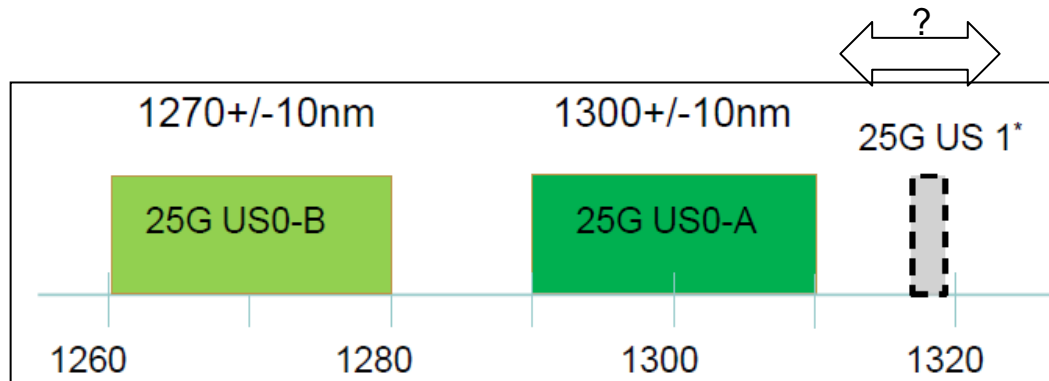


Choice of US1 wavelength

John Johnson, Broadcom Ltd.

Choice of US1 wavelength

- ❑ The two-wavelength plan of record was adopted by the task force in July 2017 (Motion#5).
 - Enables WDM coexistence of 25G-EPON with legacy 10G-EPON (original objective) and GPON (objective adopted July 2017).
 - Enables 2x25G upstream using both US0 wavelengths at the expense of WDM coexistence with the legacy PON.
- ❑ The need for WDM coexistence of 2x25G upstream with 10G-EPON was adopted by the task force in Nov. 2017 (Motion#12).
- ❑ In Jan. 2018, the wavelength of US0-A was shifted lower 10nm from $130\pm 10\text{nm}$ to $1300\pm 10\text{nm}$.
 - Excludes placement of US1 between US0-B and US0-A.
- ❑ A new wavelength proposal for US1 is needed in the wavelength range $> 1310\text{nm}$
 - Should be as close to US0-A as practical for filtering in order to increase US/DS diplexer gap and reduce chromatic dispersion.

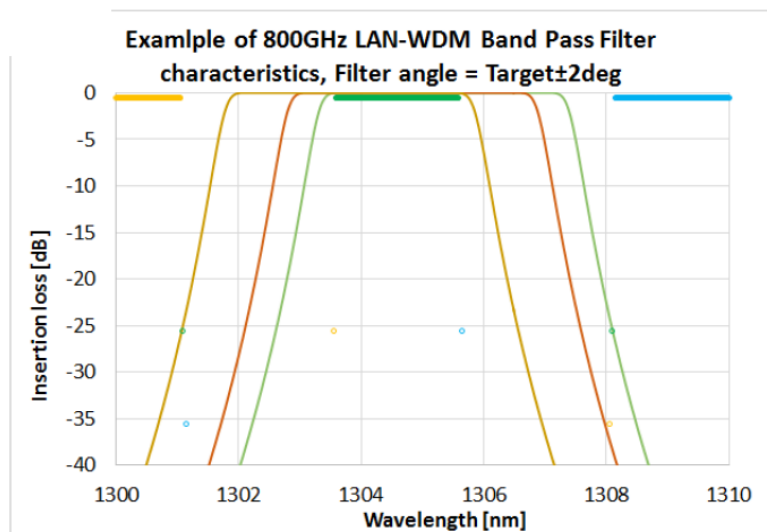


Liu_3ca_2_0118

RX filtering: Prior contributions

- ❑ The channel spacing needed for RX demux and wavelength blocking filters has been discussed extensively in 802.3ca
- ❑ For these reasons, channel spacing $>5\text{nm}$ is preferred, since 2x25G OLT RX will likely have collimated beam.

