**ON A RETRIAL QUEUE WITH A CHAIN OF FINITE CAPACITY ORBITS AND A FINAL INFINITE CAPACITY ORBIT**

Achyutha Krishnamoorthy,

Centre for Research in Mathematics,

CMS College, Kottayam 686001.

email: [achyuthacusat@gmail.com](mailto:achyuthacusat@gmail.com),

**Abstract**:

We consider a single server retrial queue (RTQ) with no waiting space at the service station, A finite number M of orbits, with the first M-1 having finite capacities K, 2K, ...., (M-1)K in the increasing order, and the Mth one having infinite capacity are provided for retrial customers, depending on the number of retrials they have completed-- orbit one seats tho primary customers who encounter a busy server on their arrival, ... the (M-1)th accommodates those who have completed M-2 retrials and the last one is for those who is offered either the last retrial/direct access to the server through a SEARCH by the service system at the EPOCH OF COMPLETION OF A SERVICE. This mechanism provides exact information of the number of retrials an arbitrarily chosen customer in the system has completed. The increasing nature of the capacities of the orbits together with the assumption that retrial rates from orbits increase in a sequential manner, ensure minimum loss of retrial customers.

This system is analysed under the assumption that the primary arrivals follow a Poisson process; inter-retrial times in each orbit are exponentially distributed. Customers in the last orbit are endowed with a privilege of being either taken for service at a customer service completion epoch through a SEARCH MECHANISM requiring negligible time or through the retrial.

Two cases are considered:

1. Retrial customers return to orbit with probability one;

2. such customers abandon the system with probability p. A comparison of the   
 performance of these two is carried out by introducing separate cost functions.