Nesting DWDM within CWDM

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Basics

"**W**avelength **D**imension **M**ultiplexing is a technology which multiplexes a number of optical carrier signals onto a single optical fiber by using different wavelengths of laser light"

–Wikipedia

Basics (for humans)

- light can have multiple "colors" (wavelengths)

- you can "join" (multiplex) them

- this allows you to carry multiple signals on 1 fiber
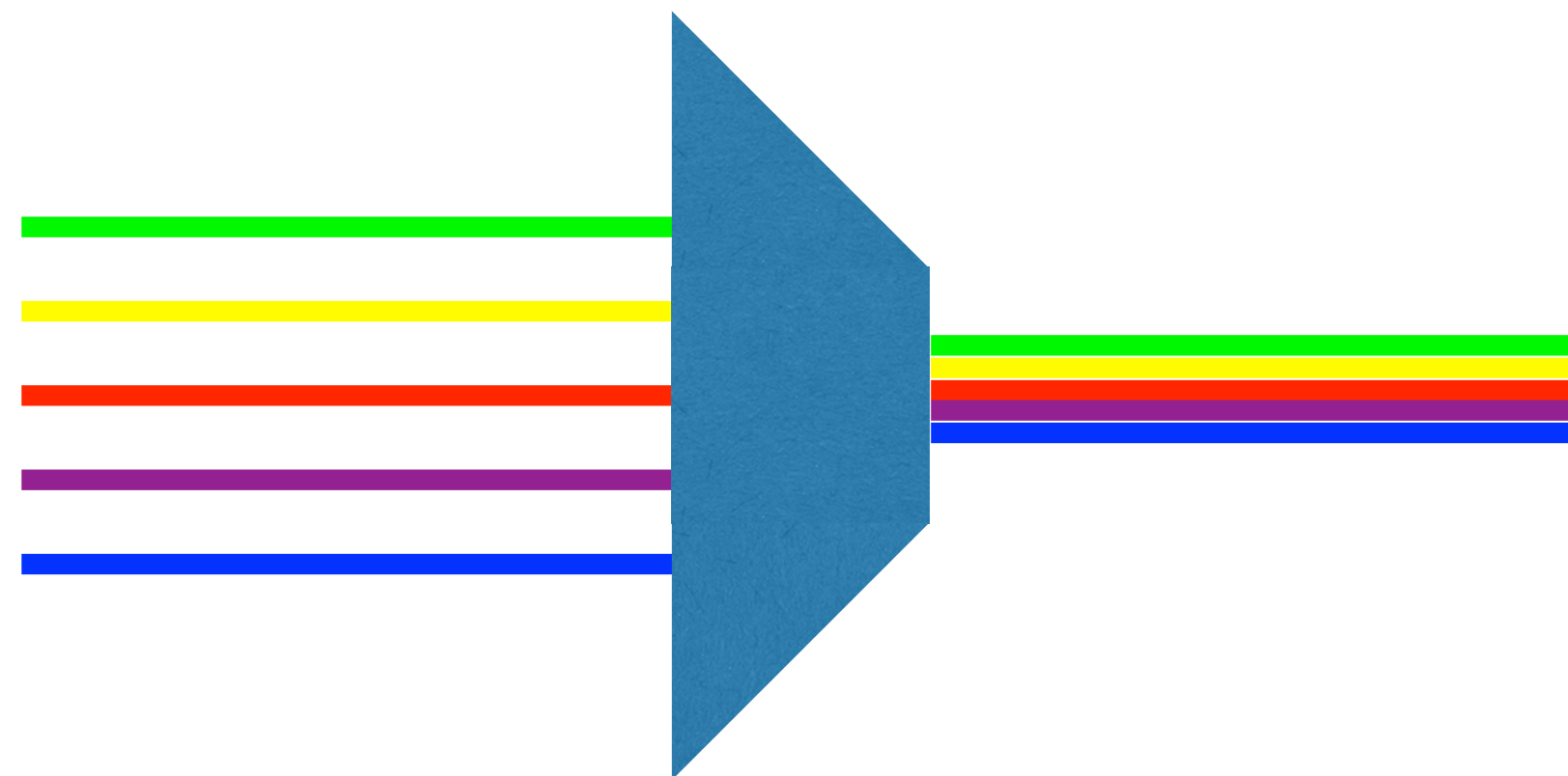
Coarse **WDM**