Funada_3ca_1a_0716

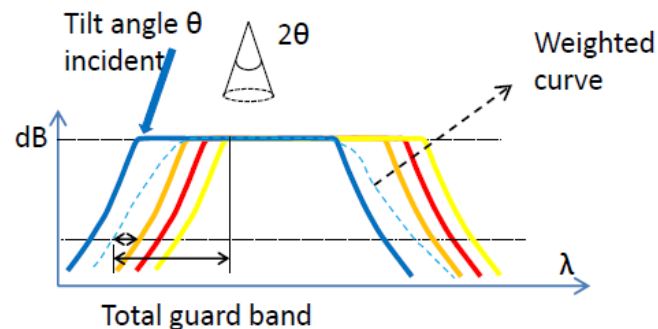


LAN-WDM filter -40dB rejection at $\sim 4\text{nm}$ from edge of passband.

Funada_3ca_1_0316

Light coupling scheme of Bi-D	US/DS Gap	Rx guar band
Non-collimated light	$>35\text{nm}$	$>10\text{nm}$
Collimated light	$>20\text{nm}$	$>5\text{nm}$

Liu_3ca_3_0716



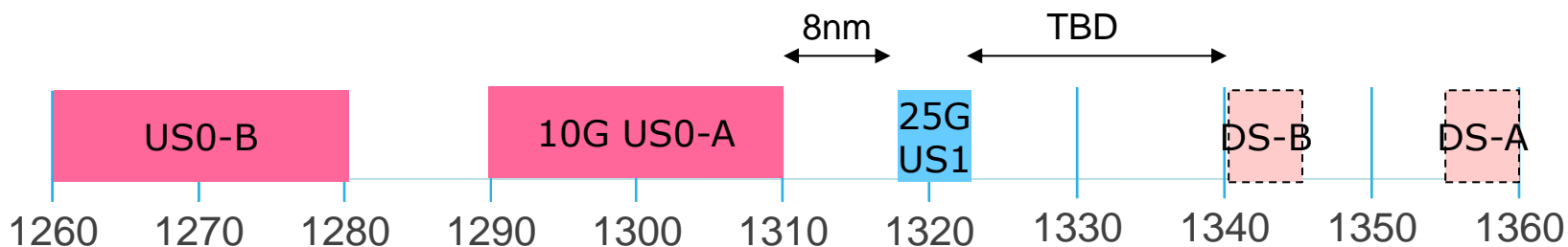
Inter-channel gap $>10\text{nm}$ for converging beam and $>5\text{nm}$ for collimated beam.

DFB wavelength tolerance

- ❑ For lowest DFB laser manufacturing cost, wider passband is preferred.
 - DFB wavelength manufacturing variation $\sigma \sim 0.41\text{nm}$ (Funada_3ca_1_016)
 - Typical (uncooled) DFB wavelength distribution is $\pm 3\text{nm}$, $\pm 2\text{nm}$ is more challenging. (Liu_3ca_3_0716, Zhang_3ca_1_1116)
 - Filter center wavelength tolerance $\sim \pm 1\text{nm}$ (Liu_3ca_3_0716) reduces the available passband width for laser wavelength.
 - TEC operating temperature range of $\pm 5^\circ\text{C}$ adds additional $\sim \pm 0.5\text{nm}$ allowable laser wavelength.
- ❑ For these reasons, passband width $\geq 4\text{nm}$ is preferred.

US1 wavelength proposal

- ❑ Based on these prior contributions, US1 should be at least 5nm from US0-A and the passband should be at least 4nm.
- ❑ Propose US1 be centered at 1320nm with 4nm passband.
 - US0-A to US1 gap = 8nm
 - 5nm passband width supports high DFB laser yield for cooled 2x25G ONU TX.
 - US/DS gap is TBD, but is as small as practical.



- ❑ Motion # Adopt $1320 \pm 2\text{nm}$ for channel US1 for use in ONUs with 2x25G upstream capability.