complete picture of the space environment than a single satellite would do. The satellites were also to test new communication applications, including communications between the individual satellites.



EDSN

Argus or SLU-02, is a 2U cubesat was developed by the Saint Louis University (SLU) in collaboration with the Vanderbilt University. It was to tests the effects of space radiation on modern electronics using the Vanderbilt University Controller (VUC) that would record the radiation-induced events.

PrintSat was a 1U cubesat built by Students at Montana State University (MSU) using nano-carbon-impregnated plastic printed with a 3D printer. In orbit it was to report on the suitability of its structure in space.

The final cubesats was the 3U STACEM developed at the Utah State University.

## Satellite Update

### Launches in October 2015

Int.Des.	Name	Launch date	Launch vehicle	Country	Notes
2015 055A	Progress M-29M	1-Oct-2015	Soyuz U	Russia	Docked with ISS
2015 056A	Morelos-3	2-Oct-2015	Atlas V-421	Mexico	Communications
1998 067GZ	AAUSat-5	5-Oct-2015	ISS	Denmark	Scientific
1998 067HA	GOMX-3	5-Oct-2015	ISS	Denmark	Scientific
1998 067HB	Flock 2b-01	6-Oct-2015	ISS	USA	Earth observation
1998 067HC	Flock 2b-02	6-Oct-2015	ISS	USA	Earth observation
1998 067HD	Flock 2b-03	6-Oct-2015	ISS	USA	Earth observation
1998 067HE	Flock 2b-04	6-Oct-2015	ISS	USA	Earth observation
1998 067HF	Flock 2b-05	6-Oct-2015	ISS	USA	Earth observation
1998 067HG	Flock 2b-06	6-Oct-2015	ISS	USA	Earth observation
1998 067HH	Flock 2b-07	6-Oct-2015	ISS	USA	Earth observation
1998 067HJ	Flock 2b-08	6-Oct-2015	ISS	USA	Earth observation
1998 067HK	Flock 2b-10	7-Oct-2015	ISS	USA	Earth observation
1998 067HL	Flock 2b-09	7-Oct-2015	ISS	USA	Earth observation
1998 067HM	Flock 2b-13	7-Oct-2015	ISS	USA	Earth observation
1998 067HN	Flock 2b-14	7-Oct-2015	ISS	USA	Earth observation
2015 057A	LQSat	7-Oct-2015	CZ 2D	China	Earth observation
2015 057B	Lingqiao-A	7-Oct-2015	CZ 2D	China	Earth observation
2015 057C	Lingqiao-B	7-Oct-2015	CZ 2D	China	Earth observation
2015 057D	Jilin-1	7-Oct-2015	CZ 2D	China	Earth observation
2015 058A	NOSS 3-7	8-Oct-2015	Atlas V-401	USA	Military
2015 058B	Aerocube-5C	8-Oct-2015	Atlas V-401	USA	Technology
2015 058C	Aerocube-7A	8-Oct-2015	Atlas V-401	USA	Technology
2015 058D	Fox-1A	8-Oct-2015	Atlas V-401	USA	Technology
2015 058E	BisonSat	8-Oct-2015	Atlas V-401	USA	Technology
2015 058F	ARC-1	8-Oct-2015	Atlas V-401	USA	Technology
2015 058G	SNaP-3 Alice	8-Oct-2015	Atlas V-401	USA	Technology
2015 058H	LMRSTSat	8-Oct-2015	Atlas V-401	USA	Technology
2015 058J	SNaP-3 Eddie	8-Oct-2015	Atlas V-401	USA	Technology
2015 058K	PropCube-3	8-Oct-2015	Atlas V-401	USA	Technology
2015 058L	SINOD D-1	8-Oct-2015	Atlas V-401	USA	Technology
2015 058M	SNaP-3 Jimi	8-Oct-2015	Atlas V-401	USA	Technology
2015 058N	PropCube-1	8-Oct-2015	Atlas V-401	USA	Technology
2015 058P	SINOD D-3	8-Oct-2015	Atlas V-401	USA	Technology
2015 059A	Apstar-9	16-Oct-2015	CZ 3B/E	Hong K.	Communications
2015 060A	Turksat-4B	16-Oct-2015	Proton M/Briz M	Turkey	Communications
2015 061A	Tianhui-1C	26-Oct-2015	CZ 2D	China	Earth observation
2015 062A	Navstar 2F-11	31-Oct-2015	Atlas V-401	USA	Navigational

