



LAUNCH KIT  
June 2016

VA 230

EchoStar XVIII

BRIsat





# VA 230

EchoStar XVIII  
BRIsat



## ARIANESPACE'S THIRD ARIANE 5 MISSION IN 2016 WILL ORBIT SATELLITES FOR THE AMERICAS AND ASIA-PACIFIC

On its fifth launch of the year, which will be the third mission in 2016 utilizing an Ariane 5 launcher from the Guiana Space Center (CSG) in French Guiana, Arianespace will orbit two satellites: EchoStar XVIII for the operator DISH Network L.L.C.; and BRIsat for PT. Bank Rakyat Indonesia (Persero) Tbk.

This mission – the 230th overall by an Ariane launcher – will mark a new all-time Arianespace record for a total payload weight orbited: 10,730 kg., including a net weight of 9,840 kg. for the two satellites. The launch, designated Flight VA230, is to be the very first time that Arianespace orbits two satellites built by SSL (Space Systems Loral) on the same launcher, as well as Arianespace's initial launch of a spacecraft entirely dedicated to use by a financial institution.

EchoStar XVIII and BRIsat will be the 533rd and 534th satellites launched by Arianespace.

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### EchoStar XVIII

EchoStar XVIII will be the fourth satellite orbited by Arianespace for the operator DISH Network L.L.C. (NASDAQ:DISH). Arianespace and DISH Network L.L.C. are continuing a very fruitful collaboration that dates back to the launch of EchoStar II in 1996.

DISH Network L.L.C. through its subsidiaries, provides approximately 13.874 million pay-TV subscribers, as of March 31, 2016, with the highest-quality programming and technology, and the most choices at the best value. DISH offers a high definition line-up with more than 200 national HD channels, the most international channels and award-winning HD and DVR technology. DISH Network Corporation is a Fortune 250 company.

The EchoStar XVIII satellite, a Direct Broadcast Satellite (DBS) with a high-power multi-spot beam in the Ku-band, will augment DISH's existing fleet, assuring the highest level of ongoing service to DISH customers.

EchoStar XVIII was built by SSL based on the SSL 1300 platform.

### BRIsat

BRIsat is the first satellite to be operated by PT. Bank Rakyat Indonesia (Persero) Tbk. (BRI), which selected Arianespace as its launch services provider. This Indonesian bank is the first bank in the world to acquire a satellite.

BRI is a state-owned bank and the largest bank in Indonesia. BRI went public through an Initial Public Offering in 2003 and became one of the blue chip stocks traded on the Indonesian Stock Exchange. The bank manages millions of customer transactions non-stop, 24 hours daily, through service facilities spread across the country.

BRIsat is the world's first communications satellite dedicated to a financial institution. It will provide both C-band and Ku-band coverage of Indonesia, South East Asia and North East Asia. Positioned at 150.5 degrees East longitude, the satellite will enable BRI to provide enhanced secure banking communications for more than 10,600 operational branches, 236,939 electronic channel outlets, and almost 53 million customers across the Indonesian archipelago.

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## EchoStar XVIII BRIsat



BRI is optimistic that it can, through the support of sophisticated satellite-based technology, meet public demand for access to easy, safe and fast banking products. At the same time, BRI also provides innovative and comprehensive business solutions.

PT. Bank Rakyat Indonesia (Persero) Tbk. is the 37th telecom satellite operator to choose Arianespace to launch its first satellite.

BRIsat was built by SSL based on the SSL 1300 platform.

### Arianespace and SSL: a solid and successful partnership since 1983 (Intelsat 5F.7)

Both satellites on this mission were built by **SSL** of Palo Alto California, based on the highly reliable SSL 1300 platform, which has the flexibility to support a broad range of applications and technology advances.

This Ariane 5 flight will be the first Arianespace mission carrying two SSL-built satellites on the same launcher.

They will be the 54th and 55th geostationary satellites based on platforms built by SSL and its predecessors to be launched by Arianespace.

SSL is a leading provider of commercial satellites with broad expertise to support satellite operators and innovative space-related missions. The company designs and manufactures spacecraft for services such as direct-to-home television, video content distribution, broadband Internet, mobile communications and Earth observation.

