

AN ON-BOARD DATA MANAGEMENT SOLUTION

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Abstract - A Marine Data Management System (MDM-400) has been installed on the Instituto Español de Oceanografía (IEO) research vessel B/O Cornide de Saavedra. It is an experience of how a commercial solution has been developed and fully adapted to the ship characteristics, including an external communication by Universal Mobile Telecommunications System (UMTS) connection that facilitates the maintenance works. The system runs on 4 windows based computers interconnected by a LAN (Local Area Network). The current work mainly focuses on discussing the technical solutions that have been taken, real-time integration, data storage and transmission, and external communications.

Keywords - data management system, data acquisition, communications systems.

I. INTRODUCTION.

The B/O Cornide de Saavedra (<http://www.ieo.es/buques/cornide.htm>) was built in 1970 and since then has been working as research vessel focused in collecting physicochemical parameters as well as in fisheries studies. As the time has been passing, the procedures, instruments and communications have been evolving and because of it, nowadays, the scientific requirements are much stronger than before. Thorough the last years, a big effort to bring up to date the ship capabilities has been done including the equipment integration and communication systems. In this course of action, during 2008, the Instituto Español de Oceanografía (IEO) has installed a SIMRAD MDM400 Marine Data Management System on the research vessel B/O Cornide de Saavedra in order to integrate in a unique database the navigation information and scientific equipment installed on board. The main difficulties are related to the special characteristics associated to an aged ship and the adaptation of the different datagrams and formats to a common one. The current system is a commercial solution that has been developed and fully adapted to the ship characteristics by IEO and SIMRAD. The system runs on 4 windows based computers interconnected by a LAN. One of the computers is configured as MDM Server, who receives the data from several instruments, and also supports the database. All the data collected underway are received, stored and distributed in real-time. The other PCs connected on the LAN act as Clients where the users are able to list, plot and download data in different formats including ASCII files that are easily readable by any post-processing software, regardless the platform.

Besides, in order to bring up to date the communication system on board, Dixita has implemented a remote connection via Universal UMTS to all the PCs in the network that has also been proved very useful in the first steps of MDM installation to check if the system was working properly and moreover remotely facilitate the maintenance works. The same connection allows an access to Internet, volP and email services when the ship is near coast (under UMTS coverage). The whole system benefits the research activity permitting a remote access to marine data and information systems, but also an easier and faster communication between ship and research institutions onshore.

II. DATA MANAGEMENT SYSTEM

The MDM-400 system runs on 4 windows based computers connected to the Ethernet LAN. All the instruments on board are cable connected to the MDM server. Today the implemented system is capable of acquiring, sharing and storing data position from GPS systems, meteorological data from an automatic Aanderaa weather station, physico-chemical sea water properties from the SeaBird-21 thermosalinometer and Turner-10AU fluorometer, echograms from

EA600 and EK60 echo-sounders, and current velocity profiles from the vessel mounted ADCP. These instruments are connected to the MDM Server via serial ports. The way to incorporate data from the installed devices is through dedicated drivers that control the incoming datagrams, interpret each of them and store data locally in a relational SQL database sited in the server. Currently all the drivers are configured to store one sample by minute, to reach a compromise solution between time resolution and storage capability, but it could be customized according to scientific requirements by changing the storing parameters in the Server Manager.

To take advantage of the possibilities given by the interconnected PCs, the specific SeaBird software used to configure and collect CTD data has been implemented on 2 clients. One of the MDM applications permits the users to store directly the obtained raw or/and processed files in the server, that in this case acts as backup, keeping data as independent files that could be retrieved in the same formats from any other client PC or removable device.

III. COMMUNICATIONS SYSTEM

To facilitate the maintenance works, bring up to date the software, antivirus, etc. a remote connection via UMTS to all the PCs in the network, and also to other PCs on board, has been implemented. It allows a flexible and secure integration of an existing IP remote network into the Intranet of the vessel, enables remote LAN/WAN integration making use of the wireless data services (GPRS/3G/3G+based).

This has been proved very useful in the first steps to check if the system was working properly and also to solve problems when the vessel was on surveys.

The same UMTS connection allows an easier and cheaper access to Internet services, volP services and email when the ship is near coast -under UMTS coverage-. With a UMTS Marine Antenna (<http://www.dixita.com/docs/UMTSantenna.pdf>) it's possible get a coverage about 20 miles. The system allows connecting the vessel LAN with the central IEO LAN, achieving a complete vertical integration. It facilitates the report sending of the MDM daily automatic output by direct email and data replication to the datacenter onshore. In the same way, the system permits a daily report to Coriolis of thermosalinometer data, as it is part of the international IEO commitments in the field of the operational oceanography, also allows scientists to use the software for data acquisition equipment, and manage the computers of the vessel from their research labs on land with a Virtual Private Network (VPN).

IV. CONCLUSIONS

This experience has proved very useful in testing this kind of data management systems in order to install them on the new IEO vessels currently under construction. This system reduces the complexity of the previous one and increases data sharing and device connectivity capabilities. The improvement in real time data access is very important in order to face up to new demands linked to operational oceanography programs, large amount of data storage and management and social requirements.

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