### Other updates

Int. Des.	Name	Notes
1998 067FN	Flock 1b-27	Re-entered 14 October 2015
1998 067FQ	Flock 1b-21	Re-entered 12 October 2015

1998 067FR	Flock 1b-22	Re-entered 3 October 2015
1998 067FU	Flock 1d'-1	Re-entered 13 October 2015
1998 067FX	Flock 1b-6	Re-entered 16 October 2015
---	Flock 2b-11/12	Deployment failed on 7 October 2015
2013 064K	NPS Scat	Re-entered 28 October 2015

## Eutelsat 65 West A, Eutelsat 9B

Eutelsat has booked several launch vehicles for future satellites.

Eutelsat 65 West A will be launched with an Ariane 5 in early 2016. The launch will be without the usual second satellite in the lower payload berth as Eutelsat wants to get the satellite on location before the 216 Olympic Games in Rio de Janeiro. This move was necessary as no satellite for the lower payload berth could be found.

Eutelsat 65 West A is based on the Space Systems/Loral LS-1300 platform and will carry 24 Ka, 24 Ku and 10 C band transponders.

Eutelsat also entered into a multi-launch agreement with International Launch Services for Proton launches over the next seven years. The first satellite to be launched under this contract is Eutelsat 9B, scheduled for January 2016. This Eurostar 3000 platform will carry 66 K band transponders as well as a payload for the European Data Relay Satellite System.

## Moonspike

The European Moonspike venture to send a small spacecraft to the Moon has faltered after an on-line fundraising effort to get US\$ 925,000 to start work on the project, failed after raising only US\$ 122,000.

## Roscosmos

The Russian space agency Roscosmos has signed contracts for 31 commercial launches during 2016.

A number of these launches will take place from the new Vostochny Cosmodrome.

## SpaceX and Orbcomm

SpaceX is getting ready to return the Falcon 9 launch vehicle in service with the launch of 11 Orbcomm second generation satellites in December 2015.

The satellites, identified as Orbcomm-102, -105, -108, -110, -112, -113, -114, -115, -116, -117 and -118, will be placed in a 600 km orbit, after a single burn of the second stage. The second stage will re-ignite to test the launch vehicle's ability to place satellites into a geostationary transfer orbit.

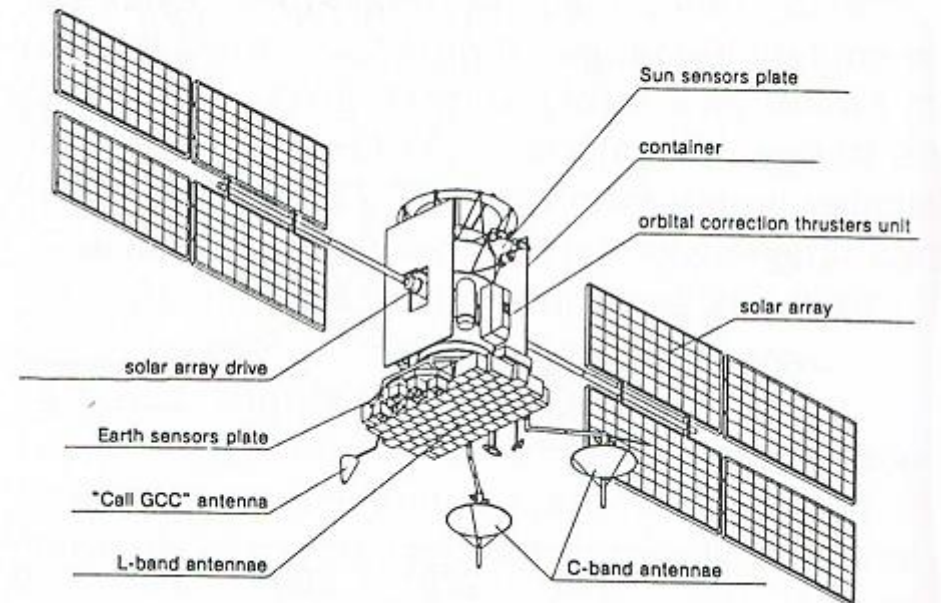
## Cancelled projects: Russian comsats

By Jos Heyman

In the early 1990s there were a number of USSR/Russian proposals for communications satellites that never reached an operational status. Some of these (Koskon, Signal, Elekon and Kuryer) have been discussed in an article on cancelled LEO comsats (TSI News Bulletin, February 2014). This article discusses some other proposals.

