Open ROADM

openroadm.org Multi-Source Agreement

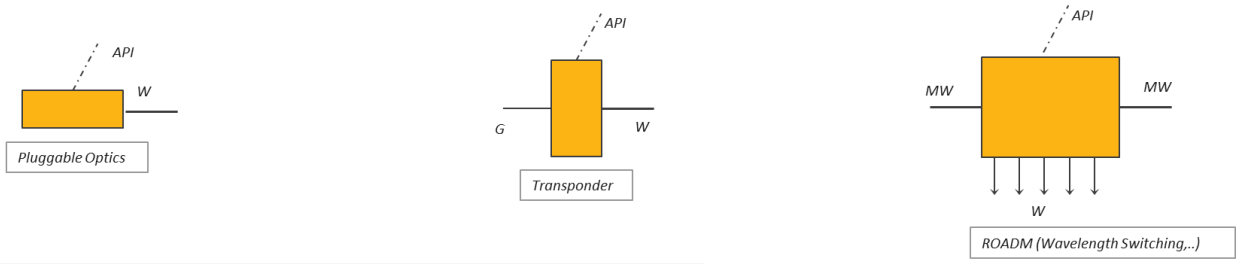
The goals of the Open ROADM Multi-Source Agreement are (1) the disaggregation and opening up of traditionally proprietary ROADM systems and (2) the SDN-enablement of traditionally fixed ROADMs.

The Open ROADM team's goal has been simplicity from the beginning, concentrating on lower performance metro systems to make it work in the first release.

There are many ways to disaggregate ROADM systems, e.g. hardware disaggregation (e.g. defining a common shelf) or functional disaggregation (less about hardware, more about function). Due to the complexity of common shelves, the Open ROADM MSA chose the functional disaggregation first. We defined three optical functions: pluggable optics, transponder and ROADM (the optical switch part with amplifiers, couplers, WSS, etc.). Common shelves can be introduced at a later point for some functions, like transponders, if they make sense.

All of the three disaggregated functions (pluggable optics, transponder and ROADM) are controllable through an open standards-based API (written in the data modeling language YANG) that can be accessed through an SDN Controller using NETCONF. Open ROADM uses the NETCONF interface for provisioning, as well as PM, alarms, etc.

There are two optical specifications, one called Single-Wave (or W) to define how pluggable optics or transponders interoperate and the other called Multi-Wave (or MW) to define how ROADMs interoperate.

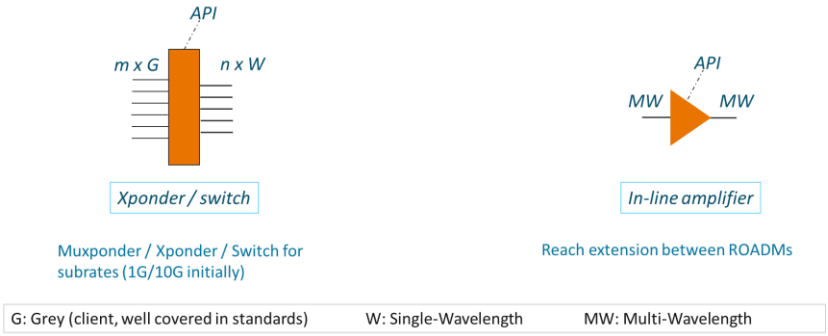


G: Grey (client, well covered in standards) W: Wavelength MW: Multi-Wavelength

The W specification for the initial release is 100G only with Cortina HD-FEC, we are working to get a consensus on 200G and 400G with better performance in Release 3.

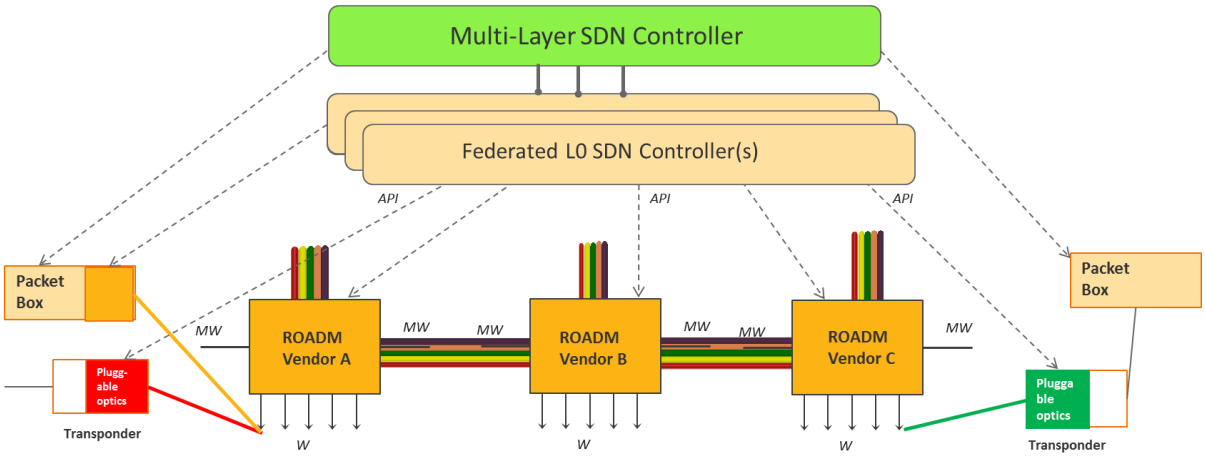
The MW specification abstracts a lot of the previously proprietary ROADM to ROADM control loops into the SDN controller to simplify the interaction. The OSC is a Gigabit Ethernet channel. In the first release, the specification was for fixed grid 50 GHz, 96 wavelengths for simplicity, with flexgrid modeling support added in the second release (2.x).

For release 2.x, we added two new functions, an OTN Xponder/switch for lower rate services, like 1GigE and 10GigE, as well as an in-line amplifier for reach extension up to 1000km for 100G HD-FEC.



The YANG data models provided contain a network abstraction, as well as Service Remote Procedure calls (RPCs) and Device template. Every network provider can choose their own network abstraction, we just included one as an example on how device and network layer tie together, the same goes for the Service RPC calls. The Device template would be filled in by every hardware supplier with their device-specific information.

So for the overall architecture the diagram is below on how to glue it all together.



Since the whole network is supposed to be SDN-controlled, the assumption is that the ROADMs are flexible, software-controlled ROADMs with colorless-directionless (CD) or colorless-directionless-contentionless (CDC). The models are built to support both CD and CDC ROADMs.

To summarize the high level feature sets of each release:

V1.2.1: metro reach up to 500km, 100G line without DCMs, all-ROADM, 100G clients only, fixed grid

V2.2: regional reach up to 1000km with ILA support, FlexGrid ready, OTN Crossponder for 1G and 10G clients