NG-EPON Wavelength Considerations

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NG-EPON Objectives [SG approve]

Objectives

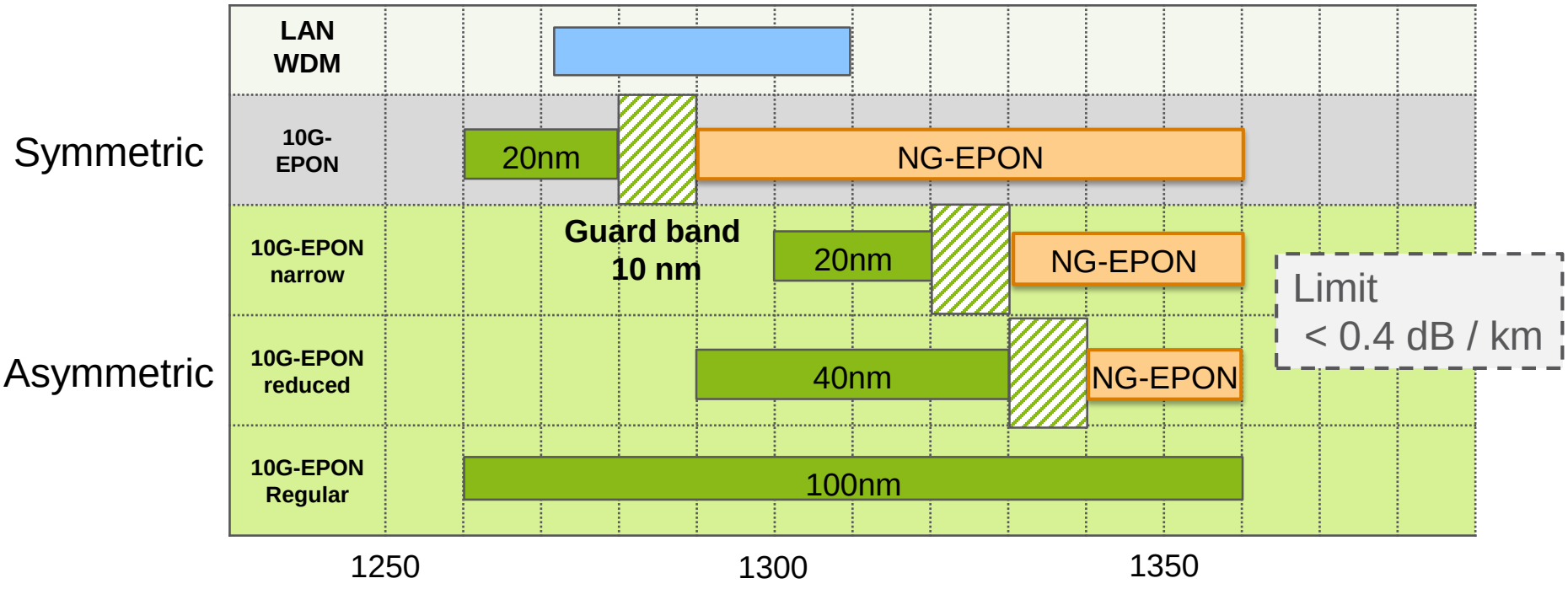
1. Support subscriber access networks using point to multipoint topologies on optical fiber
2. Provide specifications for physical layers operating over a single SMF strand and supporting the MAC data rate of:
   - 25 Gb/s in downstream and 25 Gb/s in upstream
   - 100 Gb/s in downstream and 100 Gb/s in upstream. This physical layer specification shall accommodate flexible configuration to support operation at reduced MAC data rates.
3. PHY(s) to have a BER better than or equal to 10^{-12} at the MAC/PLS service interface (or the frame loss ratio equivalent)
4. Support coexistence with 10G-EPON
   - Optical power budgets to accommodate channel insertion losses equivalent to those supported by the 10G-EPON standard
   - Wavelength allocation allowing concurrent operation with 10G-EPON PHYs

Considerations of O-band Transmission

Item	O-band	Note
Tx / Rx	10G / 25G EML-TOSA based Tx 10G / 25G APD based Rx	Potential re-use of 25 Gb/s 100GBASE-ER4 optics
Power Budget	10G / 25G APD Rx [1]	PRX30 is achievable for 10G / 25G transmission
Chromatic dispersion tolerance	Negligible dispersion induced power penalty	No need to use advanced modulation format
Transceiver package	MSA package	SFP+, XFP, CFP
Modulation format	NRZ	
Eye mask Specification	Re-using of existing standards	IEEE 802.3 av IEEE 802.3 ba

[1] Ge/Si APD for PAM4 application, SIFOTONICS. IEEE P802.3bs 400 GbE Task Force
http://www.ieee802.org/3/bs/public/adhoc/smf/15_06_09/huang_01_0615_smf.pdf

WDM Coexistence with 10G-EPON



- In the case of coexistence with Symmetric 10G-EPON, NG-EPON can use a O-band over 70 nm.
- In the case of coexistence with asymmetric 10G-EPON, an available band is reduced because of 1G upstream.

