

## WIRELESS PAM DIGITAL TRANSMISSION SYSTEM

### DESCRIPTION

The Seiche Wireless PAM system (W-PAM) enables transmission of full acoustic data from any marine platform in true real-time. This is necessary for effective mitigation (rather than near real-time or summary data). The system is integrated within Seiche buoys and rafts or can readily be installed on other platforms, such as Unmanned Surface Vehicles (USVs). Applications include:

- Real time mitigation of marine mammals
- Real-time monitoring of underwater sound levels

W-PAM receives signals from Seiche hydrophones, typically acquired at a sampling frequency of 500 kHz for a customised frequency range pass-band. The data stream is wirelessly transmitted to an operator located onshore or on a support vessel. Transmission causes negligible latency, packet loss or reduction in data quality. It has a range of up to 8 km, typically using 2.4 GHz/5 GHz bands. Omni-directional antennas and focussed sector antennas depending on the monitoring circumstances.

W-PAM works with the industry standard software, PAMGuard. For optimal performance, W-PAM can be further configured by one of two modes:

- RT Mode 1: full-bandwidth streaming and remote processing
- RT Mode 2: local processing and remote desktop viewing

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### KEY FEATURES

The highly configurable approach of W-PAM allows the system to meet any specific constraints on power, data quality/quantity and transmission range.

System has the flexibility to integrate a range of capabilities within the unit architecture.

The W-PAM system is contained within a robust, fully waterproof unit of compact cylindrical dimensions (65 cm x 25 cm) and lightweight (< 6 kg).

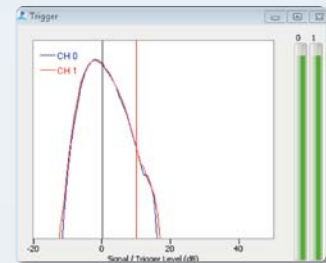
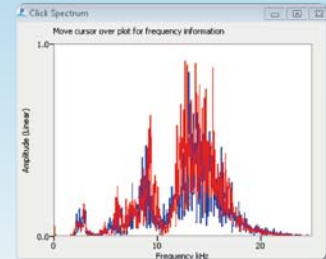
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## RT MODE 1

An analogue-to-digital sampling device is installed within W-PAM on the transmitting platform (e.g. a USV) and the full-bandwidth hydrophone signals are transmitted to the receiver station (e.g. on a support vessel) for remote processing in PAMGuard. The operator views and utilises the full frequency range required for monitoring in true real-time. Sound recordings of the transmitted signal are made at the receiver station. A key advantage of RT Mode 1 is the high quality of display as data is streamed directly to the receiver station.

## RT MODE 2

An electronic processing unit is installed on the transmitting platform (e.g. a USV) and the audio signal is processed locally within W-PAM using PAMGuard. The operator at the receiving station (e.g. a support vessel) has full control and viewing access to the PAMGuard user interface via a remote software link. This configuration has the advantage of lower bandwidth requirements, lower power consumption and greater transmission range. In addition, RT Mode 2 can readily be used in conjunction with DRS installed on the platform for assured data acquisition.



## CASE STUDY

This collaboration with ASV for Universities of Louisiana, New Orleans and Oregon was part of a survey to assess impacts on marine mammals of the Deepwater Horizon spill of 2005. A PAM array and W-PAM system was installed aboard two USVs: C-Enduro and the C-Worker. A wireless link was established using RT2. Twenty-seven real-time detections were successfully made of dolphin species and sperm whales.