SOLUTION BRIEF

Data Center Interconnection
Leveraging Standard WDM Transport to Connect Data Centers

The Importance of Being Interconnected

The global transformation to a digital economy is driving all manner of private enterprises and public institutions to become more Cloud-based in order to scale their IT infrastructures and create tightly integrated digital eco-systems among customers, suppliers and partners.

As a result, the requirement for interconnectivity between these organizations, the Cloud and each other is growing rapidly. Enterprises and institutions are colocating in more and more data centers to get closer to one another and they are exchanging more and more data, both of which drive a greater need for interconnection bandwidth (see Figure 1).

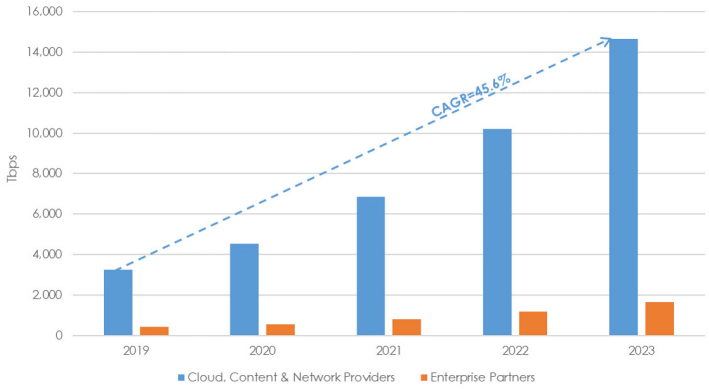


Figure 1 - Interconnection bandwidth growth 2019-2023

Facts & Figures:

- Global interconnection bandwidth is expected to grow an average of 45% over the next five years to 16,300 Tbps of traffic
- 87% of Equinix customers colocate in more than one metropolitan area and 73% are located in multiple regions (Americas, EMEA, Asia-Pac)
- The average number of data centers occupied per company was 12 in 2019 and is expected to grow to 17 by 2022
- Interconnection revenue is outgrowing colocation service revenue among retail data center operators
- "Traditional" WDM transport equipment makes up 59% of the DCI equipment market, the remainder being purpose-built Compact DCI systems

The Challenge

As a data center operator or tenant, the challenge you face is how to connect to all your locations and increase your interconnection bandwidth to support your digital strategy.

While the introduction of 800G transport technology seems to provide the answers to your interconnection problems, a number of issues must be considered before you deploy it:

- Channel width—800G channels are wider than standard 100GHz ITU filters and cannot pass through them (see Figure 2)
- Network upgrades—Because of its width, 800G cannot be used to upgrade existing line systems. Instead it requires a greenfield overbuild using flexgrid/colorless ROADMs (or, alternately, 150GHz fixed filters)
- Spectral efficiency—800G channels are actually made up of multiple sub-bands—typically 4 or 8—with gap bands between each to minimize the non-linear effects that occur at such high line rates. The result is an optical carrier that occupies more spectrum than four 200G channels or two 400G channels.

