

WWDM for (Large Campus and) Metropolitan Area Applications of 10GbE

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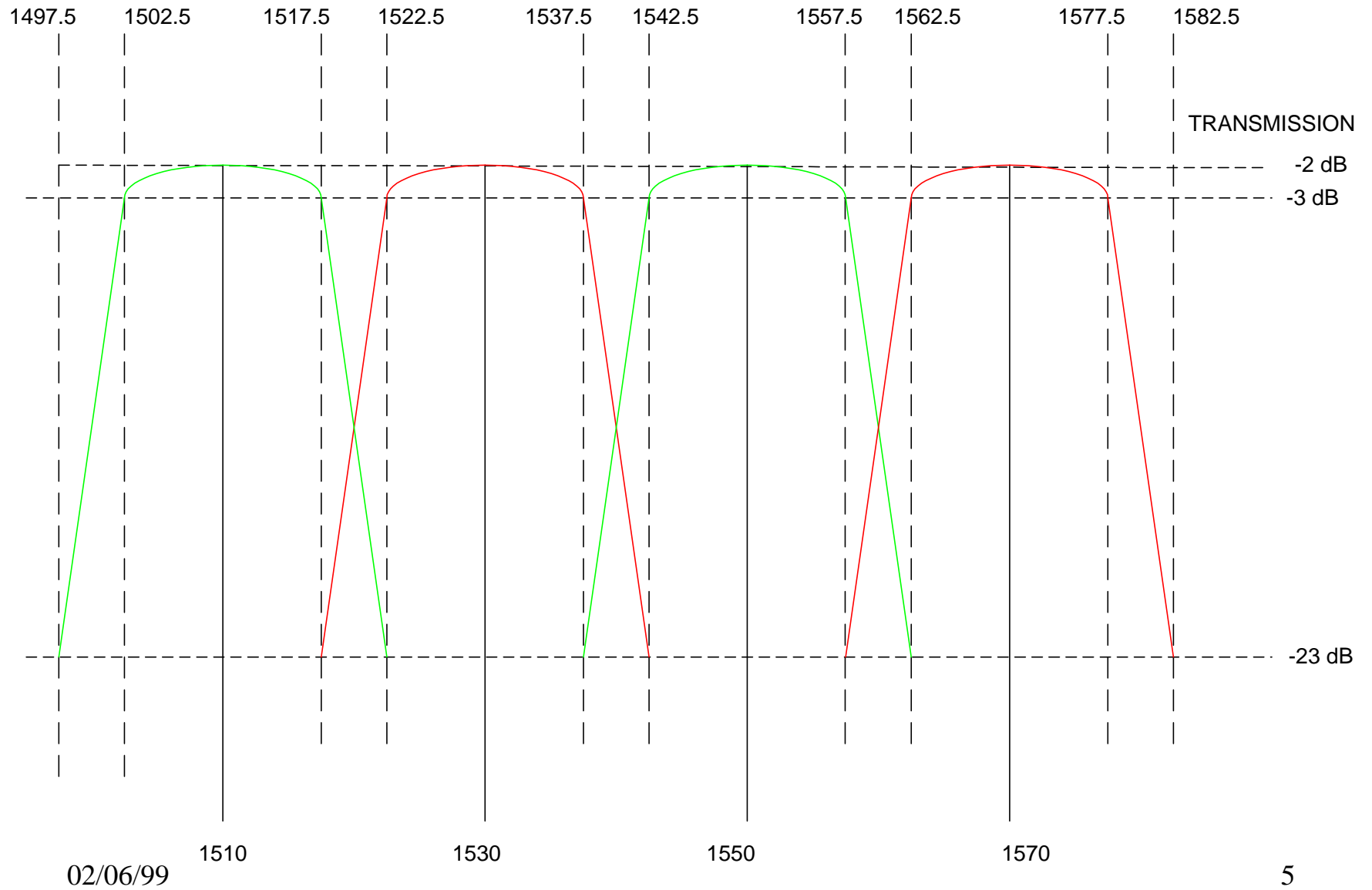
Background

- Our involvement began with a Fibre Channel SAN, 8 channels, ring topology, 4:1 WWDM.
- Design extended for GbE.
- Field data on 4x2.5 Gbaud WWDM by June 2000.

Summary of the Proposed Scheme

- 4:1 WWDM, each at 2.5 Gbps (3.125 Gbaud)
- 8B10B code
- 1510 nm, 1530 nm, 1550 nm, 1570 nm.
- Single Mode, Large Campus or Dark Fiber MAN.
- Distance: 0 to 28 kilometers.
- Lasers: direct modulation, DFB, Isolated.

