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## ABSTRACT

The other name of GSM 1800 is Digital Cellular System (DCS) 1800. it seem as the digital communication network, GSM 1800 has the same principle work as the seem as the other GSM, but this technology use the high frequency. GSM 900 works in frequency 900 MHz while GSM 1800 works in frequency 1800 MHz (1.8 GHz).

Wireless communication system have two different system, they are a transmitter system and receiver system. There are two different line, in and out line. While the communication line to the base station has only one line, that is why the transceiver system needs a duplexer[1].

In this final project was realized a duplexer for DCS 1800. Duplexer consists of two hybrid and two bandpass filter. Hybrid coupler was realized using the branch-line hybrid coupler that modified to provide a wide bandwidth. The produce of coupling and output each is 3.78 dB and 2.90 dB. The isolation produced 16.80 dB and return loss 30.442 dB with VSWR 1.0619. the phasa produced is 88.20. while the bandpass filter was realized using cross-coupled hairpin-line method. Both filters were designed identified. The frequency operation of Bandpass filter was realized is 1739.54 MHz with bandwidth 80 MHz and FBW 4.597 %. In frequency operation produced insertion loss 2.58 dB, return loss 9.05 dB and VSWR 2.09.

The realized duplexer has a larger than 25 dB isolation in over TX band with loss between RX and antenna 4.68 dB and loss between TX and antenna 2.68 dB. The produced return loss in antenna port is 21.58 dB in RX band and 8.08 in TX band. The produced return loss in TX port is 20.09 dB and 29.01 dB in RX port.

**Key words :** *DCS 1800, duplexer, hybrid, band-pass filter, branch-line hybrid coupler, cross-coupled hairpine-line filter.*