### Mayak and Arkos

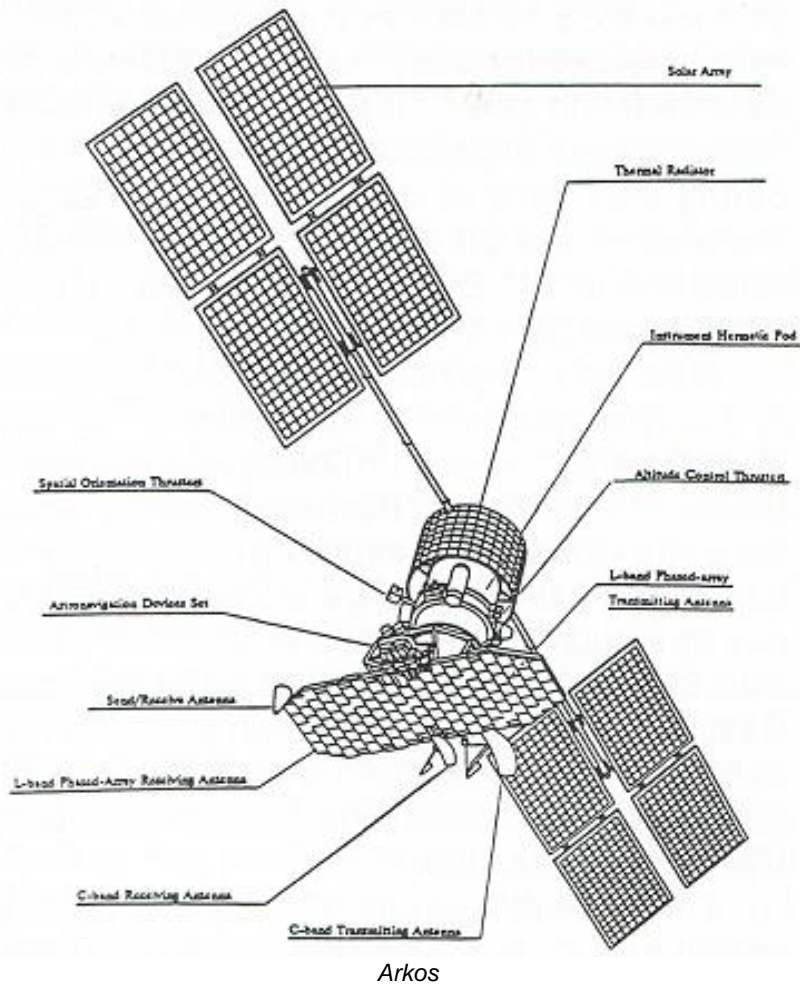
The Mayak and Arkos communications satellite were to serve the Marathon network designed to provide mobile services to ships, aircraft and land users, including those in remote areas.



Mayak

The Mayak communications satellite was developed by the Applied Mechanics NPO in the early 1990s.

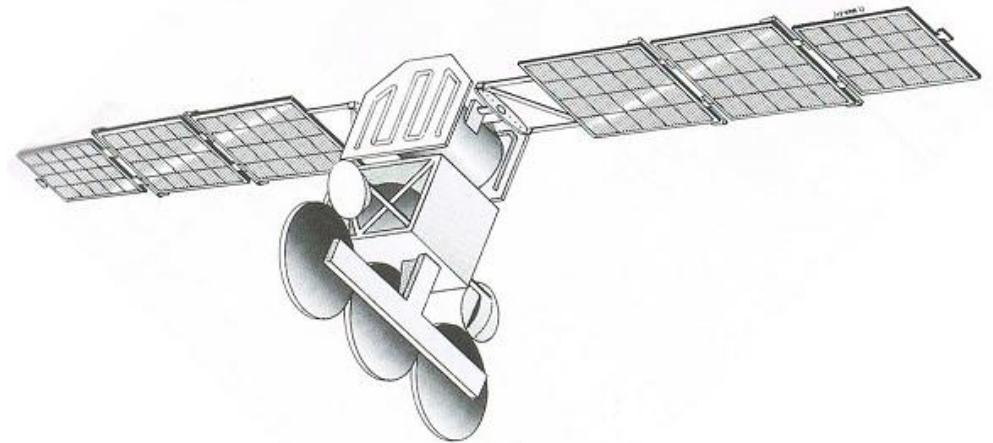
To be placed in the same type of orbits as the Molniya's, Mayak was to be fitted with transponders in the L band and the C band and was to be compatible with Inmarsat standards. It was to have a mass of about 3000 kg. The first flight was scheduled for 1997.



