LIGHTMODE microROADM

The LIGHTMODE (LM) microROADM is a disaggregated DWDM Open Line System micronode and is part of a larger family of line system and muxponders/transponders micronodes. It is designed to offer the highest level of flexibility in the smallest footprint possible, and as such to operate as a two-degree DWDM ROADM in a single rack unit (1RU).
LM microROADM is based on a highly modular WSS-free architecture offering operators the ability to optimize configuration, cost and footprint.

The LM microROADM also has the ability to address highly complex mesh network configurations (up to 9 degrees) using a WSS-based card.

Single Fiber Working and an Extended Temperature Range (-40°C to +65°C / -40°F to +149°F), allow the LM microROADM to work deeper in the access environment, where space, power, environmental conditions and shortage of fiber are real problems to cope with.

With control algorithms for channel activation and automatic power adjustment, the microROADM keeps tight, closed loop control over network traffic ensuring that power degradation or variations do not affect traffic.

LM microROADM 2D WSS-less ROADM
with 8+8 channels AID

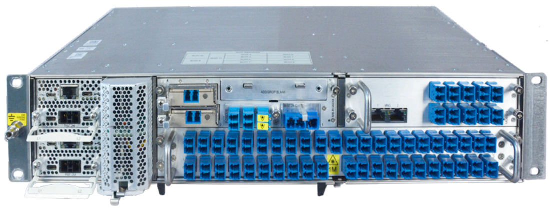
LM microROADM multi-degree ROADM,
1 degree in 1RU chassis option

The LM microROADM control algorithms are operated by the individual nodes, making the microROADM a truly Open Line System with no dependencies on riding traffic, transponders, or the SDN controller being utilized.

HIGHLY COMPACT MODULAR ROADM

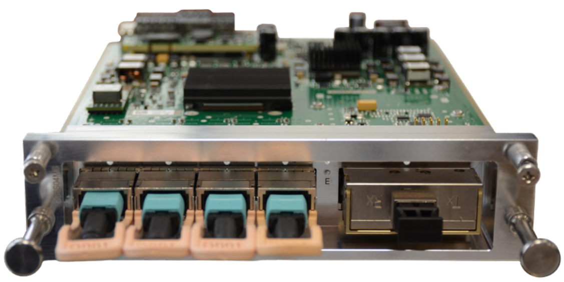
With a stackable design, the LM microROADM can easily and cost effectively scale to satisfy optical network growth, supporting 12 chassis stacked to act as a single NE.
The ROADM capability is complemented by static filters and add-drop components for C/DWDM FOADM deployments.
Both coherent and non-coherent transmission are supported.
Flexible bandwidth capability is provided to accommodate channels that require more than 50GHz optical bandwidth (400G and above).
The LM microROADM is available in 1RU and 2RU chassis providing up to 4 or 8 half slot cards. With the removal of the half slot divider in the 2RU shelf, both chassis can host full slot cards like the 40 channel Mux/Demux.
The LM microROADM is designed for access and metro infrastructure. It can accept alien wavelengths from external systems as an Open Line System or use its own transponders/muxponders housed in the LM OTN micronode which provides OTN multiplexing and switching and DWDM wavelengths at 10G, 100G, 200G and 400G.
LM OTN micronodes and LM microROADM micronodes can be stacked and addressed as a single network element with a single IP address.

LM microROADM with amplification, 16 channel mux/demux, CRU and AC power option in a 2RU chassis

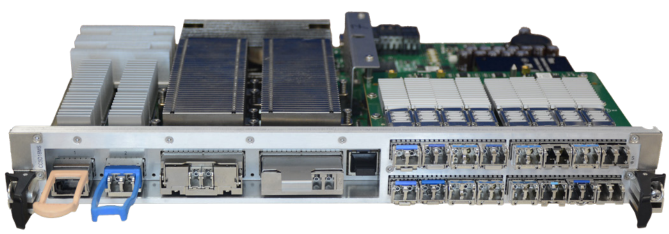


LM microROADM 40 channel terminal with amplification, OTDR filter and 1x9 WSS in a 2RU chassis

The availability of purpose designed line cards (multi-port 10G transponder/muxponder, 100G/200G transponder/muxponder, 400G muxponder) allows the convergence of transport layer (WDM) and transmission layer (OTN), further improving the solution compactness. The capability to scale down the line rate (from 400G to 300G or 200G) makes the brownfield deployment easier.
The LM microROADM can also be equipped with a Clock Recovery Unit (capable of providing boundary clock processing) to support PTP and SyncE transport over DWDM infrastructure, via a dedicated OTC (Optical Timing Channel).