Ten more SSL satellites are scheduled for Arianespace launches.

### Ariane 5 sets new record with total payload weight of 10,730 kg

This launch sets a new all-time Arianespace record for total payload weight orbited, at 10,730 kg. – including a net weight of 9,840 kg. for the two satellites.

The Ariane 5 used on this mission therefore surpasses the previous record of 10,500 kg. (9,503 kg. for the satellites), set by the Ariane 5 launch on February 7, 2013.

The 337-kg increase in payload weight confirms the flexibility and power of Arianespace's launch services with the Ariane 5 heavy launcher.

Arianespace's long experience with the Ariane launcher family, and its proven excellence, are now being incorporated on the new generation of European launch vehicles: the Ariane 6 heavy launcher the Vega-C light launcher.



# VA 230

EchoStar XVIII  
BRIsat

## MISSION DESCRIPTION

The third Arianespace Ariane 5 launch of the year will place both satellites into geostationary transfer orbit.

The launcher will be carrying a total payload of 10,730 kg.

The launch will be from Ariane Launch Complex No. 3 (ELA 3) in Kourou, French Guiana.

### DATE AND TIME



Liftoff is planned on **Thursday, June 16, 2016** as early as possible within the following launch window:

- > Between **05:30 p.m. and 06:40 p.m.**, Kourou time
- > Between **04:30 p.m. and 05:40 p.m.**, Washington D.C. time
- > Between **20:30 and 21:40**, Universal Time (UTC)
- > Between **10:30 p.m. and 11:40 p.m.**, Paris time.

### MISSION DURATION



The nominal duration of the mission (from liftoff to separation of the satellites) is: **42 minutes, 06 seconds.**

### TARGETED ORBIT



Perigee altitude  
**250 km**



Apogee altitude  
**35,766 km**



Inclination  
**6 degrees**

### THE LAUNCH AT A GLANCE

The launcher's attitude and trajectory are controlled by the two onboard computers, located in the Ariane 5 vehicle equipment bay (VEB).

About seven seconds after start of the ignition of the main stage cryogenic engine at T-0, the two solid-propellant boosters are ignited, enabling liftoff. The launcher first climbs vertically for 6 seconds, then rotates towards the East. It maintains an attitude that ensures the axis of the launcher remains parallel to its velocity vector, in order to minimize aerodynamic loads throughout the entire atmospheric phase, until the solid boosters are jettisoned.

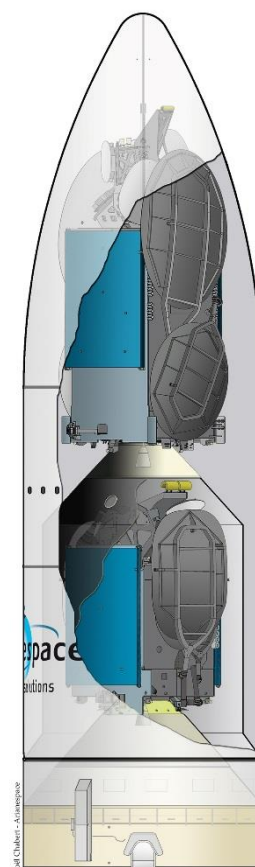
The fairing protecting the payload is jettisoned at T+220 seconds.

Once this first part of the flight is completed, the onboard computers optimize the trajectory in real time, minimizing propellant consumption to bring the launcher first to the intermediate orbit targeted at the end of the main stage propulsion phase, and then the final orbit at the end of the flight of the cryogenic upper stage.

The main stage splashes down off the coast of Africa in the Atlantic Ocean (in the Gulf of Guinea). At orbital injection, the launcher will have attained a velocity of approximately 9,365 meters/sec-ond, and will be at an altitude of 640 kilometers.

