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SATELLITE COMMUNICATION ADOPTS MULTI-TRANSDUCER NODE DISTRIBUTIVE BEAM FORMING (DBF)

Abstract

Seas and oceans are essential for building up a sustainable developing propagation world for all mankind.

Maritime communication between ocean and terrestrial was normally performed via relay satellite on outer space; however, it was impossible to put up a large base station deep in ocean to directly communicate with satellite, for the base station could not be scattered and placed on sea level. The transducer node is a newly proposed idea for solving such problem, as the transducer node is always featured with a lower cost and smaller size, which is feasible to be flexibly positioned on sea level. Whereas single transducer node is difficult to perform communication with satellite due to its lower power level, this paper proposed a novel scheme to perform communication between transducer node network and satellite based upon the Multi-Transducer Node Distributive Beam Forming (MTNDBF) technique. The MTNDBF can maximize the received signal coming from multi-transducer node, and enhance the telecommunication capability of wireless transducer node network.

The primary counteract issue of communication between satellite and transducer node on sea level is the extremely long distance that caused a quite severe propagation loss. The MTNDBF technique is capable of receiving signal from multi-node at one time via the beam forming scheme, and maximizing the received signal via a cooperative adjustment method along with the increasing of the number of the node, which can be applied to cope with the severe propagation loss. This paper aims at studying several issues, including an adaptive distributive beam forming technique to optimize the power resources of transducer node network, which could effectively improve the communication performance of multi-transducer node. Besides, the natural fluctuation on sea level would bring a severe doppler spread and make a impact on the carrier synchronization within transducer nodes, hence, an adaptive carrier frequency and time synchronization, as well as a cell node self-adaptive reconfiguration technique would be proposed and studied on this paper, to implement a high performance of communication between satellite and transducer node on sea level. The self-adaptive technique scheme provides a newer idea and approach for the hybrid application on transducer node and satellite.

The innovatively proposed scheme is practical, affordable, and commercially viable, the MTNDBF technique can boost the power resource utility on transducer nodes, which could be vastly applied by a great many fields of communication application, such as multi-terminal (sea level/satellite/terrestrial) mobile communication network, wrecked ship or aircraft salvage, like search and rescue (SAR) mission, and any other emergency maritime satellite communication applications.