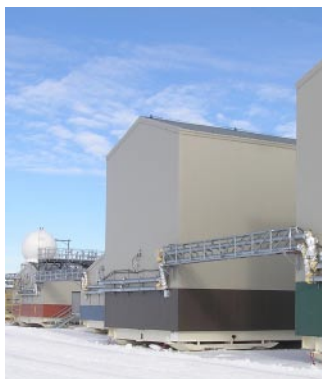




# Motorola's Point-to-Point Wireless Solution Keeps Communications Afloat in Antarctica

Antarctica



CSBF buildings in Antarctica

Some climates of the world are so harsh that only wildlife and scientists explore them. Antarctica is a perfect example, where temperatures dip lower than most of us can imagine, and winds continually whip across the ice-covered land. But such harsh conditions help scientists study the effects of weather and climate on day-to-day life in friendlier environments. Motorola is helping those scientists collect valuable data with point-to-point solutions that can withstand even the rigors of the South Pole.

## Customer

Antarctica is the highest, driest, coldest and windiest place on the face of the earth, making it, oddly enough, an ideal laboratory setting for many scientific disciplines. For example, the extremely dry air, with less than three percent humidity, allows for unobstructed views of space. Another unusual phenomenon is that in mid-December the upper-air currents above the continent circulate in a nearly perfect circular pattern. This means that what goes up, such as a balloon, will return to its launch point in about two weeks. Scientists who wish to study the universe but cannot afford to build and launch satellites can use these two conditions, the dry air and circular currents, to their advantage for scientific study. In fact, they often use enormous helium-filled balloons to lift scientific instruments into the atmosphere to gather information and transmit it back to the scientists on the ground. Furthermore, the payload from these balloons can be recovered and possibly reused, something satellites can't accommodate.

The Columbia Scientific Balloon Facility (CSBF)<sup>1</sup>, located in Palestine, Texas, USA, operates on the Ross Ice Shelf to provide support for large, unmanned, high-altitude research balloons for space scientific study. The CSBF, founded in 1961, is a NASA facility operated by New Mexico State University. The facility is responsible for providing launch, tracking and control, airspace coordination, telemetry and command systems, and recovery services for these balloons. Customers of the CSBF include NASA centers, universities and scientific groups from all over the world. The research balloons ride the high-altitude wind currents that circle Antarctica, collecting data about cosmic rays, electron precipitation from Earth's radiation belts, and other similar phenomena in near-space environments.

<sup>1</sup> The Columbia Scientific Balloon Facility (CSBF), located in Palestine, Texas, is a NASA facility managed by the Physical Science Lab of New Mexico State University. The contract to manage the facility is administered by the Balloon Program Office at Wallops Flight Facility of Goddard Space Flight Center (GSFC).



CSBF communications rack – PTP 400 Series radios, IP-MUX, WLAN, etc.

### The Situation and Challenge

In 2005, the CSBF replaced its aging communications system in Antarctica. To support the research efforts at the refurbished facility, a new communications system was designed, encompassing a new TCP/IP network, wireless LAN and cable plant. The design team also made use of an existing T1 telephone network. To interconnect the various system components and to handle all inbound and outbound traffic, wireless technology was deployed throughout the network.

Given the nature of the work performed in Antarctica by the CSBF, which takes place during the region's austral summer months from November through March, a connection was needed to link the CSBF's operations personnel to the main Ethernet backbone five-and-a-half miles away at McMurdo Station, the largest research station in Antarctica. The solution also had to deliver a high degree of reliability and operate with little-to-no maintenance or manipulation amidst freezing Antarctic temperatures and blizzard conditions. To make matters worse, 95 percent of the connection lies above flat ice, which can significantly affect transmission integrity.

The design team also faced a unique challenge because the facility where the communications systems are housed can shift as a result of melting snow during the season. Moreover, the CSBF Antarctic communications facility is torn down annually during the winter months, so the team needed a solution that could be set up and dismantled with ease each year.

