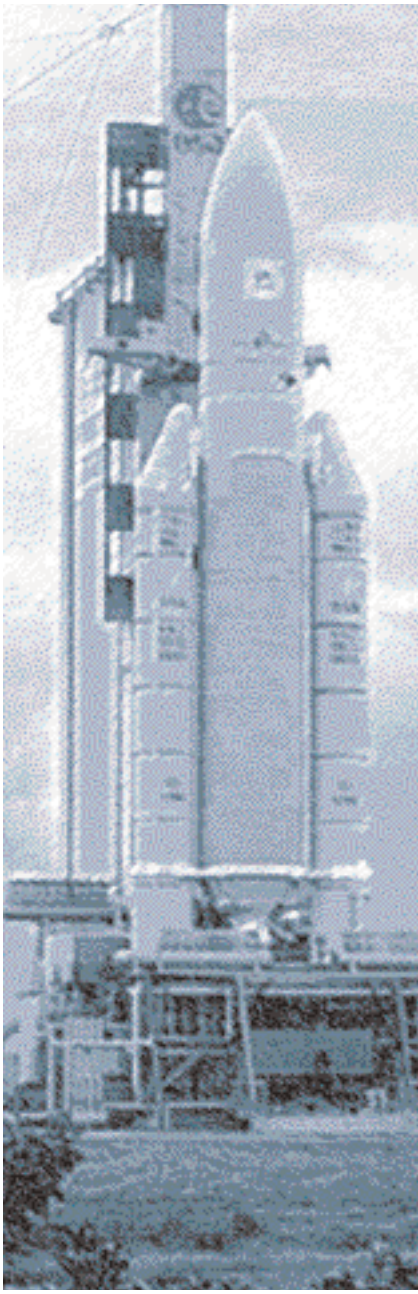
Satellites launched for the USA and Asia

Arianespace will be orbiting two payloads on its fifth flight of the year: the Spaceway 2 direct broadcast satellite for American operator DIRECTV, and the Telkom 2 communications satellite for Indonesian operator PT. Telekomunikasi Indonesia Tbk.



Spaceway 2 is one of the largest telecom satellites ever launched into geostationary orbit. Based on the Boeing Satellite Systems 702-2000 platform, it weighs over 6,100 kg. It has an all Ka-band payload designed to support the expansion of DIRECTV's high-definition programming.

Telkom 2 was built by Orbital Sciences Corporation of the United States using the Star-2 platform. Weighing about 2,300 kg at launch, it is fitted with 24 C-band transponders. Telkom-2 will provide telephony, image and data transmission services in Southeast Asia and the Indian sub-continent. This is the second satellite for which PT. Telekomunikasi Indonesia Tbk has chosen Europe's launcher, following Telkom-1, launched successfully from Kourou on August 12, 1999. It is also the fourth Indonesian satellite to be launched by Ariane, including Palapa C-2 in 1996 and Cakrawarta-1 in 1997.

Telkom-2 is the 43rd Asian satellite to be launched by Arianespace.

Follow the launch live on the internet broadband
at www.arianespace.com
(starting 20 minutes before lift-off)

1. Arianespace Flight mission

The 168th Ariane launch will orbit two satellites: the Spaceway 2 HD direct broadcast satellite for American operator DIRECTV, and the Telkom 2 communications satellite for Indonesian operator PT. Telekomunikasi Indonesia Tbk.

This will be the 24th Ariane 5 launch.

The launcher will be carrying a total payload of 9,150 kg, including 8,095 for the Spaceway 2 and Telkom-2 satellites, to be separated in their assigned orbits.

The launch will be performed from the ELA 3 launch pad at Kourou, French Guiana.

