Single liner shipping service design

The design of container shipping networks is an important logistics problem, involving assets and operational costs measured in billions of dollars. To guide the optimal deployment of the ships, a single vessel round trip is considered by minimizing operational costs and flowing the best paying demand under commercially driven constraints. This paper introduces the Single Liner Shipping Service Design Problem. Arc-flow and path-flow models are presented using state-of-the-art elements from the wide literature on pickup and delivery problems. A Branch-and-Cut-and-Price algorithm is proposed, and implementation details are discussed. The algorithm can solve instances with up to 25 ports to optimality, a very promising result as real-world vessel roundtrips seldom involve more than 20 ports. © 2013 Elsevier Ltd.