### PAYLOAD CONFIGURATION

- > **Upper payload (CUH): EchoStar XVIII**  
Mass at liftoff: 6,300 kg.
- > **Lower payload (CUB): BRIsat**  
Mass at liftoff: 3,540 kg.
- > Long version of the payload fairing
- > Long version of the SYLDA (Système de Lancement Double Ariane)







**VA 230**

**EchoStar XVIII  
BRIsat**

## ECHOSTAR XVIII



<b>CUSTOMER</b>	DISH Network L.L.C.
<b>PRIME CONTRACTOR</b>	SSL (Space Systems Loral)
<b>MISSION</b>	Direct Broadcast Satellite (DBS)
<b>MASS</b>	6,300 kg. at liftoff
<b>STABILIZATION</b>	3 axis
<b>DIMENSIONS</b>	8.3 m x 3.5 m x 2.9 m
<b>PLATFORM</b>	SSL 1300
<b>PAYLOAD</b>	A high power multi-spot beam in KU band - 61 transponders
<b>ONBOARD POWER</b>	13 kW (end of life)
<b>DESIGN LIFE</b>	15 years
<b>ORBITAL POSITION</b>	110° West
<b>COVERAGE AREA</b>	CONUS (contiguous United States), Alaska, Hawaii.

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**arianespace**  
service & solutions

## BRIsat



<b>CUSTOMER</b>	PT. Bank Rakyat Indonesia (Persero) Tbk
<b>PRIME CONTRACTOR</b>	SSL (Space Systems Loral)
<b>MISSION</b>	Telecommunications
<b>MASS</b>	3,540 kg. at liftoff
<b>STABILIZATION</b>	3 axis
<b>DIMENSIONS</b>	5.6 m x 3.5 m x 3.1 m
<b>PLATFORM</b>	SSL 1300
<b>PAYLOAD</b>	9 Ku-band transponders and 36 C-band transponders
<b>ONBOARD POWER</b>	9.5 Kw (end of life)
<b>DESIGN LIFE</b>	More than 15 years
<b>ORBITAL POSITION</b>	150.5° East
<b>COVERAGE AREA</b>	Indonesia, South East and North East Asia

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## ARIANE 5-ECA LAUNCH VEHICLE

The launcher is delivered to Arianespace by Airbus Safran Launchers as production prime contractor.

54.8 m

### Fairing

(RUAG Space): 17 m  
Mass: 2.4 t

780 tons  
(total mass at liftoff)

### EchoStar XVIII

(DISH Network L.L.C.)  
Mass: 6,300 kg.

### ACU - Payload adaptor (2)

(RUAG Space or Airbus Safran Launchers)  
Mass: approx. 140 kg. each

### BRIsat

(PT. Bank Rakyat Indonesia (Persero) Tbk)  
Mass: 3,540 kg.

### SYLDA - Internal structure

7 versions (Height: 4.9 to 6.4 m)  
Mass: 400 to 530 kg.

### Vehicle Equipment Bay

Height: 1.13 m  
Mass: 970 kg

### ESC-A - Cryogenic upper stage

Height: 4.71 m  
Mass: 19 t

### HM-7B engine

Thrust: 67 kN (in vacuum)  
945 sec. of propulsion

### EPC - Cryogenic main stage

Height: 31 m  
Mass: 188 t

Propellants (in metric tons)  
at T-O  
H: Cryogenic  
P: Solid

### EAP - Solid Rocket Boosters

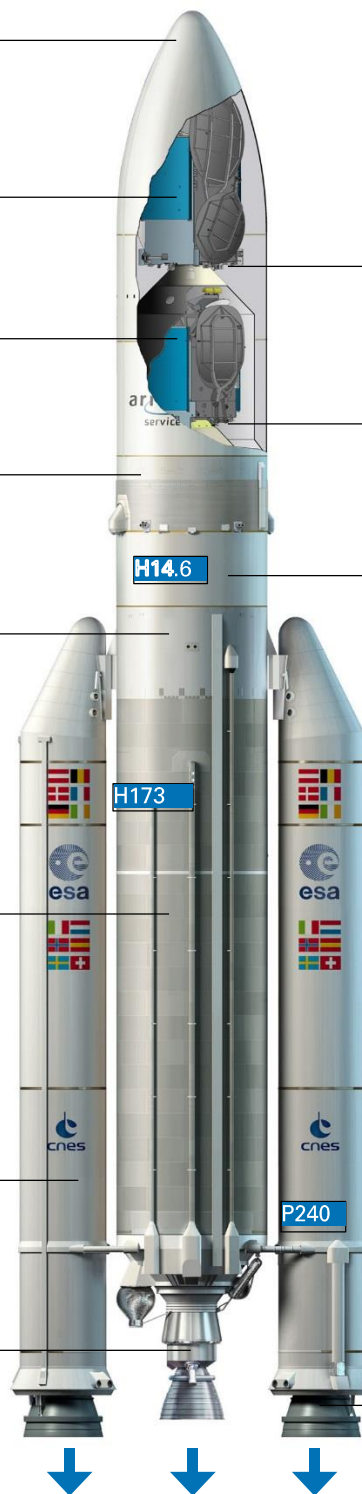
Height: 31.6 m  
Mass: 277 t approx.

