



EQUINIX

Passive DWDM

Leverage your Dark Fiber

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What is Passive DWDM?

Wikipedia defines DWDM as:

“Dense wavelength division multiplexing, or DWDM for short, refers originally to optical signals multiplexed within the 1550 nm band...”

- Passive DWDM systems have no active components. The physical equipment interface transmits and receives the wave of light.
 - Generally consists of separate shelf components for the TX and RX pairs.
 - The use of prisms to multiplex and de-multiplex the waves of light.
 - Some offer line side monitor ports to allow for greater flexibility.
 - ITU Grid: C-Band at 100 GHz spacing per channel

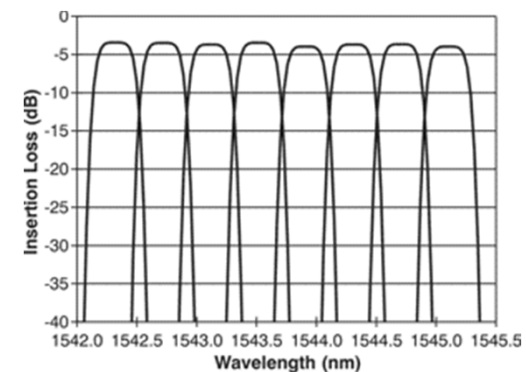
- More information about DWDM can be found at:
 - <http://en.wikipedia.org/wiki/DWDM>

Why should I use passive DWDM?

- Cost
 - If you compare the price with Active DWDM systems you save money.
- Complexity
 - Passive DWDM isn't complex at all, its really Plug & Play and there is nothing to provision.
- Support and Troubleshooting
 - None. If it's not working then it's most likely your active gear or dark fiber.
- Density
 - You can very easily get 16-32+ wave systems for a reasonable price.
 - Passive DWDM supports more channels than CWDM, but if SPF+ is your only option then you will have to use CWDM.

ITU Spacing Grid:

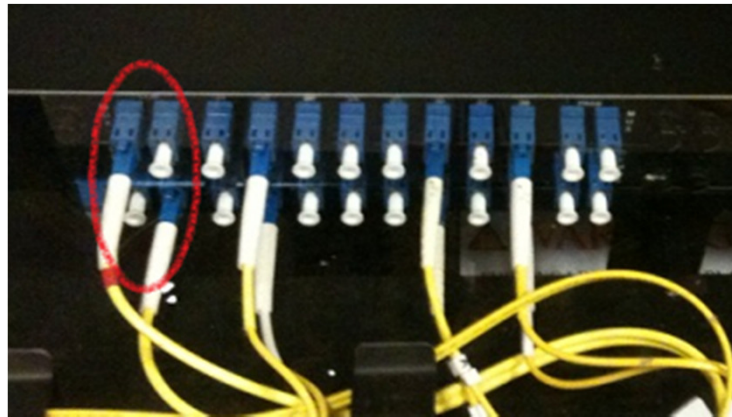
<http://www.fiberdyne.com/products/itu-grid.html>



What equipment is needed?

