

smartoptics

DCP-M

True plug and play open-line networking system
for PAM4 and coherent DWDM systems



Metro data center interconnect

Smartoptics has long been a pioneer of optical DCI (data center interconnect) connectivity solutions based on unique embedded xWDM technology. This approach gives us a total insight in to the importance of keeping networking simple. Embedded xWDM offers enormous commercial and technical advantages and forms the very basis of open-line networking. Multiplexing without restrictions. It was this approach to embedded networking that led to Smartoptics designing the world's first open-line system. M-Series was the definition of an open-line system long before the industry adopted the phrase. An intelligent multiplexer with distance extension, open management protocols and able to transport any combination of DWDM transceivers, transponders and muxponders. The rationale behind M-Series was to extend the reach of embedded networks and to remove the dependency on more complex telecom grade systems when simple point to point connectivity was all that was required. Now open-line networking is an established concept and many initiatives understand the importance of the approach. The Open Compute Project, Open ROADM, Telecom Infra etc. they all see the value in having open scalable solutions fit for today's open requirements.

DCI, market and drivers

The landscape for content delivery has been evolving rapidly and continues to do so. Today content delivery network providers (CDN) carry two thirds of all internet traffic.

Video traffic accounts for huge peak traffic rates and is one of the reasons accounting for the biggest growth trends in bandwidth consumption: Mobile access and cloud connectivity services.

And these CDNs and DCOs (Data Center Operators) are not prepared to accept out dated transport solutions used by traditional internet service providers and carriers for their own demanding requirements.

Like all fiber networks, CDNs requirements are unique and to be competitive they must harness the benefits of true open-line networking. Their needs are simple: Fully featured solutions offering plug and play flexibility across metro and regional networks for all of today's protocols, and easily scalable for tomorrows growth. Minimal capex, opex and spares and open standards architectures. Systems which offer instantaneous service access regardless of traffic type and can keep the network competitive in the face of stiff competition.

A lot is written about the advantages and cost savings of open-line networking (OLN) but to provide a truly agnostic open platform, traditional optical transport vendors need to completely change their business model. And this means a platform redesign because the complete vertically integrated platforms are in direct contradiction to an open approach to DCI (data center interconnect). When stripped down to its basic elements OLN is a simplified platform that links data centers together. A system that works with all transceiver types regardless of brand. Coherent or direct detect. Pluggable transceivers or transponder based elements. A platform that is specific to every customer's individual needs. A platform that contains multiplexing and signal monitoring and amplification and dispersion compensation if needed. A system based on modern open APIs for easy integration in to third party telemetry systems. True open-line networking harnesses the advances in silicon technology, transceiver developments and open software standards.

DCP-M40e



DCP-M, a true open-line networking platform

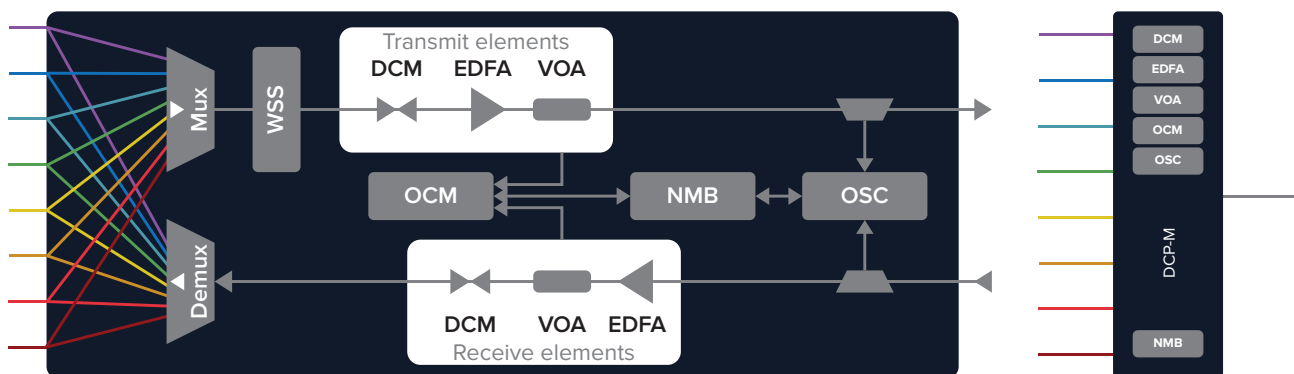
As a pioneer in open-line networking solutions Smartoptics understands that you can't engineer simplicity in to a system that is designed for something completely different. Whereas M-Series was the first open-line system, DCP-M has expanded on this principle to provide even more channels in a data center specific form factor with front to back air cooling. DCP-M has none of the inherent costs or architectures to weigh it down and is the only 1U platform on the market with everything required in an open-line system. DCP-M could be easily mistaken for a passive DWDM multiplexer. If it wasn't for the power supplies and management system neatly tucked away on the rear of the unit, you'd be hard pressed to tell the difference.