Injection orbit

Perigee altitude	**250 km**
Apogee altitude	**35,916 km at injection**
Inclination	**7° degrees**

The lift-off is scheduled on the night of november 10 to 11, 2005 as soon as possible within the following launch window:

Launch opportunity

	Universal time (GMT)	*Paris time*	*Washington time*	*Kourou time*	*Jakarta time*
Between	*11:44 pm*	*00:44 am*	*07:44 pm*	*08:44 pm*	*06:44 am*
and	*00:29 am*	*01:29 am*	*08:29 pm*	*09:29 pm*	*07:29 am*
on	*Nov. 10/11, 2005*	*Nov. 11, 2005*	*Nov. 10, 2005*	*Nov. 10, 2005*	*Nov. 11, 2005*

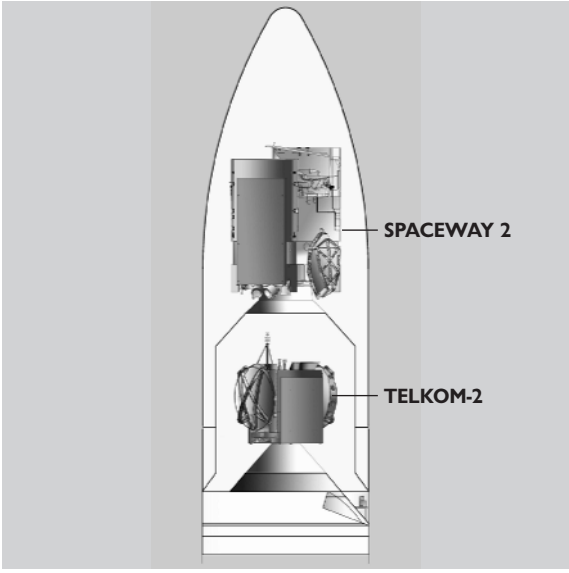
Ariane payload configuration

The SPACEWAY 2 satellite was built by Boeing Satellite Systems for the operator DIRECTV.

Orbital position: 99.2 degrees West, to the west of the Galapagos Islands.

The TELKOM-2 satellite was manufactured by Orbital Sciences Corporation for the Indonesian operator PT. Telekomunikasi Indonesia Tbk.

Orbital position: 118 degrees East, over the Indonesian archipelago.



2. Range operations campaign: ARIANE 5 - SPACEWAY 2 - TELKOM-2

Satellites and launch vehicle campaign calendar

Ariane activities	Dates	Satellites activities
Campaign start review	*May 2 , 2005*	
EPC Erection	*May 2, 2005*	
EAP transfer and positionning	*May 3, 2005*	
Integration EPC/EAP	*May 4, 2005*	
ESC-A Erection	*May 11, 2005*	
Integration equipement bay	*May 13, 2005*	
	May 24, 2005	*Arrival in Kourou and begining of SPACEWAY 2 preparation campaign in building S5*
Operations on hold	*June 9, 2005*	
	September 24, 2005	*Arrival in Kourou and begining of TELKOM-2 preparation campaign in building S5*
Roll-out from BIL to BAF	*October 20, 2005*	
Restart of launch campaign	*October 17, 2005*	
	October 19-21, 2005	*SPACEWAY 2 filling operations in S5B building*
	October 24-26, 2005	*TELKOM-2 filling operations in S5A building*

Satellites and launch vehicle campaign final calendar

J-9	*Wednesday, Oct. 26*	*SPACEWAY 2 integration on adaptor and transfer to Final Assembly Building (BAF)*
J-8	*Thursday, Oct. 27*	*SPACEWAY 2 integration on Sylda*
J-7	*Friday, Oct. 28*	*Fairing integration on Sylda - TELKOM-2 integration on adaptor and transfer to Final Assembly Building (BAF)*
J-6	*Saturday, Oct. 29*	*TELKOM-2 integration on launcher*
J-5	*Monday, Oct. 31*	*Upper composite integration with SPACEWAY 2 on launcher*
J-4	*Wednesday, Nov. 2*	*ESC-A final preparations and payloads control*
J-3	*Thursday, Nov. 3*	*Launch rehearsal*
J-3 bis	*Monday, Nov. 7*	*Arming of launch vehicle*
J-2	*Tuesday, Nov. 8*	*Launch readiness review (RAL) and final preparation of launcher*
J-1	*Wednesday, Nov. 9*	*Roll-out from BAF to Launch Area (ZL), launch vehicle connections and filling of the EPC liquid Helium sphere*
J-0	*Thursday, Nov. 10*	*Launch countdown including EPC and ESC-A filling with liquid oxygen and liquid hydrogen*

3. Launch countdown and flight events

The countdown comprises all final preparation steps for the launcher, the satellites and the launch site. If it proceeds as planned, the countdown leads to the ignition of the main stage engine, then the two boosters, for a liftoff at the targeted time, as early as possible in the satellites launch window.
The countdown culminates in a synchronized sequence (see appendix 3), 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.

