To achieve socio-economic and environmental sustainability, the physical internet is proposed as a new paradigm for future logistics operations. Concerning the transport part of the supply chain, the ambition of the European Commission is to shift 30% of road freight transport by 2030 to environmentally friendlier modes that have lower societal impact, such as rail and inland waterways. This shift should reach 50% by 2050. Therefore, it is necessary to introduce innovative solutions that support optimal integration of different transportation modes and their cost-effective use. As intermodal transport is often seen as too static, a synchromodal approach to transport may increase the competitiveness of intermodal transport. Synchromodal transport emphasizes the dynamics and flexibility which should be incorporated in decisions on routing and rerouting load units using multiple transport modes. In a synchromodal view, ideally, load units are routed through an interconnected network of hubs depending on the network capacity, where the sender is not concerned about the route of its packages. This requires flexible and real-time planning, which poses a number of challenges for planners. In this context, adequate decision support and fast planning algorithms with real-life characteristics are needed to support this synchromodal vision. Current modelling approaches for synchromodal transport are first discussed. Next, we deduct opportunities and challenges that arise for OR models in this dynamic context. Finally, an integrated intermodal routing approach is presented as a first step towards synchromodal decision support from the perspective of a network operator.