



## Experimental testing of Asymmetric Underwater Acoustic Networks

**5th IEEE International Conference on Communications and Electronics**

**U. Vilaipornsawai**, [uvilaipornsawai@ualg.pt](mailto:uvilaipornsawai@ualg.pt)

**A. Silva**, [asilva@ualg.pt](mailto:asilva@ualg.pt)

**S.M. Jesus**, [sjesus@ualg.pt](mailto:sjesus@ualg.pt)

LARSyS, University of Algarve, Campus de Gambelas, PT-8005-139 Faro, Portugal

**Ref.:** 5th IEEE International Conference on Communications and Electronics, Da Nang (Vietnam), July 2014

### **Abstract:**

The coordinated operation of multiple vehicles within the framework of multipoint non-cabled observatories and offshore activities sprung the necessity for complex underwater acoustic networks (UANs). An example of such UAN consisting of fixed and mobile underwater nodes, was recently developed and tested at sea. A star-shaped network topology was adopted, where wide area network (WAN) integration was ensured through an asymmetric underwater master node composed of an acoustic modem, for low-data-rate downlink from WAN to UAN, and a multiple receiver antenna for single-input-multiple-output (SIMO) high-priority high-data-rate uplink, from UAN to WAN. This paper focuses on the performance of the high-priority SIMO uplink combining multichannel geometry-adapted passive Time Reversal (pTR) and single Decision Feedback Equalizer (DFE). High data-rate and sustainable communications for mobile and fixed nodes were considered. Two experimental data sets were used: one from the UAN10 sea trial (Pianosa island, Italy, September 2010) for a moving source and UAN11 (Trondheim Fjord area, Norway, May 2011) for a fixed source. BPSK/QPSK signaling, data-rate upto 4000 bps and a source speed upto 0.5 m/s, were considered for carrier frequencies ranging from 5kHz to 25.6kHz. Temporal coherence is shown to be a key factor, determining the performance of pTR-based techniques. Moreover, the geometry-adapted pTR is shown to sustain the temporal coherence in case of geometry changes.