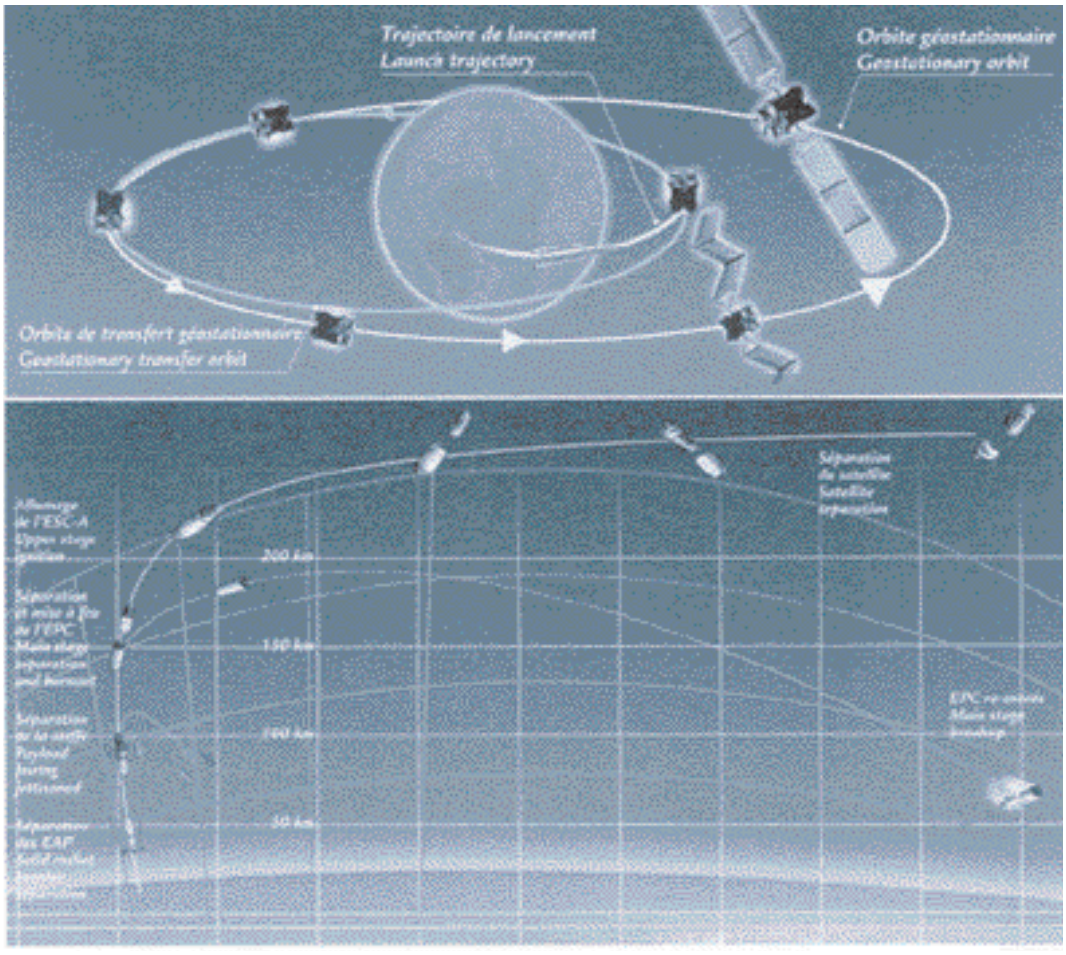
Time		Events
– 11 h	*30 mn*	*Start of final countdown*
– 7 h	*30 mn*	*Check of electrical systems*
– 5 h	*50 mn*	*Start of filling of main cryogenic stage with liquid oxygen and hydrogen*
– 3 h	*20 mn*	*Chilldown of Vulcain main stage engine*
– 1 h	*10 mn*	*Check of connections between launcher and telemetry, tracking and command systems*
	– 16 mn 00 s	*"All systems go" report, allowing start of synchronized sequence*
	– 4 mn 00 s	*Tanks pressurized for flight*
	– 1 mn 00 s	*Switch to onboard power mode*
	- 05,5 s	*Command issued for opening of cryogenic arms*
	– 04 s	*Onboard systems take over*
	– 03 s	*Unlocking of guidance systems to flight mode*