The Arkos communications satellites were to be fitted with similar transponders as the Mayak spacecraft but would have operated from a geostationary orbit. The first of five Arkos satellite was to be launched in 1995.

### **Tyulpan**

The Tyulpan communications satellites were to be developed by Lavochkin. The satellites were to be about 2600 kg and would have been fitted with C band and Ku band transponders. The constellation would have consisted of six satellites placed in so called Molniya orbits, with each spacecraft having a maximum 'visibility' of eight hours. The proposal was made in 1994.



*Tyulpan*

### **Zerkalo**

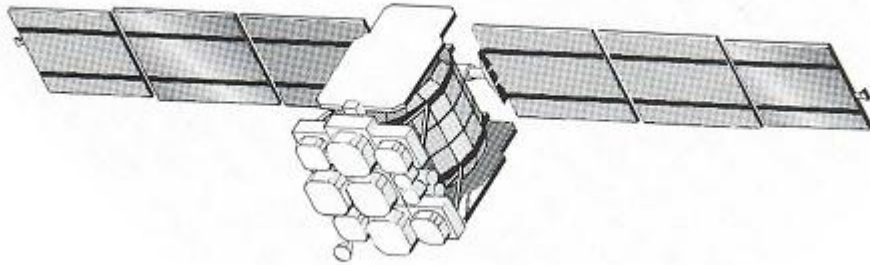
Lavochkin, in cooperation with NOOS Space Technology, also advanced the Zerkalo communications satellite. The 3000 kg satellite was to be fitted with 10 Ku band transponders and was to be launched in 1995 and placed in a geostationary orbit at 88.1°E.



*Zerkalo*

## Kupon/Bankir

The Kupon system was originally developed by Lavochkin as a military communications satellite and was to be used for the third generation GKKRS (Global Space Command and Communications System).



*Kupon (Bankir)*

Development was cancelled when the USSR broke up but Lavochkin instead used the design for the Bankir network for the relay of banking data. This network was owned by the Russian Federation Central Bank and was initially envisaged to have four to eight satellites in low-Earth orbits. By 1997 it was envisaged to have the Bankir network serviced by a constellation of four Kupon spacecraft located in geostationary orbits at 9.5°W, 55°E, 86.5°E, and 91.75°E. The spacecraft would have carried 16 Ku band transponders. Eventually only one satellite was launched as on 12 November 1997 and was located at 55°E.

*(Principal reference and illustration source: Johnson, N.L. Rodvold D.M., Europe and Asia In Space 1993-1994)*

## CRS-2

NASA has delayed the award of contracts for the Commercial Resupply Services (CRS)-2 for the transportation of cargo to the International Space Station to 30 January 2016. At the same time it has been made known that Boeing's cargo version of the CST-100 Starliner crewed spacecraft is no longer a contender, leaving SpaceX's Dragon and Orbital ATK's Cygnus as the only spacecraft for this service.

Other companies that made submissions for the CRS-2 contract were Lockheed Martin and Sierra Nevada although it is believed that these proposals have already been dropped from serious consideration.

## Luch Olimp K

The Russian Luch Olimp K, which was launched on 28 September 2014 and was reported located at 54°E, 95°E or 167°E, has made some strange moves recently. In April 2015 it moved to a location between Intelsat-7 and Intelsat-901, both located at 18°W, and recently the satellite moved to 24.4°W, right next to Intelsat-905, located at 24.5°W.

Intelsat has expressed its concerns about these moves and has called them 'irresponsible' whilst Russia states that the satellite is just a relay satellite, sending messages from spacecraft to Earth.

## ISS EVAs

On 28 October 2015 Kelly and Lindgren undertook an EVA of 7 hours, 16 minutes during which they installed cables needed for a new docking mechanism, mounted insulation panels on a physics experiment to improve cooling and lubricated the latching mechanism of the station's robot arm.

