

Flight Safety via Satellite Globecomm, Harris and the FAA

In an average year, US airlines schedule over 700,000 domestic departures and spend nearly 2 million hours in flight carrying more than 68 million passengers. Keeping this massive system running safely and efficiently is the job of the US Federal Aviation Administration (FAA).

Few passengers are aware of the complex tracking and communications system that the FAA depends on to carry out its mission.



More than 5,000 FAA sites are linked by a terrestrial, microwave and satellite network, including thousands of radar stations and communications antennas, 21 Air Traffic Control Centers (ATCs) and two network operations centers. The voice and data that flows over the network is mission critical 24 hours a day, 365 days a year in every imaginable kind of weather.

In 2002, Harris Corporation won a 15-year, \$1.7 billion contract to implement a modern and secure network infrastructure to replace multiple legacy networks that consisted of thousands of full-time, dedicated, circuits and point-to-point transmission technologies. Harris's job was to create a common infrastructure and single source of accountability for the network, while introducing proven commercial technologies, optimizing performance, and reducing costs. With part of the network running over satellite, Harris turned for help to a specialist at integrating satellite into a state of the art terrestrial network: Globecomm.

Executive Summary

As part of a \$1.7 billion Harris Corporation project to rebuild the FAA's legacy communications network, Globecomm designed and installed a satellite network linking challenging remote sites and backing up terrestrial circuits across the US. Globecomm also provides Tier One lifecycle support for the hub and remote sites. ■

Network Design and Integration

At first glance, the requirements of the project looked straightforward: design a satellite network, install antennas and related electronics at 43 remote sites across the US and in the Bahamas, and connect them via satellite to AMERICOM Government Services' teleport in Woodbine, Maryland (with a redundant site in South Mountain, California). The network was designed to provide the primary circuit to a small number of remote sites and serve as a backup for terrestrial circuits to the rest. The traffic was cockpit and controller voice communications and radar data routed to the FAA's regional ATCs on demand.

But, like air travel in today's highly congested system, the job had plenty of surprises. "This entire project was about replacing older technology with state-of-the-art gear," says Jaime Rodriguez, senior engineer on the project. "So it surprised us when the specification included an old General Datacom multiplexer (MUX). The mux used a Unix display that was hard to navigate. But you know what? We looked at alternative designs and found that this unit had unbelievable price-performance. It was designed in the days when 9.6 Kbps was a lot of bandwidth. In this variable data rate system, the mux needed to be able to squeeze up to 6 voice channels onto a circuit and this unit could do it. The biggest cost of the network is the satellite transponder capacity, and the guys who wrote the spec clearly understood that."



Globecomm won the job in December 2006 and deployed six teams across the US to install sites and bring them online. Most consisted of 2.4m Ku-band antennas with 4-watt amplifiers and associated electronics. The entire network was operational on schedule in September 2007. But Globecomm's work for Harris and the FAA was just getting started.

Lifecycle Support

"About 90% of the sites are unmanned as far as satellite expertise goes, so remote monitoring is critical," says Globecomm vice president of network services Keith Hall. "We have a long-term contract to provide Tier One lifecycle support for the hub and remote sites. We monitor network performance 24x7 from our teleport and network operations center in Hauppauge, provide helpdesk support to the FAA and Harris, and do preventative maintenance at the remote sites. When we detect a problem we can't resolve from the NOC, we have technicians visit the sites."



"One of the advantages we have at Globecomm," adds Keith Hall, "is that design, integration and lifecycle support go hand in hand. Jaime and his team designed a network with unbelievable redundancy. There's a complete duplicate RF chain at every site as well as the hub, so that if part of the primary goes down, there's a full backup standing by. When our NOC is supporting those systems, they know them inside and out. During the shakedown period for the network, we were experiencing sporadic site outages in bad weather. Our NOC team worked with the designers at Harris and our partners at AMERICOM

Government Services (AGS), and we finally decided that we were being too aggressive in terms of satellite power levels. We got AGS to raise the power level slightly and the problems went away."

By this time, Globecomm's responsibilities to the FAA and its prime contractor had grown. In April 2007, the FAA asked Harris and Globecomm to extend the satellite network to seven sites in the southern Caribbean. It made for a nice change from the FAA's usual mountaintop locations, but in some ways the sites were an even bigger challenge. "First of all," says Jaime Rodriguez, "the satellite network isn't the backup for these locations. It's the primary circuit, with landlines as the backup. And there's no local expertise available to support on-site service. A service call means an airplane flight from the States. So we changed the design. For the original set of sites, we had a redundant General Datacom mux but if the primary failed, we had to have somebody go on-site to switch manually to the backup. For the Caribbean, Harris designed and we implemented a remote switching capability for the old mux so that, if necessary, we can flip the switch from Hauppauge."

Harris's upgrade to the FAA network is expected to deliver millions of dollars in savings as well as greater reliability and expanded capabilities. "We're excited to be part of this exceptional project," says David Hershberg, Globecomm's chairman and CEO. "Our role puts us on the front line in terms of both network design and ongoing operation of these mission-critical links for the FAA. That's a position in which we are proud to serve." ■



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