HO	Ignition of the cryogenic main stage engine (EPC)		ALT (km)	V. rel. (m/s)
	+ 7,0 s	*Ignition of solid boosters*	*0*	*0*
	+ 7,3 s	*Liftoff*	*0*	*0*
	+ 13 s	*End of vertical climb and beginning of pitch rotation (10 seconds duration)*	*0.093*	*37*
	+ 17 s	*Beginning of roll manoeuvre*	*0.334*	*74*
+ 2 mn	*19 s*	*Jettisoning of solid boosters*	*64.5*	*1968*
+ 3 mn	*14 s*	*Jettisoning of fairing*	*105.1*	*2211*
+ 7 mn	*57 s*	*Acquisition by Natal tracking station*	*162.0*	*5512*
+ 8 mn	*56 s*	*Shut-down of main cryogenic stage*	*160.8*	*6900*
+ 9 mn	*02 s*	*Separation of main cryogenic stage*	*161.0*	*6921*
+ 9 mn	*06 s*	*Ignition of upper cryogenic stage (ESC-A)*	*161.1*	*6929*
+ 12 mn	*06 s*	*Acquisition by TN boat (SNA)*		
+ 13 mn	*29 s*	*Acquisition by Ascension tracking station*	*158.2*	*7600*
+ 18 mn	*15 s*	*Acquisition by Libreville tracking station*	*213.0*	*8334*
+ 23 mn	*04 s*	*Acquisition by Malindi tracking station*	*477.1*	*9040*
+ 24 mn	*41 s*	*Shut-down of ESC-A / Injection*	*694.0*	*9820*
+ 27 mn	*24 s*	*Separation of SPACEWAY 2 satellite*	*1120.8*	*9847*
+ 31 mn	*34 s*	*Separation of Sylda 5*	*1963.4*	*8903*
+ 33 mn	*22 s*	*Separation of TELKOM-2 satellite*	*2310.5*	*8650*
+ 41 mn	*20 s*	*End of Arianespace Flight mission*	*4346.0*	*7615*

