arianespace
service & solutions

LAUNCH KIT

MARCH 2016

VA229

EUTELSAT 65 West A

esa eutelsat EUTELSAT 65 West A SSL cnes

ARIANESPACE'S SECOND MISSION OF THE YEAR WILL ORBIT A EUTELSAT SATELLITE TO SERVE LATIN AMERICA

Arianespace's second launch of 2016 will use an Ariane 5 rocket to orbit the EUTELSAT 65 West A satellite for the international operator Eutelsat Communications.

This is the 274th mission overall for the Arianespace family of launch vehicles and the second for the Ariane 5 heavy-lift launcher so far this year, confirming the company's ability to meet its new 2016 target of 12 launches, with up to eight missions performed by Ariane 5.

CONTENTS

EUTELSAT 65 West A

EUTELSAT 65 West A will be the 31st Eutelsat satellite launched by Arianespace since the Eutelsat-1 F1 satellite was orbited in June 1983.

Eutelsat is one of the world's leading operators of communications satellites. The company provides capacity on 40 satellites to clients that include broadcasters and broadcasting associations, pay-TV operators, video, data and Internet service providers, enterprises and government agencies.

Including EUTELSAT 65 West A, Arianespace will have carried out more than half of this major operator's launches. Eutelsat is one of Arianespace's largest commercial customers.

EUTELSAT 65 West A is a tri-band satellite targeting Latin American and Brazilian markets with the highest growth potential.
The satellite's Ku-band coverage will spur the growth of DTH (Direct To Home) TV for households equipped with dish antennas to receive digital and HD (high-definition) channels. It will also boost the connectivity of businesses located in Central America, the Caribbean, the Andes region and in Brazil.
Its broad C-band transatlantic coverage is designed to provide contribution links and video distribution services. Furthermore, its Ka-band multibeam payload will help the operator develop Internet access services throughout Latin America, especially in Brazil.

Arianespace's launch manifest includes three more Eutelsat satellites to be launched.

Built by SSL of Palo Alto, California using a 1300 platform, **EUTELSAT 65 West A** is the 53rd GEO platform built by SSL (and predecessor companies) to be orbited by Arianespace.

Arianespace has 12 more SSL satellites to be launched: Azerpace-2/IS-38, BRISAT, BSAT-4a, ECHOSTAR XVIII, Intelsat 36, JCSAT 15, NBNCo-1B, STAR ONE D1 and 4 SkySat spacecraft for Skybox Imaging.

PRESS CONTACT
Claudia Euzet-Hoyau
c.hoyau@arianespace.com
+33 (0)1.60.87.55.11

MISSION DESCRIPTION

The second Arianespace Ariane 5 launch of the year will place EUTELSAT 65 West A satellite into a geostationary transfer orbit.

The launcher will be carrying a total payload of 6,707 kg.

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

DATE AND TIME

Liftoff is planned on Wednesday, **March 9, 2016**
as early as possible within the following launch window:

> Between **02:20 a.m. and 05:20 a.m.**, local time in Kourou
> Between **00:20 a.m. and 03:20 a.m.**, Washington DC time
> Between **05:20 a.m. and 08:20 a.m.**, Universal Time (UTC)
> Between **06:20 a.m. and 09:20 a.m.**, Paris time.

MISSION DURATION

The nominal duration of the mission (from liftoff to separation of the satellite) is: **27 minutes and 23 seconds.**

TARGETED ORBIT

Perigee altitude	Apogee altitude	Inclination
250 km.	35,746 km.	0.5 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.

