WHITE PAPER

Single Fiber Solutions

Introduction

Fiber optic networking used to require two fibers, one for transmitting and one for receiving signals simultaneously. Single fiber solutions emerged as the way to reduce costs of dark fiber solutions and optimize fiber. Rather than using two dedicated strands, a single fiber strand that carries a bi-directional signal is used.

For enterprises leasing dark fiber from providers, the operational savings are significant. The challenge is to maximize revenues while reducing their largest expenditure - monthly cost of the fiber link. Using single fiber reduced operational costs by 50%, making dark fiber an affordable solution.

In DWDM, active and passive solutions for single fiber transmission range from 4 to 8 wavelengths, with optional optical amplifiers. The single fiber solution seamlessly integrates with any standards-based interface, and supports any mix of up to 10G services.

Single Fiber Applications

Single fiber solutions are recommended for the following applications:

- Point-to-point, ring or linear add and drop topologies, where installing new fiber is difficult or expensive

- Enables splitting traffic over two different fibers as opposed to using the same fiber for the entire traffic

- Increase reliability to an existing dual fiber solution by using one fiber for transmitting and receiving, and one for protecting

DWDM Single Fiber Solution

The single fiber solution is more efficient and economical for many applications and needs, and provides the same performance and throughput as the traditional dual fiber solution. It enables customers to utilize single fiber for both transmitting and receiving, significantly maximizing their investment and reducing costs such as monthly leasing, taxes, or laying additional fibers.

The solution is transparent to the client optical interface and supports a mix of 100G, 10G, and up to 10G services. It incorporates a single mux with 8 or 16 channels, where half of the mux is used for transmitting and half for receiving (see Figure 1).
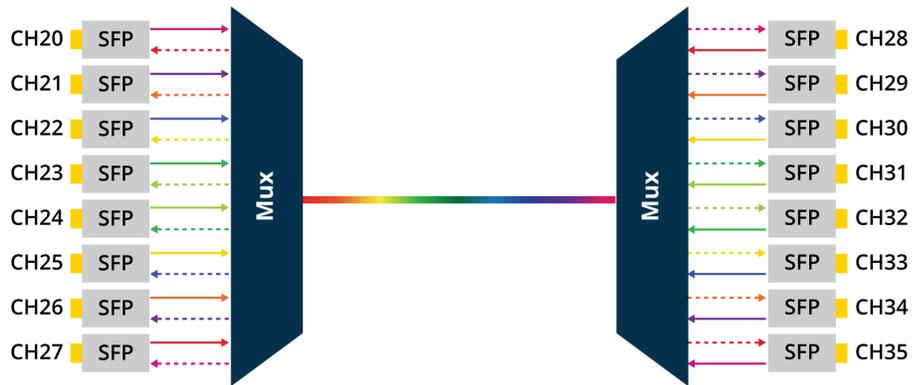

Figure 1: Using Single Fiber for Transmitting and Receiving

44 Wavelengths over Single Fiber

This solution enables extremely high utilization of a single fiber to transport up to 44 services by splitting them into 88 different wavelengths, transmitting in both directions simultaneously.

The wavelengths are split into two spectral bands by using bandpass splitters at both ends of the dark fiber, which are then connected to two muxes, each operating on a different spectral band (see Figure 2).

The mux output is connected to PacketLight's active transponders and muxponders which provide the 3R (retiming, reshaping and regeneration) functionality, performance monitoring, management, Layer-1 encryption, and other optical layer diagnostic capabilities
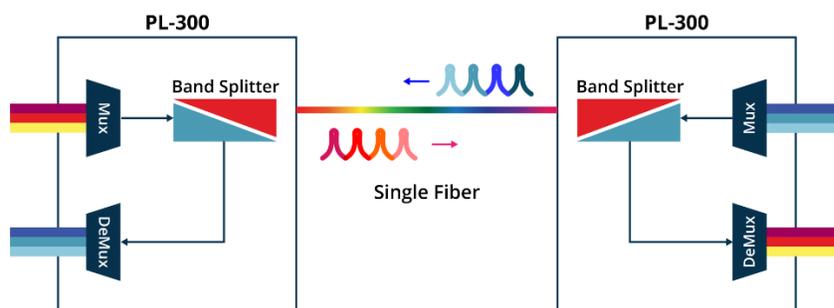

Figure 2: Splitting Wavelengths into Two Spectral Bands Using Bandpass

44 Wavelengths over Single Fiber, with Optical Amplifier

This solution suites high attenuation links and long haul networks, which require high optical budget. PacketLight single fiber solution has an integrated Erbium-doped fiber amplifier (EDFA) connected between the bandpass splitters and the mux on each side, amplifying the relevant spectrum at each end (see Figure 3).
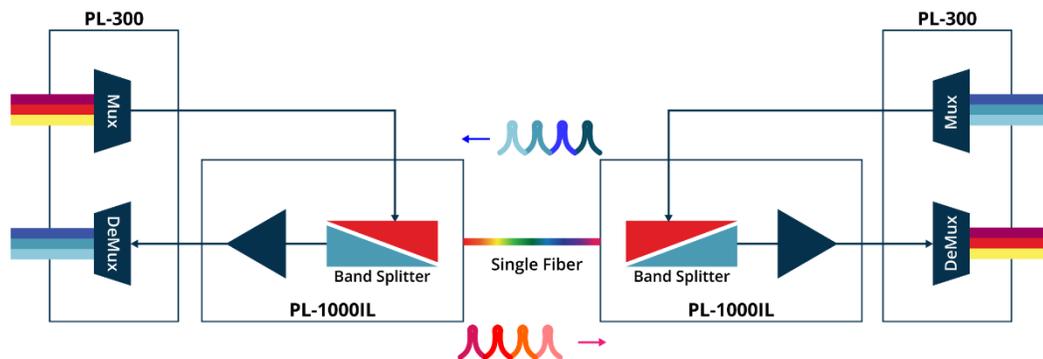

Figure 3: Single Fiber Solution with Optical Amplifier

Summary

Traditional optical networking calls for two fibers for data transport: one strand for transmitting the signal and the other strand for receiving the signal. However, dual fiber requires more optical and financial resources. PacketLight's solution enables customers to utilize a single fiber strand for both transmitting and receiving, significantly maximizing their investment and reducing monthly leasing costs.

Find out about PacketLight's Single Fiber solutions and product portfolio. Contact info@packetlight.com

About PacketLight

Established in 2000, PacketLight Networks™ offers a suite of leading 1U metro and long haul DWDM and OTN solutions, as well as Layer-1 optical encryption for transport of data, storage, voice and video applications over dark fibre and WDM networks. PacketLight provides the entire optical layer transport solution within a highly integrated compact platform, designed for maximum flexibility, easy maintenance and operation, with real pay-as-you-grow architecture, while maintaining a high level of reliability and low cost. PacketLight works with an international network of resellers and partners to provide you with a complete set of network services, with installations worldwide.