Single-λ 50G-EPON wavelength plan

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Motivation

- In Berlin meeting, the motion #6 about study of 50G PON was passed.
- Contributions provided technical feasibilities and wavelength plans of single- λ 50G-EPON in Charlotte meeting.

Motion #6

The Task Force should analyze and compare the following solutions for 50G PON and choose the best one for 50G EPON: 1) Single wavelength TDM-PON with 50Gb/s line rate, 2) Two-wavelength TDM/WDM-PON with 25Gb/s line rate per lane.

The Task Force calls for contributions on these topics.

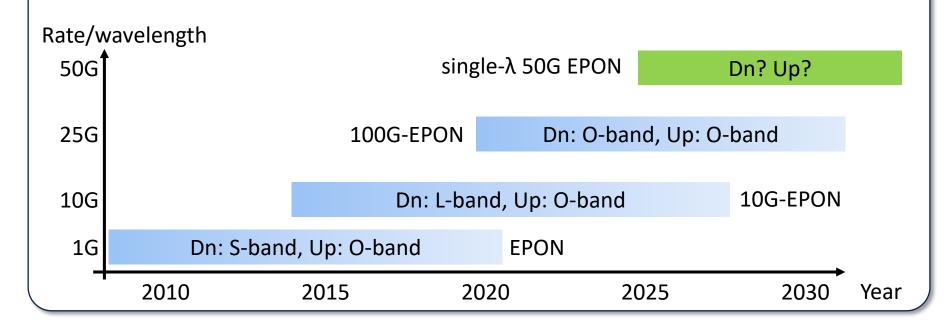
Moved: Dekun Liu Second: Liquan Yuan

For: 22 Against: 0 Abstain: 4 Procedural (> 50%) Motion Passed

- In this contribution, we discuss a wavelength plan of single- λ 50G-EPON in two issues.
 - (1) Coexistence with both 10G-EPON and 100G-EPON
 - 2 Dispersion tolerance of 50 Gb/s signal

Coexistence of single-λ 50G-EPON

- 1G-EPON will not be used after 2020 because it's bandwidth is not enough to satisfy bandwidth requirements of future services.
- It seems that standardization work of single-λ 50G-EPON would be started after 2020 considering current deployment status of 10G-EPON and 100G-EPON standardization work in 802.3ca TF.
- Single-λ 50G-EPON must be coexisted with both 10G-EPON and 100G-EPON.



Dispersion tolerance for 50 Gb/s signal

- As described a previous contribution
 (http://www.ieee802.org/3/ca/public/meeting_archive/2017/09/liu_3ca_2a_0917.pdf), to overcome dispersion penalty of 50 Gb/s signal is the most important issue to implement single-λ 50G-EPON.
- It looks natural that a modulation format of single-λ 50G-EPON will be selected among NRZ, ODB, EDB, DMT, and PAM4 as 100G-EPON TF did when TF selected the modulation format (NRZ) of 25G signal in O-band.
- O-band must be a good candidate for the wavelength plan of single- λ 50G-EPON due to less dispersion penalty of 50 Gb/s signal in all modulation format.
- However, current wavelength plan proposals for 100G-EPON occupied almost of O-band in order to allow low-cost and simple configured optical components such as TOSA, BOSA and passive filter.
- Therefore, there is not enough wavelength band in O-band for new single- λ 50G-EPON in O-band.

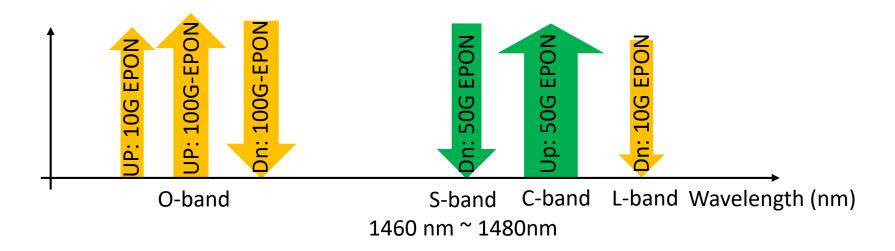


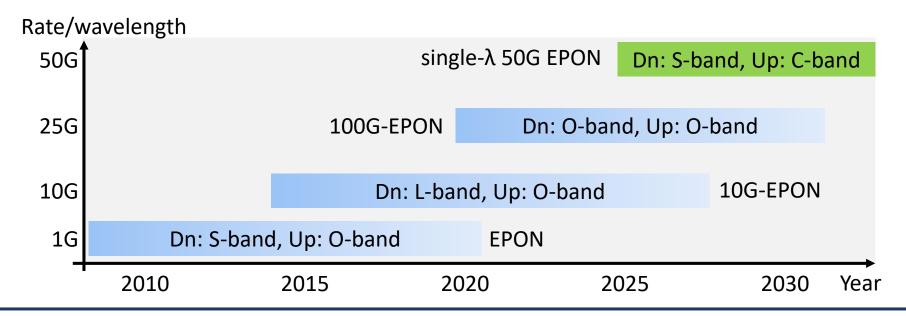
Wavelength plan for single-λ 50G-EPON

- In 2025, S-band and C-band (bandwidth : ~80 nm) will be used for single-λ
 50G-EPON because 1G-EPON will be no more used.
- 80 nm of bandwidth is wide enough to set two wavelengths for downstream and upstream signals and it makes easy to design BOSA.
- Major consideration when 50 Gb/s signals are transmitted in S-band or C-band is how they overcome dispersion penalty.
- Digital signal processing technology is a good candidate to overcome dispersion penalty. We expect that digital signal processing technology will be matured and be easy to adapt for PON optical modules after 2025.
 - ➤ Electrical dispersion compensation, electrical duo binary and coherent PON...



Wavelength plan for single-λ 50G EPON





Conclusions

- We discuss the wavelength plan for single-λ 50G-EPON in S-band and C-band considering future PON standardization and technical development status.
- We propose that O-band (1290 nm ~ 1360 nm) should be assigned for only 100G-EPON to make a simple wavelength plan and cost effective system.
- We expect that digital signal processing based PON which operates in S-band and C-band will be a candidate for a single- λ 50G-EPON after 2020.