### Vulcain 2 Engine

Thrust: 1,390 kN (in vacuum)  
540 sec. of propulsion

### MPS - Solid Rocket Motor (SRM)

Average thrust: 5,060 kN  
Maximum thrust: 7,080 kN (in vacuum)  
130 sec. of propulsion



13,000 kN at Lify-off  
(at T+7.3 sec.)

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## LAUNCH CAMPAIGN - ARIANE 5 - EchoStar XVIII - BRIsat

### SATELLITE AND LAUNCH VEHICLE CAMPAIGN CALENDAR: ECHOSAR XVIII – BRISAT

DATES	SATELLITE ACTIVITIES	LAUNCH VEHICLE ACTIVITIES
March 21 and 22, 2016		Campaign start review EPC destocking - EPC erection – EAP2 transfer
March 23, 2016		EAP1 transfer and EAP positioning
March 24, 2016		EPC/EAP integration
April 1, 2016		ESC-A erection and equipment bay integration
April 20, 2016	Arrival in Kourou of EchoStar XVIII; beginning of preparation in the S5C building	
April 21, 2016	EchoStar XVIII fitcheck in the S5C building	
May 2, 2016	EchoStar XVIII transfer to S5B	
May 3, 2016		Transfer from BIL (Launcher Integration Building) to BAF (Final Assembly Building)
May 4 to 9, 2016	EchoStar XVIII fueling operations in the S5C	
May 9, 2016	Arrival in Kourou of BRIsat; beginning of preparation in the S5C building	
May 10, 2016	EchoStar XVIII fitcheck in the S5C building	
May 11, 2016	EchoStar XVIII integration on ACUH in the S5C	
May 12, 2016	EchoStar XVIII transfer to Final Assembly Building (BAF)	
May 13, 2016	EchoStar XVIII integration on SYLDA	
May 14, 2016	EchoStar XVIII encapsulation in the payload fairing	
May 20, 2016	BRIsat transfer to S5B	
May 23 to 25, 2016	BRIsat fueling operations in building S5B	

### SATELLITE AND LAUNCH VEHICLE CAMPAIGN CALENDAR: ECHOSAR XVIII – BRISAT

DATES	SATELLITE ACTIVITIES	LAUNCH VEHICLE ACTIVITIES
Wednesday, May 25, 2016		Final inspection of the Vulcain engine
Thursday, May 26, 2016	BRIsat integration on the ACUB in the S5C	
Friday, May 27, 2016	BRIsat transfer to Final Assembly Building (BAF)	
Monday, May 30, 2016	BRIsat integration on launcher	Final inspection of the HM-7b engine
Tuesday, May 31, 2016	BRIsat encapsulation in the payload fairing and composite integration with EchoStar on launcher	
Wednesday, June 1, 2016		Completion of composite integration on launcher and payload check
Thursday, June 2, 2016		Launch rehearsal
Friday, June 3, 2016		Arming of launch vehicle
Monday, June 6 and Tuesday, June 14, 2016		Launch readiness review (RAL) 1 and 2, final preparation of launcher and BAF for chronology
Wednesday, June 15, 2016		Rollout from BAF to Launch Zone, launch vehicle connections and filling of the EPC liquid helium tank
Thursday, June 16, 2016		Start of launch countdown, EPC filling with liquid oxygen and liquid hydrogen





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## COUNTDOWN AND FLIGHT SEQUENCE

The countdown comprises all final preparation steps for the launcher, the satellites/spacecraft and the launch site. If it proceeds as planned, the countdown leads to ignition of the main stage engine, then the two boosters, for a liftoff at the targeted time.

