Smartoptics designs and enhances existing optical fiber optic networks through DWDM based solutions. Our solutions focus on providing simple and cost effective open line networking systems as opposed to complicated telecom grade solutions that are over the top in terms of price and complexity.

Dell Technologies is Dell, Dell EMC, Pivotal, RSA, SecureWorks, Virtustream, and VMware. A collective force of innovative capabilities trusted all over the world to provide technology solutions and services that accelerate digital transformation.

Together, Smartoptics and Dell EMC provide simple and cost effective 100G transmission solutions that enable the Dell Z9100-ON and S6100-ON 100G switch families to be connected over dark fiber. QSFP28 interfaces are popular due to their small size and power consumption but they have a limitation of 10/25km and quite often provide the distance limitation for data center interconnect. Smartoptics overcomes these limitations with simple distance extension solutions for single channel connectivity or multi-channel DWDM applications that enable up to 80 channels to be simultaneously connected over the same dark fiber.

DCP-101 for 100G Inter-data center connectivity

Smartoptics DCP platform is a modular plug and play platform of DWDM transponders and muxponders. The DCP-101 is a 100G transponder with QSFP28 client port and CFP line port connections. The SR4/LR4 QSFP28 client transceiver connects to the output of the Dell EMC switch and then to the client input port on the DCP-101. The CFP line signal is either connected directly to the dark fiber for a single channel
point to point connection or through a DWDM multiplexer where up to 80 channels can be simultaneously transported together over the dark fiber and over longer distances.

**Coherent CFP Line**
output to dark fiber or mux/demux

DCP-101: ½ width 1U 100G transponder that converts QSFP28 SR4/LR4 to a CFP signal for distance extension and DWDM networking

**Connecting 100G switches over dark fiber**

When connecting several 100G switches together over a dark fiber, the task is relatively simple for shorter distances and single channel connectivity. An SR4 transceiver allows up to 100m connectivity over multimode fiber within a data center and an LR4 allows up to 10km over a single mode fiber
between data centers. CFP/CFP2 interfaces allow up to 25/30km.

But what happens if the distance is longer? Or more than one single channel is required? Or different types of traffic need to be connected over the same dark fiber link?

Reference architecture 1: 100G Distance Extension

Dell Z9100-ON and S6100-ON 100G switches tested with Smartoptics DCP-101 QSFP28 to CFP transponder for simple distance extension solutions. The 100G SR4/LR4 signals from the Dell EMC switches are connected to a QSFP28 on the client port of the DCP-101. The DCP-101 converts these SR4/LR4 signals to a signal that is capable of being transmitted over longer distances and at specific DWDM wavelengths. This DCP-101 removes the distance barrier of the QSFP28 transceiver by using the CFP to carry the output signal from the switch on longer distances.

Reference architecture 2: 100G multi-channel DWDM networking

Dell EMC Z9100-ON and S6100-ON 100G switches tested with Smartoptics DCP-101 transponders and passive DWDM mux/demuxes for simple multi channel distance extension solutions. In this scenario, multiple 100G traffic channels can be connected simultaneously together over the same dark fiber through a passive DWDM mux/demux. The mux/demux (multiplexer/demultiplexer) is a simple 1U device that accepts multiple traffic channels on its inputs and outputs them as a line output on to a single dark fiber. Two DCP-101 modules can fit in to a 1U DCP-2 chassis allowing up to 200G per 1U. Multiple DCP-101s can be connected through a single multiplexer.

In this way up to 80 independent traffic channels can be combined together. An extremely simple and cost way of handling all data and storage traffic without having to rent a new fiber for each and every service. Green data center networking, offering very low capex/opex and quick ROI.
Reference architecture 3: 100G multi-channel Open Line DWDM networking

Dell EMC Z9100-ON and S6100-ON 100G switches tested with Smartoptics DCP-101 transponders and intelligent M-Series DWDM mux/demuxes for simple multi-channel distance extension solutions. Smartoptics M-Series is the world’s first distance extending multiplexer. A DWDM multiplexer with distance extension and signal monitoring providing Open Line Networking for all traffic types. An OSC (Optical Surveillance Channel) builds a dedicated communication channel between network nodes enabling topology discovery and fiber analysis. The OCM (Optical Channel Monitor) monitors the channels and ensures the traffic is present and at the correct levels. Pre and booster EDFA amplifiers can be added to extend the distance between the Z9100-ON and S6100-ON switches even further.

Up to eighty simultaneous DWDM channels can be connected together on the same dark fiber. The Coherent CFP transceiver means that all distances up to 1000km+ are possible.
100G is the new 40G

Ethernet transmission nowadays is made of steps of 100G. The same applies to DWDM and transporting 100G signals over long distance or a multi-channel DWDM network is made much easier when using 100G. As the 100G QSFP28 is the same physical size as the 40G QSFP+ transceiver, there is a 2.5x capacity increase for the same footprint equipment. Another key consideration is that there are no real 40G DWDM options available, not unless running several 40G signals through a 100G muxponder but even then it is a better utilization of wavelength capacity to run one 100G signal per 100G wavelength rather than two 40Gigs per 100G. Any future migration from 100G to 200G and above will require no additional forklifting of the transmission systems meaning that building a data center strategy on 100G instead of 40G is a better way to future proof the network and the investment.

We are also currently investigating interoperability with PAM4 and DMT technologies for pluggable QSFP28 DWDM functionality but so far the developments are at an early stage and the components are not yet commercially available. Please contact Smartoptics for latest status.
Dell EMC and Smartoptics - Harnessing the power of open line networking

In the beginning, the telco system vendors made the rules and requirements for data center design and functionality. But today, these solutions are holding organizations back by relying on assumptions that data centers need to be vertically integrated, symmetrical, and suit one kind of data networking need. The Open Compute community (www.opencompute.org) designs and shares approaches to data center networking that caters to a variety of organizations, by type, by size, and by specific needs. Because of the open source movement’s transparent approach, organizations can build world-class custom networks designed specifically around their needs, not those designed for telcos. In an open system, users should have the freedom and choice to select the connections and architectures that suit their traffic and demands best. In many cases, this is a mixture of transponders or DWDM interfaces directly embedded into switches and routers, and with these flexible approaches, all organizations can get the best-of-breed solution they need. Dell EMC and Smartoptics share this open philosophy and are proud to partner together to provide open line networking solutions for all types of data center connectivity.

ABOUT SMARTOPTICS

Smartoptics offers optical transmission solutions making networks more powerful. Expanding bandwidth without the upfront investment or hassle of traditional WDM. Our products allow corporate data centers, governments, hosting solution providers and ISPs to build simple, straightforward and cost effective solutions to fulfill their ongoing and future network capacity needs. Headquartered in Oslo, Norway, Smartoptics is an international provider with thousands of installations all around the world. Our award-winning approach has helped companies from every industry sector stay ahead of expanding network demands.

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