

DWDM Networking 80ch @ 50GHz

The TM-Series platform has been extremely successful due to its ability to combine CWDM, DWDM and SDH technologies within the same system, sharing the same card cage, carried on the same fiber and being managed by the same management system.

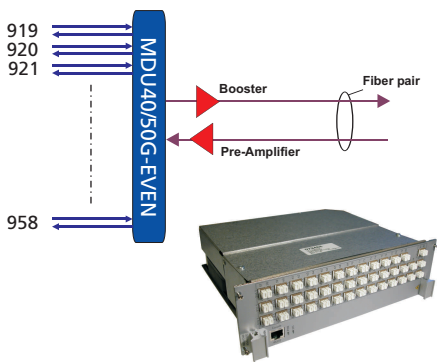
Also, the ability to support both single-fiber as well as fiber-pair configurations opens for unique networking solutions that can be used for both access, metro and regional networks.

It all addresses some of the imperative factors an operator must take into consideration when selecting the best transport solution, i.e. low CAPEX and OPEX.

The TM-platform has two alternative solutions for DWDM over fiber-pair configurations:

- A set of passive filters operating at odd and even 100GHz channels that are combined to a 100GHz/32ch solution.
- A set of passive filters operating at odd and even 50GHz channels that are combined to a 50GHz/80ch solution.

The Data Sheet covers the 80ch/50GHz alternative.



From 1 to 40 channels

The MDU40/50G-EVEN operates on every even 50GHz channel, which is equal to every 100GHz channel. The MDU40/50G-EVEN is thus one option to provide a 40ch configuration in a singular step.

The MDU40/50G-EVEN occupies three slots in a TM-3000 chassis which is a more compact solution as compared to using 5x 8ch MDU's.

The MDU40/50G-EVEN has inbuilt VOA's (Variable Optical Attenuators) in the Mux-direction so power balancing can be done without need for external VOA units or attenuators.

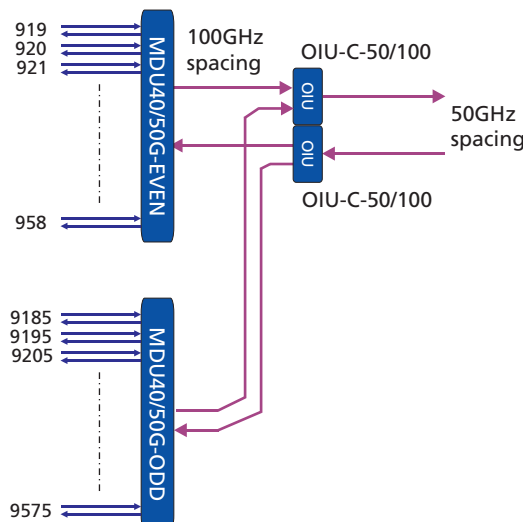
Expansion up to 80 channels

The MDU40/50G-EVEN can be combined with another 40ch MDU operating on the odd 50GHz channels; MDU40/50G-ODD. This requires addition of Optical Interleavers that convert from 100GHz spacing to 50GHz spacing. The Optical Interleaver (OIU-C-50/100) is used to combine odd and even 50GHz channels in the transmit direction, and separate the two in the receive direction.

The figure shows a combined 80ch configuration. The benefit of this solution is that all SFP and XFP-based Transponders and MuxPonders can be used since they are facing 100GHz MDU's. This would not be possible if the MDU's were operating at 50GHz since the SFP's and XFP's are not specified for interfacing with 50GHz MDU's.

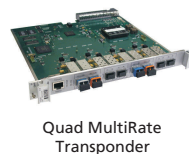
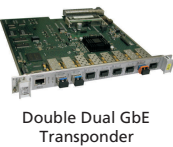
Currently SFP's and XFP's are only available with 100GHz spacing so they can only be used towards the MDU40/50G-EVEN. The tuneable 10G Transponder (TP10GCLX/TC) can operate on 50GHz spacing and can thus be used on both MDU's. So currently this 10G Transponder must be used towards the MDU40/50G-ODD.

The MDU40/50G-ODD has also inbuilt VOA's (Variable Optical Attenuators) in the Mux-direction so power balancing can be done without need for external VOA units or attenuators.

