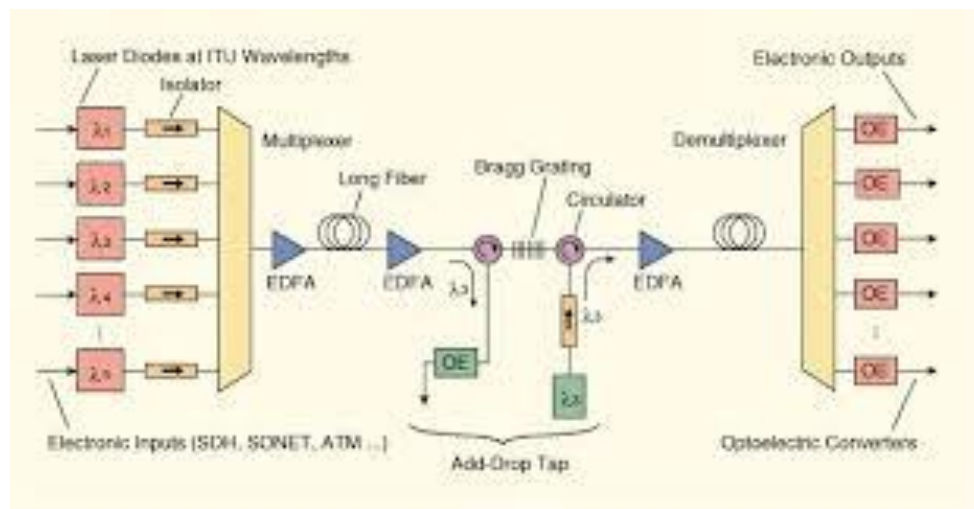


Optical Networks – Basic Concepts-II



What is an optical network?

- An optical network connects computers (or any other device which can generate or store data in electronic form) using optical fibers.
- Optical fiber is essentially very thin glass cylinders or filaments which carry signals in the form of light (optical signals).

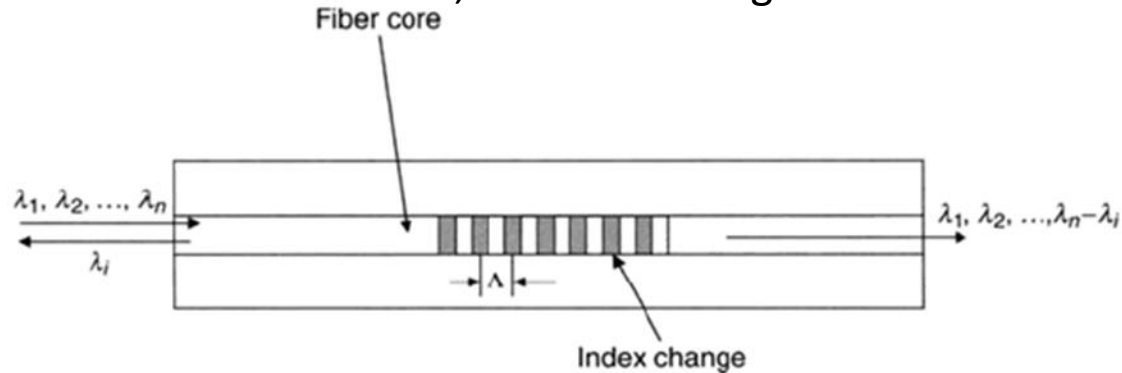
Wavelength Division Multiplexing

- ❑ The technology of using multiple optical signals on the same fiber is called Wavelength Division Multiplexing (WDM).