The countdown culminates in a synchronized sequence, which is managed by the control station and onboard computers starting at T-7 minutes.

If an interruption in the countdown means that T-0 falls outside the launch window, then the launch will be delayed by one, two or more days, depending on the problem involved, and the solution developed.

TIME	EVENT
- 11 h 30 mn	Start of final countdown
- 10 h 30 mn	Check of electrical systems
- 04 h 20 mn	Start of filling of EPC with liquid oxygen and hydrogen
- 03 h 40 mn	Start of filling of ESC-A with liquid oxygen and hydrogen
- 03 h 30 mn	Chilldown of Vulcain main stage engine
- 01 h 10 mn	Check of connections between launcher and telemetry, tracking and command systems
- 7 mn	"All systems go" report, allowing start of synchronized sequence
- 4 mn	Tanks pressurized for flight
- 1 mn	Switch to onboard power mode
- 05 s	Cryogenic arm opening command
- 04 s	Onboard systems take over
T-0	Ignition of the cryogenic main stage engine (EPC)
+ 07 s	Ignition of solid boosters (EAP)
+ 07 s	Liftoff
+ 13 s	End of vertical climb, beginning of pitch motion
+ 17 s	Beginning of roll maneuver
+ 2 mn 21 s	EAP separation
+ 3 mn 25 s	Fairing jettisoned
+ 8 mn 13 s	Acquisition by Natal tracking station
+ 8 mn 54 s	End of EPC thrust phase
+ 9 mn 00 s	EPC separation
+ 9 mn 03 s	Ignition of ESC-A stage
+ 14 mn 42 s	Acquisition by Ascension tracking station
+ 18 mn 40 s	Acquisition by Libreville tracking station
+ 23 mn 10 s	Acquisition by Malindi tracking station
+ 25 mn 30 s	Injection
+ 29 mn 20 s	EchoStar XVIII satellite separation
+ 34 mn 52 s	Sylda 5 separation
+ 42 mn 05 s	BRIsat satellite separation
56 mn 42 s	End of the Arianespace mission



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## ARIANE 5 ECA MISSION PROFILE

The launcher's attitude and trajectory are entirely controlled by the two onboard computers in the Ariane 5 vehicle equipment bay (VEB).

The synchronized sequence starts 7 minutes before ignition (T-0). It is primarily designed to perform the final operations on the launcher prior to launch, along with the ultimate checks needed following switchover to flight configuration. As its name indicates, the sequence is fully automatic, and is performed concurrently by the onboard computer and by two redundant computers at the ELA-3 launch complex until T-4 seconds. The computers command the final electrical operations (startup of the flight program, servocontrols, switching from ground power supply to onboard batteries, etc.) and associated checks. They also place the propellant and fluid systems in flight configuration and perform associated checks. In addition, they handle the final ground system configurations, namely:

