# ARCHIVED REPORT

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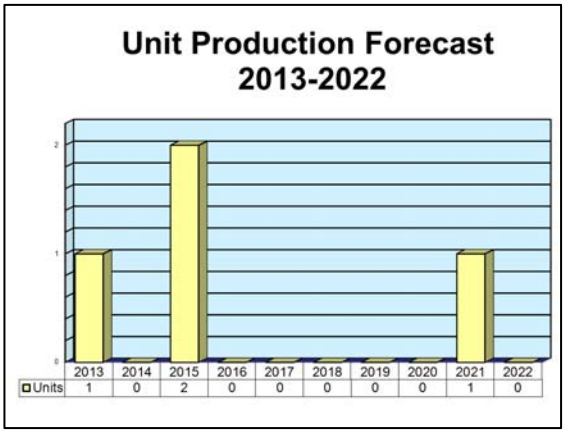
# Satmex

## Outlook

- Eutelsat agreed to purchase Satmex in July 2013
- Satmex 7 makes use of all-electric propulsion systems to save launch mass and reduce launch costs
- Satmex 8 launched on March 27, 2013, on a Proton launch vehicle
- Due to the recent acquisition of Satmex, this report will be archived; information will be combined with the report covering Eutelsat




## Orientation

**Description.** Satmex is a Latin American telecommunications satellite company and also the name given to its most recent line of communications satellites.

**Sponsor.** Satelites Mexicanos (Satmex) SA de CV was a publicly traded company based in Mexico City, D.F., Mexico. Satmex was purchased by Eutelsat in July 2013.

**Status.** Currently, Satmex operates four satellites: Solidaridad 2 (in an inclined orbit), Satmex 5, Satmex 6, and Satmex 8.

**Total Produced.** A total of seven satellites have been produced.

**Application.** Satmex satellites provide telephone, high-speed data, and digital broadcasting services across the Americas.

**Price Range.** Satmex 5 cost approximately $150 million. The total cost to build, insure, and launch Satmex 6 was reportedly $270 million. Satmex 6 cost about $350 million. Satmex estimates it will pay about $165 million to design, construct, launch, and insure Satmex 7. Satmex 9 will cost about the same.

## Contractors

### Prime

| | |
|---|---|
| **Space Systems/Loral** | http://www.ssloral.com, 3825 Fabian Way, Palo Alto, CA 94303-4604 United States, Tel: + 1 (650) 852-4000, Fax: + 1 (650) 852-5656, Email: lewisw@ssd.loral.com, Prime |
| **Boeing Defense, Space & Security, Commercial Satellite Services** | http://www.boeing.com/boeing/defense-space/space/bss/factsheets/bcss/bcss.page, 2260 E Imperial Hwy, El Segundo, CA 90245 United States, Tel: + 1 (951) 340-2492, Historical Prime |

### Subcontractor

| | |
|---|---|
| **Integral Systems Inc** | http://www.integ.com, 5000 Philadelphia Way, Lanham, MD 20706-4417 United States, Tel: + 1 (301) 731-4233, Fax: + 1 (301) 731-9606 (EPOCH Integrated Product Suite) |

Satmex



# Technical Data

## Design Features

Morelos was the first Hughes 376 design to be used as a hybrid satellite to operate in multiple bands – C and Ku – simultaneously. The HS 376 platform used for both Morelos satellites was a popular cylindrical, spin-stabilized design. Each satellite weighed about 646 kilograms and generated 950 watts of power. As Mexico's first satellites, Morelos I and II provided advanced telecommunications, including educational / commercial television, telephone, data, and business services, to urban and rural areas alike. Morelos allowed live television programming to originate in at least 12 major cities. The expected design life of the satellites was nine years, though Morelos II stayed in service for more than 15 years.

The Solidaridad satellites, based on the Boeing-601 bus, provide increased capacity for the same services as Morelos, though they added nationwide mobile communications capabilities. The satellites are body-stabilized, with a cube-shaped center and a pair of protruding solar panels that stretch nearly 21 meters in length, providing 3,300 watts of power. A 27-cell nickel-hydrogen battery provides power during eclipses. Each satellite weighs about 1,641 kilograms. Each Solidaridad carries 18 active C-band transponders, though with much higher power than Morelos, allowing reception by smaller terminals. There are also 16 active Ku-band transponders, as well as one L-band channel. All bands cover Mexico, with the C- and Ku-band coverage extending into the southwestern United Sates. There are also spot beams in the Ku-band for major U.S. cities such as Chicago, Dallas, Houston, Los Angeles, Miami, New York, San Antonio, San Francisco, Tampa, and Washington, DC. C-band coverage also extends to the Caribbean and Central and South America.