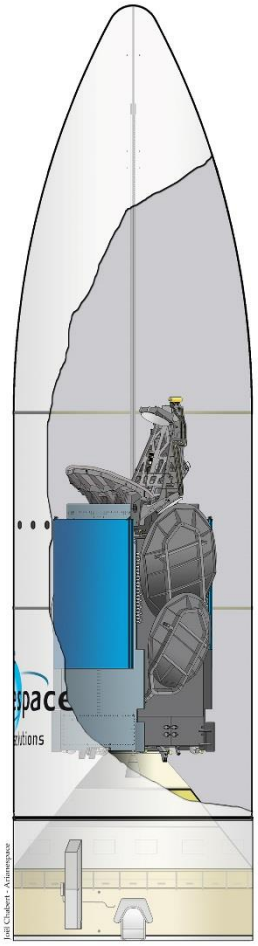
Once this first part of the flight is completed, the onboard computers optimize the trajectory in real time, minimizing propellant consumption to bring the launcher first to the intermediate orbit targeted at the end of the main stage propulsion phase, and then the final orbit at the end of the flight 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/second, and will be at an altitude of 640 kilometers.

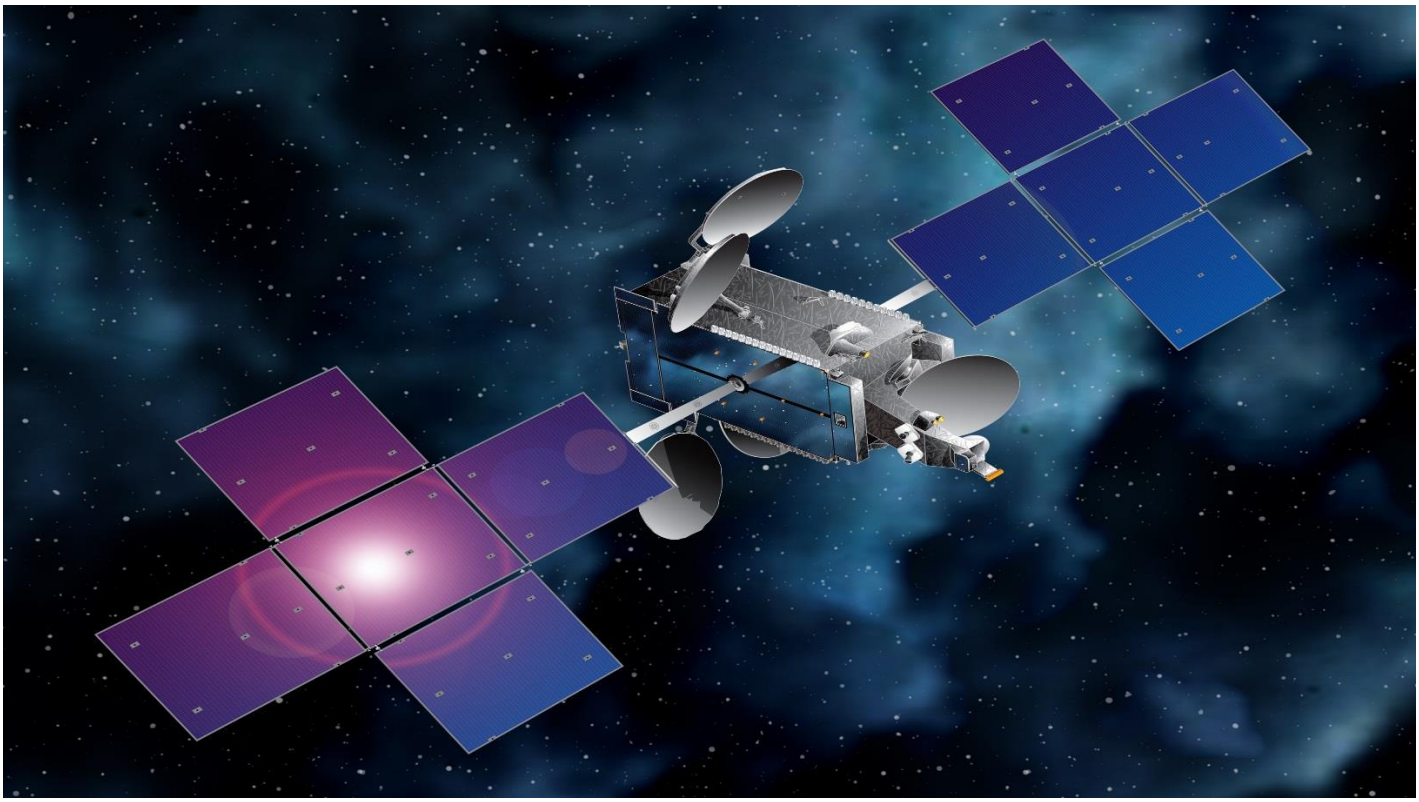
PAYLOAD CONFIGURATION

> **Payload (CU):** EUTELSAT 65 West A
Mass at liftoff: 6,564 kg.

