- My thesis title : **« Demodulation of 4G (LTE Advanced) signals aggregated in frequency» ;**
- My name : **« Abdou Kaissoine » ;**
- My public e-mail « kaissoine.abdou@anrtic.km or **abdoukaissoine@gmail.com** »
- My host institute address « Oasis-Moroni, BP 6540, Union des Comores »

ABSTRACT OF MY THESIS:

The LTE-A (Long Term Evolution Advanced) from the 3GPP plans to distribute the information on a frequency aggregated RF signal. In this thesis, we have demonstrated theoretically and practically that the demodulation can be performed by a single receiver chain, unlike the current solutions which use several receiver chains and therefore the cost, the circuit size and the difficulty of frequency synchronization are increased. Firstly, the description focuses on the performance of the demodulator circuits. This part shows the three phase demodulator (TPD) circuit has a rejection gain of 30 dB of intermodulation products from adjacent signals and a superior performance to those of conventional IQ circuits for demodulating a RF signal that consists of several bands of RF non-contiguous frequencies. The second part of the work includes the description of the technique of mixing n modulated carriers with n CW signals using a single TPD circuit. This technique reduces the band of the analog-to-digital converter (ADC) to a few ten megahertz. The principle is theoretically demonstrated for two, three and four non-contiguous frequency bands and validated by the results of measurements. The test is performed for modulated carriers of 5MHz, 10 MHz or 15 MHz bandwidth by using the same QPSK modulation format or two different modulation formats (QPSK and 16QAM). The demodulation performance is evaluated by measuring the Error Vector Magnitudes (EVM) of the down-converted baseband signals. This test shows that it is possible to demodulate a distributed non–contiguous several carrier RF signal with a bitrate more than 400 Mbps. The results of the synchronization between the local oscillators of the transmitter and receiver for a frequency aggregated OFDM signals completely validate the proposed method in the thesis.

Keywords: spectrum aggregation, Zero-IF/Low-IF, RF receiver, LTE-Advanced, three phase demodulator, error vector magnitude, sources synchronization, OFDM.