DCP-M in short

- True open-line system
- Direct detect (eg PAM4) or coherent DWDM transceivers and/or transponders
- No complex setup and minimal optical fiber knowledge required
- Intelligence and amplification in a 40 or 80 channel DWDM multiplexer
- Completely automatic optical setup, just like using a passive multiplexer
- Automatic fiber distance measurement and Dispersion Compensation setting
- Simple and cost effective datacom not telecom platform
- Modern management architecture based on REST and CLI APIs
- Easily integrated in to any network telemetry systems

Best of both worlds

DCP-M is exactly like using a passive multiplexer, but unlike a passive multiplexer it monitors the traffic, amplifies the signals for longer distances and can handle higher data rate protocols. This is because it has all the features usually reserved for the more complex DWDM platforms fully integrated in to a simple plug and play 1U module. No separate amplifier, management, dispersion compensation and traffic cards to configure. No messy wiring between modules. No additional knowledge or spares handling usually associated with the bigger systems. Instead, DCP-M provides everything required for an open-line networking system.



DCP-M, the simplicity of a passive multiplexer with the features of a telecom grade DWDM platform. If you can use the CLI commands in a switch or router, then you can use DCP-M, it is that simple.

DCP-M, zero touch functionality

DCP-M brings an unprecedented level of plug and play simplicity to DWDM DCI networking, designed with ease of use in mind. Zero-touch optical configuration means the system sets itself up without any manual configuration in the GUI or CLI. Consequently, a minimum level of optical fiber knowledge is required to install the DCP-M. If you can use the CLI commands in a switch or router, then you can use DCP-M, it's that simple. Power levels are automatically regulated on both sides when each channel is inserted – no manual setup required and a visual confirmation via LEDs shows that channel and line are set up correctly.

DCP-M measures the fiber length once an end to end connection is made and this allows an automatic setting of the tunable dispersion compensation. Pre-configuration of parameters in production like node name and IP address if applicable mean that this is a system that is installed in the field with.... zero touch. Only the power and ethernet cables and optical patch cords between the incoming DWDM signals and the DCP-M need to be connected.

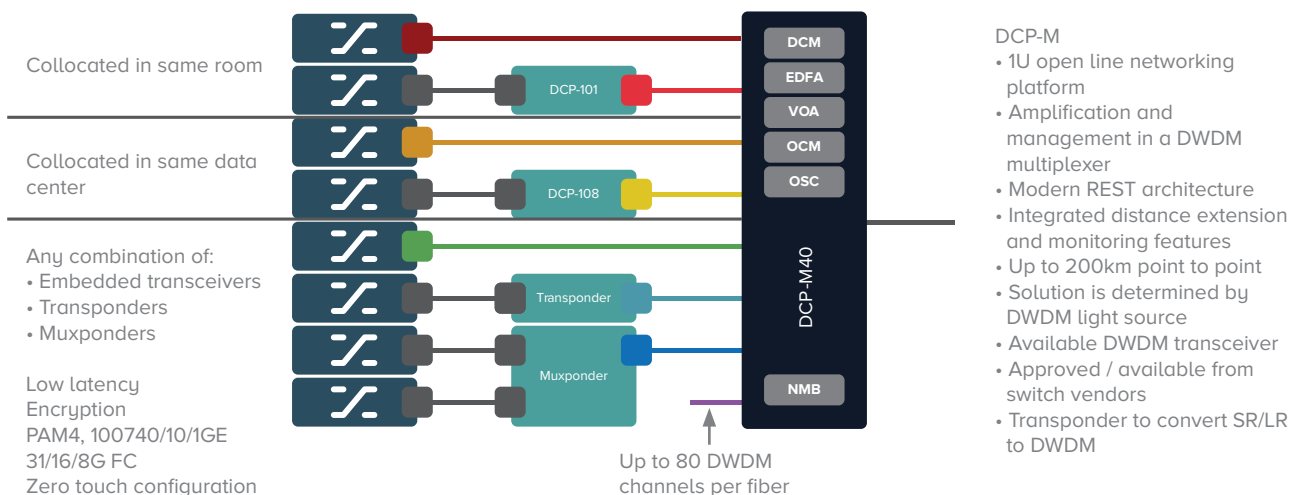
DCP-M for metro and regional DCI networking without limits

Data center interconnect refers to various network connectivity types:

Enterprise and corporate DCI

Typically referring to dedicated private fiber networks owned or run by corporates, government and campuses. Includes internet exchanges and data center operators. Networks that tend to be in the 0-80km range determined in part by historical limits of legacy optical transmission equipment and components or the limit of the FC protocol if synchronous replication is required. For these applications, a variety of traffic protocols require an open-line system to easily handle mixed SAN and WAN traffic, synchronous replication, encryption, pluggable DWDM transceiver optics or transponders, remote data access and disaster recovery.