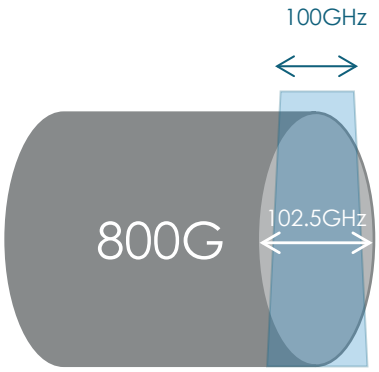


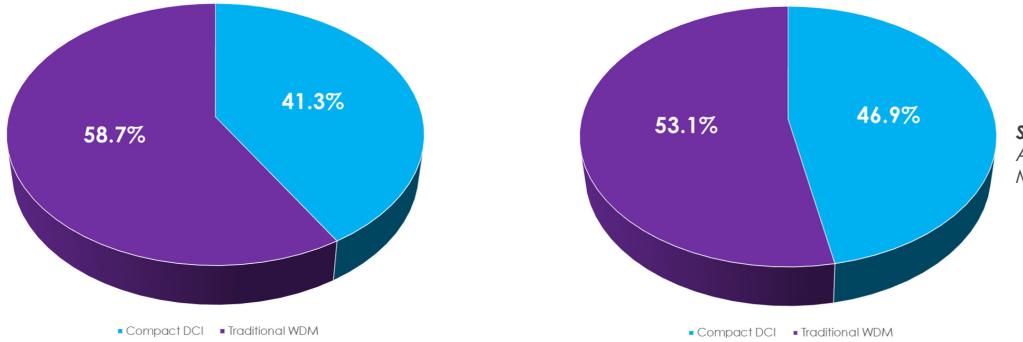
Figure 2 - 800G spectral width

So, what alternatives do you have to address your interconnection issues? Ekinops is here to help you answer that question.

Impact

The growth of interconnection bandwidth has led to the development of a new class of optical transport equipment optimized for hyperscale customers called Compact DCI (aka Compact Modular).

Despite being purpose built for DCI applications, standard (i.e., 'traditional') WDM equipment remains the DCI platform of choice and will for at least the next 5 years (see Figure 3).



***Source**: OMDIA Optical Network Applications: DCI and OTN Biannual Market Tracker: H2 2019*

Figure 3 - DCI equipment market share by type

The primary reasons for this are as follows:

- **Cost—**Compact DCI systems utilize the latest generation of coherent technology (e.g., 800G) that has extremely high development costs that are passed along to the customer
- **Disruption—**in addition to the network compatibility issues explained above, Compact DCI systems use different hardware, software and management than standard WDM systems even when they are from the same vendor. They require separate training and can result in significant changes to network operations and procedures.

- **Over-engineering—**Compact DCI systems are designed to address the needs of hyperscale data center operators that require massive capacity for their own internal connectivity. The average enterprise connecting to a dozen locations within a metro or to a backup data center in another region doesn't often need 8Tbps of capacity. What's more, the power efficiencies they claim are only realized when the system is at or near full capacity. Anything less than that does not compare favorably with standard WDM systems.
- **Obsolescence—**Because of their architecture, Compact DCI systems are specific to a generation of coherent technology. Once a new generation becomes available, the old one is immediately obsolete and all development stopped. To take advantage of the latest technology then requires a complete rip-and-replace to upgrade your network.

Ekinops360

The Ekinops360 represents a best-in-class alternative to Compact DCI systems by providing not just the capacity required to meet interconnection needs but also the flexibility, manageability, ease of use and cost-efficiency that make it ideal for data center interconnection.

Features

- Small 2RU form factor with up to 1.2Tbps capacity—2 x 600G or 6 x 200G
- 300mm depth—only 600G solution available in telco form factor (true for 300G, 400G and 500G too!)
- Ultra-low power consumption—0.3W per Gbps (incl. chassis, commons and optics)
- FlexRate™ programmable line interface—selectable from 100G to 600G
  - Compatible with existing filters, no line system replacement needed
- No license fee to upgrade bandwidth
- 'Evergreen' design allows technology migration within existing units by simply replacing modules—eliminates rip-and-replace
  - Ekinops shelves originally deployed for 10G services can support 200G, 400G and even 600G today
- Reach up 10, 000 Km connects distant data centers
  - Single span reach over 300Km without inline amplifiers
- Single-fiber operation on all line rates from 10G to 600G
- Modular Layer 1 bulk encryption added to any line—FIPS 140-2 compliant
- Add/drop of any service at any location, use for multicast distribution among data centers
- Automatic power balancing
- Easy to install and commission—lowers OPEX
- Lowest equipment cost per 100G

Simply by setting basic operating parameters such as OSNR tolerance and channel spacing, FlexRate™ modules automatically select the optimal modulation format and baud rate to achieve the highest performance possible (see Figure 4).