Satmex 5, representing Mexico's third generation of satellites, is a Boeing 601 HP (high-power) body-stabilized satellite. Its payload power is at least 10 times the capacity of Morelos II. The HP version can carry payloads twice as powerful as a regular HS 601, thanks to technologies such as dual-junction gallium arsenide solar cells, radiation-cooled traveling-wave-tube amplifiers, a xenon ion propulsion system (XIPS), and advanced battery technology. Satmex 5 has 24 active C-band and 24 active Ku-band transponders. Ku-band coverage will include direct-to-home service with 60-centimeter and smaller antennas. Overall coverage includes the entire American continent, providing services to countries such as Argentina, Brazil, Chile, El Salvador, Peru, Venezuela, and the U.S.

| | **Metric** | **U.S.** |
|---|---|---|
| **Dimensions** | | |
| *Satmex 5* | | |
| Height (stowed) | 5.5 m | 18 ft |
| Width (stowed) | 3.5 m x 2.6 m | 11.5 ft x 8.5 ft |
| Solar array span | 26 m | 85 ft |
| **Weights** | | |
| Launch mass | 4,135 kg | 9,116 lb |
| Mass in orbit (beginning of life) | 2,267 kg | 4,998 lb |
| **Performance** | | |
| Location | 116.8° W | |
| Power | 7+ kW | |
| C-band transponders | 24 @ 36 MHz, EIRP 39 dBW | |
| Ku-band transponders | 24 @ 36 MHz, EIRP 49/46 dBW | |
| Design life | 15+ years | |

Satmex 6 is a Space Systems/Loral-built FS1300 satellite, and was one of the world's largest commercial telecommunications satellites when it was ordered in late 2000. The satellite carries 60 transponders: 36 C-band transponders providing full coverage to the U.S. and Central and South America, and 24 Ku-band transponders serving the U.S., Mexico, and Central and South America, with concentrated coverage over major South American cities. The satellite can connect with smaller antennas than its predecessor can and provides

## Satmex

high-power coverage of South America and the Caribbean. Satmex 6 has a design life of 15 years.

## Satmex

| | Metric | U.S. |
|---|---|---|
| **Dimensions** | | |
| Length | 7.4 m | 24 ft |
| Width | 2.8 m | 9 ft |
| Height | 3.4 m | 11 ft |
| Solar array span | 31.4 m | 103 ft |
| **Weights** | | |
| Launch mass | 5,456 kg | 12,028 lb |
| Dry mass | 2,310 kg | 5,093 lb |
| **Performance** | | |
| Location | 113° W | |
| Power (end of life) | 12.69 kW | |
| C-band transponders | 36 @ 36 MHz, EIRP 40/39/38 dBW | |
| Ku-band transponders | 24 @ 36 MHz, EIRP 49/46 dBW | |
| Design life | 15 years | |

Satmex 6 was built by Space Systems/Loral on the company's FS1300 bus.

Source: SS/L

# Variants/Upgrades

**Morelos**
**Solidaridad**
**Satmex 5**
**Satmex 6**

**Satmex 7 and 9.** Satmex 7 pioneers the use of all-electric propulsion. The satellite is based on Boeing's new 702SP bus, and is one of the first all-electric geostationary satellites ordered by commercial communications satellite operators. Most satellites travel through space using chemical propellants, such as liquid oxygen and hydrogen. However, the new technology strips electrons from xenon gas, creating charged particles that are then blasted out of a thruster by an electric field. The force of the xenon gas blasting out of the thruster propels the satellite forward.

The new propulsion method, known as ion propulsion, has been used in the past to keep satellites in their intended orbit, but not to place satellites into orbit. While the trip that normally takes a few weeks could take up to six months using ion propulsion, it will

drastically lower the launch mass of the satellite. Satmex 7 is expected to carry between 300 and 350 kilograms of xenon propellant instead of the 2,000 kilograms of propellant that a conventional satellite would carry.

