SOLUTION BRIEF

Core OTN Switching

Add Efficiency, Flexibility and Reliability to Your Network

Is Your Bandwidth Working Hard Enough For You?

The massive capacity created by coherent transport means thousands of services can now be carried on a single link. However, unless you have a way to effectively pack all that bandwidth with revenue-generating services, you may just be throwing a lot of that bandwidth—and your money—away.

When networks ran at 10G, service providers were effectively limited to carrying six or eight services per wavelength. A couple of services could be aggregated together on a muxponder over the same link but it wasn't a big deal if the remaining capacity wasn't fully utilized. Now, with coherent line rates running anywhere from 100G to 600G, a single link is capable of carrying hundreds or even thousands of services. Since they aren't all connected to a single line card, they need to be aggregated from the edge but if the metro core is still muxponder based, the stranded capacity gets aggregated along with the services resulting in an inefficient use of the large pipes coherent provides (see Figure 1).

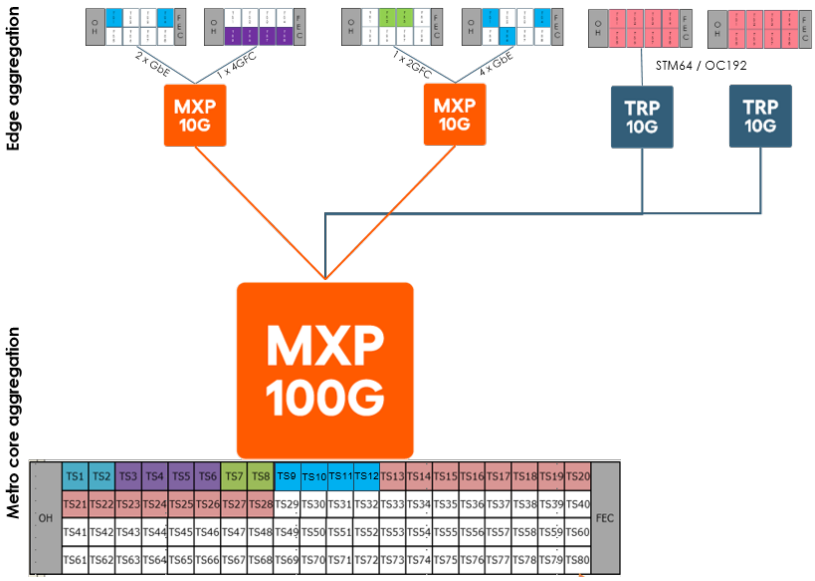

Figure 1 - Stranded bandwidth without OTN

Optical Transport Network (OTN) technology effectively uncouples usable capacity from the optical channel itself and provides a mechanism for managing individual service flows that is independent from managing the raw capacity that coherent provides. This means that any service whether it's 1G, 10G or 100G can be easily added to the network and switched from any client port to any available coherent line port which gives the service provider unlimited ability to more efficiently fill available capacity (see Figure 2).

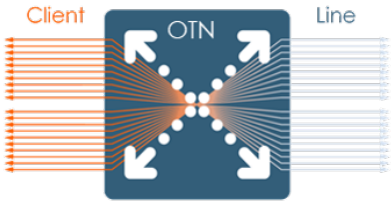

Figure 2 - De-coupling the client from the optical line

The result is a network that is more scalable and flexible with stronger protection and restoration options that are unavailable with WDM alone.

Facts & Figures [1]

- OTN equipment makes up approximately 85% of the total optical market
- OTN equipment sales—including both transport and switching—totaled $13.4B in 2019
- The total OTN market is expected to grow to $16.7B by 2024, a 5% CAGR
- OTN switching is expected to grow at twice the rate as OTN transport

These figures serve to demonstrate the commanding role OTN, and OTN switching in particular, plays in the overall optical market.

The Challenge

The challenge when introducing any new technology into your network is developing a sound business case to support your reasons for doing it:

- How is it going to improve my service offering?
- How is it going to impact my network costs?
- How is it going to impact my operations?

Ekinops has the answer those challenges.

Enabling Terabit Solutions

The Ekinops Transport Switch (ETS) platform is a standards-based OTN switch that can be seamlessly integrated into any transport network. (see Figure 3).

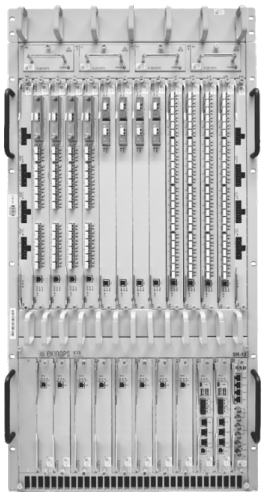

Figure 3 - EKINOPS Transport Switch (ETS)

The ETS platform improves the efficiency, flexibility and reliability of your transport network by "virtualizing" valuable optical resources allowing you to right-size capacity to meet demand. Maximizing bandwidth utilization minimizes transponders costs for lower overall CAPEX as your network grows.

