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Martha's Vineyard Coastal Observatory: 1. Guest Port Interface Overview

This information is provided to assist users planning to connect an instrument to the MVCO at either the met mast or the underwater node. The system architecture is the same at each location. However, the connectors differ, the node being an underwater mateable connector. The electronics housing contains the power and telemetry circuits. Instruments are plugged directly into the electronics housing at the mast but at the node they are plugged into a connector panel that is easily accessible to the divers. If you are connecting your instrument or computer to one of the nodes using Ethernet protocol, you must read this information. The following forms are available on this web site as well as the contacts for information and/or services to expedite installation:

Form	Purpose
MVCO Plugging-In	Planning Info: Contacts, services, budgeting
Guidelines for MVCO Shore Lab	Instructions for shore lab users
Instrument Installation Request	Preliminary information to reserve a port
Guest Port Configuration	Detailed specifications for your instrument
MVCO Acoustic User Info	To obtain information on acoustic devices
Special Notes for Ethernet Users	Connecting your instrument or computer using Ethernet protocol

Power System Overview

There is 4KW available at the offshore node, 2KW at the met mast. Power is derived from the local utility, with generator backup and an Uninterruptible Power Source (UPS) to maintain seamless power transfer during local outages. The automatic generator/UPS combination will maintain data collection capability even during severe storm events. Power is transmitted from shore at 1500 VRMS, using single phase 60-Hz AC. At the seafloor node, the high voltage AC is stepped down to 240 VAC using the transformer. This 240-VAC supply is fed into the main electronics bottle where it is converted to regulated DC power at each user port interface. Each guest port contains internal AC/DC converters, which make isolated 12-Volt and 24-Volt DC power supplies from the unregulated AC source. These power supply outputs are provided at the guest port connectors. Two separate Vicor 2nd Generation Micro-Modules provide the 12-Volt and 24-Volt DC outputs, at up to 100 watts each, which are made available to the users at each guest port. The power supply outputs are filtered to minimize common mode and differential noise.

Power supply isolation is maintained between ports, allowing for independent ground fault sensing of each port. Each guest port is monitored and controlled by a local Motorola 68HC11 microcontroller. This controller can connect or disconnect the AC input for that port, and can also power on or off the two DC outputs. In addition, it monitors voltage, current and ground fault status for both the 12-VDC and the 24-VDC power supply outputs. The port is normally configured to automatically shut power down to a guest port in the event that a fault is detected, thus preventing further damage. By using these isolated power supplies for each port, power problems on one port do not affect any other ports.

Networked Data Telemetry

All seafloor node electronics and met mast data telemetry electronics are essentially identical. Each is connected back to the shore laboratory by a 1 Gigabit/sec Ethernet fiber-optic trunk line with AC power. A Cisco Systems Ethernet switch provides 24 10/100 BaseT network connections at the node and the shore laboratory. Each switch contains a single-mode fiber-optic networking module as well as the 24 RJ-45 twisted pair connectors. The buried fiber-optic cables are connected directly to the Cisco Ethernet switch to transmit the networked data at 1 Gbps to and from the shore laboratory.

Because all sensor nodes are network connections, all nodes are simply connected together on a common Ethernet network inside the shore laboratory on Martha's Vineyard. This network is easily connected to the global Internet in a number of ways. In order to provide the highest possible bandwidth to WHOI users, a direct connection to the WHOI campus network was desired. A T-1 leased line has been installed providing a 1.2-Mbps communication link, with a 56-Kbps backup line. It is anticipated that future upgrades will be implemented as the data-bandwidth needs grow.

Because many scientific instruments utilize asynchronous serial communication interfaces such as RS-232, a method was needed to integrate multiple serial ports into the Ethernet data system. This function is provided by a Cisco Systems Model 2511 Access Server, which supplies 16 serial ports for distribution among the various user ports. The communications server has an Ethernet interface that connects to one of the network ports on the Ethernet switch. It allows direct IP, telnet, or comm-port redirection access to any of its serial ports, thus allowing users to access their underwater instruments from anywhere on the Internet.

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