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Adaptive Bandwidth Allocation: Impact of Traffic Demand Models for Wide Area Networks

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Abstract: In this paper, we consider configurable capacity tunnels. *Static bandwidth allocation* (SBA) assigns the network capacity to the tunnels according to the busy hours of their traffic aggregates. At secondary times, their capacity is underutilized and can not be used to accommodate excess traffic of other tunnels. The contribution of this paper is twofold. Firstly, we propose two mechanisms for *adaptive bandwidth allocation* (ABA) for the tunnels: *complete capacity reassignment* (CCR) and *selective capacity reassignment* (SCR). They both adapt the tunnel capacities to the current traffic demands but differ in their implementation, signaling, and configuration complexity. Secondly, we asses the bandwidth savings of ABA vs. SBA in wide area networks where the transfer rates of traffic aggregates fluctuate over time according to busy hours. Our results show that the capacity savings strongly depend on the traffic model and that they may be increased by time-aware routing.
Keywords: Adaptive bandwidth allocation, wide area networks, network dimensioning, multi-hour design, admission control, traffic engineering

1 Introduction

Configurable capacity tunnels are a popular means for traffic engineering in today's Internet. In MPLS, label switched paths (LSPs) are established through a network and associated with a guaranteed bandwidth [1]. Another area of application is network admission control (NAC). So-called border-to-border (b2b) budgets (BBBs) provide virtual capacity tunnels through a network. From now on, we use BBBs and capacity tunnels as synonyms. In contrast to a single LSP, a BBB can consist of a multi-path between border nodes. Per-flow admission control (AC) is then performed only at the ingress routers based on the capacity of the BBBs [2]. In the following, we explain the considered problem, give an overview of related work, and comment the structure of this work.

Static bandwidth allocation (SBA) assigns the network capacity to the capacity tunnels according to the busy hours of their traffic aggregates. At secondary times, the capac-

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