# Application Note

## Red/Blue Filters in DWDM Systems

Keywords

Application, DWDM, Fiber optics, Filter, WDM

Summary

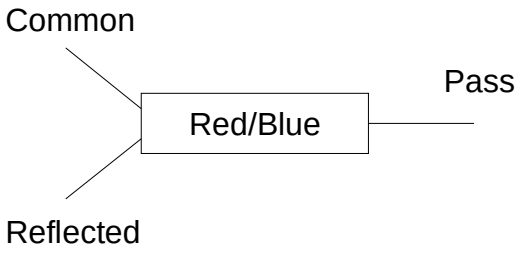
To reduce link insertion loss in high-channel count, DWDM systems, an additional component is added to the optical path. This additional component, called a "Red/Blue" filter, is used like a regular WDM. The difference lies in the wavelengths which are split.

Scenario

Customers are requesting DWDM modules, which include Red/Blue filters (or "bandsplitters").

Question

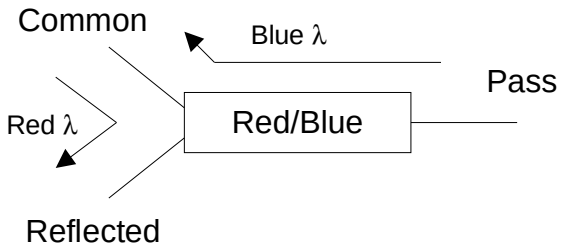
What is a Red/Blue filter, and how is it used?




Notes/Answer

Like DWDM filters, the Red/Blue filter is a thin-film filter device. It is a three-port device. One port is called the "Common." The other two ports provide the conduit for the two wavelength "bands." The two bands are the Blue ($\lambda$<1543 nm) and the Red ($\lambda$>1547 nm). One band goes thru the Reflected leg, and the other band goes thru the Pass leg. *Note: the Reflected leg and the Pass leg must be designated either Red or Blue. The band, which requires the highest isolation, goes on the Pass leg.*

The device may be used in several ways. The device can be used as a band combiner or a band splitter. As a combiner, the bands are combined in the filter and sent to the Common leg. Or, as a splitter, the both bands are fed from the Common leg, and split to the corresponding leg. Typically, however, the device is used as a two-way (i.e. bi-directional) WDM. One band is sent to the Common leg, while the other band is delivered from the Common leg. (see example diagram)




*Example of a Red/Blue WDM in bi-directional usage.*

In a DWDM module, which uses a Red/Blue filter, a Mux may be combined with a Demux. For example, the Mux combines DWDM channels in the Red band, while the Demux separates DWDM channels in the Blue Band. Using a Red/Blue filter, one can combine the Red Transmit channels and the Blue Receive channels onto a single fiber.