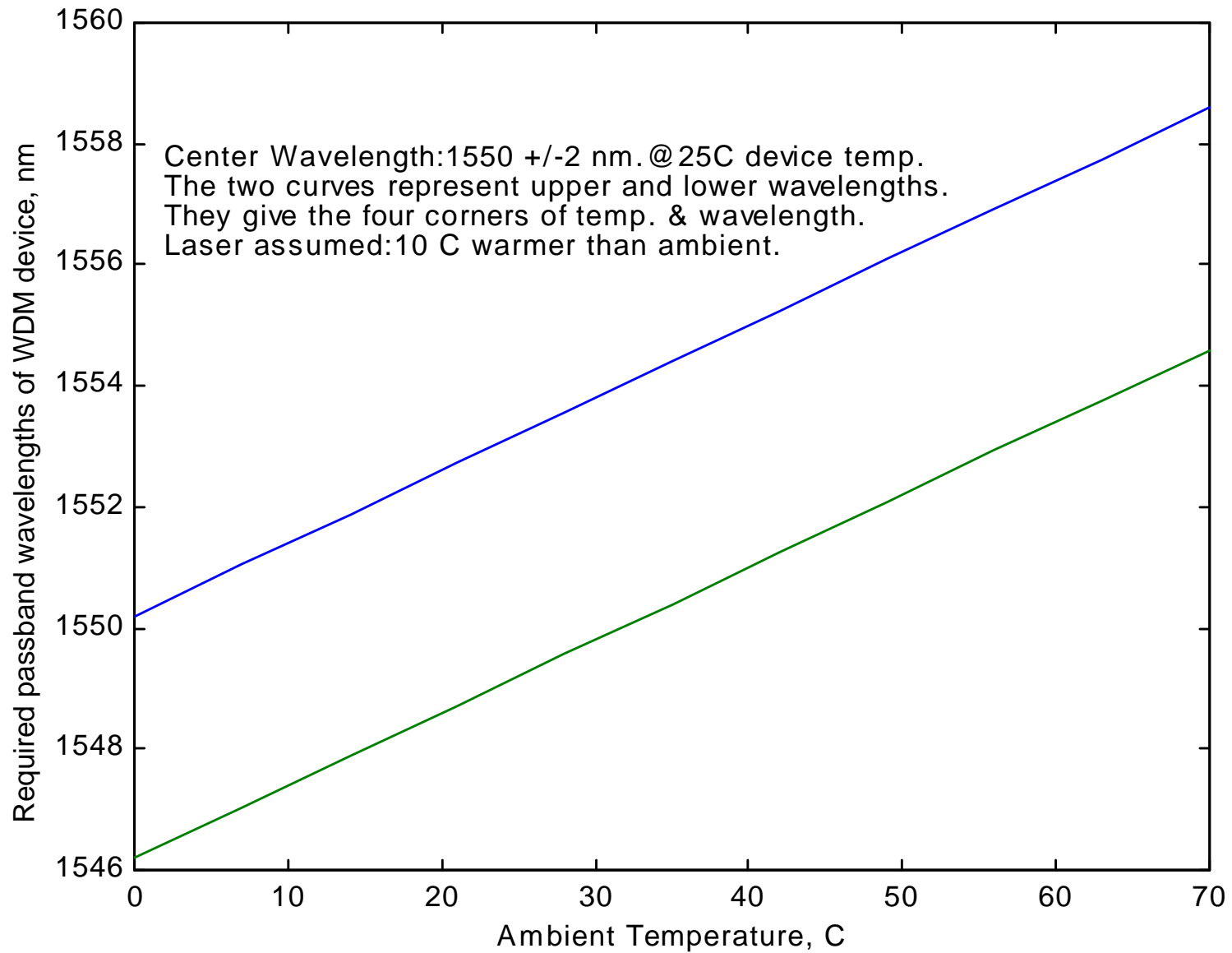
Wavelength Plan



Operating Temperature Range

- Laser wavelength drift: 0.12 nm/C max.
- For 70 degrees C operating temperature range, wavelength excursion < 8.4 nm.
- Laser wavelengths to be specified at device temperature in the center of the range.
- Add +/- 2 nm center wavelength variations for improving laser yield.
- Thermal stability of couplers: 0.005 dB/C.
- WDM passband of 15 dB is sufficient.

Calculating required WDM passband width



WDM Coupler Specifications

- Insertion loss: 3.5 dB max.
- PDL: 0.05 dB max.
- Passband: 15 nm @ 1 dB, 25 nm @ 20 dB
- Isolation: 20 dB min.
- Return loss: 40 dB min.

Link Power Budget

- Available budget: 18 dB
- Connectors: 2 dB
- Total WDM Insertion Loss: 7 dB
- Jitter Penalty: 0.62 dB
- Dispersion Penalty: 1.00 dB
- Unallocated Margin: 0.38 dB
- Cable Attenuation: 0.25 dB/km.
- Cable Length supported: 28 kms.

Advantages

- 8B10B, digital, binary, WDM - known, proven technologies.
- Works on dark fiber - desirable for MAN.
- PMD based on components available TODAY.
- Transceiver is simple.
- Jitter is easier to manage.

Disadvantages

- Spectral width may be greater than EDFA flat gain range; places an upper limit on distance.
- Not compatible with DWDM.

Conclusion

- It is an easy to implement solution, based on proven technologies and components available today. It is useful for large campuses and MAN applications. Therefore, it deserves consideration.