On 6 November 2015 Lindgren and Kelly made a second EVA of 7 hours, 48 minutes during which they completed reconfiguring the P6 Photovoltaic Thermal Control System (PVTCS 2B) cooling system on the outermost truss segment to return the system to its original configuration, essentially reversing work done to it since a 2012 spacewalk.

This system, that circulates ammonia through Photovoltaic Radiators (PVRs) to dissipate excess heat generated by solar power generation in the Solar Array Wings and keep the EPS (Electrical Power System) at a stable temperature, developed leaks in 2006 that increased by 2012 when the crew members Williams and Hoshide completed an EVA on 1 November 2012 during which they deployed an older radiator that was part of the Station's Early External Thermal Control System and bypassed the P6 radiator so that the 2B channel was running its ammonia through the older radiator, thus bypassing any leaks suspected in the radiator area which was known to be susceptible to debris and micrometeoroid hits.

Another rise in the rate of the leaks rate occurred in May 2013 when almost all of the coolant was lost in a matter of hours and the system had to be shut down. Then crew members Cassidy and Marshburn conducted an EVA on 11 May 2013 to replace a Pump Flow Control Subassembly which had been confirmed to be the source of the leak.

This was successful and there were no more leaks. The PVTCS 2B is now fully functional again.

## IGS

Japan has indicated it wants to expand its IGS series of reconnaissance satellites from four to ten over a period of several years.

## ULA

Fourteen politicians from California have sent a letter to the Defense Department with respect to the impact of the ULA's decision to drop the Delta 4 launch vehicle as well as its decision to drop Aerojet Rocketdyne as its provider of solid fuelled rocket boosters, will have on the Californian space industry.

The move is based on the concern that "the Department is not meeting its legal obligation to sustain an industrial base capable of our national security objectives." In particular they seek answers to three questions:

- Did the Pentagon conduct an analysis of what these decisions mean to the industrial base?
- Did the Pentagon determine if these actions would detract from the Defense Department's assured access to space?
- Would these decisions reduce future competitions for the Air Force's plan to overhaul its arsenal of Cold War-era nuclear missiles?

In a separate move ULA decided not to bid for the launches for the six GPS 3 satellites, commencing 2018. This was to have been the first competitive contract for military launched and ULA's move leaves the door open for SpaceX, the only other viable launch service provider.

The decision was made after that ULA decided it was unable to certify that funds from other government contracts would not benefit the GPS 3 launch, which was a requirement spelled out in the Air Force's request for proposals. It is, however, also believed that ULA has no RD-180 engines for the Atlas 5's required for the GPS 3 launches.

## Iridium Next



The launch of two the first two Iridium Next communications satellite, originally scheduled for December 2015, has been delayed until April 2014 as the result of a technical problem with the spacecraft's Ka-band communications payload.

The first two will be launched with a Dnepr launch vehicle whereas the other 70 will be launched with seven Falcon 9 launches from Vandenberg, commencing August 2016. Another nine satellites will be kept as ground spares.

## Bangabandhu-1

The Bangladesh Telecommunication Regulatory Commission ordered the Bangabandhu-1 communications satellite from Thales Alenia. To be launched by 16 December 2017 (a national holiday in Bangladesh), probably with an Ariane 5ECA launch vehicle, the satellite will be located at 119.1°East, a spot purchased from Intersputnik.

To be based on the Spacebus 4000B2 platform, the satellite will carry 26 Ku- and 14 C-band transponders.

## Venera D

Discussions between NASA and Russia concerning the Venera D mission to Venus, have been resumed following a hiatus due to the Ukrainian conflict.

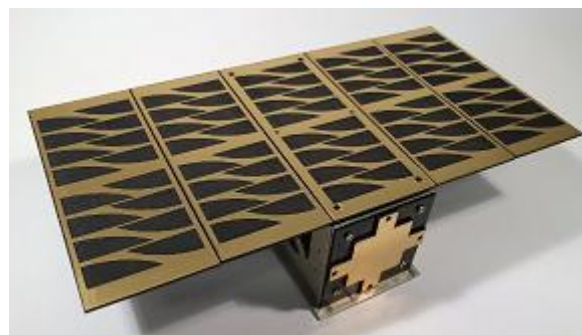
If proceeded with, Venera D may be launched in the late 2020s. The current thinking is for an orbiter and lander whilst the possibility of a balloon to study the Venusian atmosphere, is also being considered.

The 'D' in Venera D stands for the Russian word for 'long lived' and the mission would probably focus on atmospheric observations, surface imagery and composition measurements, and searching for volcanic activity.

