



FACT SHEET

Near Field Infrared Experiment (N-FIRE)

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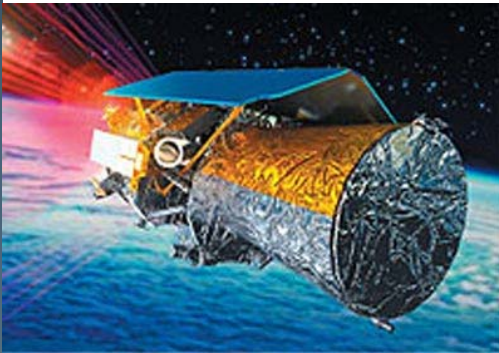


Photo: USAF.

Primary Mission¹

- Gather data on exhaust plumes from launch vehicles and missiles.
- Validate and update models and simulations that are fundamental to missile defense applications
- Collect hyper-temporal short wave infrared and visible data for assessing early launch detection and tracking capability

Secondary Mission

- Assess the viability of a laser communications system for missile defense applications.

Launch

April 24, 2007 aboard Orbital Sciences Corporation (OSC) Minotaur vehicle from Mid-Atlantic Regional Spaceport, Wallops Flight Facility, Virginia. The Minotaur is a four-stage vehicle, two stages being refurbished Minuteman II stages (designated M55 and SR19) and the other two stages being OSC stages (designated Orion 50XL and Orion 38). Vehicle is used for launching payloads to low Earth orbit. The Minotaur is about 70 feet tall and 5 feet wide. NFIRE is the 25th mission for Minotaur.

Operator

Missile Defense Agency

Manufacturer and System Integrator

General Dynamics is the system integrator, and is also responsible for the design and manufacture of the spacecraft, payload integration, full satellite system testing including EMI/EMC and environmental, configuration of the MOCs, and a year of on-orbit operations support. General Dynamics also leads the Mission Assurance and Systems Engineering Integrated Product Teams.

Specifications²

- Orbit: 495 kilometers (267 nautical miles) at 49.0° inclination
- Mass: 494 kilograms (1,089 pounds) at launch
- Dimensions: 2.65 meters by 1.31 meters (8.69 feet by 4.30 feet)
- Design life: Two years
- Cost: FY2004 (\$44 million), FY2005 (\$68 million), FY2006 (\$13.7 million), FY2007 (\$36 million), FY2008 (\$36 million)³

Mission Details

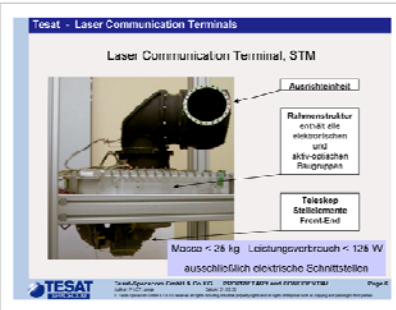
NFIRE is composed of an onboard Track Sensor Payload (TSP) and a Laser Communication Terminal (LCT), plus two ground-based Mission Operations Centers (MOCs). For the primary mission, the TSP, developed by Science Applications International Corporation (SAIC) of San Diego, California under contract to the Air Force Research Laboratory at Kirtland Air Force Base, New Mexico, will be used to collect images of the boosting rocket. NFIRE will also observe other targets beyond the Minotaur vehicles planned for use during tests, such as aircraft, rocket launches and other missile tests from a viewing distance of 60 to 600 miles.⁴



NFIRE launched from Mid-Atlantic Regional Spaceport, Wallops Flight Facility, Virginia aboard a Minotaur vehicle on April 24, 2007. Photo: USAF.

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Laser Communication Terminal (LCT), from German builder Tesat-Spacecom Photo: Tesat-Spacecom (Dr.

The LCT will be used to evaluate the utility of laser communications for missile defense applications, supporting NFIRE's secondary mission. The LCT was developed by Tesat-Spacecom and is provided by the German government as part of a cooperative agreement between the United States and Germany. Forest fires, volcanoes and ground-based rocket engine tests will also be observed.

