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CASE STUDY

A Unique Satellite System Aces Its Demonstration Tests

by Cor Westerhoff

Delivering more than promised is a worthy sales goal for any company. For XTAR, LLC, a new satellite communications company with big ambitions, recent tests of its newly launched satellite far exceeded performance objectives and validated the confidence of its two partners in this exciting new satellite business.

XTAR is a joint venture between Loral Space & Communications and HISDESAT. XTAR's first X-band satellite, XTAR-EUR, was lofted into its 29^0 west orbital location on an Ariane rocket in February and entered service in April. XTAR is designed to offset the increasing bandwidth shortfall and provide cost-effective commercial augmentation of existing X-band satellites for military and government agencies.

Before XTAR-EUR had even reached its final orbital position, initial testing of the spacecraft and the payload had already begun. "The first six weeks in the life of a satellite is our busiest time," explains John Brown, Vice President of Satellite and Program Management, Loral Skynet, which is providing XTAR with technical support and assistance. "Once the satellite reaches its correct orbital location, each day we spend testing delays the satellite's service. For that reason we operate around the clock, seven days a week during in-orbit testing," he noted.

By early April, XTAR-EUR was ready for service. Its first customer, the Spanish Ministry of Defense, accepted service immediately upon the conclusion of the in-orbit testing. In May, XTAR was awarded a multi-year contract to provide diplomatic communications services for the U.S. Department of State.

During April, XTAR conducted the first performance demonstration of the satellite. Supported by members of the U.S. Army's 7th Signal Brigade, 5th Signal Command in Mannheim, Germany, the objective was to demonstrate how a standard U.S. Army ground terminal, operated by active duty soldiers, could place a modulated carrier on XTAR-EUR. Employing existing terminals that clearly had seen considerable use under rough

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conditions, this test allowed a rank and file military satellite terminal operator to run carriers to the satellite under normal operating circumstances.

Satellite Antenna	Modulation	Antenna	Transmitter Power	Transponder Power in % (2dB OBO)	Data Rate Mbps
Spot Beam	16 QAM7/8	LHGXA 16'	20W	<9	>100
Spot Beam	16 QAM3/4	AS-3036 8'	370W	<21	>75

XTAR-EUR Demonstration Results -- Mannheim, Germany, April 2005

The tests achieved major data rate milestones, surprising even those who had been involved in the design and construction of the satellite. Told by one government participant that, "achieving 20 Mbps would be really something," within hours of setting up for this initial demonstration, XTAR demonstrated in excess of 100 Mbps using less than 9% of the operating transponder power.

"Even though you know the satellite's capabilities theoretically and through ground testing, it's always gratifying to see them demonstrated and even exceeded," explained XTAR's Gary Chesney, Director, Products and Services. Chesney was onsite with day-to-day program responsibility for the Mannheim demonstration. "What makes this first demonstration so gratifying is that we did it on real, operational U.S. Army hardware," he said. "All the ground and orbital testing using sophisticated test equipment doesn't mean much until you see it working on a real terminal, preferably one with olive drab paint and a lot of wear".

In the case of the Mannheim demonstration that's exactly what happened. The terminal was at least 25 years old and clearly had seen many deployments to some very harsh areas. Nevertheless it quickly locked on to XTAR-EUR and began a series of test routines. The terminal was a TSC-85C connected first to an LHGXA 16-foot antenna and then to an AS-3036 8-foot antenna. The results of this demonstration are summarized in the following table.

The high data rates achieved during the Mannheim demonstration were made possible by changing to a modem manufactured by Advantech. Harris Corporation and L3 Communications also contributed by slightly modifying their antenna feeds to allow operation in both circular polarizations by a simple turn of the feed. This enabled the terminal to instantly double the amount of capacity it could access on the XTAR-EUR satellite.

No one on the XTAR team ever doubted the performance of XTAR-EUR. But seeing it deliver such remarkable throughput on a battle-scarred old mobile terminal was worth a thousand Power Point charts.

Building on the success of the demonstration with the U.S. Army, the next XTAR-EUR test was organized and conducted through the auspices of the 1st Combat Communications Squadron of the U.S. Air Force at Ramstein Airbase,