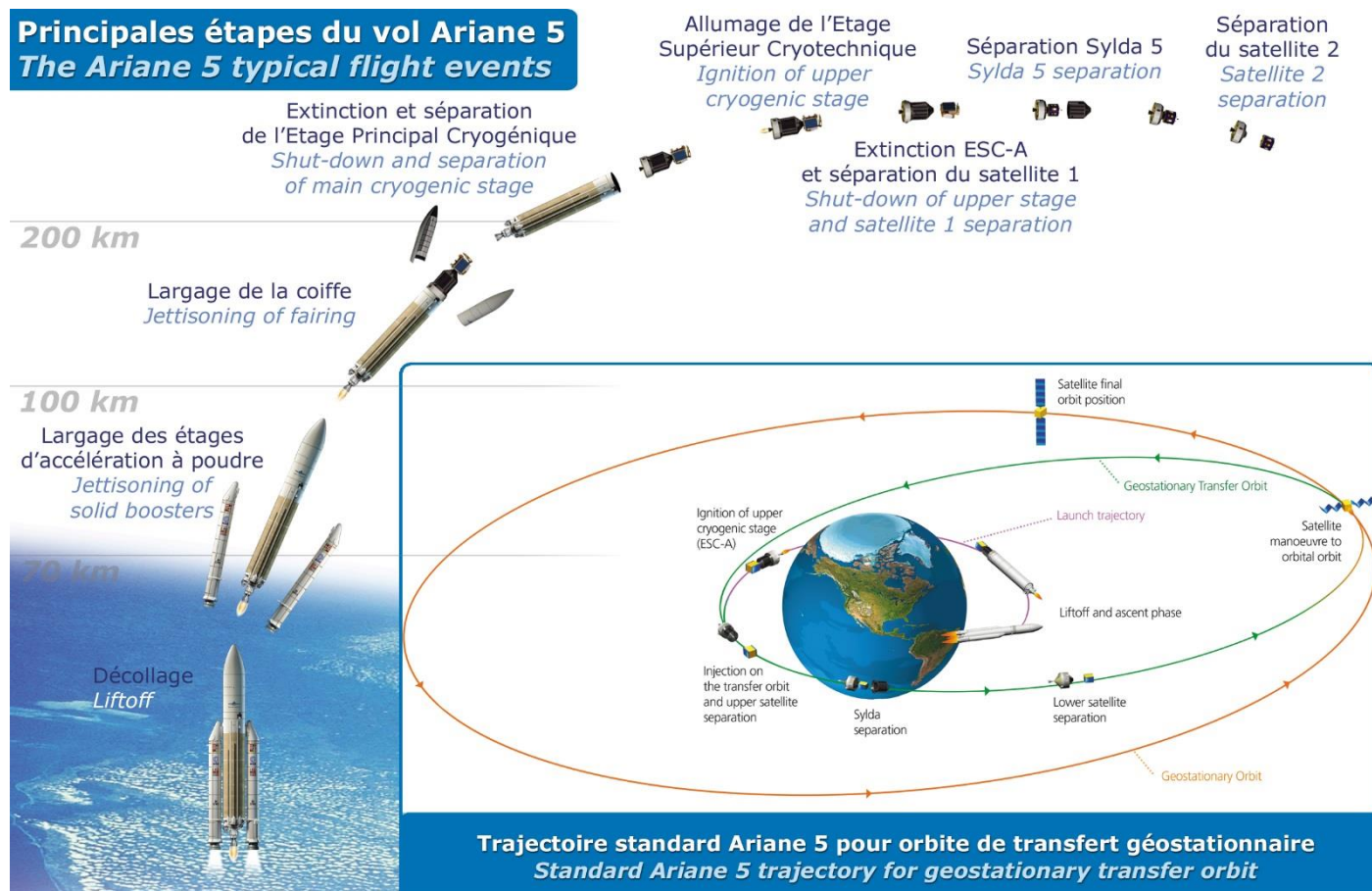
- > Startup of water injection in the flame trenches and jet guide (T-30 sec).
- > Hydrogen aspiration for chilldown of the Vulcain engine in the jet guide (T-18 sec).
- > Burnoff of hydrogen used for chilldown (T-5.5 sec).

At T-4 seconds, the onboard computer takes over control of final engine startup and liftoff operations. It:

- > Starts the ignition sequence for the Vulcain main stage engine (T-0).
- > Checks engine operation (from T+4.5 to T+6.9 sec).
- > Commands ignition for the solid boosters at T+7.05 sec for liftoff at T+7.3 seconds.

**Any shutdown of the synchronized sequence after T-7 minutes automatically places the launcher back in its T-7 minute configuration.**

### Principales étapes du vol Ariane 5 The Ariane 5 typical flight events





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# ARIANESPACE AND THE GUIANA SPACE CENTER

## ARIANESPACE, THE WORLD'S FIRST LAUNCH SERVICES COMPANY

Arianespace was founded in 1980 as the world's first launch Services & Solutions company. Arianespace now has 20 shareholders from 10 European countries (including Airbus Safran Launchers, CNES and all European companies participating in the production of Ariane launchers). Since the outset, Arianespace has signed over 530 launch contracts and launched 520-plus satellites. More than half of the commercial satellites now in service around the globe were launched by Arianespace. The company posted sales of more than 1.4 billion euros in 2015.

