

DEVELOPMENT OF THE SECOND SUBSEA NODE OF OBSEA EXPANDABLE OBSERVATORY

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Abstract:

The OBSEA (Observatorio Submarino Expandible Cableado) [expandable underwater cabled observatory] is an environment observation platform recently installed in the coast of "Vilanova i la Geltrú" (Barcelona, SPAIN) that is used also as a test bed for marine technology developments. The OBSEA was set up in May 2009 by the SARTI (Sistemas de Adquisición Remota y Tratamiento de la información [Remote Acquisition and Information Treatment Systems]) research group of the Universitat Politècnica de Catalunya (UPC), in collaboration with the Marine Technology Unit (UTM) of the High Commission for Scientific Research (CSIC) of Spain.

The OBSEA observatory initially consisted of a Shore Station (SS) and a first Seafloor Node (SN), with the possibility of expanding the system with more underwater nodes and surface buoys. These components are interconnected by an underwater telecommunications cable that allows the powering of the station and real-time communication with the instruments and equipment of the observatory. The SS is located in the facilities of the UPC and the first SN is at 4km from the coast of Vilanova i la Geltrú, at a depth of 20 meters. See Figure 1.

The first observatory platform consists of a 4.6 m² stainless steel structure designed to be stable and to protect all the instrumentation from unauthorized manipulation.

The whole system is powered from the shore station with a 3.6 kW power supply, capable of delivering up to 320 V and 11 A of DC current. The current SN design supports up to 8 wet-matable external instruments, each powered by up to 3 A at 12 V or 48 V and with a 10/100 Mbps Ethernet connection. The trunk line to the shore is a 1+1 optical connection at 1Gbps (Figure 2).

The principal element of the Seafloor Node is the Junction Box, which contains the power supply, communications and control systems of the node. The design and construction of these systems was carried out considering redundancy mechanisms for single failure resist, in addition stress tests and continuous verification procedures have being carried out during assembly.

At present, there is an upgrade project for the OBSEA observatory expansion with a new seafloor node. The second node will be installed at a short distance of the existing one and connected with a light electro-optical cable of 750 meters. This new observatory is developed with improved control electronics in the junction box. It will have double power capacity than the old one and a better control system to monitor and manage automatically all the possible system malfunctions. This control system can, for example, disconnect single components that don't work properly to avoid more problematic failure situations. The new node will be equipped with some special ROV wet-matable connectors, which will be used for testing ROV operations and with a AUV docking station. All these improvements are considered to develop in the future a new subsea station in bigger depth. Another improvement of the new junction box will be that all the instrument ports will have a "Smart Sensor Board" (SSB), providing Interoperability features such as Puck Protocol, SensorML and TEDS. The SSB will provide, in addition, Precision Time Protocol (PTP IEEE1588) features to synchronize sensor data with better than one millisecond resolution.

Figure 1. Location of the OBSEA observatory