- ITU-T G.694.2

- Center Wavelength Range from 1271nm to 1611nm

- Channel Spacing of 20nm

- typical filter passband width of 13nm

Coarse **WDM**

Example:

    channel start: 1501nm

    passband start: 1504.5nm

    center wavelength: 1511nm

    passband end: 1517.5nm

    channel end: 1521nm
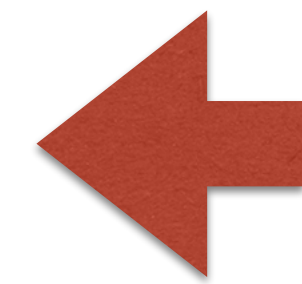
Coarse **WDM**

Example:

channel start: 1501nm

passband start: 1504.5nm

center wavelength: 1511nm ← We can put our signal in here!

passband end: 1517.5nm

channel end: 1521nm

Dense WDM

- ITU-T G.694.1

- Frequency grid, centred at 193.1THz (1552.52nm)

- allows multiple channel spacings

  - most commonly 100GHz(~0.8nm) and 50GHz (~0.4nm)

  - we'll use 100GHz here

- typical filter passband of 0.11nm

DWDM 100GHz Channels

- Channel 1:   190.1THz, 1557.03nm

- Channel 73:   197.3THz, 1519.48nm

- Most Common Range:

  - Channel 20: 192.0THz, 1561.42nm

  - Channel 59: 195.9THz, 1530.33nm

Picking CWDM Channels

1271 1291 1311 1331 1351 1371 1391 1411 1431 1451 1471 1491 1511 1531 1551 1571 1591 1611

DWDM 100GHz C59: 1530.33nm
DWDM 100GHz C20: 1561.42nm

Picking CWDM Channels

1271 1291 1311 1331 1351 1371 1391 1411 1431 1451 1471 1491 1511 1531 1551 1571 1591 1611

DWDM 100GHz C59: 1530.33nm
DWDM 100GHz C20: 1561.42nm

How many channels can we fit?

- 1531nm CWDM, Passband from 1524.5nm to 1537.5nm

Channel	Wavelength(nm)
59	1530.33
58	1531.12
57	1531.9
56	1532.68
55	1533.47
54	1534.25
53	1535.04
52	1535.82
51	1536.61
50	1537.4
49	1538.19

Picking CWDM Channels

1271 1291 1311 1331 1351 1371 1391 1411 1431 1451 1471 1491 1511 1531 1551 1571 1591 1611

DWDM 100GHz C59: 1530.33nm
DWDM 100GHz C20: 1561.42nm

How many channels can we fit?

- 1551nm CWDM, Passband from 1544.5nm to 1557.5nm

Channel	Wavelength(nm)	Channel	Wavelength(nm)
41	1544.53	30	1553.33
40	1545.32	29	1554.13
39	1546.12	28	1554.94
38	1546.92	27	1555.75
37	1547.72	26	1556.55
36	1548.51	25	1557.36
35	1549.32	24	1558.17
34	1550.12		
33	1550.92		
32	1551.72		
31	1552.52		

