

An overview of micro nodes in the market

Compact modular equipment for a highly interconnected and effective metro network infrastructure

Compact Modular Equipment

The advantages of using OTN and WDM infrastructure to minimize the use of deployed fibre pair, maximise transportable capacity and improve reliability of the network is a consolidated fact that has been spreading from the core to the metro networks. Until very recently the metro equipment tended to be:

- a scaled down version of core equipment, bringing along the complexity and inefficiency of an over structured architecture with relative higher costs into a different network context
- a limited flexible version carrying out a subset of functionalities in the attempt to offer a more cost effective solution

Today on the market there has been the appearance of new compact platforms capable of being highly flexible, modular in design, small in form factor. These equipment condense large platform capabilities in few rack unit space, offer reduced power consumption, high port density and are SDN native.

Functional Block Architecture

The concept of a single “do-it-all” equipment that appeared in the late 90s has been now superseded by a more flexible solution based on functional block architecture, generally named as disaggregated platforms.

The advantages of such solution are multiple:

- Each functional block technology advances on its own pace, independently from the rest of the node. In an integrated OTN/WDM solution scalability may be constrained by the limitation of a muxponder-centric architecture, consequently impacting on the integrated WDM layer that may still be adequate.
- Each functional block is optimized and dimensioned in functionality and performances. Integrated single platforms are achieved by compromises among the different technologies, inhibiting true optimal performances. Furthermore technological upgrades may result in traffic affecting procedures.
- Each technology block may be inserted in existing infrastructures to widen geographically the network, extending network's life cycle, improving infrastructure utilization and stepping forward in modernization, e.g. compatibility toward an SDN centric environment. For instance an OTN block may be used to maximise sub-lambda efficiency, resulting in

using less carriers consequently extending network usability, with no conflicts with the existing integrated deployments.

SM-Optics solution

Main requirement of today's metro network is the migration from a "grooming node" architecture in an access to core network to a "highly interconnected node" for an "any-to-any" site connection. Thus any access site can be connected to any central office, data centre or mobile gateway, so that:

- Boosting transport capacity to satisfying 5G requirements and progressive FTTH advancement
- Collapsing multiple stacked layers into a single easily manageable transport layer
- Delivering an SDN-centric network for fast provisioning, freeing up the network potential from architectural constraints while fostering a multivendor "best of breed" environment

Compact Modular Equipment

- ❑ 1RU Network Element fully redundant from interfaces to switching fabric
- ❑ 1RU ROADM WSS-free for cost effectiveness and flexibility
- ❑ Highest flexibility of port independency and configuration type from low speed E1 to ODU2 client thanks to FLEXSET chip
- ❑ FLEXII/O maximising scalability by re-assigning interfaces from client to line type



Dropping The Size, Increasing Functionalities

Functional Block Architecture

- ❑ Each Compact Modular Equipment is optimized in functionalities and performances.
- ❑ Each technology evolution is independent by the life cycle of other functional blocks, and together operates as a single NE
- ❑ Interoperable with any existing transport infrastructure
- ❑ SDN native for easy end to end orchestration and multivendor environment



Maximize Performances And Network Scalability

As SM-Optics developed a product portfolio addressing the emerging disaggregated architecture, based over four innovations:



- **Protocol Innovation:** Launched in 2017 micro-OTN technology extends the use of OTN to efficiently transport of low bit-rate traffic. This enhanced capability is used to address network modernization projects, transporting low speed traffic (e.g. E1 services or STM-1 services) directly over OTN resulting in the complete decommissioning of SDH transport layer in favour of a single end-to-end OTN network.
 - o SM-Optics is actively contribution to International Standards bodies/groups as ITU-T to standardize the OTN extension to Low Bit-rate mapping
- **Technology Innovation:** FLEXSET OTN switching matrix scales from 300Gbps to 1Tbps and can be addressed by ports spanning from traditional low-speed services like 2Mbps over micro-OTN, to layer2 and layer3 over ODUFlex, 100G over ODU4 and 200G over FlexO. Thanks to its embedded capabilities including multi-technology OAM, packet processing, synchronization and fast protection functions, FLEXSET operates by design at the lowest latency performances and features an Intel Stratix 10 FPGA. ([Read the PR](#)).
- **Architecture Innovation:** WDM metro and access networks today are for the vast majority built in rings or in horseshoe topology, where a two degree ROADM performs the best and where compact size and cost effectiveness are the two most important requirements. SM-Optics micro ROADM solution is based over a WSS-free architecture, removing a costly item in optical technology, and offering a 2-degree solution in a single rack unit, purpose built for metro access. ([Read the PR](#))
- **Software Innovation:** All SM-Optics' platforms are natively SDN-based. Capable of being stacked with different network modules to create the best mix of functionalities at each node and acting as single NE. HomeLight, the optical domain controller, embeds multiple functionalities beyond the simple controller to boost automation and deep photonic management. Being Transport API compliant, it allows for immediate integration and abstraction towards any SDN orchestrator or hierarchical controller.
 - o SM-Optics is actively contributing to ONF and OIF in de definition of SDN standards. ([Read the OIF PR on T-API on 2018](#))