The solution is usually determined by the availability of the DWDM light source. For example, if DWDM transceivers exist in the correct form factor and protocol and are available/approved by the data switch vendors, then this leads to an embedded DWDM approach being possible. The DWDM transceiver connects straight from the switch to the 1U DCP-M and results in the lowest cost and latency connection. If, for example, no DWDM transceivers are available for the required traffic types then a transponder needs to be used to convert the output signal of the data switch to a DWDM signal that can be connected to the DCP-M. Being able to handle these protocols in an efficient plug and play way is key to getting the most value and flexibility out of the network.



Metro DCI, PAM4

Typically referring to hyperscale data centers and larger Internet Exchanges connected inside the city and who require many high bandwidth connections at 100G+ data rates. The focus being on simplified operation, low cost, and the ability to harness developments in pluggable DWDM transceivers.

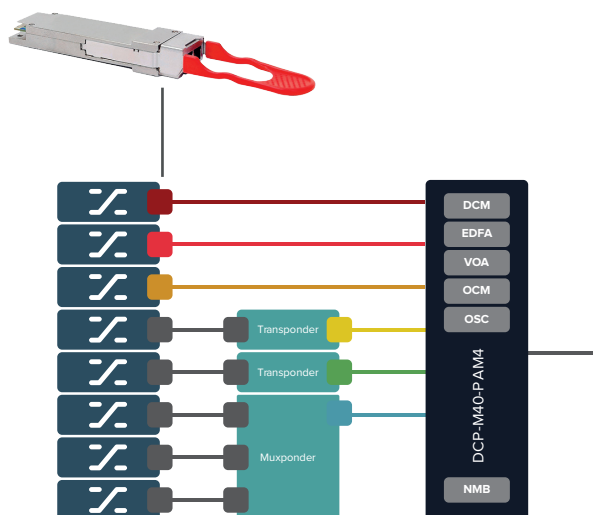
Recent developments in direct detect 100G transceivers, for example Inphis ColorZ QSFP28 PAM4 DWDM transceiver have radically altered the 100G networking landscape. Until recently, embedded 100G DWDM networking was only available if switch vendors opted to use CFP/CFP2 transceiver types with their equipment. This is possible of course, but these are a large form factor transceiver and what usually happens is a specific switch model or plug in card is developed to specifically handle these transceiver types.

PAM4 and DCP-M connectivity

Inphis ColorZ utilizes advanced PAM4 signaling and delivers up to 4Tb/s of bandwidth over a single fiber, allowing multiple data centers located up to 80km of each other to be connected and act like a single data center. The transceiver can be used in data switches with QSFP28 transceiver interfaces. The result is 100G networking with the smallest footprint, lowest power consumption and lowest capex/opex. Perfect for web scale data centers and Internet Exchanges looking to keep costs, inventory and rack space down. DCP-M is the perfect accompaniment to the ColorZ transceiver and enables true open-line embedded 100G networking. DCP-M and PAM4 provide the following advantages:

- The only 1U plug and play PAM4 connectivity solutions on the market
- No transponders required. So no need for additional back to back SR4/LR4/CWDM4 transceivers which reduce cost, complexity, time to service and points of failure.
- New 100G interconnects are therefore added in the same way as a DWDM transceiver is added to an embedded DWDM network
- Simple provisioning and management
- New high capacity DCs and services brought on line as integrated elements of a larger infrastructure
- Flexible expansion to new lower cost locations with no change in architecture
- Standardization for geographically distributed topologies
- Lower opex. No incremental software or support services needed.
- No transport platform training or services are needed beyond basic CLI skills
- Removes the transport issue from all metro builds. Only access to fiber is needed.