> **Long version of the payload fairing**



EUTELSAT 65 West A



CUSTOMER	Eutelsat Communications
PRIME CONTRACTOR	SSL
MISSION	High-speed fixed communications, video distribution, Direct To Home broadcasting and internet services
MASS	6,564 kg. at liftoff
STABILIZATION	3 axis
DIMENSIONS	7.9 m x 3.2 m x 3.6 m
PLATFORM	1300
PAYLOAD	15 C-Band transponders (36 Mhz equivalent), 24 equivalent Ku-Band transponders (36 MHz) and up to 24 Ka-Band spotbeams
ONBOARD POWER	16.7 kW (end of life)
DESIGN LIFE	More than 15 years
ORBITAL POSITION	65 deg °°°West
COVERAGE AREA	Latin America, including Brazil

PRESS CONTACT

EUTELSAT
Christina Darvasi
Communications and Public Relations
Eutelsat Americas

T: +52 55 2629 5847
M: +521 55 5435 9580
E: cdarvasi@eutelsat.com

ARIANE 5 ECA LAUNCH VEHICLE

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

54.8 m Overall height

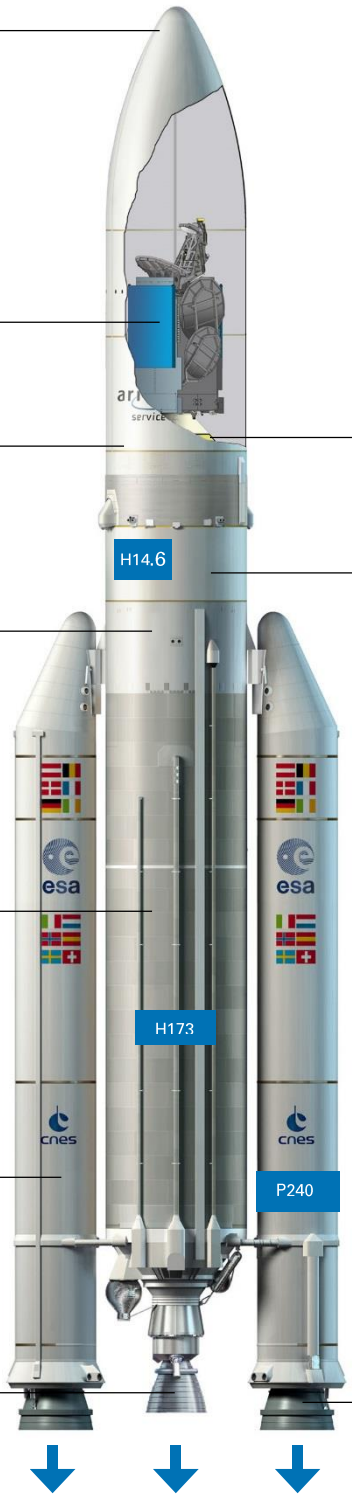
Fairing
(RUAG Space)
17 m
Mass: 2.4 t

780 tons
(total mass at liftoff)

EUTELSAT 65 West A
(Eutelsat)
Mass: 6,564 kg.

Vehicle Equipment Bay
Height: 1.13 m
Mass: 970 kg

ACU – Payload adaptor
(Airbus Defence and Space)
Mass: approx. 143 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 liftoff
(at T+7.3 sec.)

