

# BULK ARRIVAL RETRIAL QUEUE WITH UNRELIABLE SERVER AND PRIORITY SUBSCRIBERS

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**Abstract**—This paper is concerned with the analysis of unreliable server bulk arrival retrial queue with two class non-preemptive priority subscribers. The two types of subscribers arrive according to Poisson flow in which priority is assigned to class one, and class two subscribers are of non-priority type. The subscribers in each class arrive to the system in batches; the batch sizes follow the geometric process. If the server is free at the time of any batch arrivals, the subscriber of this batch begins to be served immediately and leave the system forever. The priority subscribers that find the server busy are queued and then are served in accordance with FCFS discipline. The arriving non-priority subscribers on finding the server busy cannot be queued and leave the service area and try their chance after some random time. If a subscriber is being served at the instant of the server failure, the service is interrupted and restarted after repair. The life time of the server is assumed to be exponentially distributed. The repair time and service time are also assumed to be i.i.d. general distributed. We obtain the condition of Ergodicity for such a queueing system. The analytical results for queue size distribution as well as some performance characteristics under steady state conditions by applying supplementary variable technique are derived. The waiting time distribution is also discussed for priority and non-priority subscribers. By taking illustration, computational results are provided to facilitate the sensitivity analysis.

**Keywords**—Bulk arrival, Retrial queue, Non-preemptive priority, Unreliable server, Supplementary variables, Queue size, Waiting time.

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