

# Service Level Differentiation in Call Centers with Fully Flexible Servers

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## Abstract

We study large-scale service systems with multiple customer classes and many statistically identical servers. The following question is addressed: How many servers are required (staffing) and how does one match them with customers (control) in order to minimize staffing cost, subject to class level quality of service constraints? We tackle this question by characterizing scheduling and staffing schemes that are asymptotically optimal in the limit, as system load grows to infinity. The asymptotic regimes considered are consistent with the Efficiency Driven (ED), Quality Driven (QD) and Quality and Efficiency Driven (QED) regimes, first introduced in the context of a single class service system.

Our main findings are: a) *Decoupling* of staffing and control, namely (i) Staffing disregards the multi-class nature of the system and is analogous to the staffing of a single class system with the same aggregate demand and a single *global* quality of service constraint, and (ii) Class level service differentiation is obtained by using a simple *Idle server based Threshold-Priority* (ITP) control (with state-independent thresholds), b) *Robustness* of the staffing and control rules: Our proposed Single-Class Staffing (SCS) rule and ITP control are approximately optimal under various problem formulations and model assumptions. Particularly, although our solution is shown to be asymptotically optimal for large systems, we numerically demonstrate that it performs well also for relatively small systems.

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