400G Muxponder (4 x 100G clients, 1 x 400G line) is half slot, double height card combining 100GbE and OTU-4 into 400G line



100G/200G Transponder/Muxponder is a full slot, double height card, supporting 10G/25G/100G Ethernet clients with PTP capability

WHY USE A MODULAR OPEN LINE SYSTEM

- High modularity allowing for an optimized configuration at each site:
  - Optimized shelf size
  - High modularity within each shelf
  - Stackable 1RU functional blocks/micronodes
- High density supporting a full 2-degree ROADM in 1RU including 8 chs. Add/Drop, booster and pre-amp, and OSC (and optional OTDR filter) which is a typical configuration of a metro access ring
- Various ROADM configurations available optimized from 2 to 9 degrees
- Hassle free scalability thanks to single-channel optical filters, to be added only when a 10G service is provisioned reducing the first installation costs while allowing for the industry's most granular growth
- Colorless by design, the microROADM WSS-less technology uses only splitters and couplers. The architecture is Gridless/ Filterless allowing transmission at any channel frequency, supporting 100G/200G/300G/400G data rates for colorless configurations
- Extreme configuration flexibility, thanks to a wide availability of pluggable items. For example, our ROADM on a blade allows the choice of amplifiers and other components to optimize cost at every site
- Support for alien wavelengths allowing to source transponders and muxponders from the LIGHTMODE portfolio or from other providers. SynchE and PTP transport and distribution enabling 5G backhauling over SFW and DFW networks
- Embedded OTDR capability allowing for fiber infrastructure surveillance directly from the NMS
- Support for SDN (Restconf-Netconf/Yang) natively on the NE or northbound from the Optical Network Controller (the SM-Optics management platform)

TECHNICAL SPECIFICATIONS

Parameter	**LM microROADM**
Number of Wavelengths	4/16/40/80
Application	Dual Fiber Working, Single Fiber Working
Node configurations	Terminal, Hub, ROADM (with and without WSS), ILA
Network topology	Point-to-Point, Linear ADM, Ring,/Multi-ring, Horseshoe, Mesh
Redundancy (1+1)	Power, control, fans
Subrack Size (H x W x D)	1RU chassis: 44.2x482.6x282.0 mm^3 / 1.74x19.00x11.10 in^3 2RU chassis: 88.4x482.6x282.0 mm^3 / 3.58x19.00x11.10 in^3
Power supply	-48 VDC (-40.5 to -57 VDC) 1RU fully redundant AC/DC converter available as option embedded AC power option in 2RU chassis
Power consumption	1RU chassis: 130 W (max) 2RU chassis: 800W (max)
Operating temperature	-5°C to +45°C / 23°F to 113°F -40°C to +65°C/ -40°F to 149°F for specific configurations
Relative humidity	5% to 95%
Management	Stackable, managed as single NE, RESTCONF/Yang from NE or Manager
Regulations & standards	ETS 300 019-1-3, Class 3.2 ETS 300 019-1-1, Class 1.2 ETS 300 019-1-1, Class 2.2 ETS 300 019-1-1, Class 2.2 ETS 300 386 / EN 300 132-2 / EN 300 753 EN 60825-1/-2 / EN 60950-1

TAKEAWAYS

microROADM
Full 2-degree colorless ROADM in 1RU with single channel scalability

Block Architecture
Allows stacking of shelves to form a single Network Element, optimizing cost and footprint at each site.

Industries Highest modularity
Pluggability below the 1RU level including selection of filters, amplifiers, OSC, and OTDR

Native SDN
Removes the need for proprietary software integration, supporting T-API RESTCONF/YANG models according to ONF specifications. Both to the NE and Northbound from the manager.

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