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Multiband Optical Filters Are Telecom Networks' Multitaskers

Dual- and multiband optical filters are helping to enhance the complexity, footprint, performance, and cost of fiber network components.

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Multiband optical filters have long been used in applications such as fluorescence spectroscopy, astronomy, and 3D cinema, to name a few. The ability to combine more than one spectral band into a single optical filter can enable flexibility of system design and reduce the number of components and the costs needed to achieve a desired functionality.

Optical fibers have always played a key role in fiber optic telecom systems. They provide the wavelength selectivity needed for optical add-drop modules (OADMs) and wavelength division multiplexing (WDM) functions, and at low loss profiles to enable gain-flattening fibers (GFFs) to relieve-doped fiber amplifier (EDFA) problems.

Recent advancements in multiband and multifunction optical filters have expanded the benefits to telecom components. Such filters not only supported the development of dual- and multibandpass filters for use in the backbone WDM architectures associated with wireless networks, they also enabled hybrid GFFs that couple gain-flattening functionality with laser pump blocking. These component advancements leverage the power of multiband filters to improve performance and save module build costs.

Didn't WDM solve this?

WDM technology has been around since the late 1990s, when it emerged from and enabled the massive growth in demand for greater telecommunications bandwidth to support the World Wide Web. By using thin-film filters, modules and system architects could optically add or drop individual channels in a single fiber. Coarse WDM (CWDM) (with 20-nm band spacing) was followed by dense WDM (DWDM), which allowed subnanometer band spacing to transport multiple signal bands simultaneously along the fiber optic highway.

The thin-film filters at the time consisted of single-band WDM channels that transmitted or reflected a single signal channel, or somewhere a group of channels using an X-skip-Y OADM skip filter.

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Multiband Optical Filters Are Telecom Networks' Multitaskers

The ability to combine more than one spectral band into a single optical filter can enable flexibility of system design and reduce the number of components and the costs needed to achieve a desired functionality in fiber optic telecom components. Recent advances in multiband and multifunction filters support the development of dual- and multi-bandpass filters for use in the backbone WDM architectures for wireless networks, and enable hybrid GFFs that couple gain-flattening functionality with laser pump blocking to improve performance and save module build costs.

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