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Reliable network infrastructure for railway systems to support future services

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Abstract:
The communications network connects people, equipments and systems across the entire railway organization. Therefore, it is of great importance for railway operators to select and implement the best telecommunication networks in order to deliver more services to a wider variety of customers and to save costs. Operators also require upgrading the rail communications systems to a single, unified and secure network capable of transporting all traffic types including global system for mobile communications- railway (GSM-R), voice, video, and data traffic. In this paper, we study a backbone infrastructure and network optimization model for railway systems. We describe how to move smoothly and securely from legacy technology, such as synchronous digital hierarchy (SDH) or time division multiplexing (TDM)-based protocols, to a flexible and scalable network. In our research, we have come up with using multi protocol label switching (MPLS) for quality of service (QoS) guarantees. We also consider optical transport network (OTN) as a distinct layer for optical backbone network in railway systems. Using OTN in physical layer of the network provides adequate bandwidth for all future needs. Moreover, we suggest a multilayer architecture consisting of IP/MPLS over OTN over dense wavelength division multiplexing (DWDM) to support various services in a railway area.

Keywords:
railway signaling, optical network, IP/MPLS, OTN/DWDM, QoS

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