Satmex 7 is expected to weigh around 1,800 kilograms at launch, while still carrying 40 transponders and providing 8 kilowatts of power. The weight savings will allow the satellite to launch with an Asia Broadcast Satellite on board a Falcon 9.

Satmex 9 includes the same technology. The contract for Satmex 7 included a provision for an optional satellite. The option for Satmex 9 was exercised by Satmex in July 2013.

**Satmex 8.** According to Satmex and Space Systems/Loral, Satmex 8 will be based on the SS/L 1300 satellite bus. It will carry about 64 C- and Ku-band transponders.

# Program Review

**Background.** Mexico's first communications satellite program began with the governmental agency Telecomunicaciones de Mexico (Telecomm). In 1982, Telecomm hired Hughes Space and Communications Company, today Boeing Satellite Development Center, to construct Morelos I and II, two HS 376 geostationary satellites. Morelos I was launched in June 1985 on the NASA 51-G crewed mission. The satellite successfully reached its orbit at 113° W, providing national Mexican coverage. In November of the same year, Morelos II was launched on board the NASA 61-B crewed mission. The satellite successfully reached its 116.8° W orbit. The Iztapalapa Control Center was built in Mexico City to control the new satellites.

In 1991, Telecomm contracted Hughes Space and Communications to construct its next series of satellites. This series included the Solidaridad I and II, two HS 601 geostationary satellites. The Solidaridad (Solidarity) satellites were so named to represent the way satellite telecommunications were uniting the urban and remote parts of the country both with one another and with the rest of the world.

Solidaridad I was launched in November 1993 and reached its 109.2° W orbit. Solidaridad II followed shortly after, launching in October 1994 to a 113° W orbit. At that time, Morelos I had reached the end of its planned service life.

## *Mexican Privatization of Telecomm*

Mexico saw a number of reforms to the Mexican Telecommunications Law starting in 1995. One result was the privatization of Telecomm, subsequently named Telecomm Satellite Fix Services Section. The new company was registered under Mexican law in June 1997, becoming Satelites Mexicanos SA de CV (Satmex). In October, after a public tender, the joint venture of Principia and Loral Space & Communications acquired 75 percent of Satmex through holding company Servicios Corporativos Satelitales. The new management structure of Satmex was in place by May 1998.

Hughes Space and Communications was hired again in 1996 for the construction of Satmex 5, a 601 HP body-stabilized satellite providing additional C- and Ku-band coverage for the Americas. The satellite was launched in December 1998, and was intended to replace the aging Morelos II. Morelos II was used well beyond its nine-year service life, however, which provided Satmex with supplemental coverage for a number of years.

By 2000, Satmex had exceeded its international market expectations, seeing a 24 percent revenue increase over the previous year. Despite its success, Satmex soon ran into difficulties when it lost Solidaridad I due to a short circuit in the SCP2 redundant processor. Satmex then contracted Space Systems/Loral for the construction of Satmex 6, a new geostationary satellite that was planned for launch in 2003.

## *Financial Troubles Abound*

In August 2003, Satmex defaulted on a $16.2 million interest payment on its $320 million senior note. At the time, the company's total debt was $524 million, with its parent company, Servicios Corporativos Satelitales, owing an additional $170 million to the Mexican government. Satmex 6 was sent to the launching site, the Guiana Space Center in French Guiana, as scheduled, although Satmex lacked the necessary funds to insure and launch the satellite. Satmex realized the company had no future without Satmex 6, and so was hoping that investors would forward the needed funds for the launch. Unfortunately for Satmex, the funds were not received, and launch was delayed until further notice. The satellite remained in storage at the Guiana Space Center.

Two years later, in 2005, Satmex 6 remained on the ground, with Satmex unable to raise the funds it needed for launch. A group of frustrated U.S. creditors went to

a New York court in an attempt to force Satmex into Chapter 11 bankruptcy protection and to approve a reorganization plan under which the creditors would invest $55 million to pay for the delayed launch of Satmex 6. This action came after a number of failed negotiations between creditors and company officials, as well as the resignation of Satmex Chief Executive Officer Lauro Gonzalez Moreno in February 2005. Moreno had not been quickly replaced, exacerbating negotiation difficulties.