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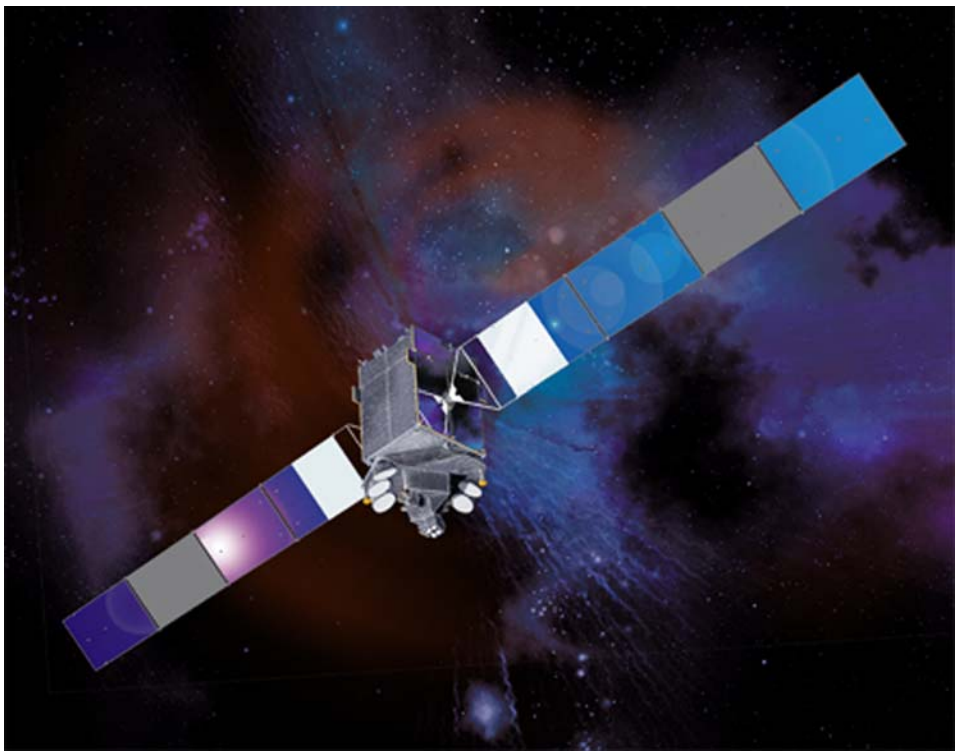
Germany. This demonstration was considerably more complex, and included multiple terminals operating in both Germany and England while being monitored by ground stations in Madrid and the Canary Islands.

As with the Army at Mannheim, the purpose of the Ramstein test was to display for the USAF a full range of high data rates in both left hand and right hand polarization. An additional objective was to demonstrate a number of unique U.S. military services to conclusively prove the compatibility of XTAR-EUR with U.S. Department of Defense systems. Again, the results exceeded XTAR's highest expectations.

Two USC-60A terminals connected to 2.4-meter (~ 8 foot) antennas were used for the Air Force demonstration. Substituting an Advantech modem to allow higher data rates, two simultaneous carriers of 75 Mbps were transmitted between the USC-60's for a total of 150 Mbps.

Weather played an unexpected role in the successful validation of XTAR-EUR at Ramstein. The satellite continued transmitting in high power without interruption through one of the fiercest thunderstorms the region had seen in years. The storm lasted several hours, causing significant local flooding.

Over four days of intense testing the USAF personnel ably demonstrated their ability to link to the XTAR-EUR satellite under a variety of conditions. One participant quipped that he didn't think XTAR could have achieved greater validation "without moving to the sands of Iraq".



Space Systems/Loral-built XTAR-EUR

That is just what XTAR has in mind for the next series of demonstration of this unique, dedicated X-band service.

Operating on XTAR-EUR

In addition to displaying XTAR-EUR's superlative throughput capacity, both tests also demonstrated the satellite's full compatibility with IP-based communications. Utilizing a modem provide by iDirect Technologies, the test established that XTAR IP transmissions are backward compatible with existing defense X-band terminals. Better still, all indications point toward the satellite being fully compatible with new and developing architectures for decades to come.

In summary, while demonstrating to the DoD the exceptional capabilities of XTAR's commercially available X-band satellite services, the Mannheim and Ramstein tests also validated the viability of XTAR-EUR to the major terminal manufacturers. Furthermore, the tests successfully established IP-compatibility, as well as the facility to use higher level coding techniques, like 16QAM, on a satellite at acceptable bit error rates. And the tests proved that existing tactical terminals can double their operating spectrum with only minor COTS modifications.

Now that's delivering more than promised. SM

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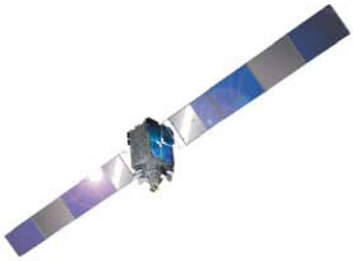

Flexibility and Dynamic Mobility. XTAR provides high-powered satellite coverage wherever and whenever your force wants it. While deployed, troops have the option to move their X-band spot beam coverage, whether they are traveling 200 or 2000 miles. XTAR allows the user—in real time—to support long-haul communications, logistics and infrastructure requirements as well as immediate mission-critical needs, whether for deployment of troops, vehicles or vessels anywhere on the globe.

Fast Deployment and Global Interoperability for U.S. and NATO Forces. Our systems support multinational government, military and intelligence community's unique delivery requirements. International Status of Forces Agreement means XTAR's X-band capacity is ready for immediate use with government terminals supporting in-theater operations.

No New Infrastructure Investment. XTAR is designed to interface with all current X-band terminals without additional infrastructure requirements, thereby reducing customer costs. The system's powerful X-band transponders provide more data throughput to existing X-band terminals while for the first time allowing users to employ X-band terminals smaller than 2.4 meters.

Location Specific Bandwidth: XTAR's steerable antennas concentrate high power to specific locations on demand.

For further information on XTAR's unique X-band satellite capacity, contact us at +1-703-414-1099 or visit www.xtarllc.com.

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