Re-discussion of the 802.3 Objectives

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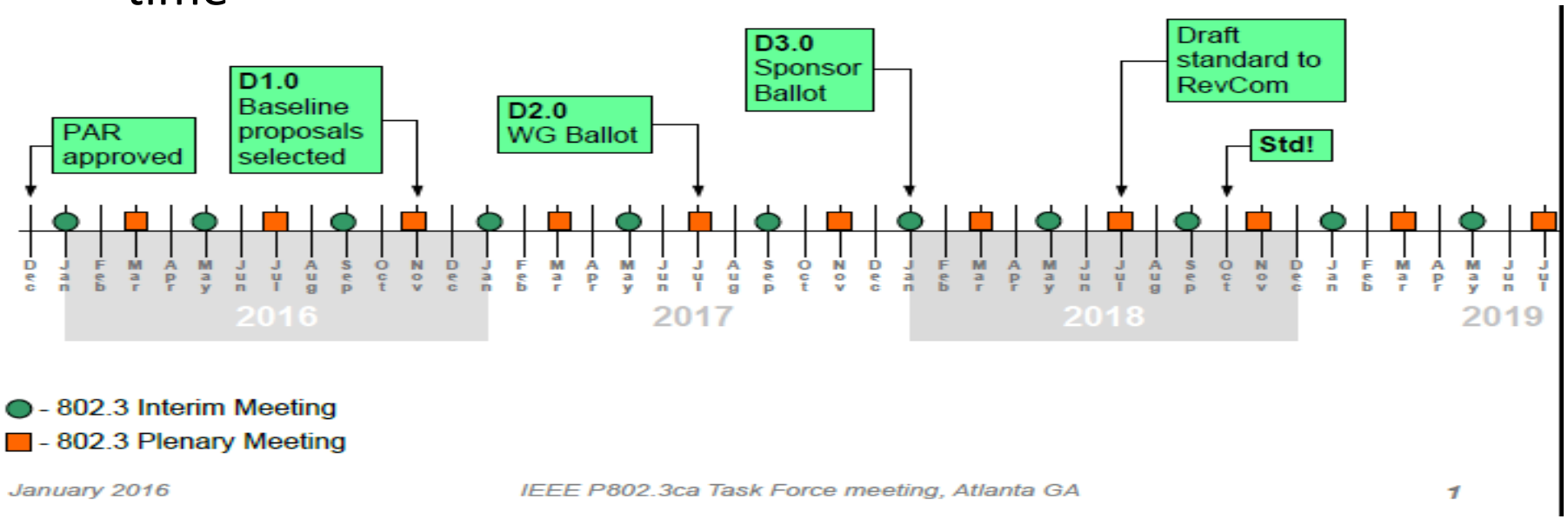
Why re-discuss the objectives?

- The 802.3ca objectives have been changed at least three times, most recently was at Jan. 2018 meeting
- The original timeline has been postponed more than one time



The 802.3ca TF is expected at D3.0 sponsor ballot stage in Jan. 2018 according the original timeline

Re-checking the map may save time…

Experience tells us that when we get lost, stopping the car, rechecking the map may actually save us time…

- **It took 3 meetings in SG to determine the 802.3ca objectives**
- **It took 14 meetings in TF, from Jan. 2016 to March 2018, to bring us here today**
- **What are the causes for all these delays?**
- **Will there be more?**

We certainly should have more knowledge of the project than 2 years ago …

What objectives have been changed?

- The most recent change of the 802.3ca objectives happened at the Jan. 2018 meeting
- The objectives have been changed several times previously
- The changes are in two areas
  - Multi-channel architecture
  - Coexistence with legacy PONs
- 100G with 4x25G was removed from the objective at Nov. 2017 meeting
- WDM coexistence with legacy PONs (GPON, 10GEPON, XG-PON and XGS-PON) was added at Jan. 2018 meeting
- Coexistence with GPON was added at a 2017 meeting

Why change these objectives?

- The removal of 100G with 4x25G objective was due to the difficulties in finding 4 pairs of wavelengths in O band and the power budget issues
  - The 802.3ca TF spent near 2 years in wavelength discussions
  - There are simply not enough spectra resources in O band that meet 20km PON reach requirements (FWM, dispersion, wide channel, etc.) with 4 pairs of channels
- The addition of coexistence with GPON may help with possible PON convergence in the future
- The addition of WDM coexistence with legacy PON was, according to a comment at last meeting, because some “operators prefer so”

Why set the objectives as they are?

- As stated previously, the addition of WDM coexistence with legacy PON, according to a comment at last meeting, was because some "operators prefer WDM coexistence"
- Then why set the multi-channel (2x25G, 4x25G) requirements? Also according to comments at the last meeting, because someone said that "we don't have to come back again" when the rate beyond 25G are needed

- **The works of the 802.3ca TF from Jan. 2016 to today shows that the multi-channel architecture and the WDM coexistence with legacy PON requirements create many technical challenges.**
- **We should have better reasons to require them**

Creates a “once for all” PON?