Financial problems continued for Satmex when parent company Servicios defaulted on its debt to the Mexican government. The debt was $170 million, although the total reached around $190 million with interest. The payment failure led the Mexican government to begin legal proceedings that would give it almost complete ownership of Satmex. It was determined that court proceedings would take place in Mexico and not under U.S. jurisdiction as the U.S. creditors had hoped. Nevertheless, the U.S. Bankruptcy Court for the Southern District of New York left room for future action by U.S. creditors if Mexican proceedings ignored their interests or ran into any serious complications. The creditors noted that despite losing U.S. jurisdiction, they were still willing to invest the needed $55 million. During the Mexican bankruptcy proceedings, Satmex 6 was returned to the manufacturer, Loral, for refurbishment and testing to get ready for launch, in the hopes that the resources needed for launch would soon be acquired. At this point, Satmex 6 had languished in storage for nearly two years.

### *Resolution and Reorganization*

In early 2006, Satmex signed a restructuring agreement with its stakeholders and scheduled the launch of Satmex 6 for later in the year. The agreement had the much-needed support of the Mexican government, which was gained after a separate agreement was reached for the government to receive payback from its loan to Servicios through future sales of the holding company's stake in Satmex. The reorganization plan called for the Mexican government and Servicios to own 20 percent of the new company and Loral and Principia to receive 2 percent, with the remaining 78 percent to be passed on to bondholders of the company's $320 million senior note. The Mexican government and Servicios would retain majority voting rights, as required by law. All the shares of Satmex would then be transferred into a new Mexican equity trust, whose purpose would be to find a potential buyer for the newly restructured company.

Satmex Sale. With Satmex out of bankruptcy, the company's stakeholders began an effort to sell the company for about $500 million. With no bidders willing to pay that price, the sale was suspended in June 2007.

Talk of a sale of Satmex started again in February 2010, when EchoStar placed a bid for $374 million. The bid included $267 million in cash and $107 million to pay off some of Satmex's debt. In return, EchoStar would receive Satmex's three satellites, three orbital slots, and two uplink centers, along with the company's entire workforce. Satmex bondholders rejected the offer in March. However, as late as May, there was talk that negotiations were continuing. As in 2007, when no one was willing to pay the asking price, the main sticking point was apparently the price of the bid.

### *Satmex 6 Finally Launched*

An Ariane 5 launched two commercial communications satellites in May 2006. The Ariane 5 ECA lifted off from Kourou, French Guiana, at 5:09 p.m. EDT (2109 GMT) and placed its two payloads, Satmex 6 and Thaicom 5, into geosynchronous transfer orbit about a half-hour later. The combined mass of the two satellites – 8,200 kilograms – made this the heaviest launch to GTO performed to date by the Ariane 5. The launch was the second of the year for the Ariane 5.

Satmex 7 and 9. Satelites Mexicanos indicated that it would purchase a satellite from Space Systems/Loral in 2008 that would be designated Satmex 7. The company did not provide any specific details, but indicated that the deal fell through.

Instead, Satmex decided to purchase the satellite from Boeing. A contract was announced in March 2012. Satmex teamed up with Asia Broadcast Satellite (ABS) to sign a contract for four satellites, with an option for four more. By combining their purchases, Satmex and ABS were able to take advantage of economies of scale, something they would not have been able to do had they purchased satellites on their own.

Under the agreement, the first two satellites (Satmex 7 and ABS-3A) have already been ordered. Deposits were made for the other two satellites. Satmex and ABS were to decide in mid-2013 which company will take delivery of the satellites. Decisions regarding the final four satellites will be made at a later date.

Satmex 7 is expected to launch in early 2015 on board a Falcon 9.

In July 2013, Satmex exercised the option in the contract for Satmex 9. This satellite is also expected to launch in 2015.

Satmex 8. In February 2010, it was reported that Satmex 5 had suffered a failure of its main Xenon Ion Propulsion System. Since the backup XIPS had already

failed years earlier, the satellite is now relying on its bi-propellant propulsion system. This will reduce the lifespan of the satellite by about 30 months.

The failure of the Satmex 5 XIPS forced the company to consider upgrading its fleet sooner than originally planned. In April 2010, Satmex signed an Authorization to Proceed with Space Systems/Loral for Satmex 8. Bondholders approved the company's plan to use $100 million of its own money to pay for part of the satellite. Satmex also used part of a bond issued in April 2011 to fund the satellite. Satmex 8 launched on a Proton on March 27, 2013.