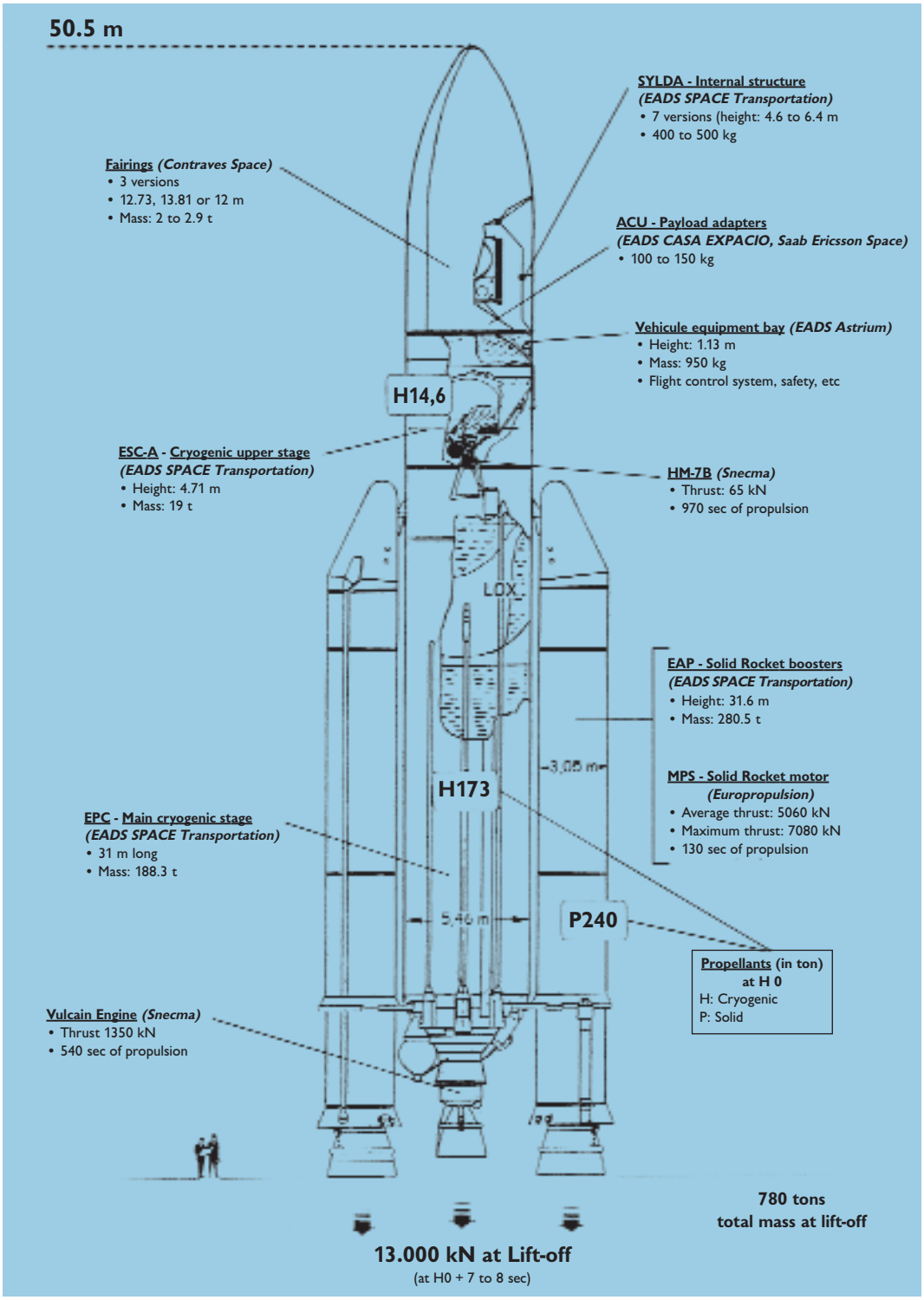
4. Flight trajectory

The launcher's attitude and trajectory are totally controlled by the two onboard computers, located in the Ariane 5 vehicle equipment bay (VEB).
7.05 seconds after 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.
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 upper cryogenic stage.
The main stage falls back off the coast of Africa in the Atlantic Ocean (in the Gulf of Guinea).
On orbital injection, the launcher will have attained a velocity of approximately 9,322 meters/second, and will be at an altitude of about 694 kilometers.
The fairing protecting the SPACEWAY 2/TELKOM-2 spacecraft is jettisoned shortly after the boosters are jettisoned at about T+194 seconds.

