

## ABSTRACT

Bandwidth is a very valuable and limited resource in satellite communication systems, so its utilization should be a major consideration, leading to efficiency aspects. The price of per mega herzt (MHz) satellite transponder is expensive, and the capacity is very limited. These become the strategic issues when satellite communication is the one and only option, and at the same time it's becoming the ultimate solution to telecommunication fulfillment in rural areas, which do not allow the provision of fiber optic or terrestrial radio.

Various modulation techniques and multiple access technologies are developed with the aim of being able to use satellite bandwidth efficiently. However, advances in modulation techniques and multiple access technologies have not been able to compensate and resolve the speed of growth in telecommunication demand, especially in areas that can only be served using satellite communications systems, and to obtain broadband data services. The Carrier in Carrier (CnC) technique has been implemented on Single Channel Per Carrier (SCPC) satellite backhaul link for cellular provider to address the bandwidth efficiency challenges in fulfilling the capacity of telecommunication services to the country. This technique adopts Paired Carrier Multiple Access (PCMA) or Adaptive Cancellation technology, that conceptually is a frequency reuse technique, which allows the use of the same frequency spectrum for two-way signals pairs, uplink and downlink [2][3].

In this thesis, the analysis is directed to obtain the optimum transponder management by calculating and comparing the bandwidth efficiency generated by the implementation of CnC, between theory and practice under operational conditions. Selection of used main input parameters are those will affect to the amount of bandwidth and power required by the system, including the types of modulation, coding, and forward error correction (FEC) index. This research will use two types of satellites and two different of modems. The parameter types that used many and varied, in order to obtain the results of a comprehensive analysis, where theoretically the maximum efficiency value is up to 50%, and at least 25% bandwidth saving in practice.