

## ABSTRACT

Nowadays, recent FTTH network are using CWDM PON architecture with three optical channels to support Broadband Services. Wavelength 1550 nm was used to TV broadcasting, wavelength 1490 nm was used to transmit digital data downstream and 1310 nm for digital data upstream transmission. In terms of system design, this approach requires WDM filters, additional lasers and photodiodes at CO and end-users. It is not efficient for bandwidth utilization.

Because of the simplicity and stability of microwave and RF devices, SCM can combine different RF channels (analog & digital signals) closely with each other in electrical domain, and then modulate onto an optical carrier. In this final project, 39 channels analog video streams and 1Gb/s digital data are mixed by different microwave frequencies and combined together in the electrical domain before modulating onto one wavelength using optical single sideband modulation. This composite signal is modulated at the lower sideband of the optical carrier. In addition, a microwave frequency is modulated at the upper sideband of optical carrier. The optical sub carriers at the lower sideband of optical carrier will then demodulate into electrical domain for CATV broadcasting and downstream digital data transmission.

The goal of this final project is to examine the transmission performance of SCM network transmitting 1Gb/s data and 39 channels analog video streams under one wavelength, so WDM filters, additional lasers and photodiodes at CO and end-users requirement can be reduce. This project will examine the CATV Carrier-to-Noise Ratio (CNR) and the digital data receiver Q values.

*Keywords: Sub-carrier Multiplexing, Fiber To The Home, CATV*