

# Abstract

In fiber-optic communications, **Wavelength Division Multiplexing (WDM)** is a technology which multiplexes a number of optical carrier signals onto a single optical fiber by using different wavelengths (i.e. Colours) of laser light. This technique enables bidirectional communications over single mode fiber, as well as enhances the capacity of optical communication system.

In this project 1550-nm wavelength domain is used to design the DWDM system. The reason for choosing this wavelength domain is that it falls in the amplification range of EDFA and also has low attenuation. By the invention of EDFA and other dispersion compensation techniques, transmission of optical signal over hundreds of kilometers became possible.

Advantage of DWDM is its protocol and bit-rate independent. DWDM based network can transmit the data in IP, ATM, SONET, SDH and Ethernet. Therefore DWDM based networks can carry different types of traffic at different speeds over optical fibers. Voice transmission, e-mail, video and multimedia data are just examples of services which can be transmitted simultaneously in DWDM systems. DWDM is a type of frequency division multiplexing (FDM).

In this project we design the DWDM system for eight channels with channel spacing is 50 GHz (0.4nm). Another DWDM technology is also invented with channel spacing 25 GHz (0.2 nm) and 12.5 GHz (0.1 nm). But disadvantage of these small channel spacing is that it causes inter-channel crosstalk and non-linearity phenomenon which degrade the signal quality and result in affecting the high bit rate transmission. If we mitigate these non-linearity phenomenon Ultra High bit rate transmission can be possible. Thus by using the DWDM system a large number of carrier signal can be multiplexed with large data rate and can be transmitted over thousands of kilometers.