- Defining a PON standard that consists of 25G, 2x25G and 4x25G covering 3 generations of PONs so that “we don’t have to come back again” sounds interesting but may not practical
- Technology uncertainty: New technologies may become feasible during the 3 generations timeframe (20 years?)
  - The industry is at the edge of having longer reach 50G serial with PAM4
  - History shows that higher rate serial is more economical than channel bounding
  - Short reach coherent may become economical for PON
- Remember, from 802.3ah 2004 to today (12 years) there are only two generations of EPON in the market

WDM and TDM Coexistence

- As discussed previously, the addition of WDM coexistence requirement with legacy PON, according to a comment at last meeting, was because some “operators prefer so”
- But at what cost? If the WDM coexistence with legacy PON requirement result in divided markets with two type of 25G and two types of 50G PONs, then it is not wroth it.
- Both WDMA and TDMA coexistence have been specified in PON standards; and there are pros and cons for both.
- In case of coexistence of two types of PONs, WDMA or TDMA is a matter of choice.
- However, if more than two types PONs need to coexist, using both WDMA and TDMA provides an extra degree of freedom.

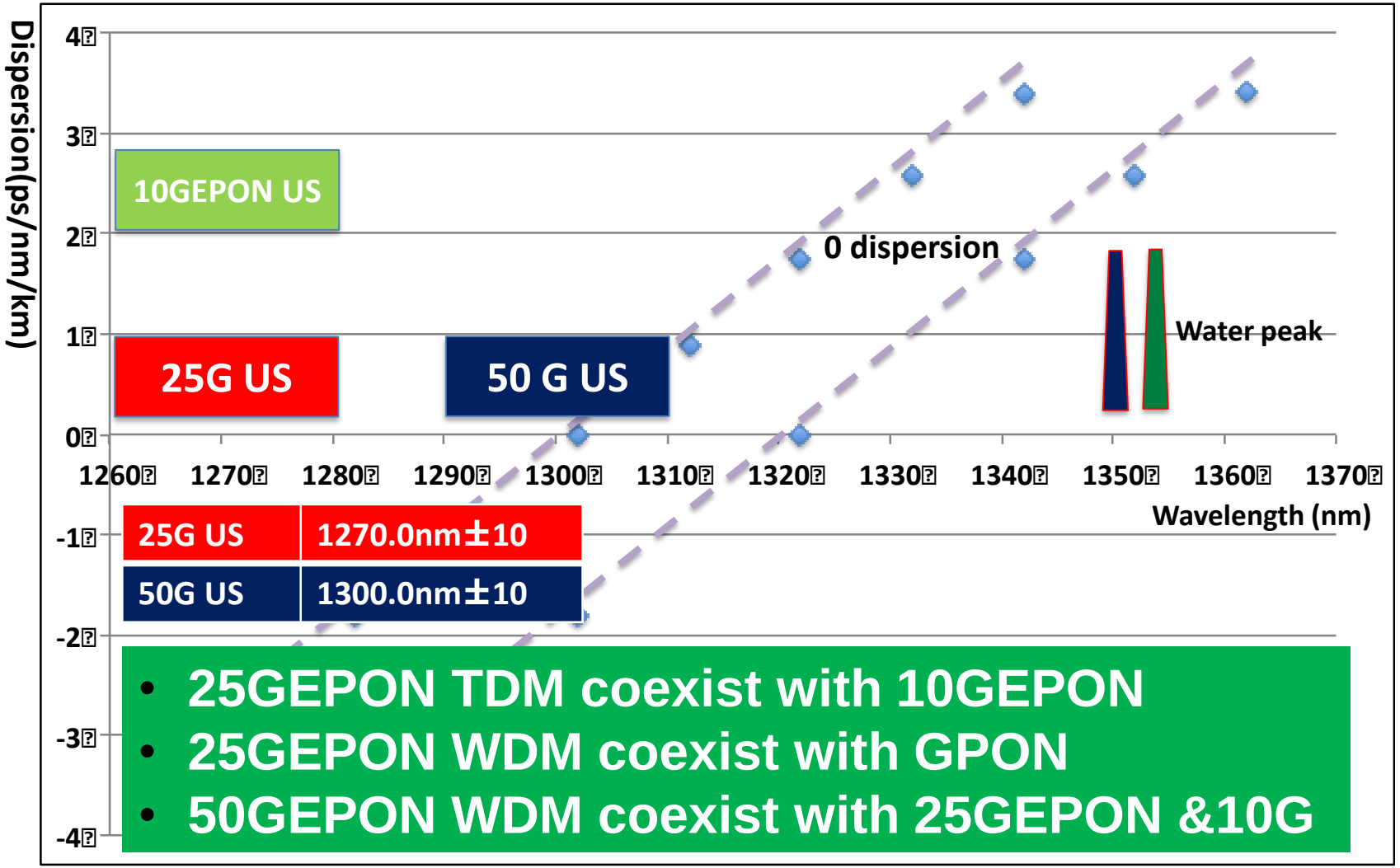
Adding an extra degree of freedom could enable simpler solution