Conclusion

- CWDM 1531 fits DWDM 100GHz Ch59-Ch51

- CWDM 1551 fits DWDM 100GHz Ch41-Ch25
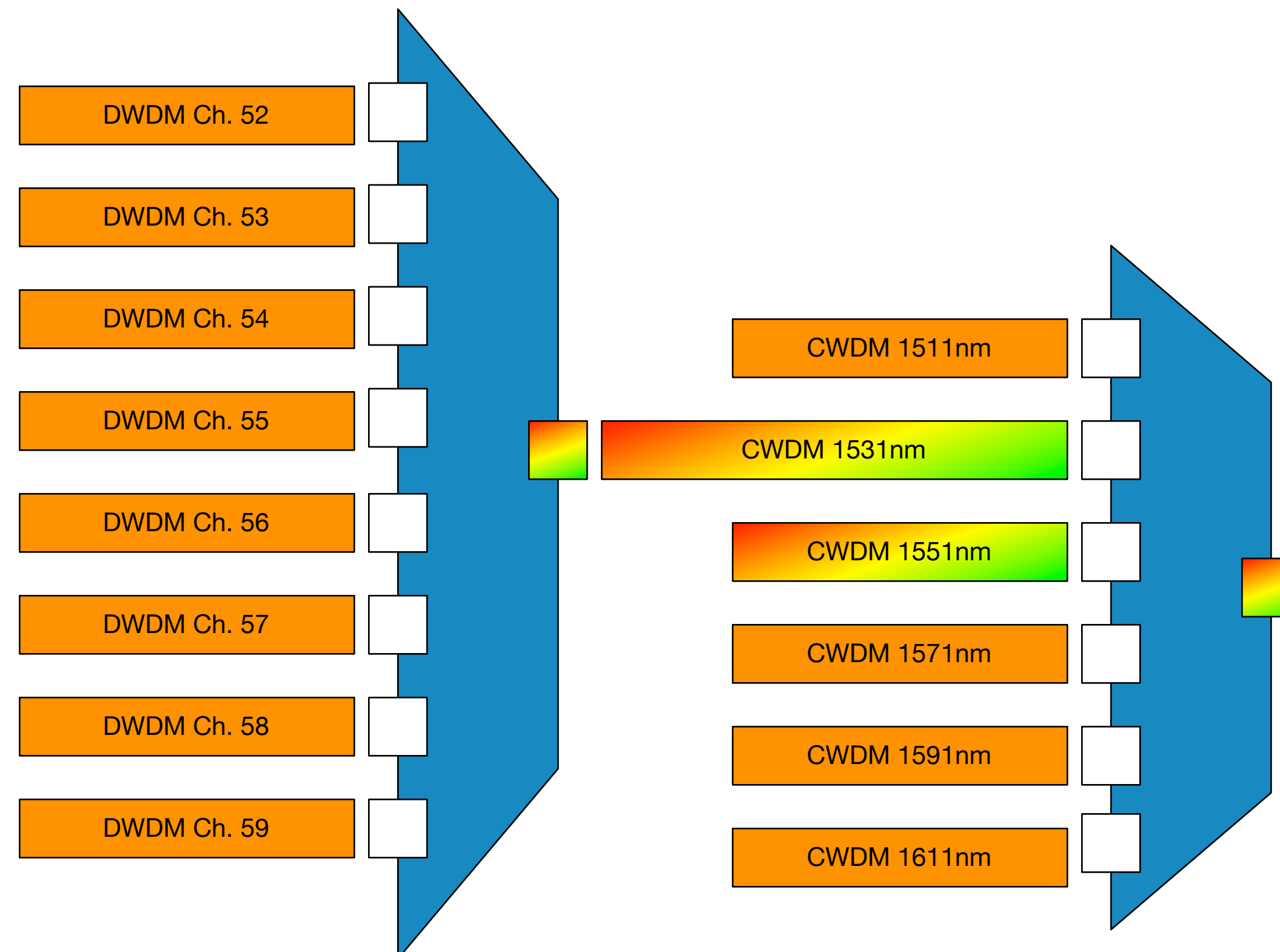
Considerations

- Obviously stacking multiplexers adds attenuation

- CWDM Filter passbands may vary, talk to your manufacturer

- power meters may misguide you when measuring, use an OSA

- think before using amplifiers

Thank you!

Questions?

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