Motorola Wireless Enables Live Streaming Video from the Ocean Floor

Off Key Largo, Florida

MOTOROLA

Customer

The National Oceanic and Atmospheric Administration (NOAA), an organization within the US Department of Commerce, conducts research and gathers data about the oceans, atmosphere, space and sun, and applies this knowledge to science and service that touch the lives of all Americans. NOAA's Aquarius is the world's only operational undersea laboratory, located adjacent to the coral reef at the Florida Keys National Marine Sanctuary in Key Largo. Aquarius is owned and funded by NOAA and is operated by the National Undersea Research Center (NURC) at the University of North Carolina at Wilmington (UNCW). It is made to withstand the pressure of ocean depths to 120 feet (37 meters) and has been used for scientific and experimental missions.

Solution Provider

Rapid Systems has been offering the most advanced Internet experience in the State of Florida and surrounding areas since 1994. Its state-of-the-art network, facilities and technical resources are second to none, giving customers all the advantages of a pure ATM network over an IP infrastructure. Rapid Systems engineers tenaciously monitor, maintain and upgrade the network to provide their customers the most advanced technologies, services, support, hardware and software available. For more information on Rapid Systems, go to www.rapidsys.com.

The Situation and Challenge

NOAA's Aquarius Habitat, a 400-square-foot (122-square-meter) undersea laboratory, is located nine miles (14.5 km) offshore in the Florida Keys at a depth of 62 feet (19 meters) where it sits on the ocean floor. In addition to serving as a home base for aquatic research, it also serves as a laboratory for experiments that require the simulation of an outer-space environment. Video communications must be streamed from the Aquarius Habitat to the NURC's land-side office in Key Largo, where the experiments are then streamed live on UNCW's website. In addition, the Habitat is monitored by a Watchdesk at the base station.

From the undersea laboratory, the video was fed on a hard wire up to the top of a 30-foot (9-meter) buoy on the ocean's surface. From the buoy, a conventional point-to-point broadband wireless system connected to the NURC office in Key Largo where the video was fed directly onto the web. The connection's throughput could range anywhere from 2 – 4 Mbps depending on the swell of the ocean. As the project has grown, higher-resolution video has become available, and the wireless link has become too slow to stream live video, making the communication choppy and incomplete, and periodically crashing the video servers. The video required at least 7 Mbps of throughput for proper performance, but the existing wireless device was unable to provide the performance or high availability needed. Other wireless systems were tested but could not maintain the connection.

Technical Requirements

- In excess of 7 Mbps of bandwidth was required
- Ability to connect reliably over open water
- Availability equal to or better than carrier-grade (99.999%)
- Ability to link from one moving endpoint (high seas) to a stationary endpoint
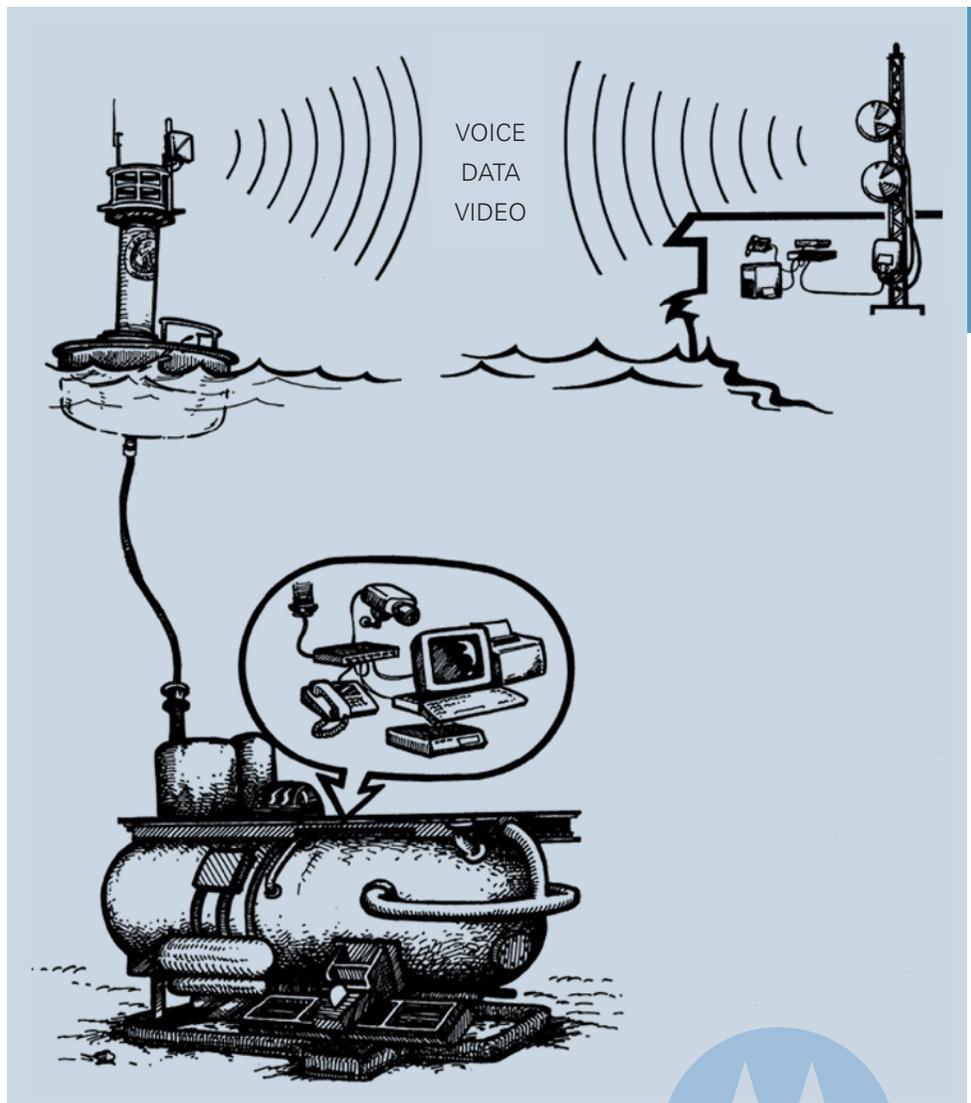
Deployment Detail and Interoperability