It enables service-oriented configuration, switching and restoration for greater control over how you use your capacity and automates service creation, updates, and deletion to streamline operations and reduce OPEX.

The ETS platform also provides seamless integration with Ekinops360 WDM systems and is SDN-capable for complete end-to-end connectivity and management.

[1] *OMDIA DCI, Packet-Optical, and OTN Equipment Market Tracker, H2'20 (April 3, 2020)*

Features

- 2.88T switch matrix scalable to 6T
- ODUk level switch granularity including ODUflex
- Multi-rate, multi-protocol client support from 10Gbps to 100Gbps
- 10G and 100G gray or DWDM coherent line interfaces
- 5+1 protected switch matrix
- ASON control plane
- Multi-tier protection and restoration options

The ETS platform is compatible with Ekinops360 WDM systems at the optical and service levels creating a powerful combination of high capacity transport and service manageability.

Applications

The primary applications for core OTN switching are:

- Improving bandwidth efficiency;
- Relieving network congestion; and
- Increasing network reliability

Improving bandwidth efficiency means eliminating as much stranded bandwidth from the network as possible. With client inputs functionally separated from line outputs, an OTN switch can direct any incoming service to any output port allowing it to take advantage of any unused capacity (see Figure 4).

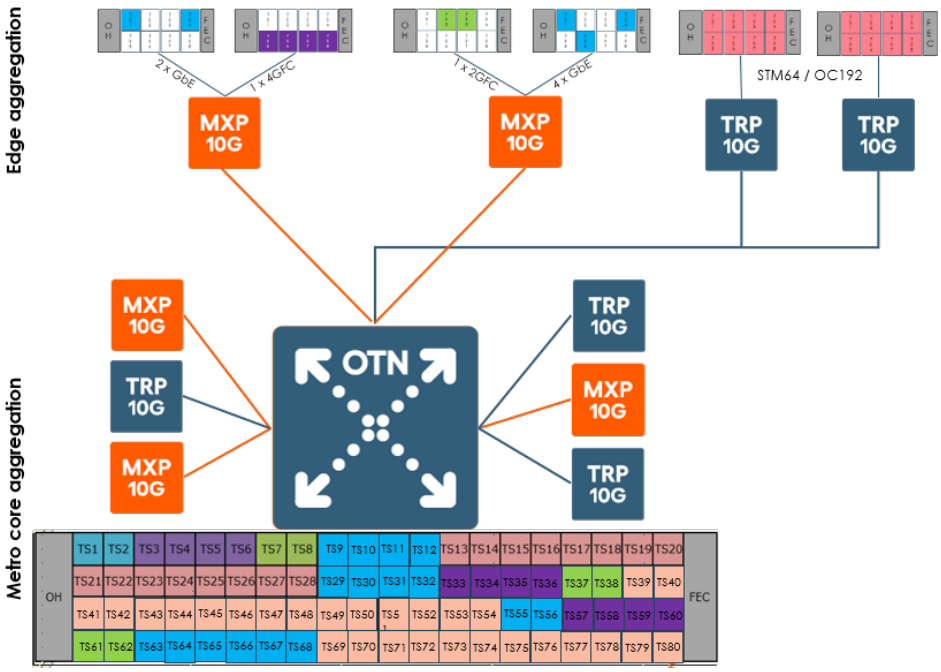

Figure 4 - Improving bandwidth efficiency

Similarly, network congestion can be relieved by using OTN switching's ability to re-direct any traffic flow—whether a single 1G service or an entire wavelength of traffic—at any point in the network to take advantage of underutilized routes in the network. Figure 5 shows how traffic is re-directed to open routes to relieve congestion and load-balance network demand.