### *Bankruptcy*

In February 2011, Satmex proposed a reorganization to its bondholders. Under the plan, which was approved in March 2011, Satmex issued $325 million in bonds. A total of $238 million of the proceeds from the bond issue were used to pay outstanding debt held by first-priority lenders. The remaining funds will be used to partially finance the construction of Satmex 8. In addition, $197.9 million of notes held by second priority lenders was converted to equity in the company. After a little less than two months, Satmex emerged from Chapter 11 bankruptcy protection on May 26, 2011.

In July 2013, Eutelsat announced that it had agreed to purchase Satmex. The deal is worth a total of $1.14 billion, including $311 million of Satmex debt that Eutelsat will absorb.

## Timetable

| Month | Year | Major Development |
|---|---|---|
| | 1982 | Mexico places first order for Morelos I and II communications satellites |
| Jun | 1985 | Morelos I launched on NASA 51-G crewed mission |
| Nov | 1985 | Morelos II launched on NASA 61-B crewed mission |
| Nov | 1993 | Solidaridad I launched on Ariane 4 |
| Oct | 1994 | Solidaridad II launched on Ariane 4 |
| Dec | 1998 | Satmex 5 launched on Ariane 4L |
| | 2000 | Solidaridad I lost due to short circuit in the SCP2 redundant processor |
| May | 2006 | Launch of Satmex 6 on Ariane 5 |
| | 2006 | Plans for restructuring and sale of Satmex company proposed |
| Apr | 2011 | Satmex enters Chapter 11 bankruptcy protection |
| May | 2011 | Satmex emerges from bankruptcy |
| Mar | 2013 | Satmex 8 launched on Proton |
| Jul | 2013 | Eutelsat agrees to purchase Satmex |

## Forecast Rationale

In July 2013, French satellite operator Eutelsat announced that it would purchase Satmex. The agreement follows a change in Mexican law that allows foreign control of Mexican satellite operators. With the transaction, Eutelsat gains presence in the growing Latin American satellite services market.

Before the transaction was announced, Satmex had faced a difficult future. Faced with a high debt load and an aging satellite fleet, the company declared bankruptcy in early 2011. Under bankruptcy protection, Satmex was able to pay off older debt and convert some debt into equity. However, even after exiting bankruptcy protection, the company had $325 million in outstanding bonds.

Despite these difficulties, Satmex has a number of characteristics that made it appealing to a buyer. Long plagued with an aging fleet of satellites, Satmex took delivery of a new satellite in March 2013. Two additional satellites, using new weight-saving technology from Boeing, are set to be delivered in 2015. Satmex also has valuable spectrum and orbital slot rights over Latin America.

Eutelsat will continue operations over Latin America using satellites and spectrum and orbital slot rights now belonging to Satmex. Satellite deliveries will continue over the forecast period in order to grow capacity in Latin America, allowing Eutelsat to leverage the purchase of Satmex to grow its presence in the region. Since these satellites will be purchased by Eutelsat, Forecast International's Satmex report will be archived in November 2014 and production forecasts will be included in our Eutelsat report.

Satmex

# Ten-Year Outlook

| ESTIMATED CALENDAR YEAR UNIT PRODUCTION | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Designation or Program** | **High Confidence** | | | | | **Good Confidence** | | | **Speculative** | | | |
| | **Thru 2012** | **2013** | **2014** | **2015** | **2016** | **2017** | **2018** | **2019** | **2020** | **2021** | **2022** | **Total** |
| **Boeing Defense, Space & Security** | | | | | | | | | | | | |
| **Satmex 9** **<> Boeing-702SP <> Satelites Mexicanos** | | | | | | | | | | | | |
| | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| **Satmex 7** **<> Boeing-702SP <> Satelites Mexicanos** | | | | | | | | | | | | |
| | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| **Subtotal** | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| **Space Systems/Loral** | | | | | | | | | | | | |
| **Satmex 8** **<> 1300 <> Satelites Mexicanos** | | | | | | | | | | | | |
| | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| **MFR Not Selected** | | | | | | | | | | | | |
| **Satmex Follow-Ons** **<> Satelites Mexicanos** | | | | | | | | | | | | |
| | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| | | | | | | | | | | | | |
| **Total** | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 4 |