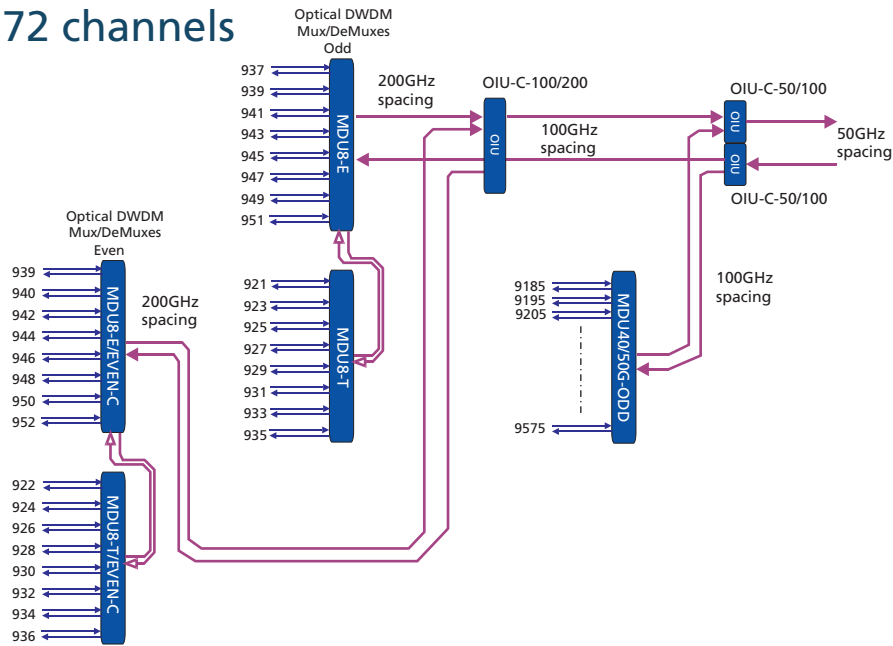


This AN covers a small portion of all available units within the TM-platform.

See separate Data Sheets and Application Notes for more information about other products and other networking examples



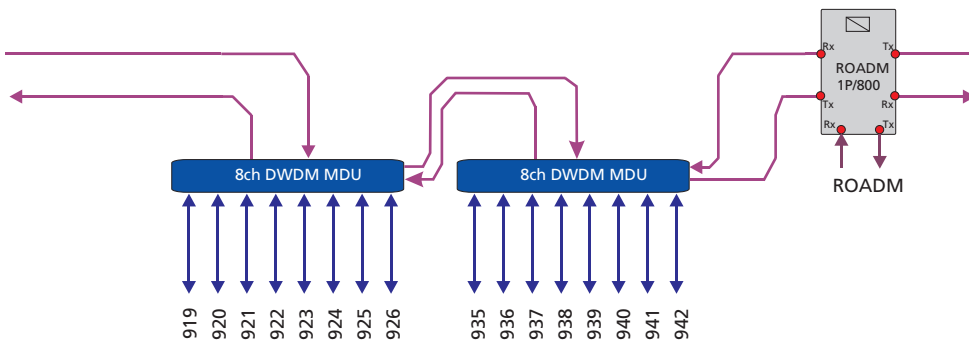
From 32 to 72 channels



It is as an alternative possible to combine the 200GHz/32 channel solution with the MDU40/50G-ODD unit as shown in the figure above. It is thus possible to expand an existing 32ch system up to 72 channels without the need to introduce a MDU40/50G-EVEN unit.

Add/Drop alternatives

The MDU40/50G-EVEN and MDU40/50G-ODD units are primarily intended to be used at the end nodes of a network. For intermediate add/drop there are number of options depending on how many channels that are to be accessed in the add/drop nodes. One option is a series of 8ch MDU's that include a combination of band drop and Mux/DeMux functionality. Five MDU's cover the same range as the MDU40/50G-EVEN and five additional cover the range of the MDU40/50G-ODD unit. All of the 8ch MDU's have an extension port and they can thus be combined in any order to select a segment of 8 channels.



The figure shows an example where two 8ch MDU's are cascaded via the extension ports to drop 8 channels from different segments of the wavelength band. These 8ch MDU's can of course also be used at the end nodes to provide a step-wise upgrade to 40 and 80 channels. Another alternative is to use the ROADM unit to provide dynamic add/drop nodes. The ROADM unit supports both 100GHz as well as 50GHz spaced systems.

The amplifiers (EDFA-based) are provided in different power alternatives and can be configured as pre-amplifiers or as line/booster amplifiers. The 17dBm and 20dBm amplifiers are provided in both singular and double unit types to optimize the cost profile.

The chromatic dispersion is addressed via a set of different optical dispersion compensation units that are placed at the end nodes and at the intermediate add/drop nodes if such are present. Variable Optical Attenuators (VOA's) can be introduced to provide automatic power control and Optical Channel Monitor units (OCM) are provided to enable measurement of wavelength power levels at amplifiers and ROADM units

The specifications and information within this document are subject to change without further notice. All statements, information and recommendations are believed to be accurate but are presented without warranty of any kind.

The TM-series Platform entails both CWDM and DWDM solutions in single-fibre or fibre-pair configurations. All in the same card cage, one the same fibre and under the same node and network management system.



6-port Ethernet Demarcation Unit



9xGbE/10G Muxponder



10G Tunable Transponder



Double 10GbE DWDM Transponder



ROADM



Embedded Node Manager (ENM)



Transmode Network Manager (TNM)

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