The company's activities are worldwide, with the headquarters in Evry (near Paris); the Guiana Space Center in French Guiana, where the Ariane, Soyuz and Vega launch pads are located; and offices in Washington, D.C., Tokyo and Singapore. Arianespace offers launch services to satellite operators from around the world, including private companies and government agencies. These services call on three launch vehicles:

- > The Ariane 5 heavy-lift launcher, operated from the Guiana Space Center in French Guiana.
- > The Soyuz medium-lift launcher, currently in operation at the Guiana Space Center and the Baikonur Cosmodrome in Kazakhstan.
- > The Vega light-lift launcher, also operated from the Guiana Space Center.

Building on its complete family of launchers, Arianespace has won over half of the commercial launch contracts up for bid worldwide in the past two years. Arianespace now has a backlog of more than 70 satellites to be launched.

## THE GUIANA SPACE CENTER: EUROPE'S SPACEPORT

For more than 40 years, the Guiana Space Center (CSG), Europe's Spaceport in French Guiana, has offered a complete array of facilities for rocket launches. It primarily comprises the following:

- > The CNES/CSG technical center, including various resources and facilities that are critical to launch base operations, such as radars, telecom network, weather station, receiving sites for launcher telemetry, etc.
- > Payload processing facilities (EPCU), in particular the S5 facility.
- > Ariane, Soyuz and Vega launch complexes, comprising the launch zones and launcher integration buildings.
- > Various industrial facilities, including those operated by Regulus, Europropulsion, Air Liquide Spatial Guyane and Airbus Safran Launchers - all involved in the production of Ariane 5 components. A total of 40 European manufacturers and local companies are involved in the launcher operations.

Europe's commitment to independent access to space is based on actions by three key players: the European Space Agency (ESA), the French CNES space agency and Arianespace. ESA is responsible for the Ariane, Soyuz and Vega development programs. Once these launch systems are qualified, ESA transfers responsibility to Arianespace as the operator. ESA has helped change the role of the Guiana Space Center, in particular by funding the construction of the launch complexes, payload processing buildings and associated facilities. Initially used for the French space program, the Guiana Space Center has gradually become Europe's own Spaceport, according to the terms of an agreement between ESA and the French government. To ensure that the Spaceport is available for its programs, ESA takes charge of the lion's share of the CNES/CSG fixed expenses, and also helps finance the fixed costs for the ELA launch complexes.

The French CNES space agency has several main responsibilities at the Guiana Space Center. It designs all infrastructure and, on behalf of the French government, is responsible for safety and security. It provides the resources needed to prepare the satellites and launchers for missions. Whether during tests or actual launches, CNES is also responsible for overall coordination of operations and it collects and processes all data transmitted from the launcher via a network of receiving stations to track Ariane, Soyuz and Vega rockets throughout their trajectories.

## ARIANESPACE IN FRENCH GUIANA

In French Guiana, Arianespace is the contracting authority in charge of operating the family of three launchers, Ariane, Soyuz and Vega.

Arianespace supervises the integration and functional checks of the Ariane launcher - built by Airbus Safran Launchers as production prime contractor - in the Launcher Integration Building (BIL). It then carries out acceptance tests of the launcher at the same time as satellite preparations in the Payload Preparation Complex (EPCU), which is operated by the Guiana Space Center (CNES/CSG). Next, Arianespace oversees final assembly of the launcher and integration of satellites in the Final Assembly Building (BAF), followed by transfer of the Ariane launcher to Launch Zone No. 3 (ZL3), and then final countdown and liftoff from Launch Complex No. 3 (CDL3).

Arianespace deploys a top-flight team and technical facilities to ensure the launchers and their satellite payloads are ready for their missions. Building on this unrivalled expertise and outstanding local facilities, Arianespace is now the undisputed benchmark in the global launch services market.