

XTM SERIES

Flexgrid-Ready ROADMs

Multi-degree Flexgrid-Ready ROADMs for Flexible Optical Networks

The 1x4 and 1x9 flexgrid-ready reconfigurable optical add-drop multiplexers (ROADMs) enable flexible and cost-efficient DWDM networking for Infinera's XTM Packet Optical Transport System (P-OTS).

Optimized for Dynamic Network Applications

Both the 1x4 ROADM-F and the 1x9 ROADM-F support 80-channel fixed grid operation and are flexible grid (flexgrid) ready which is enabled through a future XTM series software release. Infinera's ROADM-F is a compact optical networking solution for all topologies supporting dynamic traffic design allowing for hitless changes in wavelength allocation. The 1x4 ROADM-F serves as a building block for reconfigurable add-drop nodes for up to four dimensions,

while the 1x9 ROADM-F supports applications requiring up to nine dimensions. The 1x9 ROADM-F also supports highly cost effective splitter/coupler-based ROADM architectures for coherent 100G+ wavelengths through its dual-wavelength selective switch (WSS) design.

The 1x4 ROADM-F has four individual add-drop ports and the 1x9 ROADM-f has nine individual add-drop ports. The add ports of both units use a WSS to dynamically select which of the 80 DWDM channels on the ITU-T 50 GHz C-band grid to add to the line signal for each add port.

The 1x9 ROADM-F uses a second WSS to also dynamically select which channels to drop from the line signal for each drop port while the 1x4 ROADM uses an optical coupler to distribute the incom-



Key benefits:

- Add-drop any wavelength from/to any port for DWDM network flexibility
- Flexgrid-ready
- Built-in VOA for easy channel power balancing
- Fully integrated with XTM Series and Digital Network Administrator (DNA)
- Compact, low power design

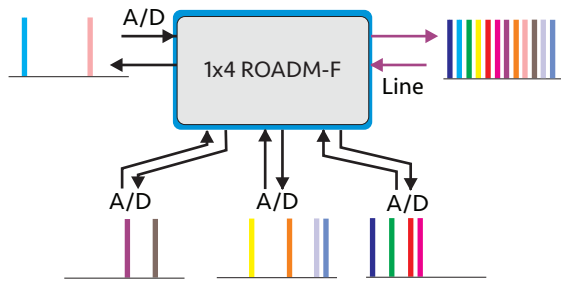


Fig 1. Schematic Principle of 1x4 ROADM-F Add-drop Function.

ing line signal to all four drop ports. The 1x4 ROADM-F requires a separate DWDM add-drop filter or mux/demux unit to be used for locally terminating traffic while the 1x9 ROADM-F can simply use splitter/coupler-based connectivity. This ability to use lower cost splitters and couplers can be combined with coherent 100G+ optics to create cost optimized ROADM architectures including colorless and directionless configurations and even smaller degree ROADM nodes. The 1x4 and 1x9 ROADM-F units include variable optical attenuator (VOA) functionality for all line-side DWDM channels for optimal network performance.

Grouping of different ROADMs can be done in the node management software to facilitate wavelength management through a ROADM node function. This simplifies commissioning and minimizes risk of faulty handling.

Linear Add-drop Applications

For ring and bus network structures, the 1x4 and 1x9 ROADM-F units enable dynamic add-drop nodes with two-dimensional east and westbound traffic by pairing two units and connecting them via one of the add-drop ports for the express traffic.

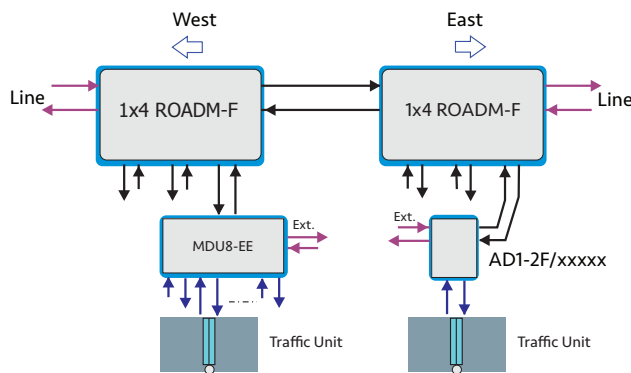


Fig 2. Linear Two-dimensional ROADM Node.

Initially, locally terminating traffic may be allocated to one of the add-drop ports, keeping the remaining ports for traffic upgrades or for scaling into multidimensional nodes.

A DWDM add-drop filter or a mux/demux unit is used to separate the terminated channels.

Multidimensional Node Applications

The individual add-drop ports of any of the two flexgrid-prepared ROADMs enable redirection of traffic in multidimensional nodes. For example, by grouping four units and interconnecting the add-drop ports, a four-dimensional node may be created, where traffic from any line can be directed to any other line or be locally dropped.

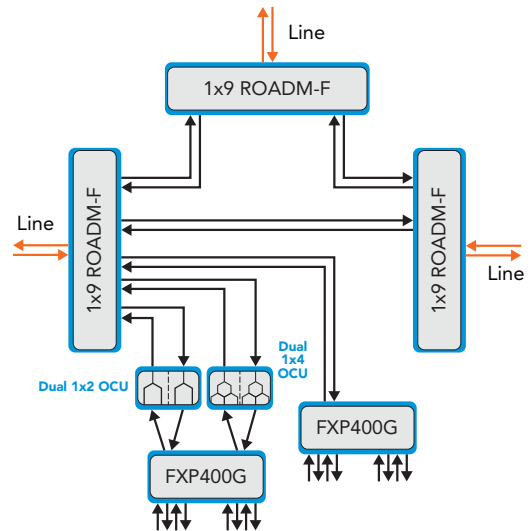


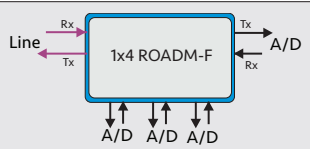
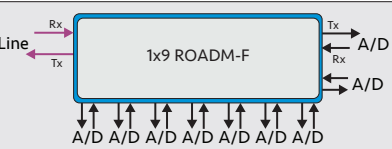
Fig 3. 1x9 ROADM-F used to create 3-degree coupler-based ROADM

Low Power Design and Small Footprint

The 1x4 ROADM-F typically consumes 15 W and the 1x9 ROADM-F 18W. This low power consumption with a small footprint reduces site operating expenses while allowing for more networking capacity in a small space.

The 1x4 and 1x9 ROADM-F units can be mounted in a TM-3000, TM-3000/II, TM-301 or TM-301/II chassis, where it occupies one full-size slot.

Specifications

	1x4 ROADM-F	1x9 ROADM-F
Insertion Loss (See Figure)	 <p>Add [A/D Rx] – [Line Tx]: < 6.5 dB Drop [Line Rx] – [A/D Tx]: < 7.1 dB</p>	 <p>Add: 7.5 dB Drop: 7.5 dB</p>
Range	80 channels on 50 GHz ITU-T C-band grid (prepared for 4.8 THz flexgrid)	
Add Ports	Wavelength selective switch (WSS)	WSS with VOA
Drop Ports	Passive optical coupler	WSS with VOA
Line Side Features	Variable optical attenuator (VOA) functionality on all individual wavelengths	
No. of Add-drop Ports	4	9
Switching Time	3 s all channels	
VOA	Range: 0–15 dB Step size: 0.1 dB	
Dimensions	Occupies one full-size slot in a TM-3000, TM-3000/II, TM-301, TM-301/II chassis	
Power Consumption	15 W typical 30 W maximum	18 W typical 24 W maximum

Specifications and Features Are Subject to Change

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