

Arvensis Consulting

PASSIVE CWDM

BENEFITS AND ADVANTAGES

The benefits of Passive CWDM are substantial, as are the cost savings to monthly Operational Expenditure. The ability to combine several data streams into a single data stream and to then transport all of this over a single fiber and then separate the various stream at the other end will be explained as well as the pro's and con's and savings that can be realised.

PASSIVE CWDM

BENEFITS AND ADVANTAGES

BENEFIT #1: EQUIPMENT ARCHITECTURE

Passive in nature, 1RU unit that requires no power or cooling so no components that can fail. An estimated MTBF of 500 years for the passive optical components. Each 1RU unit can accommodate 2x 8# modules.

BENEFIT #2: ANNUAL SAVINGS

4, 8, 12, 18 channels over a single fiber strand up to ~40km⁽¹⁾ generating annual savings of \$4k to \$72k for UFB metro⁽²⁾ dark fibers and \$1.3k to \$22k when used in a Data Centre⁽³⁾ environment.

BENEFIT #3: LOW CAPEX, HIGH ROI

Regardless of the transceiver line rates, an 8# CWDM solution costs less than \$2500 for both ends. A fully equipped solution with transceivers supplied for a 10Gb x 8# solution will see payback in 20 months whereas a 1Gb 8# will break even after ~5 months⁽⁴⁾.

BENEFIT #4: EASY INSTALLATION

The CWDM solution is plug-and-play, no setup, no programming needed, simply install in a rack, connect the patch cables to the corresponding optical modules and that's it. While an end to end solution design is required for an optical linking budget, this is no different to any other instance where optical connectivity is used.

BENEFIT #5: UNLIMITED TECHNOLOGIES

The CWDM solution is entirely transparent in your network and can accommodate a mix of technologies on different channels across the same solution. You can equip 10Gb Ethernet next to SDI video or legacy technologies such as SDH/PDH or even SCADA using an optical interface⁽⁵⁾.

BITS AND BYTES

WDM: Wave Division Multiplexing

C/DWDM: Coarse and Dense Wave Division Multiplexing

CWDM uses up to 18

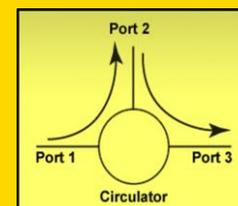
wavelengths from 1271nm to 1611nm

Passive CWDM is ideal for metro networking

CWDM cannot be amplified as DWDM systems can due to the CWDM channels operating outside of the operating window of the erbium-doped fiber amplifier (EDFA).

CWDM uses 20nm channel spacing allowing for more cost-effective lasers to be used.

An optical circulator enables single fiber working however adds to insertion loss.



PASSIVE CWDM

DISADVANTAGES

DISADVANTAGE #1: RANGE

Passive CWDM range is limited to the metro environment due no optical amplification that DWDM wavelengths can employ. It is still possible to realised distances of over 40km with careful engineering and span design ⁽⁶⁾.

DISADVANTAGE #2: SCALABILITY

The main limitation here being the colored optics and limited wavelengths available. As growth drives expansion you may find yourself deploying more passive devises which may become hard to manage ⁽⁷⁾.

DISADVANTAGE #3: MANAGEMENT

Due to the passive nature the devices have not active management capabilities. Accurate documentation and knowledge of your network are the best way to manage a passive CWDM solution ⁽⁸⁾.

DISADVANTAGE #4: SYSTEM DESIGN

Careful system design is required to ensure the correct optical power is used. To low optical power and a channel won't work, too high and you may damage the far end receiver. Unknowns such as fiber span quality are also a contributing factor ⁽⁸⁾.

DISADVANTAGE #5: SHARED FATE

While not essentially a disadvantage specific to a CWDM solution but rather an inherent disadvantage of any solution that uses a common infrastructure, in this case an optic fiber strand. In the event of a fiber break all optical channels will be impacted. Correct network architecture design can provision for network resiliency.

BITS AND BYTES

A CWDM solution uses a separate optical multiplexer (MUX) and demultiplexer (DEMUX)

The CCWDM devices (Compact CWDM) are based on thin film filter technology

All CWDM devices are RoHS-6 compliant (lead free)

Operating temperature ranges is: -5°C to 75°C

Costs: Annual rental fees for 8 UFB fibers \$34k. For UFB 18 fibers its \$77k. Cost for 8# CWDM \$2k. These are conservative rental cost and are usually higher.

CWDM 1RU, dual slot, 2x 8# devise shown below.



NOTES

1. 40km span distance is assumed as a safe system working distance. Greater distances can be realised with high quality fiber, minimal splicing losses and the use of APC connectors at all points of connectivity. Always ensure that an optical budget is completed.
2. UFB pricing assumed at typical Chorus dark fiber rates @ \$355 per single strand fiber. In most cases there may be 2 fibers required and a. ICAB for exch-exch connectivity to connect customer premises so savings would be much greater.
3. Data center interconnectivity assumes interconnect fees for Sydney based data centers. These will vary from data center to data center and country to country.
4. Arvensis-Consulting can assist customer with their cost saving analysis and business case.
5. Arvensis-Consulting can supply a turnkey solution with all the relevant patch leads, OFDF's, optical attenuators and CWDM transceivers, all packaged as a complete solution.
6. Contact Arvensis-Consulting if you are uncertain, we can assist and advise before you spend on a solution that may not work.
7. For greater scalability we offer a Passive DWDM solution that offers great wavelengths. 32/40/48/80/88 and 96# wavelength options are available.
8. Document templates can be provided if requested to enable you to better manage your network
9. Arvensis-Consulting recommend that prior to deploying any xWDM solution, OTDR measurements are taken and any span events that fall outside acceptable limits are remedied.

For more information contact Arvensis-Consulting

info@arvensis-consulting.com

Or visit www.arvensis-consulting.com

Call +64 21 22 66 182