One step back and two steps forward

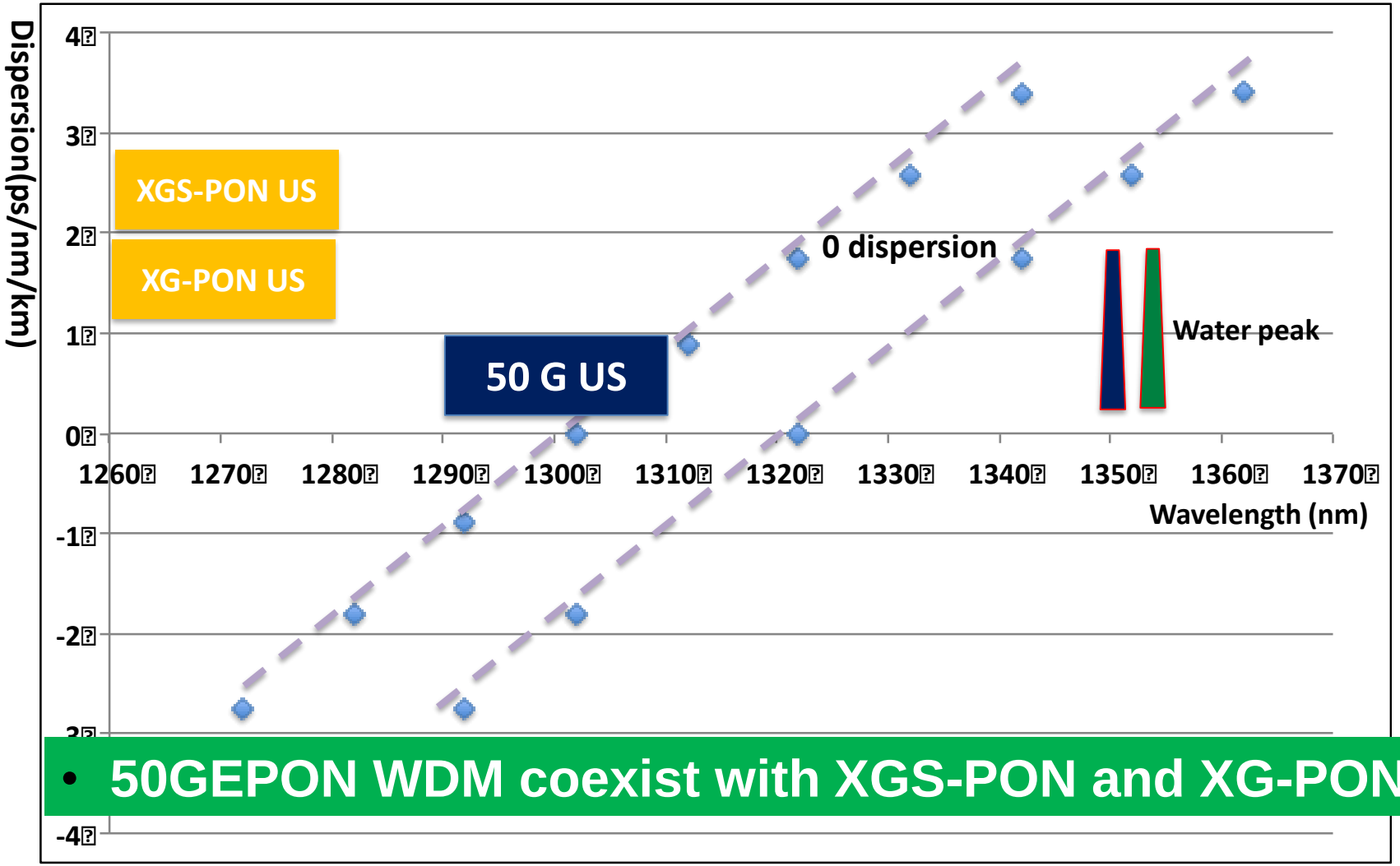
Relax the multi-channel and coexistence requirements