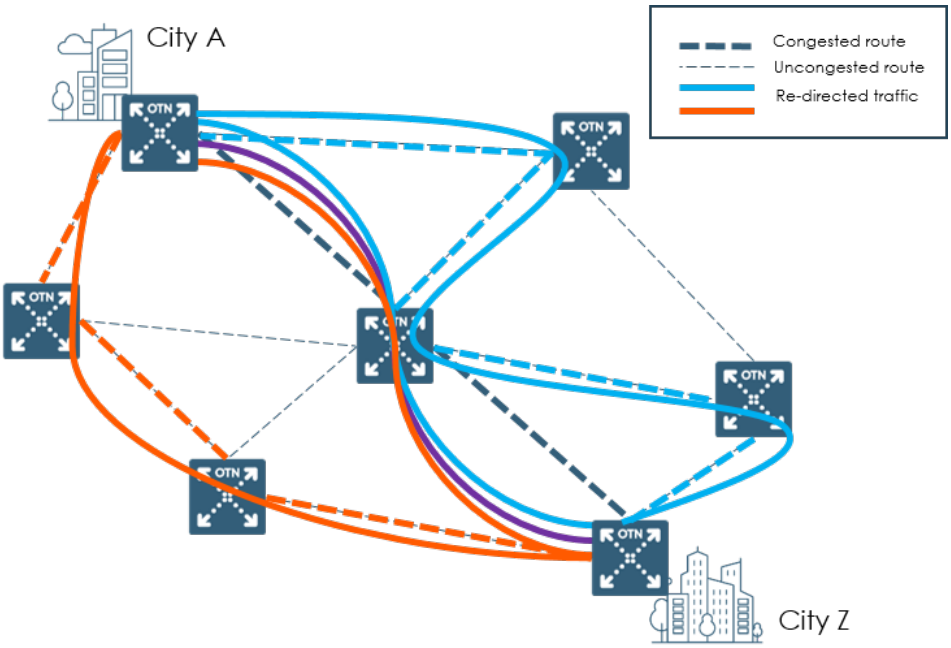

Figure 5 - Relieving network congestion

This same switching capability can also be used to improve network reliability. Using an ASON-based control plane, multiple protection and restoration schemes can be implemented simultaneously (see Figure 6).

- 1+1
  - Pre-defined protection route
  - 1+1 switching time
  - < 50ms guaranteed
  - Bandwidth pre-allocation
- 1+R
  - Calculated after fail
  - <600ms
  - Pre-planned bandwidth
- 1+1+R
  - Pre-defined protection route
  - 1+1 switching time < 50ms
  - Restoration route calculated
  - Bandwidth occupation

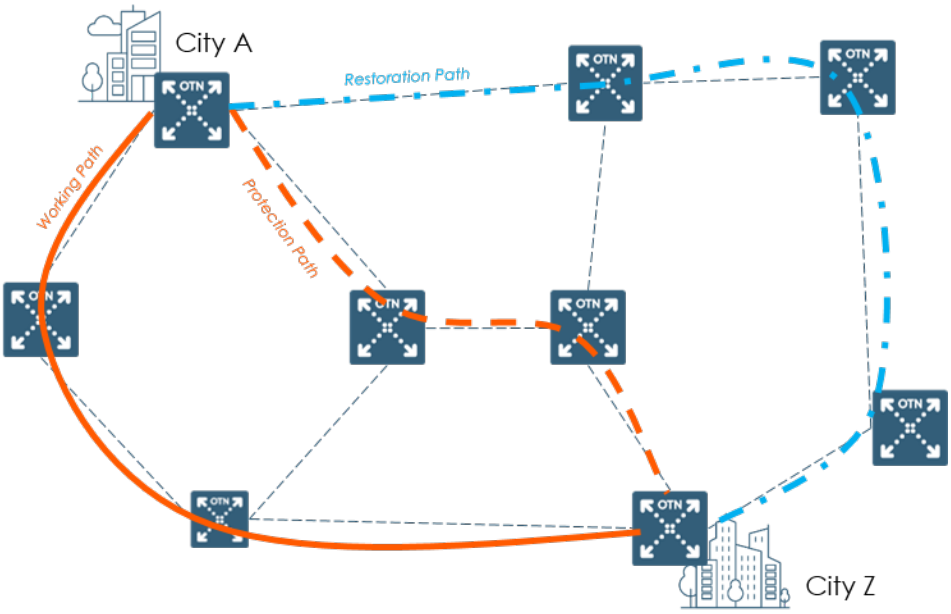

Figure 6 - OTN-based protection and restoration options

Management

The ETS NMS is designed as a service manager that hides the complexity of creating and configuring network services by reducing service and network management to few clicks. It uses NETCONF/YANG to define the network topology and orchestrate the changes in a set of devices to keep the network always consistent.

The ETS platform is managed through the same Celestis NMS management interface as our Ekinops360 WDM systems. A single NMS user profile can be used to manage both WDM and OTN products.

Conclusion

The massive increase in available capacity made possible by today's coherent technology has resulted in a rapid increase in the volume of services that can be transported over a single wavelength. Now more than ever there is a need to manage all that capacity efficiently to get the best return on your network investment.

OTN is the dominant traffic management technology for optical networks, embedded in nearly nine out of every ten optical network devices sold. It provides the ability to manage individual services in an operationally streamlined and automated manner, grooming traffic to efficiently fill big coherent pipes and take advantage of idle capacity anywhere in the network to make sure you can fully utilize your network's most important asset—bandwidth.

It also increases network reliability compared to WDM alone with multiple levels of protection and restoration that can be applied on a per-service basis. This capability also provides a mechanism for generating new revenue streams through multi-tier SLA offerings.

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 networks and 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, with operations in 4 continents; Ekinops (EKI) - a public company traded on the Euronext Paris exchange - is headquartered in Lannion, France, and Ekinops Corp., a wholly-owned subsidiary, is incorporated in the USA.

Contact us

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