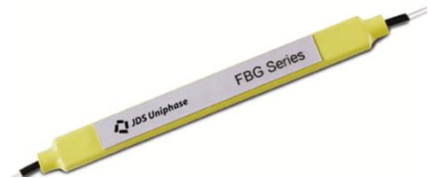
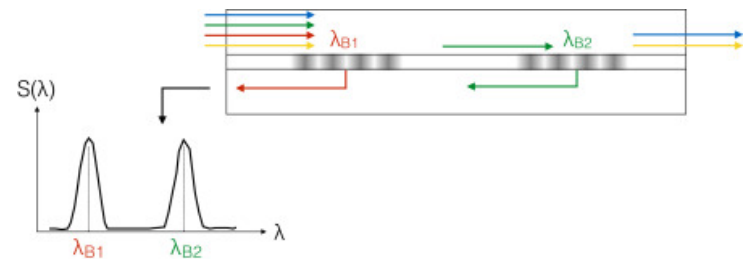
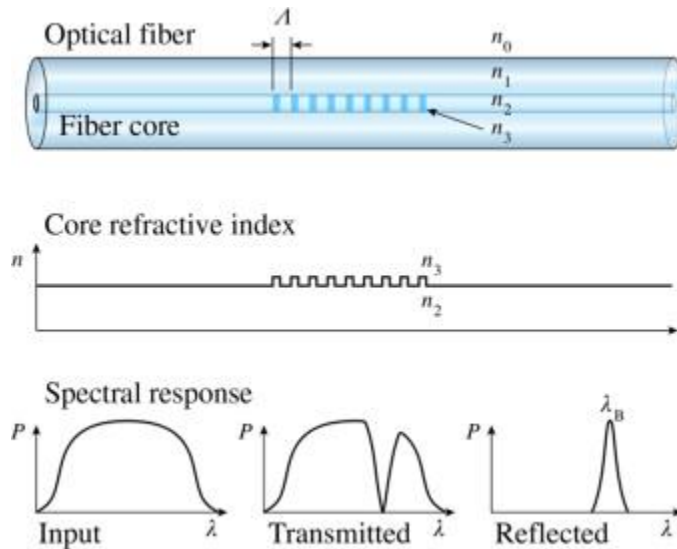
- ❑ WDM Optical Network
 - Divide the vast transmission bandwidth available on a fiber into several different smaller capacity “channels” non-overlapping bandwidths,
 - Each of these channels can be operated at a moderate bit rate (2.5-40 Gb/s) that electronic circuits can handle,
 - Each of these channels corresponds to a different carrier wavelength.

Fiber Bragg Grating (FBG)

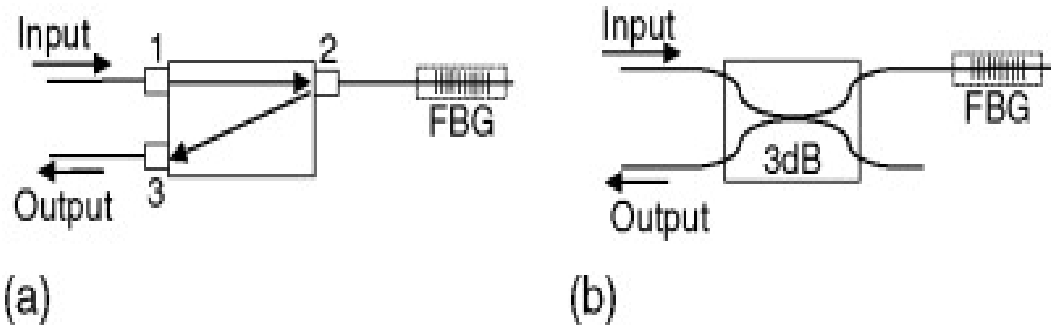
As a resonant structure, the FBG will act as a wavelength selective mirror. It consists of distributed Bragg reflectors in a short segment of optical fiber that reflects particular wavelength light and transmits all others, as shown in Figure .



Schematic diagram of a fiber Bragg grating.



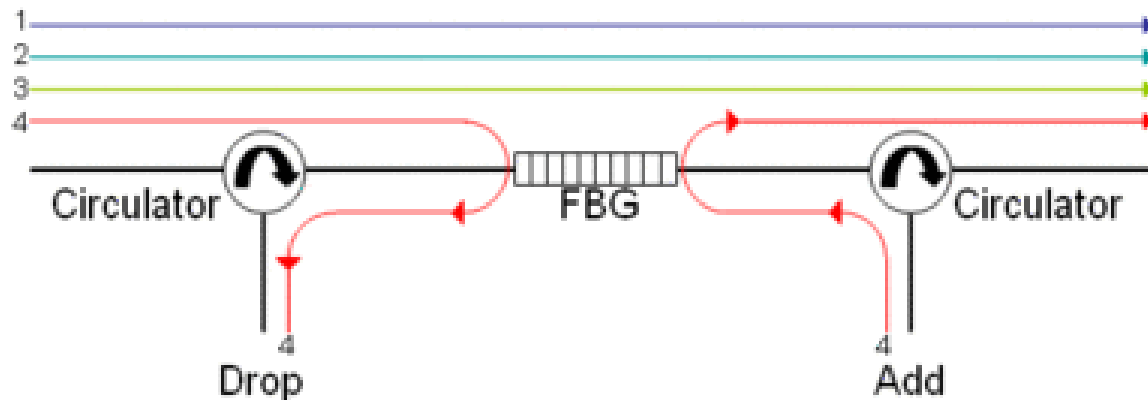
- Optical circulators have many applications in optical communication systems and optical instrumentations for redirecting optical signals.
- One example is the use with fiber Bragg gratings, as shown in Figure. Since the reflection characteristic of a fiber Bragg grating can be used either as a bandpass optical filter or as a dispersion compensator, an optical circulator has to be used to redirect the reflected optical signal into the output.
- Although a 3-dB fiber directional coupler can also be used to accomplish this job,