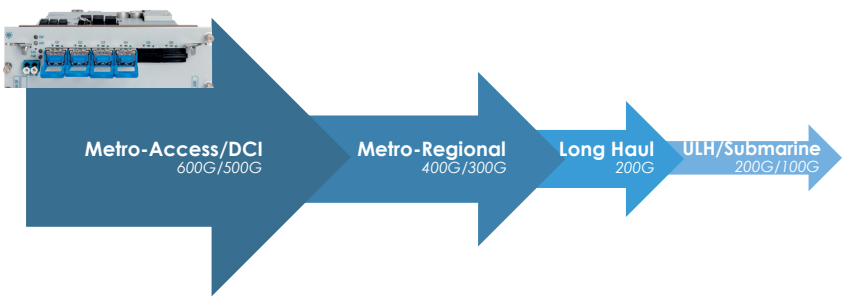


Figure 4 - FlexRate tunable performance

Management

Managing your Ekinops360 equipment is easier than installing it. Using Ekinops Celestis NMS network management system, you can provision, monitor and troubleshoot your Ekinops network end-to-end from your NOC.

The integrated D&Q design tool lets you model and optimize your network based on real-network parameters prior to commissioning while point-and-click provisioning allows for completely automated system operations. Simply install the equipment and Celestis NMS and the rest takes care of itself.

Celestis NMS uses a single DCN connection to the management interface of the near-end shelf using the in-band overhead to carry a 10 Mbps digital communication channel (DCC) or generalized communications channel (GCC) to the other nodes in the network.

Celestis NMS provides a standard northbound interface (NBI) for seamless integration with your existing higher layer OSS/BSS platform.

Conclusion

In today's digital economy, interconnectivity plays an increasingly vital role in creating the ecosystems enterprises and institutions need to transact business efficiently.

Data centers are becoming the new central office of the modern communications world and enterprises and institutions recognize the need to deploy in multiple locations to connect to the customers, partners, suppliers and others they need to.

While purpose-built systems using the latest generation of hardware have evolved to fill this space, in most cases they are too costly and power hungry to be considered practical solutions.

Standard WDM transport systems that have been deployed for over 20 years have proven to be more than adequate for a majority of data center tenants and remain the platform of choice for data center interconnectivity.

The Ekinops360 platform delivers the functionality and requirements need to support any connectivity application from across the street, across the country or across the ocean.

It provides best-in-class performance among 'traditional' WDM systems with its multi-reach, multi-rate, multi-protocol service support so it is capable of supporting any type of connectivity between any two points no matter where they are located to deliver any service.

Ekinops FlexRate™ technology allows a single hardware module to be used for all applications from a few kilometers to thousands while service add/drop capability enables multicast capabilities so a single stream can be delivered to multiple location. In addition, advanced bulk Layer 1 encryption capability can be added at any point to ensure data security and regulatory compliance.

Ekinops360 is a multi-generational 'evergreen' architecture designed to evolve to future hardware generations without having to rip-and-replace equipment. It is compatible with existing line systems—ROADMs & filters—preserving your investment in your network and is not only non-disruptive to your existing operations, it's advanced software capabilities can actually streamline and simplify operations to lower operational cost.

About Ekinops

Ekinops is a leading provider of open and fully interoperable Layer 1, 2 and 3 solutions to service providers around the world. Our programmable and highly scalable solutions enable the fast, flexible and cost-effective deployment of new services for both high-speed, high-capacity optical transport as well as virtualization-enabled managed enterprise services.

Our product portfolio consists of three highly complementary product and service sets: Ekinops360, OneAccess and Compose.

- Ekinops360 provides optical transport solutions for metro, regional and long-distance networks with WDM for high-capacity point-to-point, ring and optical mesh architectures, and OTN for improved bandwidth utilization and efficient multi-service aggregation.
- OneAccess offers a wide choice of physical and virtualized deployment options for Layer 2 and Layer 3 access network functions.
- Compose supports service providers in making their networks software-defined with a variety of software management tools and services, including the scalable SD-WAN Xpress.

As service providers embrace SDN and NFV deployment models, Ekinops enables future-proofed deployment today, enabling operators to seamlessly migrate to an open, virtualized delivery model at a time of their choosing.

A global organization, Ekinops (EKI) - a public company traded on the Euronext Paris exchange operates on four continents.

Contact us

sales.eu@ekinops.com | sales.asia@ekinops.com | sales.us@ekinops.com | www.ekinops.com