

Demo of Wireless Doppler Current Sensor (DCS)

Background

A wireless underwater sensor network is on many fish farmers' wish lists to measure critical parameters. Especially where it is difficult or expensive to reach with cables or where cables are subject to wear and tear, underwater wireless networks can be a good solution.

Aanderaa, SeaCloud, and WSense recently carried out a project in a fish farming facility in northern Norway to demonstrate the stability and function of such a system. The test was designed to check stability, user-friendliness, and data quality under different conditions, including during boat operations, storms, and routine daily challenges faced by fish farmers.

As a result of a well-established partnership between Aanderaa and WSense, wireless underwater sensor network solutions are available on the market today. WSense is a company that provides IoT and uses underwater wireless mesh networks to enable better monitoring of water quality. Aanderaa supplies sensors that are critical for the monitoring and management of fish health and efficiency in the aquaculture industry. By connecting the wireless sensor system from Aanderaa & WSense to Seacloud's well-developed portal, the project partners have merged the very best in sensor technology, underwater IoT, and analysis tools to provide a complete data acquisition & delivery system. This collaborative project successfully demonstrates that together, these companies can now offer a joint system that is more practical, cost-saving, and robust than the legacy wired solutions used today.

"Aanderaa, SeaCloud, and WSense provide solutions allowing customers to collect sensor data wirelessly"

Project description

The following equipment was used in connection with the demo:

- Aanderaa Doppler Current Sensor (DCS) with frame
- WSense Gateway
- Gateway Modem
- WSense Node for DCS connection
- WSense Node in network

Rope and weights were used for placing nodes in the water.



Rune Stigum Olsen (Xylem Analytics, Norway) and Kristian Kasin Nordlie (WSense) deploying the Aanderaa DCS and the WSense node.



The Aanderaa DCS is a robust current sensor for measuring current speed and direction in the water. The sensor has a built-in compass, a tilt sensor and can also measure temperature.

Configuration of demo

The Gateway was integrated to the fish farm barge's network, and the gateway modem was placed on the outside of the barge. A node was installed 5 meters deep, between two cages, connected to the DCS, enabling ocean current data to be relayed wirelessly. An additional node was installed within the fish farm to act as a relay within the underwater mesh network. The ocean current data from the DCS was thus enabled to either transmit directly to the barge node via the node it was connected to, or to transmit data via the neighboring node. Data transfer was controlled by WSense's gateway solution and made available to SeaCloud's users in real-time.

Benefits of the technology

It has been common for fish farmers to collect sensor data via long cables installed throughout the length of the fish farm, distances often spanning several hundred meters. In addition to high infrastructure, installation and maintenance costs, these long cable lengths have other disadvantages and risks in connection with boat traffic, weather, and wind that wears on the cables. A wireless option presents several advantages, especially in places exposed to the weather, including increased flexibility and reduced maintenance costs.

Completion of demo and changes along the way

At the test location, all the cages had been fitted with deep lice skirts becoming an acoustic barrier hindering underwater wireless communications. WSense mesh network capabilities enabled "around the corner" data transfer as shown in the communication layout figure, the robust network design ensuring that all sensor data arrived error-free. The wireless sensor network was tested using several different transmission frequencies, and the system dynamically reconfigured via commands sent remotely from shore via the Gateway to the facility. The convergence of sensors, wireless network, and cloud access within this project enabled the measurements and system configurations to be adjusted in real-time, for example to adjust the amount and frequency of the sensor data sampling as required.

Summary

Aanderaa, SeaCloud, and WSense are providing customers with complete solutions that enable wireless acquisition of sensor data, without the customer having to change the system or potentially buy new sensors. These field-proven solutions answer today's challenges in providing customers with high-quality sensor data without cables, relayed via cloud service and displayed to the end user for an intuitive user experience.



Kristian Kasin Nordlie (WSense) mounting the Gateway on the barge.



Overview of fish farm - sensor data relayed via underwater mesh network.



Aanderaa Data Instruments AS

Sanddalsringen 5b

P.O. Box 103 Midtun

5843 Bergen, Norway

+47 55 60 48 00

aanderaa.info@xylem.com

Aanderaa.com



Aanderaa.com