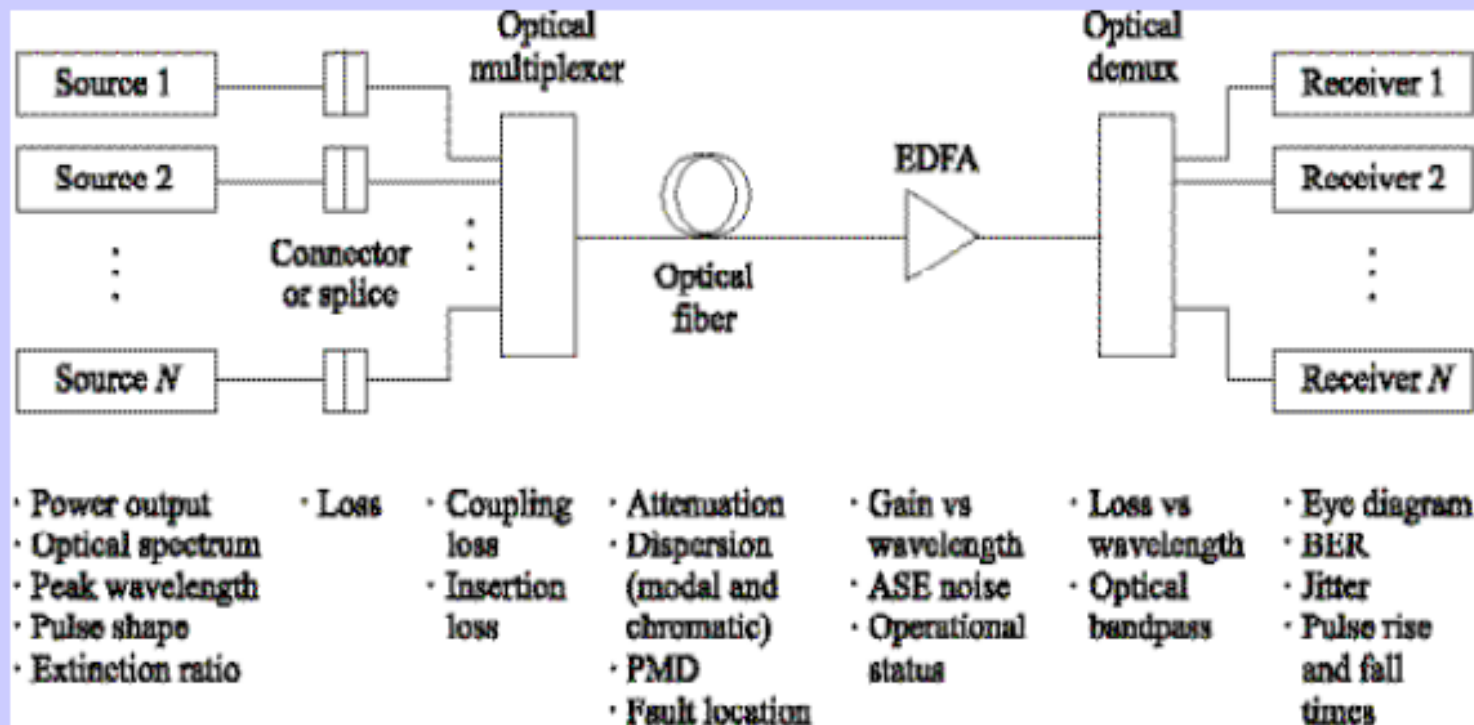
Redirect FBG reflection using (a) a circulator and (b) a 3-dB fiber directional coupler.

Optical Add-Drop Multiplexer (OADM)

The primary application of fiber Bragg gratings is in optical communications systems. It is specifically used as notch filters. They are also used in optical multiplexers and demultiplexers with an optical circulator, or optical add-drop multiplexer (OADM). Figure 5 shows 4 channels, depicted as 4 colours, impinging onto a FBG via an optical circulator. The FBG is set to reflect one of the channels, here channel 4. The signal is reflected back to the circulator where it is directed down and dropped out of the system. Since the channel has been dropped, another signal on that channel can be added at the same point in the network.



Typical OFC link & Performance Parameters



Performance-measurement parameters of users interest