

Boeing Defense, Space & Security
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Wideband Global SATCOM

Description and Purpose:

The mission of the Wideband Global SATCOM (WGS) system is to provide broadband communications connectivity for U.S. and allied warfighters around the world. WGS is the highest-capacity military communications system in the U.S. Department of Defense arsenal, providing a quantum leap in communications capability for the U.S. military.

Boeing's investments in phased array antennas and digital signal processing, combined with innovations in the commercial satellite market, have resulted in a flexible WGS system that delivers the capacity, coverage, connectivity and control required by the most demanding operational scenarios.

Program Status:

The U.S. Air Force MILSATCOM Systems Directorate at Los Angeles Air Force Base (AFB) is the WGS customer. The first WGS three satellites, which constitute Block I, are all on-orbit and are meeting or exceeding all operational requirements. WGS-1 was placed into service over the Pacific Ocean region in April 2008. WGS-2 was placed into service over the Middle East in August 2009. WGS-3 went into operations over Europe and Africa in June 2010. WGS-4, the first in the Block II series, was launched on Jan. 19, 2012, and is expected to go into service over the Middle East in summer 2012. The Block II satellites include an RF bypass enhancement to support high-data-rate airborne intelligence, surveillance and reconnaissance (AISR) missions.

In August 2010, the Air Force awarded initial funding under the Block II Follow-on contract. In September 2011, the Air Force authorized additional funding to the Block II Follow-on contract for full production, launch and on-orbit activation of the WGS-7 satellite and procurement of long-lead materials for WGS-8. The authorization also includes options for the full production, launch and on-orbit activation of WGS-8 and WGS-9. The U.S. Air Force exercised options on WGS-8 in December 2011 and WGS-9 in January 2012.

General Characteristics:

WGS is designed for coverage, capacity and connectivity, and can process more than 3.6 gigabits per second of data – more than 10 times that of the previous system. Operating at both X-band and Ka-band, the system will enable networks for tactical

Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR).

WGS supports communication links throughout the allocated 500 MHz of X-band and 1 GHz of Ka-band spectrum. Through frequency reuse and digital channelization, each WGS payload can exploit more than 4.8 GHz of usable communications bandwidth.

The WGS design includes 19 independent coverage areas – 10 Ka-band and 8 X-band spot beams can be positioned anywhere in the field of view of each satellite. Full-Earth coverage in X-band is also provided. Use of phased array technology allows the eight X-band beams to be steered and shaped to apply gain and power exactly where it's needed.

Communications between users is enhanced using the digital channelizer, which allows for very efficient use of a satellite's bandwidth. It divides the uplink bandwidth into nearly 1,900 independently routable sub-channels, providing the connection from any uplink coverage area to any downlink coverage area.

Miscellaneous:

The WGS communications payload is controlled from four Wideband Satellite Operations Centers, using ground-based control elements provided by Boeing. Platform control is conducted from Schriever Air Force Base using mission-unique software designed specifically for this program by Boeing in concert with the U.S. Air Force Command and Control System-Consolidated (CCS-C).

WGS leverages a wealth of government and commercial experience and technology, including the proven Boeing 702HP satellite platform – the industry leader in capacity, performance, and cost-efficiency. Enabling technologies of the 702HP platform include xenon-ion propulsion system (XIPS), highly efficient triple-junction gallium arsenide solar cells, and deployable radiators with flexible heat pipes.

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