

## A Queue with Two-Stage Heterogeneous input and Service with Bernoulli Schedule Server Vacation

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**Abstract:** In this paper we consider a single server queue with two phase arrivals and two phase services. Arrivals are Poisson variables with different rates. For each input, the server provides private service with exponential distribution. The rates of services are different. The policy of service is FCFS, where the server changes the kind of service according to the customer in the front of queue. After the completion of each service, the server either goes for a vacation with probability  $\theta$  ( $0 \leq \theta \leq 1$ ), or may continue to serve the next customer with probability  $(1 - \theta)$ , if any. Otherwise, it remains in the system until a customer arrives. Vacation times are assumed to have exponential distribution. We obtain steady-state probability generating function for queue size distribution for each input and expected busy period.

**Keywords:** Poisson Process, Exponential Distribution, Heterogeneous Service, Vacation with Bernoulli Schedule, Steady-state Equations, Mean Queue Size.