Hardware Multiplexer and de-Multiplexer

- Individual shelf components containing prisms

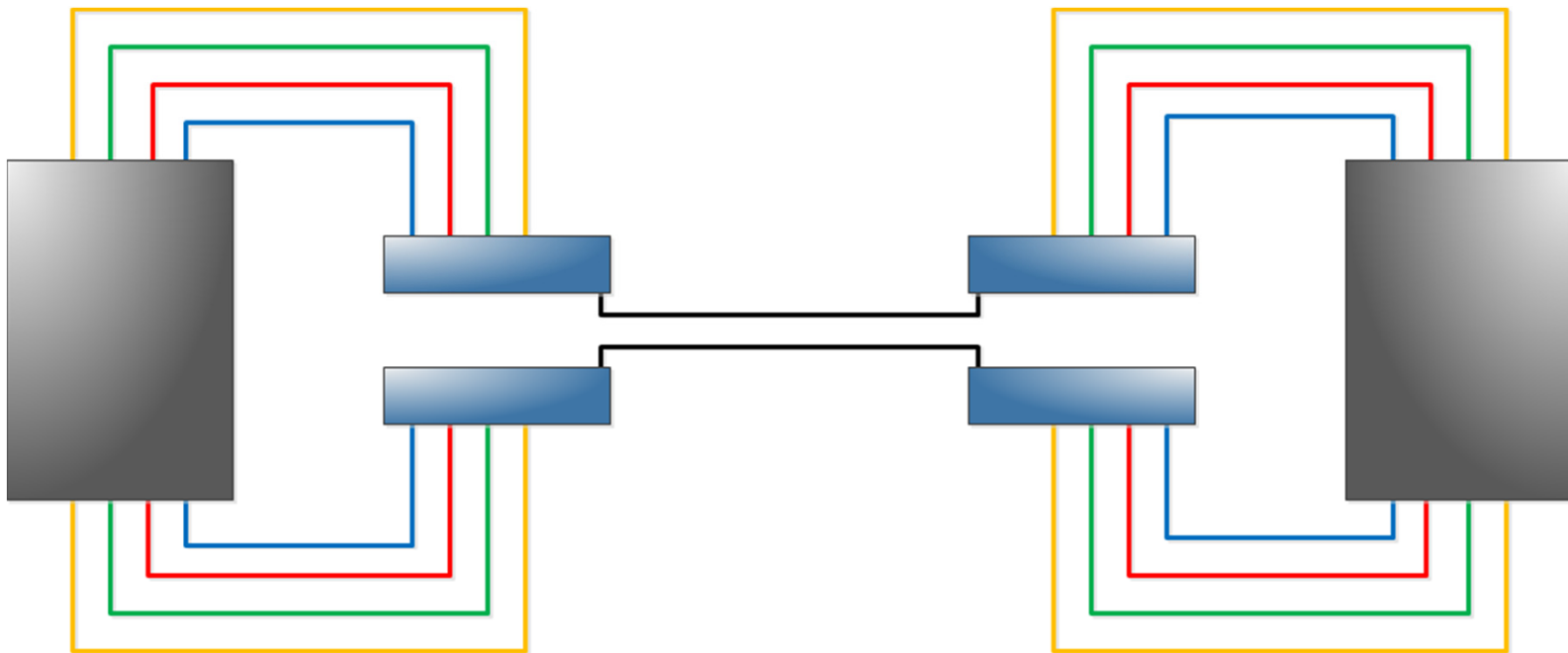


- Dark fiber In / Out circled
- Remaining ports are filtered for the labeled channel / wavelength
- Generally 1 unit to support input and another to support output
- “High end” units will also usually have a monitor port

There are various hardware form factors for the shelves out there. Rack mounted units are most common in a data-center environment.

Sample Topology

- Since waves are only unique to one piece of fiber, you can use the same wavelength on the second path, allowing you to have less spare optics on hand.



Optic & Wavelength Information

XFP Pluggable's	Reach	Wavelength (nm)	Fiber	Notes
10G-LR XFP	10 – 25 km	~1310	9/125 μ m SMF	SFP+ form factor will perform roughly the same
10G-DWDM XFP	10 – 25 km	1577.03 to 1520.25	9/125 μ m SMF	No SFP+ option in mass production



When shouldn't passive DWDM be used?

- Do you have dark fiber available?
- Is the cost of the fiber prohibitive?
 - 16 channel shelves list for \$4,450.00
 - Optics list for around \$10,000.00 each, realistically \$3k-\$6k
 - In the EU, for example, metro dark fiber is quite cheap
- Hardware supported and/or vendor compatible optic availability?

What else should be considered?

- If you need redundancy, you will need a second set of fiber and hardware.
- Distance limitations that may require the use of EDFA's.
- Port availability
- You're relying on your dark fiber vendor to not cut your fiber and take down all your waves.
- Most vendors have limited stock and lead times could be 12+ weeks for delivery.
- No OIR without using additional equipment connected to the monitor port.

Other reading



- Richard Steenbergen, Optical Networking 101 & 201
 - http://nanog.org/meetings/nanog48/presentations/Sunday/RAS_opticalnet_N48.pdf

Questions?