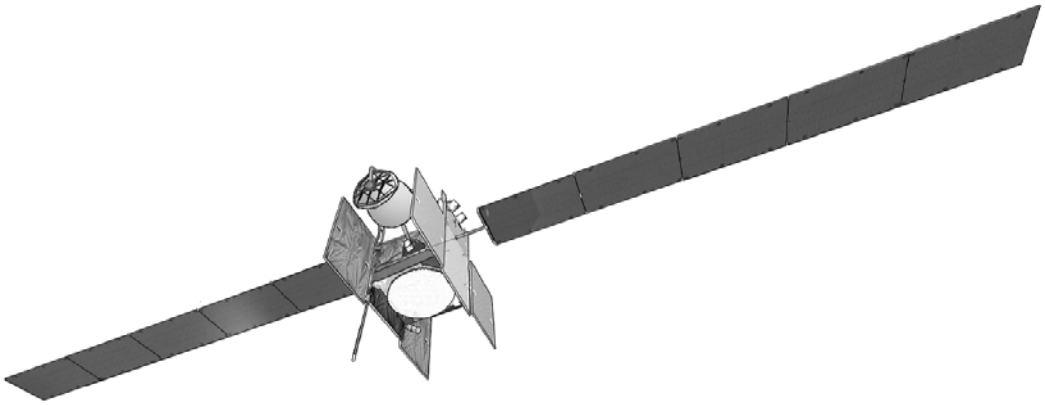
Standard Ariane 5 trajectory for geostationary transfer orbit



5. The Ariane 5-ECA (Industrial architect: EADS SPACE Transportation)



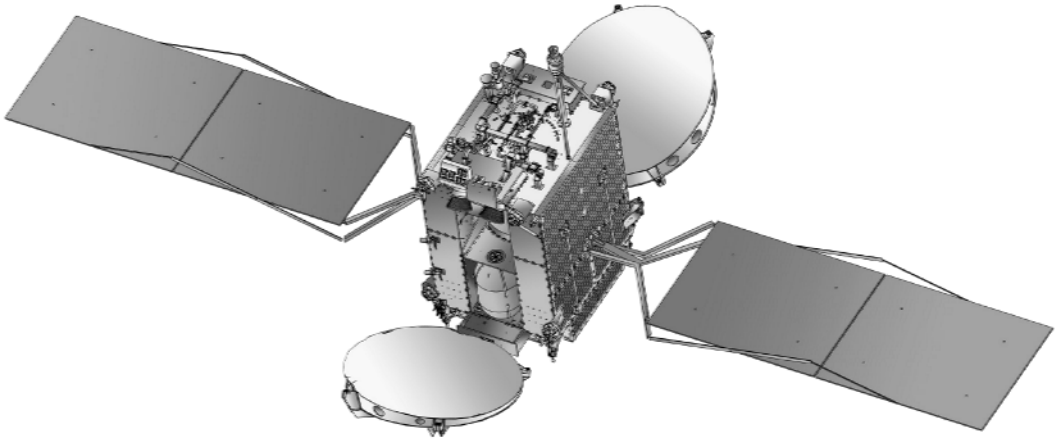
6. The SPACEWAY 2 satellite



Customer	DIRECTV	
Prime contractor	*Boeing Satellite Systems*	
Mission	*HD direct broadcast satellite*	
Mass	*Total mass at lift-off*	*6.116 kg*
	Dry mass	*3.940 kg*
Stabilization	*3 axis stabilized*	
Dimensions	*5,1 x 3,2 x 3,4 m*	
Span in orbit	*40,9 m*	
Platform	*BS 702-2000*	
Payload	*72 Ka band transponders*	
On-board power	*12,8 kW (end of life)*	
Life time	*More than 12 years*	
Orbital position	*99.2° West*	
Coverage area	*North America and Hawaï*	

Press Contact:
Robert MERCER
DIRECTV Communications
Tél. : +1 (310) 726-4683
rgmercer@directv.com

7. The TELKOM-2 satellite



Customer	PT. Telekomunikasi Indonesia Tbk.	
Prime contractor	*Orbital Sciences Corporation*	
Mission	*Communications satellite*	
Mass	*Total mass at lift-off*	*1.975 kg*
	Dry mass	*899 kg*
Stabilization	*3 axis*	
Dimensions	*at launch*	*2,4 x 3,3 x 1,9 m*
	span in orbit	*12,6 m*
Platform	*STAR 2*	
Payload	*28 C Band transponders:*	
On-board power	*2.918 W (end of life)*	
Life time	*+15 years*	
Orbital position	*18° East*	
Coverage area	*84 spot beams and 3 shaped beams covering Asia Pacific, Australia and New Zealand, South East Asia, India*	