In early 2008, the LCT aboard NFIRE and another similar system aboard Germany's TerraSAR-X (launched on June 15, 2007) successfully exchanged data, covering more than 5000 kilometers in space without any errors.

The bandwidth achieved in the test was a hundred times greater than during conventional communication by radio waves, enabling a data rate equivalent to roughly 400 DVDs per hour. This could make it possible to transmit large data packets between several satellites in the future, for instance to send image data from Earth observation satellites to a ground station.

That has not been possible until now, as the bandwidth of radio waves is not large enough. Another advantage of this new form of communication is that lasers are easier to focus than radio waves, which means that data transmissions can be directed more accurately.⁵



TerraSAR-X during shock and vibration tests. Photo: DLR/EADS-

Controversy

The NFIRE spacecraft originally was designed to feature an additional sensor that would have flown near a missile target during testing to take a closer look. The additional sensor was to be mounted on a kill vehicle developed for missile interceptors.



Representative Loretta Sanchez (D-CA), District 47. Photo: www.lorettasanchez.house.gov.

Opponents of space-based missile interceptors raised objections to the kill vehicle as a possible precursor to an operational system of space-based interceptors as well as space-based anti-satellite weapons, particularly once the MDA acknowledged that it would likely impact the target rocket. The FY2005 budget for NFIRE was contingent on removal of the kill vehicle from the mission. To compensate for not having the kill vehicle, the NFIRE satellite can be positioned closer to the incoming launch vehicle. The LCT was added to NFIRE in lieu of the kill vehicle.⁶

Many prominent Democrats expressed outrage over NFIRE early on. After learning from the MDA that NFIRE had a "significant chance of colliding with the [target] missile," Representative Loretta Sanchez (D-CA) demanded that the Pentagon report to Congress on this potentially destabilizing "offensive space weapon." Senator Daniel Akaka (D-HI) confronted U.S. Air Force Undersecretary Peter Teets directly: "My question to you is, is the NFIRE program intended to pursue space weapons capabilities? If not, what safeguards are being placed on the NFIRE program to stop it from turning into such a program?"⁷

The criticism, according to some, was based on false assumptions. When the kill vehicle was part of the design, it would not have acted as a true weapon. James Oberg, writing for MSNBC, noted at the time, "the kill vehicle's fangs have been pulled." The platform lacked its own rocket motor and steering device, and would have limited maneuverability. In fact, the MDA was going to launch the "target" missile almost directly at the NFIRE satellite in order to accomplish a successful interception. In short, the kill vehicle would not have been able to "kill" much more than U.S. test missiles on a predictable trajectory. In any case, the kill vehicle was ultimately removed from the NFIRE mission.⁸

1. Lehner, Rick. *Missile Defense Research Satellite Launched*. Missile Defense Agency Press Release, 24 April 2007.
2. *Near Field Infrared Experiment (NFIRE) Factsheet*, General Dynamics.
3. Singer, Jeremy. "MDA Budget Documents Detail NFIRE Experiments." *Space News*, 18 April 2005; *Fiscal Year 2008 Defense Budget: Programs of Interest*. Center for Defense Information (CDI) website, 19 December 2007; Hitchens, Theresa, M. Katz-Hyman and V. Samson. *Space Weapons Spending in the FY 2007 Defense Budget*. CDI, 6 March 2006.
4. Staff writers. "General Dynamics NFIRE Satellite Completes First Missile Defense Experiment." *Space Daily*, 24 August 2007.
5. Staff writers. "TerraSAR-X And NFIRE Fire Up The Pipe With Laser Data Transfer." *Space Daily*, May 14, 2008.
6. de Selding, Peter B. "Space-to-Ground Laser Link Tests Set for 2007." *Space News*, 6 April 2006.
7. Gambrell, Kathy. "Rep. Sanchez Seeks Progress Report On NFIRE Program." *Aerospace Daily & Defense Report*, 11 May 2004.
8. Oberg, James. *The war of words over war in space*. MSNBC, 16 April 2004.