- Relax the multi-channel requirement
  - Postpone multi-channel until 50G serial matures with 2x50G
  - Define 50G wavelength plan today
- Allow TDM coexist with legacy PON
  - The 25GEPON TDM coexists with 10GEPON
- XGS-PON and XG-PON to 25G PON is considered too small a step for 10G migration by several FSAN operators
  - Not requiring coexistence of 25G PON with XGS-PON
- XGS-PON and XG-PON WDM coexistence with 50G PON

Coexistence of 25G, 50G with 10G EPON

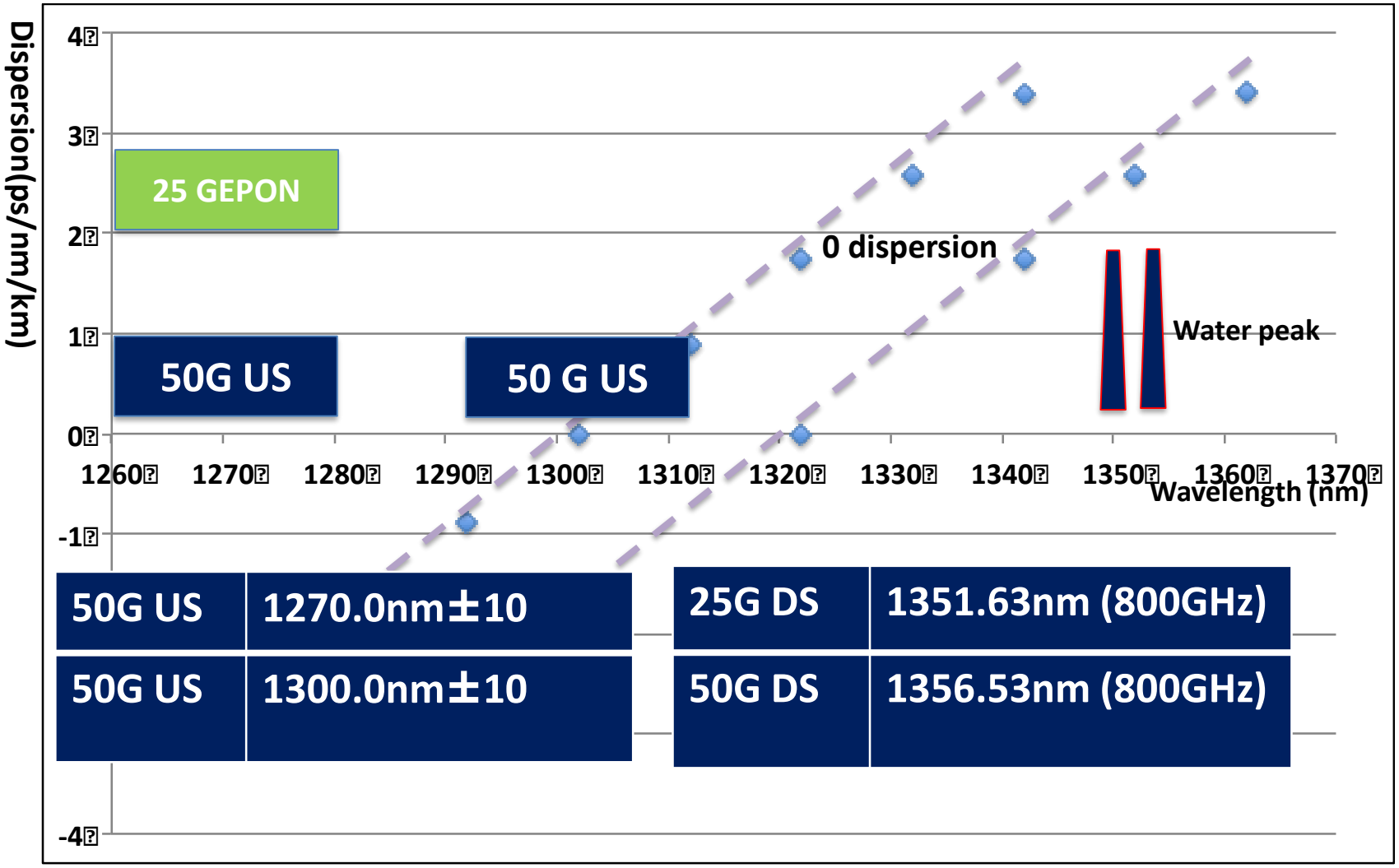


Coexistence with XGS-PON



- 50GEPON WDM coexist with XGS-PON and XG-PON

Scales to 100Gbps



Conclusions

- Postpone multi-channel until 50G serial matures with 2x50G. Define 50G wavelength plan today
- Allow TDM coexistence with legacy PON
  - The 25GEPON TDM coexists with 10GEPON
- Not requiring coexistence of 25GEPON with XGS-PON
- XGS-PON and XG-PON WDM coexist with 50G PON
- No new wavelengths are needed to scale to 100Gb/s rate

Thanks

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