Press Contact:
Muhammad AWALUDDIN
Head of Corporate Communications
PT. Telekomunikasi indonesia, Tbk.
Tél. : +62 22 452 7455 - awaluddin@telkom.co.id

Appendix 1. Arianespace SPACEWAY 2/TELKOM-2 launch key personnel

In charge of the launch campaign			
Mission Director	*(CM)*	*Dan MURÉ*	*ARIANESPACE*
In charge of the launch service contract			
Ariane Payload Manager	*(RCUA)*	*Alexandre MADEMBA-SY*	*ARIANESPACE*
Ariane Deputy Mission Manager	*(RCUA/A)*	*Michaël CALLARI*	*ARIANESPACE*
In charge of SPACEWAY 2 satellite			
Satellite Mission Director	*(DMS)*	*Jeff SETO*	*DIRECTV*
Satellite Program Manager	*(CPS)*	*Darell HUNTLEY*	*BBS*
Satellite Preparation Manager	*(RPS)*	*Jay UTECH & Greg HIELE*	*BBS*
In charge of TELKOM-2 satellite			
Satellite Mission Director	*(DMS)*	*Sarwoto ATMOSUTARNO*	*PT Telkom*
Satellite Program Manager	*(CPS)*	*Al LEWIS*	*OSC*
Satellite Preparation Manager	*(RPS)*	*Don HATCH & Steve THIBAULT*	*OSC*
In charge of the launch vehicle			
Launch Site Operations Manager	*(COEL)*	*André SICARD*	*ARIANESPACE*
Ariane Production Project Manager	*(CPAP)*	*Franck VASSEUR*	*ARIANESPACE*
In charge of the Guiana Space Center (CSG)			
Range Operations Manager	*(DDO)*	*Emmanuel SANCHEZ*	*CNES/CSG*
Flight Safety Officer	*(RSV)*	*Fleur LEFEVRE*	*CNES/CSG*

Appendix 2. Launch environment conditions

Acceptable wind speed limits at lift-off range from between 7.5 m/s to 9.5 m/s according to the wind direction. The most critical is a northerly wind. For safety reasons, the wind's speed on the ground (Kourou), and at a high altitude (between 10,000 and 20,000 m) is also taken into account.

Appendix 3. The synchronized sequence

The synchronized sequence starts 7 mn beforre 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, it is fully automatic, and is performed concurrently by the onboard computer and by two reduntant 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, it handles 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 lift-off operations:

- It starts the ignition sequence for the Vulcain main stage engine (T-0).
- It checks engine operation (from T+4.5 to T+7.3 sec).
- It commands ignition of the solid boosters for immediate lift-off at T+7.3 seconds.

Any shutdown of the synchronized sequence after T-7 mn automatically places the launcher back in its T-7 min configuration.

Appendix 4. Arianespace, its relations with ESA and CNES

From a production base in Europe, Arianespace, a private company, serves customers all over the world.
Arianespace is the world's first commercial space transportation company, created in 1980 by 36 leading European aerospace and electronics corporations, 13 major banks and the French space agency CNES (Centre National d'Etudes Spatiales).
The shareholder partners in Arianespace represent the scientific, technical, financial and political capabilities of 12 countries: Belgium, Denmark, Germany, France, Great Britain, Ireland, Italy, Netherlands, Norway, Spain, Switzerland and Sweden.
In order to meet the market needs, Arianespace is present throughout the world: in Europe, with its head office located near Paris, France at Evry, in North America with its subsidiary in Washington D.C. and in the Pacific Region, with its representative offices in Tokyo, Japan, and in Singapore.
Arianespace employs a staff of 250. Share capital totals 395,010 €.
Arianespace is in charge of these main areas:
- markets launch services to customers throughout the world ;
- finances and supervices the construction of Ariane expendable launch vehicle ;
- conducts launches from Europe's Spaceport of Kourou in French Guiana ;
- insures customers for launch risks.