LAUNCH CAMPAIGN:
ARIANE 5 – EUTELSAT 65 West A

SATELLITE AND LAUNCH VEHICLE CAMPAIGN CALENDAR

DATE	SATELLITE ACTIVITIES	LAUNCH VEHICLE ACTIVITIES
January 21, 2016		Campaign start review EPC destocking - EPC erection
January 22, 2016		Transfer and EAP positioning
January 23, 2016		EPC/EAP integration
January 26, 2016		ESC-A erection and equipment bay integration
February 05, 2016	Arrival in Kourou of EUTELSAT 65 West A; beginning of preparation in building S5C	
February 06, 2016	EUTELSAT 65 West A fitcheck in building S5C	
February 16, 2016	EUTELSAT 65 West A transfer to S5B	
February 18, 2016		Transfer from BIL (Launcher Integration Building) to BAF (Final Assembly Building)
February 18 and 20, 2016	EUTELSAT 65 West A fueling operations in building S5B	
February 22, 2016,	EUTELSAT 65 West A integration on the payload adaptor	
February 24, 2016	EUTELSAT 65 West A transfer to Final Assembly Building (BAF)	

SATELLITE AND LAUNCH VEHICLE CAMPAIGN FINAL CALENDAR

DATE	SATELLITE ACTIVITIES	LAUNCH VEHICLE ACTIVITIES
Thursday, February 25, 2016	EUTELSAT 65 West A integration on launcher	
Friday, February 26, 2016	EUTELSAT 65 West A encapsulation in the payload fairing	
Monday, February 29, 2016	Completion of composite integration on launcher	
Wednesday, March 02, 2016		Payload check - Launch rehearsal
Friday, March 04, 2016		Arming of launch vehicle - final preparation of launcher and BAF for chronology Launch readiness review (RAL)
Monday, March 07, 2016		Rollout from BAF to launch Zone, Launch vehicle connections.
Tuesday, March 08, 2016 and Wednesday, March 09, 2016		Filling of the EPC liquid helium tank Start of launch countdown, EPC filling with liquid oxygen and liquid hydrogen

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 hr 30 min	Start of final countdown
- 10 hr 30 min	Check of electrical systems
- 04 hr 20 min	Start of filling of main cryogenic stage with liquid oxygen and hydrogen
- 03 hr 40 min	Start of filling of the ESC-A stage with liquid oxygen and hydrogen
- 03 hr 30 min	Chilldown of Vulcain main stage engine
- 01 hr 10 min	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
- 03 s	Two inertial reference systems switch to flight mode
T-O 00 s	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 32 s	EAP separation
+ 3 mn 39 s	Payload fairing jettisoned
+ 7mn 26 s	Acquisition by Natal tracking station
+ 8 mn 49 s	End of EPC thrust phase
+ 8 mn 58 s	EPC separation
+ 8 mn 59 s	Ignition of ESC-A stage
+ 13mn 02 s	Acquisition by Ascension tracking station
+ 18 mn 20 s	Acquisition by Libreville tracking station
+ 23 mn 32 s	Acquisition by Malindi tracking station
+ 24 mn 41 s	End of ESC-A thrust phase / Injection
+ 27 mn 23 s	**EUTELSAT 65 West A satellite separation**
+ 01h 31 mn 06 s	End of the Arianespace mission

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).