### Technical Requirements

- Sustained, reliable connection over a distance of five-and-a-half miles in harsh weather conditions
- Throughput of nearly 10 Mbps
- Easy, web-based system troubleshooting, monitoring and management
- Low profile and compact form factor
- Ease of installation and the ability to effortlessly deploy and dismantle on a seasonal basis

### Deployment Detail and Interoperability

The technicians chose to deploy four Motorola MOTOwi4 Fixed PTP 400 Series Wireless Ethernet Bridges to establish a reliable connection between the CSBF and McMurdo Station as well as interconnect the components that comprise the new communications system. Set-up, configuration, alignment and testing were easily handled through the PTP 400 Series bridge's intuitive web interface, which provided a logical sequence into each configuration and monitoring page. The web interface is also used to monitor and troubleshoot should problems arise. For added reliability, polarity diversity was used on all the PTP 400 Series units via their own ANDREW PX2F-52-NXA (2', dual polarity) antenna at each end of the connection.

One of the design requirements set by the CSBF was to make the system as low-profile and compact as possible. The small form factor of the PTP 400 Series bridges met this pre-requisite, even with the use of external antennas. And all network and phone traffic was handled reliably and with high availability.

The new Motorola PTP wireless system supports a traditional analog phone line and has allowed the CSBF to upgrade to a new TCP/IP network. In fact, the design team leveraged Motorola's IP-MUX technology to convert T1 telephony traffic to IP and then transport it over the PTP 400 Series bridges. This unique approach has worked flawlessly since it was installed and represents a significant cost-savings to the organization.

Furthermore, because the PTP 400 Series units are easy to configure and install, the entire communications system is dismantled and re-installed each year. In fact, deployment of the system can be done in as little as two to three days.

### Results

The four PTP 400 Series bridges now connect the CSBF's operations to McMurdo Station with a high degree of reliability. In the face of challenging environmental factors – freezing temperatures, blizzard conditions, temperature inversions, ice and melting snow – the radio links have remained up-and-running through two full seasons with no failures. After the initial alignment, throughput rates have reached nearly 10 Mbps each way. The web-based management interface allows the technical operations team in McMurdo to monitor performance from their desktops. All of this ensures that the vital space and environmental research undertaken by the CSBF is not affected by communications issues.

### Why Motorola:

- Rock-solid connectivity over a long distance in the harshest of weather conditions
- Ability to leverage existing T1 infrastructure as well as provide enough bandwidth for a new TCP/IP network
- Ease of configuration and simple design, allowing communications to be set up in as little as 2-3 days
- Small, lightweight form factor for low profile

### MOTOwi4™

The Wi4 Fixed PTP 400 Series Wireless Ethernet Bridges are part of Motorola's MOTOwi4 portfolio of wireless broadband solutions and services that help customers improve communications, increase efficiency, and enhance customer and public service. Delivering IP coverage to virtually all spaces, the MOTOwi4 portfolio includes Fixed Broadband, WiMAX, Mesh and Broadband-over-Powerline solutions for high-speed connectivity over private and public networks.

“Even in the harshest Antarctic conditions, Motorola’s PTP wireless bridges have come through for us. The compact form factor, rock-solid reliability and ability to troubleshoot problems remotely have made it possible for the Columbia Scientific Balloon Facility to carry out research each year. Furthermore, the ease-of-use and simple design have made the PTP bridges an ideal solution for our required seasonal set-up and tear-down.”

— Jim Hamlin, Project Engineer, CSBF



CSBF telecom facility 5.6 miles away from McMurdo Station.

#### About Motorola

Motorola is known around the world for innovation and leadership in wireless and broadband communications. Inspired by our vision of seamless mobility, the people of Motorola are committed to helping you connect simply and seamlessly to the people, information, and entertainment that you want and need. We do this by designing and delivering “must have” products, “must do” experiences and powerful networks – along with a full complement of support services. A Fortune 100 company with global presence and impact, Motorola had sales of US \$42.9 billion in 2006. For more information about our company, our people and our innovations, please visit [www.motorola.com](http://www.motorola.com).



Motorola, Inc., Unit A1, Linhay Business Park, Eastern Road, Ashburton, Devon, TQ13 7UP, UK +1 877 515-0400 • [www.motorola.com/ptp](http://www.motorola.com/ptp)

MOTOROLA, the stylized M Logo and all other trademarks indicated as such herein are trademarks of Motorola, Inc. © Reg. US Pat & Tm. Office. All other product or service names are the property of their respective owners. © 2007 Motorola, Inc. All rights reserved.