Asymmetric 10G-EPON ONU OTRx

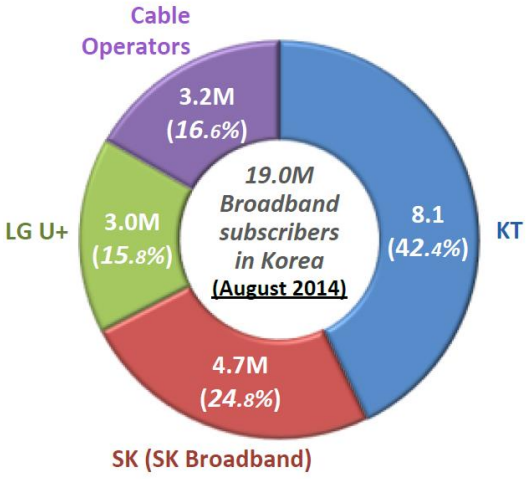
› As survey results, most of the vendor provide 10G-EPON ONU transceivers based on DFB-LDs.

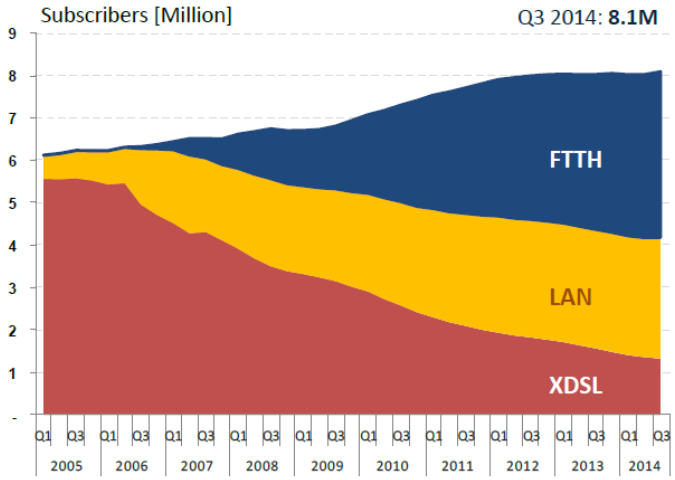
	Form factor	Data rate Tx	Data Rate Rx	Tx	Rx	Wavelength (Tx/Rx)	Distance
Vendor A	SFP+	1.25 Gb/s	10.3 Gb/s	DFB-LD	APD	1310 nm / 1577 nm	20 km
Vendor B	SFP+	1.25 Gb/s	10.3 Gb/s	DFB-LD	APD	1310 nm / 1577 nm	30 km
Vendor C	SFP+	1.25 Gb/s	10.3 Gb/s	DFB-LD	APD	1310 nm / 1577 nm	30 km
Vendor D	SFP+	1.25 Gb/s	10.3 Gb/s	DFB-LD	APD	1310 nm / 1577 nm	-

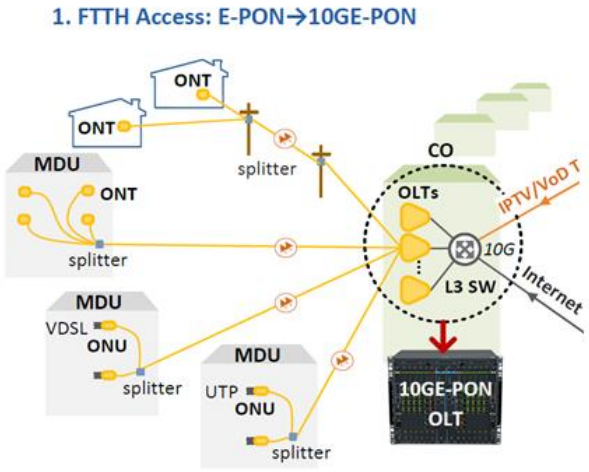
[1] http://www.optcore.net/optcore/html_products/Asymmetric-10G-EPON-ONU-Transceiver-Module-745.html
[2] http://www.sourcephotonics.com/sp_web/products/broadband-access/
[3] http://www.ligentphotonics.com/files/product-list-04.shtml
[4] http://www.xgiga.cn/Files/Product/ex-u1231-30d.pdf

10G-EPON Status of Korea Operators

- They require a power budget of PR30 (29dB) of E-PON.
- Optical transceivers based on DFB-LD (Narrow band) are used for E-PON ONU.
- They will start trial services with 10G-EPON soon.







<Netmanias, 2015>

Conclusions

- A simple and low-cost 10G / 25G transmission method with high dispersion tolerance for NG-EPON.
- O-band is one of candidates for WDM coexistence considering that it is…
  - Mature technology, available today for 100GE, and Multi vendor
  - Easy to archive
  - Available as laser diode
  - High chromatic dispersion tolerance
- In addition, wavelength plan for 100G NG-EPON which would employ multiple wavelengths should be considered.

Thank you!