



Underwater acoustic communications: from point-to-point to networks

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Abstract

This is a review presentation that addresses recent developments in underwater acoustic telemetry as a tool for ocean observation, monitoring and protection. Distributed sensing is a paradigm with important reflections in oceanic technology where bottom installed structures can not always be connected to a central hub through cabled networks. Moreover, recent developments in ocean robotics lead to the off-the-shelf availability of autonomous underwater vehicles that rely on wireless communications for sending information and receiving commands. Unlike its aerial counterpart wireless underwater communications, are strongly affected and limited by the propagation media: the low speed of propagation, highly limited bandwidth, spatial and time variability of environmental properties and randomness, all together contribute to the slow adoption of standardized and reliable underwater communications networks. This paper addresses the main issues regarding and characterizing the underwater acoustic communication channel as well as the proposed techniques to overcome those issues for, in a first stage, point-to-point (P2P) communications and then for the set up of full underwater networks comprising both fixed and mobile nodes. The presentation is illustrated by real data based examples drawn from experiments carried out at sea by the Signal Processing Laboratory, University of Algarve, Portugal (SiPLAB, www.siplab.fct.ualg.pt) in numerous national and European research projects in the last 15 years.

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