DWDM PAM4 QSFP28 transceiver

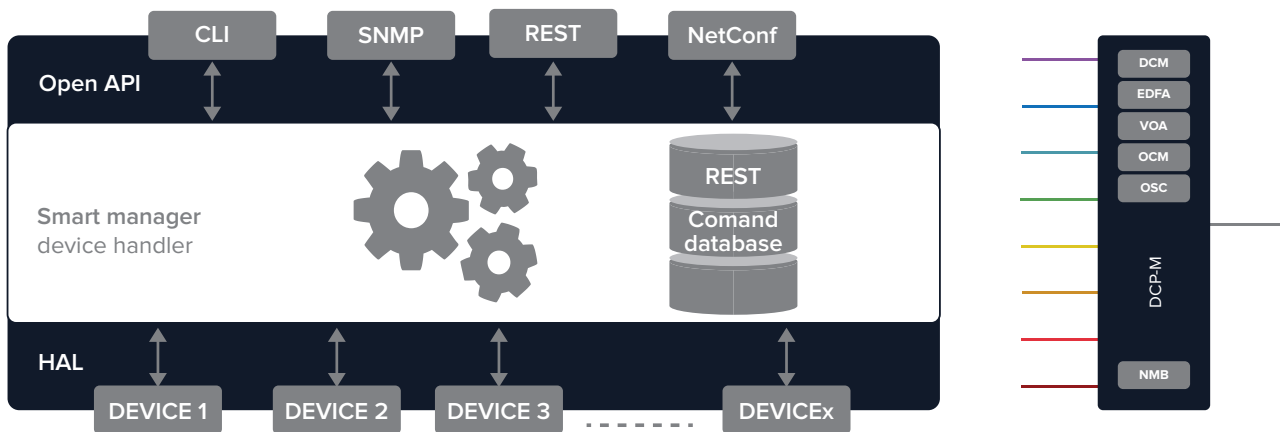


Unparalleled density, price and form factor

- DCP-M is the only 1U OLS for use with PAM4 transceivers
- One QSFP28 form factor embedded in data center core and spine switches
- Lowest possible space requirement and additional equipment requirements
- Forty DWDM channels per 1U
- 8Tb/s of DWDM per fiber pair
- Minimal power reqt
- Quick ROI. Lowest cost 100G connectivity and TCO.
- No additional transport layer needed as integrated directly in to the data center fabric
- No new complex software needed as line system is plug and play

Modern management architecture for today's DCI

Smartoptics' Smart Manager software platform is designed to easily handle all of today's DCI applications. Smart Manager is a modern REST based architecture built from the ground up specifically for DCI and is integrated in to all DCP modules.



Integrated Smart Manager in each DCP module

In the same way that DCP-M is the simplest open-line system on the market to operate, the same applies to the management platform. Standard north bound interfaces talk directly to each network element via a device handler. These device handlers provide specific interfaces to monitor and control the individual traffic units. Each DCP module is equipped with a common device handler and the same solution can therefore be used everywhere in the network. As it is based on standard REST architecture, there is no need for complex conversion or translation routines. Just straight forward communication between each DCP element. This DCI specific approach is also the most simplest and robust approach to DCI networking without compromising on network control and functionality.

Command Line Interfaces (CLI) are used to provision the various network elements and if you can use the CLI commands in a switch or router, then you can easily use any DCP module. Configuration is minimal and straight forward and additional SNMP and REST interfaces expand this functionality. Standard and configurable REST commands are available for easy integration in to other network telemetry systems via APIs. A combination of industry standard and configurable SNMP alarms provides all the necessary web based monitoring functions for all DCP modules in the network. New services, elements or sites are seamlessly added with no impact on the network performance or visibility.

Simple • easy to operate • open software

- Modern DCI architecture
- No TL1 or Hypervisor translation required
- Small form factor solutions
- Automated provisioning
- Industry standard open and customizable APIs
- REST and CLI architecture
- Standard and customizable SNMP

Network topology • fiber losses • network mapping • service type

Flexible networking solutions to suit all networking tasks

Truly innovative organizations need effective, efficient systems that can grow and change with them. Today, the requirement for transporting data traffic between sites is primarily for security, and although it's a small percentage of traffic, it is a very important part of the traffic consideration. To achieve this, many organizations are still relying on complex and expensive platforms designed primarily for telecom operators.

Thanks to the Open Compute Project, it's now possible to break free of the agenda set by carriers, and design flexible, scalable data center networking fit for the innovative, fast-moving datacom industry.

The Smartoptics portfolio is built on the principles of open-line networking. It is designed to keep networking as simple, open, and cost-efficient as possible. Using the M-Series, the DCP platform, and open transceivers – in any combination – it's possible to handle all of the network tasks that a corporate data center has. This model allows organizations to build data centers that are free from the constraints of the historical telecoms networks, and can be easily scaled and adapted as organizational needs change.

Smartoptics harnesses the latest and best of open-line networking, delivering solutions for all application types, reducing costs, maximizing flexibility, and enabling the ultimate performance for a corporate data center.

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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