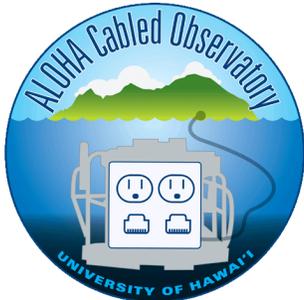


Opengear's Resilient Online Connectivity Enables Research on the Ocean Floor

SUMMARY



Industry:
Scientific Research

Customer Profile:

The ALOHA Cabled Observatory (ACO) sits on the ocean's floor, three miles below the water's surface and sixty miles north of the Hawaiian island of Oahu. The observatory provides real-time oceanographic data using equipment including a hydrophone and pressure sensor, along with instruments for measuring and communicating temperature, salinity, currents, acoustics, and video images. The ACO holds several records associated with its depth: it is the deepest functioning observatory of its kind, the deepest power node on earth, and the deepest extent of the Internet. The data captured and transmitted by these instruments is available to scientists and the public online in real-time.

Objectives:

- ▶ Implement resilient connectivity to keep the ACO online and actively collecting and transmitting valuable scientific data.
- ▶ Reliably stream terabytes of data over a submarine fiber-optic cable.
- ▶ Introduce secure, high-availability methods of interfacing with resources at remote locations, both at the ACO's on-land data centers and at the ACO itself.
- ▶ Maintain a flexible, extensible networking solution prepared to adapt to the ACO's future upgrades, equipment, and research needs.

THE CHALLENGE

With the ALOHA Cabled Observatory used by scientists all over the world to carry out experiments on the ocean floor, it is critical that the network connection to the observatory maintains high reliability. Because these experiments work with high value equipment in a setting where repair or replacement would be inconvenient and costly (to say the least), the security of connections controlling equipment at the ACO is critical to maintaining its functionality. The ACO streams many terabytes of data gathered from instruments on the ocean floor as well, and this highly valuable scientific data must be transmitted online in real-time and stored using methods that absolutely prevent data loss.

THE SOLUTION

The ACO is connected to land by a 147-mile long submarine fiber-optic cable, which enters the AT&T Makaha Cable Landing Station on Oahu. At this station, Opengear's network equipment manages the ACO's power supply and communications and forwards data streams through the University of Hawaii backbone to its Manoa campus (and the ACO data center). The Opengear equipment ensure resilience of key ACO sensors by providing both inband and out of band control for streaming hydrophone and video data through a high-availability "failover" pair of encrypted connections from the AT&T Cable Landing Station to one of the School of Ocean and Earth Science and Technology's (SOEST) data centers.

To provide secure access, Opengear safeguards the connection between the landing station and the data center via an IPsec VPN tunnel, enabling Opengear devices in the data center to contact the station and control resources at the ACO over the VPN. Through this solution, secure remote access to equipment at the ACO can be established from just about anywhere in the world using an integrated SSL-VPN, making it simple for ocean scientists to conduct experiments while maintaining security practices in line with Federal Information Processing Standards and surpassing Department of Defense requirements for securing unclassified data.

The university researchers operating the ALOHA Cabled Observatory have found that Opengear's highly reliable, flexible, and extensible solutions capably provide resilient connectivity, secure yet user-friendly access and control, versatile data management, and redundant data storage to accomplish their needs. With ambitious future plans for the ACO, including upgrades and installation of new equipment, researchers plan to rely on Opengear to maintain the observatory's secure and resilient connectivity into the future.

THE SOLUTION (Cont.):

The ACO makes use of Opengear devices to manage and secure valuable scientific information via the latest in networking and data management technology. Opengear's remote networking technology – including its redundant failover systems, smart management and systems monitoring, secure tunneling and redundant data storage work to safeguard the availability of this unique underwater connection as well as the security and uptime of its land-based network and data components.

The ACO uses Opengear's Smart OOB™ and redundant “failover pair” technology, along with secure connections via IPsec VPN tunneling. These allow scientists to control underwater equipment and experiments without security issues. Coordination of computers and storage devices offers real-time control and data management, achieving redundant copies of all datasets transmitted by the ACO that are stored at separate physical locations to ensure safety from disaster.

Results

- ▶ Equipment at the ocean floor can be accessed securely via a resilient high-availability connection.
- ▶ Terabytes of data are streamed for availability in real-time and are redundantly stored at multiple locations to safeguard against data loss.
- ▶ The ACO is prepared with a network infrastructure able to support future expansion of its equipment and capabilities.

ACM 5000 Remote Site Manager

- ▶ Deploy in wiring closets, branch offices, communications cabinets and harsh remote sites
- ▶ Out-of-band remote site access over 3G cellular or PSTN with smart failover
- ▶ Manage routers, switches, firewalls, PDUs, serial & USB consoles
- ▶ Failover to 3G cellular for uninterrupted network connectivity
- ▶ FIPS 140-2 validated encryption, SSL and SSH, stateful firewall, OpenVPN & IPsec
- ▶ Environmental and physical sensor alarm notification via SMS, SNMP or Nagios
- ▶ Automatically detect and recover from network outages and repair equipment faults
- ▶ Zero Touch Provisioning (ZTP) automation over the network, without manual user interaction



“We've all heard of the 'deep web,' but maintaining the deepest reach of the Internet – beneath three miles of water – represents an exciting new frontier and offers a uniquely insightful perspective as we work to better understand our oceans and our planet. We thank Opengear for providing dependable networking solutions and essential support for our forays into this underwater frontier.”

- Brian Chee
IT Specialist
University of Hawaii at Manoa

ACM 5000 Remote Site Manager Features:

- ▶ **Comprehensive out-of-band with Smart OOB™.** Maintain complete control during infrastructure fault conditions and network outages with serial, Ethernet and USB connectivity to critical infrastructure management consoles.
- ▶ **Failover to Cellular™**
Increase reliability of your network at remote sites and in data centers with integrated failover to 3G cellular.
- ▶ **Cellular out-of-band uptime.**
Fast to provision, simple to deploy and fully integrated into ACM5000. Always-available, high-performance remote access over the 3G network.
- ▶ **Automatic problem detection and remediation.** Leverage total remote site monitoring and connectivity to detect and respond to issues before they become outages.

About Opengear:

Founded in 2004, Opengear delivers next generation intelligent solutions for managing critical IT and communications infrastructure. Opengear smart solutions equip our customers' networks with smart automation and bulletproof resilience, enabling them to optimize technical operations and secure business continuity. The company is headquartered in Sandy, Utah, has R&D operations in Australia and sales offices in Europe and USA.

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