## Tundra

On 17 November 2015 a Soyuz 2-1b/Fregat M launched from Plesetsk, placed the first Tundra missile early warning satellite in orbit as Kosmos-2510. The Tundra satellites will replace the Oko series of missile early warning satellites, of which the last one was launched in 2012 and ceased operations in 2014.

Also known as 14F142 and EKS (Unified Space System), it is believed the Tundra satellites are being built by Energia using a 1200 kg platform. They are fitted with an infra-red sensing system developed by TsNII Kometa.



## Unicorn-1

The European Space Agency (ESA) is funding a double PocketQube to trial the relay of data from a geostationary satellite to a satellite in low-Earth orbit of 620 km in cooperation with Avanti UK. Identified as Unicorn-1, the 400 grams satellite will be fitted with an S band ISL radio. Launch will take place in late 2016 as one of the

payloads on the Dnepr launch vehicle that will place Unisat-7 in orbit.

## Landmapper

Aquila Space and Astro Digital, two San Francisco based companies, will establish the Landmapper constellation of 30 Earth observation satellites.

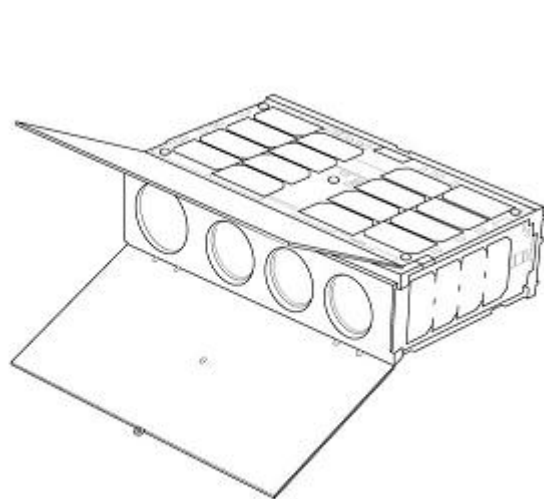
The constellation, to be launched from 2016 over a four year timeframe, will comprise of 10 Broad Coverage (BC) satellites and 20 High Definition (HD) satellites.

The project aims to increase the supply of imagery available to customers that are currently users of Landsat data by providing higher resolution images at a more frequent basis than the Landsat programme provides.

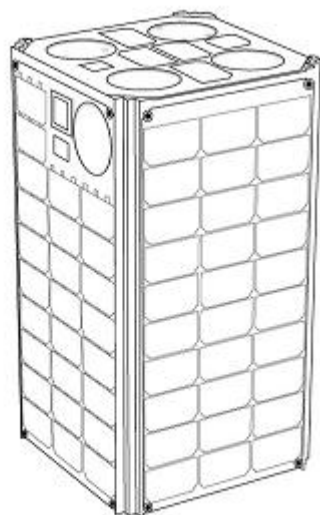
The Landmapper BC satellites are based on Aquila's Corvus-BC platform, a 6U cubesat, which will carry a payload that will provide imagery in the red, green and NIR spectral bands with a resolution of 22 m.

The Landmapper-HD is based on Aquila's Corvus-HD platform, a 16U cubesat unit, that will carry a payload with a resolution of 2.5 m operating in the blue, red, green, near-infrared and red-edge spectral bands.

Operating from an altitude of 600 km, the constellation will provide updates every three to four days.



**Landmapper BC**



**Landmapper HD**

## Hera



California based Hera Systems hopes to establish a 48 cubesats Earth observation constellation to provide daily imaging services with a resolution of 1m. The launch of the first nine satellites is expected to take place late 2016.

Whilst Hera was originally looking at satellites in the range of 50 to 60 kg, the platform ultimately selected is a 12U cubesat platform.

## FLEX

The Fluorescence Explorer (FLEX) is a European Space Agency (ESA) mission to monitor the health of global vegetation by measuring the faint glow given off by plants as they convert sunlight and carbon dioxide into energy in a process known as photosynthesis.

The satellite will be launched in 2022 with a Vega launch vehicle and will carry the Fluorescence Imaging Spectrometer (FLORIS), an instrument that will quantify plant glow in blocks of about 90,000 m<sup>2</sup>.

FLEX will fly in formation with one of Europe's Sentinel 3 Earth observation satellites in a sun-synchronous orbit of 815 km altitude.