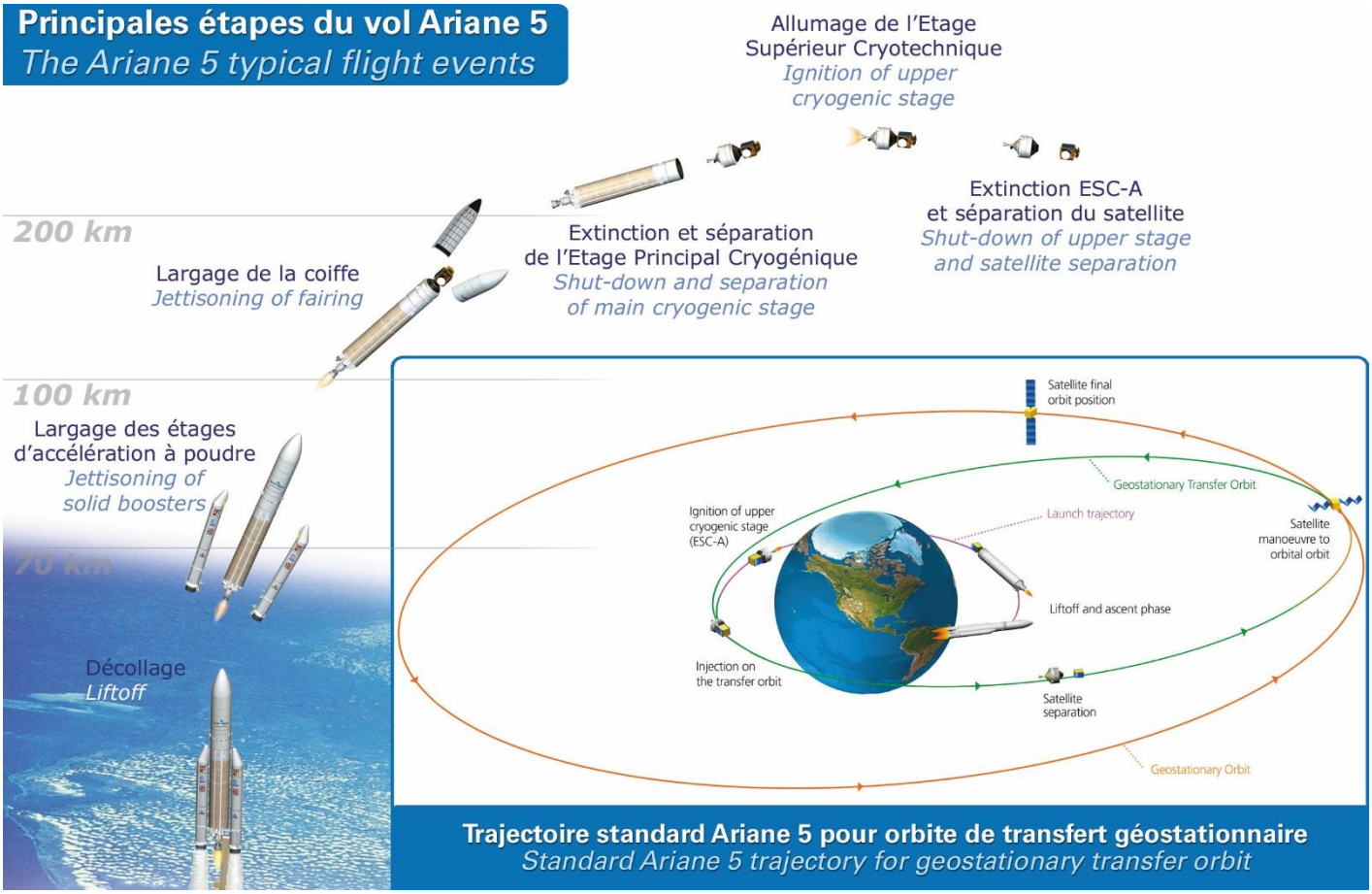
At T-4 seconds, the onboard computer takes over control of final engine startup and liftoff operations. It:

> 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.



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 worldwide were launched by Arianespace. The company posted sales of more than 1.4 billion euros in 2015.

As of January 1, 2016, Arianespace had 313 employees, who work at the company's headquarters in Evry (near Paris); at the Guiana Space Center in French Guiana, where the Ariane, Soyuz and Vega launch pads are located; and at 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 launcher, operated from the Guiana Space Center in French Guiana.

> The Soyuz medium launcher, currently in operation at the Guiana Space Center and the Baikonur Cosmodrome in Kazakhstan.

> The Vega light 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 700 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 mainly comprises the following:

> 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 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 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), operated by the Guiana Space Center (CNES/CSG). Arianespace next oversees final assembly of the launcher and integration of satellites in the Final Assembly Building (BAF), followed by transfer of the 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.