

## ABSTRACT

In this final project, a multiplexer with hybrid-coupled method that used to combine downlink frequency of DCS 1800 and WCDMA at 1805 MHz-1880 MHz and 2110 MHz-2170 MHz have been designed and realized. The insertion loss to be achieved is  $\leq 0,5$  dB, the return loss to be achieved is  $\geq 25,046$  dB, and the amount of SWR to be achieved is  $\leq 1,12$ . Meanwhile, to avoid the interference between the channel, isolation to be achieved is  $\geq 65$  dB. Multiplexer hybrid - coupled has the characteristic of each channel consists of two BPF and two identical 90 hybrid. The BPF was realized by using squared open loop resonator and 90 hybrid section is realized with branch line hybrid coupler. The multiplexer was modified in order to be able pass the operating frequency DCS 1800 and WCDMA with help of Ansoft HFSS V.10 software. The multiplexer was realized by using microstrip circuit, where the data of measurements for would be material comparative with further analysis.

BPF and hybrid section that have been made according with the design and simulation, but no realization of hybrid coupled multiplexer. The test result obtained on channel DCS 1800 is capable to pass the frequency 1790 MHz – 1870 MHz, or in the other words operating frequency bandwidth of DCS 1800 is 65 MHz. The other parameter obtained in centre frequency of DCS 1800 channel is 15.515 dB insertion loss, 30.365 dB return loss, 58.398 dB stop band loss, SWR of 1.0626, and 22.75 dB isolation port. Meanwhile, the WCDMA channel is capable to pass 2105 MHz – 2175 MHz, or all the working frequency can be passed within multiplexer. The other parameter obtained in centre frequency of WCDMA channel is 12.965 dB insertion loss, 31.664 dB return loss, 42.837 dB stop band attenuation, SWR of 1.0537, and 18.519 dB isolation port.

**Key words:** Multiplexer *hybrid coupled*, DCS 1800, WCDMA, BPF, hybrid 90<sup>0</sup>.