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Tingting Yang · Xuemin (Sherman) Shen

Mission-Critical Application Driven Intelligent Maritime Networks

Springer

Tingting Yang
School of Electrical Engineering
and Intelligentization
Dongguan University of Technology
Dongguan, Guangdong, China

Xuemin (Sherman) Shen
Department of Electrical
and Computer Engineering
University of Waterloo
Waterloo, ON, Canada

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Preface

The development of maritime services has driven a radical increase of data volume recently. The ever-increasing resource-intensive tasks, such as the high-definition video playback, and maritime navigation safety, dramatically increase the energy consumption and the requirement of bandwidth of wireless maritime networks. This Springer Brief aims at providing valuable insight on the high-efficiency data transmission scheduling, group intelligent search and rescue approach aided by the artificial intelligence (AI)-powered maritime networks. The great challenges and opportunities of the 5G networks and AI spanning from the ground to the sea are also discussed.

In Chap. 1, we present a brief introduction of maritime heterogeneous networks, including space/air/sea/ground-integrated network architecture, framework, operations, etc. In particular, the software defined network (SDN)-based maritime heterogeneous network framework is designed. In Chap. 2, a comprehensive survey is provided to cover the existing research and development in the considered field, such as maritime networking, resource allocation methods, and mission critical maritime applications. In Chap. 3, an intelligent transmission scheduling method using the deep reinforcement learning for SDN-based maritime communication network is proposed with multiple network objectives (i.e., minimizing delay, cost, or energy consumption). In Chap. 4, mobile edge computing (MEC) is introduced into maritime communication network and a multi-vessel computation offloading algorithm based on the improved Hungarian algorithm is proposed. In Chap. 5, a novel search and rescue networking is proposed, which is based on the multi-agent autonomy decision and task allocation. In this model, there are two levels of control agents, which adopt distributed edge computing to complete mission-critical applications of path search and target positioning, respectively. Conclusions are presented and open research issues are discussed in Chap. 6.

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Dongguan, China Tingting Yang
Waterloo, Canada Xuemin (Sherman) Shen

Contents