

Defense, Space & Security
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Mexican Satellite System (Mexsat)



Description and Purpose: The Mexsat program is an end-to-end satellite communications system that provides 3G+ communications services to terminals across multiple platforms. The system consists of three satellites, two ground sites, associated network operations systems and reference user terminals. Mexsat is México's next-generation telecommunications system.

Customer: Secretaria de Comunicaciones y Transportes de México (Secretary of Communications and Transportation of Mexico)

General Characteristics: Representing a fourth generation of Boeing satellites to serve México, the Mexsat system will join the country's current satellite fleet to offer mobile satellite services and fixed satellite services to support national security, civil and humanitarian efforts. The Mexsat system will provide disaster relief, emergency services, telemedicine, rural education, and government agency operations, including offering telecommunications access for the Mexican people living in remote parts of the country.

The Mexsat contract calls for Boeing to design and deliver a complete end-to-end turnkey system consisting of: two Boeing 702HP geostationary satellites; a GEOSTAR-2 satellite from Orbital Sciences Corporation for fixed satellite services; two ground stations; and ground-based beam-forming and communications network equipment that tie into the government, private and public terrestrial networks. Boeing will also deliver reference user terminals, which are used for testing and validation of the system.

México named the three satellites: Bicentenario, to commemorate the anniversary of México's independence from Spain; Centenario, in honor of the 100th anniversary of the Mexican Revolution; and Morelos-3, to continue the naming tradition of the first Mexican satellite system. The satellites will operate over México and its patrimonial seas, including the Gulf of Mexico and the Pacific Ocean.

Under a contract with Boeing, Orbital Sciences Corporation manufactured Bicentenario, a fixed system satellite that launched aboard an Ariane 5 rocket on December 19, 2012. Bicentenario is in service and operated by Mexico's technical agency Telecom.

The two ground stations in support of the Mexsat satellite system and network operations, located in Iztapalapa and Hermosillo, México, were unveiled in November 2012. Both Iztapalapa and Hermosillo have successfully completed gateway site acceptance tests. The ground stations serve as the spacecraft and network management operations centers and connect the space-based network to terrestrial networks.

The Centenario and Morelos-3 satellites are Boeing 702HP geomobile satellites. Centenario, which was completed in 2013, was lost due to a Proton launch vehicle failure. Morelos-3, completed in 2014, was intended to serve as the back-up satellite in the system, but due to the Proton incident, it will now serve as the primary satellite and will launch on an Atlas V launch vehicle in 2015. The 702HP satellite will supply 14 kilowatts of power through 5-panel solar array wings using high-efficiency ultra triple-junction gallium arsenide solar cells. It will also carry a 22-meter L-band reflector that enables connectivity to handheld terminals, complemented by a 2-meter Ku-band antenna. The Boeing-built Morelos-3 is designed for a 15-year service life.

Background:

The Mexsat regional mobile satellite system builds on Boeing's 14-year history of designing and delivering advanced geomobile satellite communications systems, including the Thuraya satellite system for Thuraya Telecommunications Co., LTD in the United Arab Emirates. Boeing became a satellite industry pioneer when it launched Syncom, the world's first geosynchronous communications satellite, in 1963.

Boeing's support to México dates back to 1985 when Boeing provided two Boeing 376 satellites, Morelos-1 and Morelos-2. Both were retired after exceeding the contract design life. The Solidaridad-1 and Solidaridad-2 satellites, launched in 1993 and 1994, respectively, provided C-, Ku- and L-band satellite telecommunications services. Solidaridad-1, a Boeing 601HP satellite, was retired after meeting its contracted service life, and Solidaridad-2, which has exceeded its contract life, is still in service. Satmex-5, a Boeing 601HP satellite launched in 1998, is providing C- and Ku-band fixed satellite services and is expected to reach its contracted service life in 2013.

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Technical Specifications

PAYLOAD COVERAGE

- L-band mobile satellite services with coverage
- C- and Ku-band satellite for fixed satellite services

DIMENSIONS

In Orbit	H: 22 meters W: 29 meters L: 41 meters
Stowed	H: 9 meters W: 3 meters L: 4 meters
Mass at Launch	5,400 kg
Mass in Orbit (beginning of life)	3,200 kg

PROPULSION

Liquid apogee thruster	100 lbf High Performance Liquid Apogee Thruster
Axial thrusters	Four 5-lbf Axial Thrusters
East/West thrusters	Four 2.2-lbf East/West thrusters

ANTENNAS

L-band	22-meter L-band reflector
Ku-band	2-meter Ku-band antenna
T&C	T&C wide coverage antennas

PAYLOAD

	Flexible Digital Channelizer
	L-band Solid State Power Amplifier (SSPA)
	100W Ku-band traveling wave tube amplifiers (TWTA)s

POWER

Solar Panels	Two wings each with five panels of ultra triple junction gallium arsenide solar cells
Beginning of life	14 kW
End of life	13 kW
Batteries	Two Lithium Ion battery packs Battery Electronics Unit (BEU) Integrated Power Controller (IPC)