Rapid Systems and NURC deployed a Motorola Point-to-Point Wireless Ethernet Bridge – 400 Series solution with integrated antennas between NURC's land-side base station in Key Largo and the 30-foot (9-meter) buoy out at sea – 62 feet (19 meters) above the Aquarius Habitat. The installation was conducted during heavy seas and the radios were deployed quickly. Even with the continuous rough motion of the sea, the link came up immediately.

From a 24-port Cisco switch located at the base station, the PTP 400 Series unit provides an Ethernet connection to a 12-port Cisco switch on the off-shore buoy. From the top of the buoy, a CATV wire connects the 12-port switch to another 24-port Cisco switch in the Habitat where two video servers are connected – one for the Watchdesk and the other for streaming to the website. In addition, IP phones are used between the Watchdesk and the Habitat.

The Results

The PTP 400 Series solution delivered a high-performance connection with an average throughput of 31.5 Mbps between the two endpoints, and enabled high-quality video and voice for Internet streaming and monitoring. The excess bandwidth has enabled new applications such as a videoconference link between the international space station and the Habitat. Live video of certain key missions, such as NEMO7, could not otherwise have been transmitted. The VoIP transmission between the base station and the Habitat – previously poor quality and choppy – was also greatly improved.

The broadband wireless link has maintained carrier-grade (99.999%) availability through rough 6-foot (2-meter) swells as well as Hurricane Jeanne off the Florida coast. During the hurricane, the PTP 400 Series link not only maintained the connection without dropping a packet, but its durable antennas remained intact as well.

VOICE
DATA
VIDEO

MOTOWI4™

"When reliability is critical, and one of your endpoints is atop a 30-foot (9-meter) buoy on the open sea, you need to have a very reliable system or you could find yourself on that buoy at any time of day and in any weather conditions.
The PTP 400 Series was the only solution that could provide a high-performance, carrier-grade connection in this environment. With the excess throughput we are receiving, we can begin to explore new opportunities that the bandwidth enables."

~ Dominic Landucci, National Undersea Research Center

Why Motorola?

- Motorola delivered 10-15 times the throughput of the existing solution

- The PTP 400 Series solution was the only system that could connect with carrier-grade reliability "over the open sea"

- The rugged and compact antenna design was unaffected by extreme weather conditions

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 get and stay connected 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 $36.8 billion in 2005. For more information about our point-to-point products and services, visit our website at www.motorola.com/ptp.

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For more information about the Motorola Point-to-Point Solutions:

Outside of North America: +44 1364 655500

In North America: +1 877 515-0400

www.motorola.com/ptp

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