Personalized reliable service forms an integral part of Arianespace launch package. It includes the assignment of a permanent team of experts to each mission for the full launch campaign.
Today, Arianespace's offer is mainly based on Ariane 5. With its proven experience, demonstrated business model and unquestioned credibility, Arianespace has been committed for more than 24 years to providing its customers - satellite operators around the world - a technically and economically reliable means offer to place their satellites on the targeted orbit at the right moment. This offer is strengthened by the flexibility provited by the three launcher fleet - Ariane 5, Soyuz and Vega - and by the Launch Services Alliance, which gives customers mission back-up aboard alternative launch systems.

Relations between ESA, CNES and ARIANESPACE
Development of the Ariane launcher was undertaken by the European Space Agency in 1973. ESA assumed overall direction of the ARIANE 1 development program, delegating the technical direction and financial management to CNES. The ARIANE 1 launcher was declared qualified and operational in January 1982. At the end of the development phase which included four launchers, ESA started the production of five further ARIANE 1 launchers. This program, known as the "promotion series", was carried out with a management arrangement similar to that for the ARIANE 1 development program.
In January 1980 ESA decided to entrust the commercialization, production and launching of operational launchers to a private-law industrial structure, in the form of ARIANESPACE company, placing at its disposal the facilities, equipment and tooling needed of producing and launching the ARIANE launchers. ARIANE follow-on development programs have been undertaken by ESA since 1980. They include a program for developing uprated versions of the launcher: Ariane 2 and Ariane 3 (qualified in August 1984) ; the program for building a second ARIANE launch site (ELA 2) (validated in August 1985) ; the Arine 4 launcher development program (qualified on June 15th, 1988) ; and the preparatory and development program of the Ariane 5 launcher and its new launch facilities: ELA 3 (qualified on November, 1997). All these programs are run under the overall direction of ESA, which has appointed CNES as prime contractor. In general, as soon as an uprated version of the launcher has been qualified 5 oct, 1998, ESA makes the results of the development program together with the corresponding production and launch facilities available to ARIANESPACE.
ESA is responsible (as design authority) for development work on the Ariane launchers. The Agency owns all the assets produced under these development programs. It entrusts technical direction and financial management of the development work to CNES, which writes the program specifications and places the industrial contracts on its behalf. The Agency retains the role of monitoring the work and reporting to the participating States.
Since Flight 9 Arianespace has been responsible for building and launching the operational Ariane launchers (as production authority), and for industrial production management, for placing the launcher manufacturing contracts, initiating procurements, marketing and providing Ariane launch services, and directing launch operations.

The Guiana Space Center: Europe's Spaceport
For over 30 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 bas operation, such as radars, telecom network, weather station, receiving sites for launcher telemetry, etc.
- Payload processing facilities (ECPU), in particular the new S5 facility.
- Ariane launch complexes (ELA), comprising the launch zone and launcher integration buildings.
- Various industrial facilities, including those operated by Regulus, Europropulsion, Air Liquide Spacial Guyane and EADS, which contribute to the production of Ariane 5 elements. 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 sapce Agency (ESA), French space agency CNES and Arianespace.
ESA has helped change the role of the Guiana Space Center, in particular by funding the construction of the launch complexes, playload 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.
French space agency CNES plays several roles at the Space Center.
- It designs all infrastructures and, on behalf of the French government, is responsible for safety and security.
- It provides the resources needed to prepare the satellites and launcher for missions.

Whether during tests or actual launches, CNES is also responsible for overall coordination of operations. It collects and processes all data transmitted from the launcher via a network of receiving stations, to track Ariane rockets throughout their trajectory.
In French Guiana, Arianespace is in charge of launcher integration in the Launcher Integration Building (BIL), coordinates satellite preparation in the payload processing facility (EPCU), and integrates them on the launcher in the Final Assembly Building (BAF). It is also responsible for launch operations, from the CDL 3 Launch Center.
Arianespace has created a top-flight team and array of technical resources to get launchers and satellites ready for their missions. Building on tihs unrivalled expertise and outstanding local facilities, Arianespace is now the undisputed benchmark in the global launch services market.