



Transition

SBIR Topic Number:

AF 98-107

Title:

Affordable Array Antenna for Multiple Satellite Links

Contract Number:

F30602-99-C-0026

Company Name:

Princeton Microwave Technology, Inc.,
Mercerville, NJ

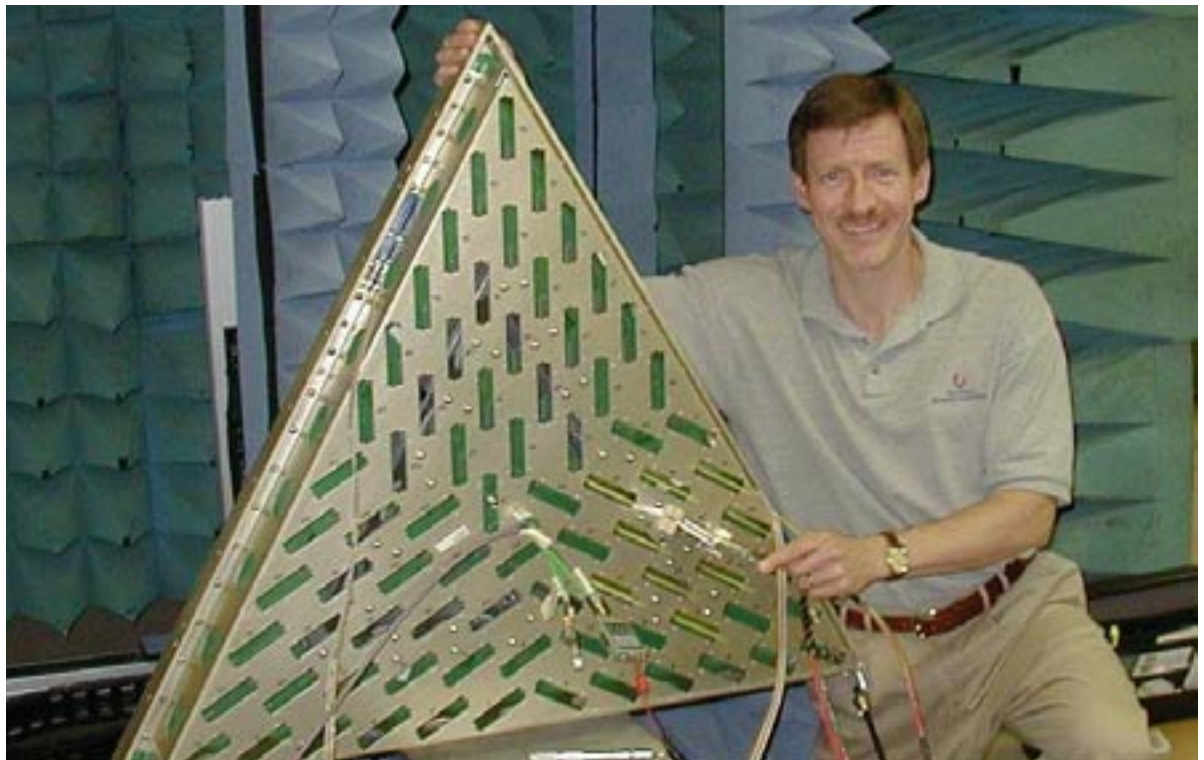
Technical Project Office:

AFRL/ Information Directorate

Transition Office:

Air Force Space Command, Space and Missile Systems Center

An example of Air Force supported SBIR technology that has been transitioned into an Air Force or other DoD system or subsystem or used by Air Force test ranges and facilities or maintenance depots.



Affordable Array Antenna for Multiple Satellite Links

- **Effective satellite missions require on-demand access and real-time operations**
- **SBIR support enabled development of technology featuring two independent transmit and two independent receive beams and is programmable to perform two simultaneous links with launch vehicles and satellite's assuring ready access and immediate operations execution**

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Air Force Requirements

Responsive satellite missions require on-demand access to any real-time execution of satellite operation. Operationally responsive space lift (ORS) and on-orbit space asset service/maneuver also require on-demand space launch control and real-time operation execution.

These are the key capabilities to support US space mission and services. However, the current Air Force Satellite Control Network (AFSCN) and other mission oriented satellite control networks cannot meet these operational needs. The main bottleneck of our space support capability is the limits and constraints on the availability, operability and flexibility of the reflector antennas that provide links between space assets and ground space operation centers. A novel phased array antenna enabled by low cost, innovative transmit/receive (T/R) module technology can alleviate the bottleneck and meet the AF transformation needs through new capabilities in multi-band, simultaneous access, programmable multi-functionality and integrated mission operation.

SBIR Technology

This project has developed a 4 channel design for an affordable, dual-band Space Ground Link Subsystem (SGLS) and Unified S-Band T/R module to be used in a geodesic phased array antenna (GPAA) concept. This project has developed a low cost component, multi-chip layout and packaging technologies for the L/S-band T/R module for under \$150 per module in large quantity. The module has two independent transmit and two independent receive beams. It is programmable to perform two simultaneous, full duplex communication links with launch vehicles or satellites. Approximately 47,000 T/R modules are used in a 10-meter geodesic electronically scanned antenna to meet the new AF space support mission needs.

The project is an SBIR Phase II enhancement step to deliver 500 dual-band T/R modules for a 6-panel phased array antenna demonstration and evaluation of the operational capability of the GPAA concept. The demonstration and evaluation, sponsored by AF Space Battle Lab is scheduled for August 2004 to support AF Space Command (AFSPC) key decisions on space capability

transformation in the next 15 years. The demonstration will use the PAA to link with multiple LEO satellites from a NASA Test Flight Facility located at Wallops Island, VA. The AF Satellite and Launch Control SPO (SMC/RNA) and AFRL/IF have been providing funding for this effort since 1998.



Air Force Transition Payoff

This technology in conjunction with other associated technologies currently under SBIR development will support the implementation of a GPAA concept to enable the evolutionary transformation of the current AFSCN into an Integrated Satellite Control Network (ISCN). The ISCN will meet the objectives of AFSPC Master Strategy Plan (MAP) and Space Support Mission Area Plan (MAP) for an affordable, shared, national satellite control network with new capabilities in support of future responsive space lift and satellite operation. It is one of the most basic and responsive infrastructures to enable integrated across-mission operations for all space activities in force enhancement, force application and counter space. Many transformational warfighting capabilities under development will rely on the ISCN support and contribution.

Company Benefit

Princeton Microwave Technology Inc. (PmT) has doubled in size from four to eight employees due to the Affordable Arrays for Multiple Satellite Links Program. They have become part of a very advanced Phased Array Antenna Team, including AF Space Battle Lab, Space and Missile Systems Center, AFRL/IF (Rome, NY), AFRL/SNHA (Hanscom, AFB), Aerospace Corp, Ball Aerospace and two other SBIR contractors.

PmT has been awarded two more SBIR contracts from AFRL/IF due to their demonstrated capabilities in the subject SBIR Program. PmT has marketed and sold several microwave components which have been developed under this program. The success of these components have lead to the development of similar products which are sold by PmT.



U.S. AIR FORCE

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