

# Design choices for 100 Gb/s

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# Inputs from ITU-T Q2/15

- G.9806 has had two budget classes
  - S: 0 to 15 dB      B-: 10 to 23 dB
  - The “S” class is very similar to the BR-20 optics in 802.3cp
- Recent inputs indicate that a 15 dB loss range is too large, and 10 dB is the feasible loss range
  - Actual Rx input range is ~12 dB, given a 2 dB Tx output power range
- This has led to the split of the lower budget class
  - $S_L$ : 0 to 10 dB       $S_U$ : 5 to 15 dB
- This change allows us to rethink the mapping of budget classes

# Proposed mapping

- Class  $S_L$  = BR10 = 0 to 10 dB of link loss
- Class  $S_U$  = BR20 = 5 to 15 dB of link loss
- Class B- = BR40 = 10 to 23 dB loss
  
- This budgets could be justified as follows
- BR10 =  $0.5 \text{ dB/km} * 10 \text{ km} + 5 \text{ dB connectors}$
- BR20 =  $0.5 \text{ dB/km} * 20 \text{ km} + 5 \text{ dB connectors}$
- BR40 =  $0.45 \text{ dB/km} * 40 \text{ km} + 5 \text{ dB connectors}$

# Unresolved issues

- Is the 10 to 23 dB loss class achievable?
- Does CWDM make sense for BR10?
- Is 800 GHz spacing too narrow?

# Feasibility of 23 dB

- The current APD sensitivity per the baseline is -12.5 dBm OMA
- To reach 23 dB of loss means OMA<sub>min</sub> = +10.5 dBm
  - This seems quite high, and would require an SOA post-amp
- The alternative solution would be to use 50 Gb/s in two channels
- The sensitivity specified in clause 160 is -15.1 dBm
  - Given the passage of time, we might improve on that value
- The Tx OMA<sub>min</sub> is then 8 dBm
  - More reasonable, but still not great
- Also, the TDP will be significantly less

# CWDM for 10 km

- Analysis shows that CWDM channels at 1291 and 1311 nm are feasible to go 10 km in G.652 fiber
- In general, CWDM lasers are smaller, lower power, and more economical because they don't require Peltier coolers
  - This would give the BR10 budget more of a reason to exist, as it allows a lower cost module
- But, if there is a common spectrum plan for BR10 and BR20, the change between the two becomes a simple power adjustment
  - This could be something potentially done in the field (maybe even auto-negotiated?)

# 800 GHz too close together

- The LAN WDM grid of 800 GHz has received a lot of use, and demultiplexers / diplexers have been manufactured in volume
- However, there is a call to consider using a wider spacing
  - Purportedly this would be to make the filter easier to make
- In the past, fairly wide spacings were used to make low cost designs like uncollimated optics and 45 degree beamsplitters possible
- Give our constraints, all of those designs are out of reach
- So, the only advantage of using a wider spacing would be to increase yield on the optical filter, at the cost of making the dispersion problem harder
- This doesn't sound like a good tradeoff

# Bottom line

- There may be consensus on the following items:
  - 800 GHz grid wavelengths for BR20
  - Loss budgets for BR10 = 0 to 10 dB, and BR20 = 5 to 15 dB
- We need more discussion on the wavelength plan for BR10
  - CWDM is attractive from cost, size, and power perspective
- Still need work on the feasibility of BR40, and how aggressive we will be on the loss budget



# Thank you

Any questions?